Classroom Management
Strategies for Teaching

Orion Gutierrez

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Edited by Orion Gutierrez

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Preface

Classroom management is the process by which teachers and educational administrators manage and practice teaching techniques. This book on classroom management discusses the fundamental concepts like lesson planning, learning methodologies and the various study skills that are attained by students. Contents also highlight the learning objectives that are to be set in an effective classroom environment. This book aims to equip students and experts with the advanced topics and upcoming concepts in this area. It aims to serve as a resource guide for students and experts alike and contribute to the growth of the discipline. A number of latest researches have been included to keep the readers up-to-date with the global concepts in this area of study.

The researches compiled throughout the book are authentic and of high quality, combining several disciplines and from very diverse regions from around the world. Drawing on the contributions of many researchers from diverse countries, the book's objective is to provide the readers with the latest achievements in the area of research. This book will surely be a source of knowledge to all interested and researching the field.

In the end, I would like to express my deep sense of gratitude to all the authors for meeting the set deadlines in completing and submitting their research chapters. I would also like to thank the publisher for the support offered to us throughout the course of the book. Finally, I extend my sincere thanks to my family for being a constant source of inspiration and encouragement.

Editor

Assertive classroom management strategies and students' performance: The case of EFL classroom

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Abstract: Ample research findings support the effective role that classroom management strategies play in enhancing students' learning. Drawing upon Iranian high school teachers' classroom management strategies, this article is intended to examine the extent to which these teachers follow assertive classroom management strategies and if these strategies affect students' performance. Conducting a survey including 123 female students, it was found out that Iranian teachers apply classroom management strategies of organization, teaching management, teacher–student relationship, and teacher punishment–rewards (consequences) with varying degrees. In the results section, Pearson correlation is applied between students' achievement and each part of teacher management strategies. Finally, a positive relationship between teachers' assertiveness and students' performance was approved. The findings led to implications for in-service training programs for EFL teachers.

Subjects: Arts & Humanities; Education; Language & Literature

Keywords: classroom management strategies; assertiveness; students' performance; EFL classroom; Iranian teachers

1. Introduction

Teachers of all types often try to keep their classrooms free from disruption. To do so, they need to manage the class and correct the learners' behavior in such a passionate way that encourages, motivates, and retains positive behavior. Though, the terms classroom "discipline" and "management"

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PUBLIC INTEREST STATEMENT

In this paper, we introduce the classroom management and its four dimensions called organizing, teaching management, teacher–student relationship, and teacher sanction–reward strategies, review the literature and describe the process in which the research is done. Our study has tried to find out the students' (123 female students, within the age 15–17 attending senior high schools in Bukan, west of Iran) views about their teachers' classroom management characteristics in four different schools. The intention was to find out whether there is any relationship between the teachers' classroom management features and their students' performance. The results indicated that there is a weak positive correlation between students' English scores and the extent to which their teachers' apply classroom management strategies in EFL classrooms.

may be considered synonyms, discipline is "associated with the notion of bringing children into line" (Skiba & Peterson, 2003, p. 66), which is a needed element for learning and teaching (Emmer, Evertson, & Worsham, 2003). Classroom management, on the other hand, embodies establishing rules to organize the class, to plan materials and activities, and to explain instructions and consequences of acting up. Wong and Rosemary (2001) defined classroom management as "all the things that a teacher does to organize students, space, time and materials so that instruction in content and student learning can take place" (p. 84). Furthermore, as Wong and Rosemary (2001) note, all the practices and procedures that a teacher applies to have a good classroom environment in which instruction and learning can take place is related to classroom management. To achieve this, teachers need to apply a set of strategies to organize space, time, and materials.

Many beginning teachers view teaching as directly transmitting information to passive learner (Torff, 2003). Most often, they do not comprehend the significance of classroom management strategies and their effect on students' social and academic behavior. Accordingly, teachers need to be more careful about the strategies and techniques of managing their classes. Geiger (2000) believes that only half of the class time is allocated to teaching and learning activities and the other is spent on classroom management. When teachers appropriately manage the environment, there is little chaos, disorder, and negative behavior in the class. Needless to say, in unorganized environments, effective teaching and learning processes would not happen.

Whereas many attempts have been made on training teachers in pre-service and in-service education programs in Iran, little information is available on teachers' behavior in managing English classrooms. Though the importance of classroom management strategies is repeatedly voiced, identification of the management strategies EFL teachers employ and the extent to which they lead to better students' performance are avenues open to research. Accordingly, the present study is intended to survey a sample of Iranian EFL students in high school level to investigate the degree to which their teachers apply management strategies and their effects on the students' English achievement.

2. Review of the related literature

Classroom management entails the activities to organize and direct classes to achieve specific goals. Advocated and developed by Lee Canter in 1976, assertive discipline is an approach to classroom management which is to assist teachers to have an organized, teacher-in-charge classroom environment which prevents discipline problems. Stoughton (2007) asserts that to avoid discipline problems, teachers need to acquire and employ classroom management strategies. Although Edwards (1993) considered classroom management as a troubling aspect of teaching, McCormack (2001) and Bromfield (2006) consider that learning and using classroom management strategies are of great importance for teachers.

Martin and Sass (2010) considered classroom management an umbrella term for teachers' actions to manage class, students' behavior and their learning. These actions encompasses works like establishing order, dealing with misbehavior, offering appropriate instruction, and taking care of students' emotional and cognitive needs (Emmer & Stough, 2001). Kounin (1970) maintains that "producing a high rate of work involvement and a low rate of deviancy in academic setting" effectively define classroom management issues (p. 63). Likewise, Walker and Shea (1998) consider that dealing with different students' behavior in different situations needs various classroom management strategies. In this relation, Tulley and Chiu (1995) examined the most effective classroom management strategies in their study and concluded that positive reinforcement, explanation, and change of strategy were among the most effective ones.

Shawer (2006) considers the teachers who use a set of classroom management strategies like organizing, teaching management, teacher–student relationship, and teacher punishment–rewards (consequences) as "assertive teachers." These teachers clearly and firmly express their needs. They have positive expectations of students. They say what they mean and mean what they say. They are

consistent and fair. On the other hand, teachers who are less assertive fail to make their needs or wants known. They appear indecisive which confuses the students. They threaten but their students know that there will be no follow through (Canter & Canter, 1976).

Almost two decades ago, Brophy (1983) maintained that classroom management puts more emphasis on providing supportive environment for students to learn materials rather than focusing on controlling behaviors. Further, Charles and Senter (2008) stated that good teaching management takes place through an active and relevant curriculum. Stough, Palmer, and Leyva as cited in Ormord (2003), believe that effective classroom management contributes significantly to student learning and development. Adding a positive element to this definition, Burden (2003) states that student–teacher relationship is also important in the classroom management discussion. He thinks that classroom management needs to encourage positive social interaction and active engagement in learning. Charles and Senter (2008) approved Burden's realization and maintained that there is a direct relationship between good teaching practice and classroom management issue.

Lewis and Lovegrove (1987) believe that the students' ideas are one of the very important factors in determining their teachers' approach to discipline. In a recent research, Aliakbari and Sadeghi (2014) investigated Iranian teachers' perceptions of teacher leadership practices in schools. Their findings maintained teachers' age, gender, and years of teaching experience did not appear as significant factors in teachers' perception of teacher leadership practices. In another study, Aliakbari and Darabi (2013) explored the relationship between efficacy of classroom management, transformational leadership style, and teachers' personality. They reported a positive relationship between transformational leadership style, personality factors, and efficacy of the classroom management. Results indicated a weak, but significant, relationship between efficacy of class management and teachers' Extraversion, Openness, and Neuroticism personality factors. Likewise, a significant relationship between teachers' education level and classroom management efficacy was reported.

According to Adeyemo (2012) "Good classroom management can help to ensure protection of students from physical attacks by other students, dangerous environmental conditions such as playing around electrical equipment, and from psychological abuse from peers or adults" (p. 374). The author further concluded that effective classroom management skills or techniques have strong and positive influence on student achievement in physics.

Also, Nunan (1995) thinks that determining the way the students' think about their teachers' classroom management is of great importance, since there will be a negative impact on learning, if there's mismatch between what teachers and students expect to happen in the classroom. Yet, as mentioned previously, little attention has been paid to this area in language education.

Inspired by these views and acknowledging, the dearth of research in this area in Iran, the present study was motivated to examine the relationship between a set of classroom management strategies that English teachers apply in their classes and the students' achievement in EFL classes.

3. Statement of the problem

In last few decades, many studies have been conducted to show that effective classroom management is a necessary condition for having a conductive learning environment (Hilary, 1991). In a conductive learning environment, students know what to do, what is expected of them, and how to succeed (Sanford, Emmer, & Clements, 1983). Besides, literature shows that students have more academic achievements in a well-managed classroom environment (Griffith, 2002; Wong & Watkins, 1998). Assertive and non-assertive teachers are the main subjects of the literature on classroom management. Teachers who use a set of classroom management strategies more than the others are more assertive. According to Shawer (2006) these strategies are: organization, teaching management, teacher–student relationship, and teacher punishment–rewards (consequences) strategies. Canter and Canter (1976) asserts that more assertive teachers, who use a firm, positive, and respectful tone, apply consequences

and deliver praise-as expected, are modeled by students. While less-assertive ones, who use an indecisive tone, fulfill consequences, and reward inconsistently, cannot be modeled, since students' expectations for modeling are unclear.

Given the existence of no thorough research covering the classroom management issues in Iran and due to the repeated importance given to the assertive classroom management strategy, this study intended to investigate such strategies among the Iranian EFL teachers in high school level and their students' achievement to find answers to the following research questions:

(1) To what extent do Iranian EFL learners think their high school teachers apply classroom management strategies?

(2) Is there any relationship between applying classroom management strategies and the EFL students' achievement?

4. Methods

4.1. Participants

A total of 123 female students, within the age bracket 15–17, attending senior high schools in Boukan, west of Iran, participated in this study. A convenient sampling was adopted in this study, in which the participants were those who happened to be available for the study (Mackey & Gass, 2005). The subjects randomly selected in four different schools were asked to complete a questionnaire administered to collect information on the teaching process and their teachers' characteristics in EFL classes. Although the students were not trained to analyze their teachers' behavior, they were observers of the class events and were considered advanced enough to report their teachers' behaviors appropriately.

4.2. Instrument

A questionnaire, developed by Shawer (2010), was adopted as the data collection tool (Appendix A). To ensure participants' understanding of the items, the translated version of the questionnaire was administered (Appendix B). To ensure that the Persian version specifies the same meaning as that of the original questionnaire, back translation technique was adopted. The applied questionnaire included scales referring to classroom management variables and their dimensions, that is, actions related to: organizing, teaching management, teacher–student relationship and teacher sanction/reward strategies. The questionnaire was to seek the subjects' attitudes about their teachers' behaviors and investigate the extent to which the given management strategies were applied by their EFL teachers. The questionnaire was composed of four subsections that address components of classroom management: organization (8 items), teaching management (11 items), teacher–student relationship (10 items), and teacher punish–reward strategies (8 items). Respondents indicated on a five-point, Likert scale (from much to never) to show how well each item describes their beliefs concerning their teachers' classroom management strategies. The process was not timed; however, participants normally completed it in approximately 10 minutes. High scores indicated a well-managed classroom and thus more assertiveness in teachers' behavior, while low scores indicated a less well-managed classroom and thus less assertiveness in teachers' manners. The validity and reliability of the translated questionnaire has been calculated through Cronbach α which is, respectively, (0.91) and (0.94), according to Shawer (2010).

4.3. Procedure and data collection

Data collection embraced distributing the questionnaire among 123 high school female students. The data were collected as a part of normal school time in March 2012. In order to analyze the obtained data, descriptive statistics in the form of mean and standard deviation were computed using the Statistical Package for the Social Sciences (SPSS). The other aspect of data collection procedure included data on students' English scores. To do so, after the fall semester, four lists containing the subjects' English scores in the final exam were examined in order to analyze the effect of the

mentioned classroom management strategies on the students' performance in EFL classes. Since the students were asked in four different classes about their English teachers, they are hereafter referred to as Teacher A, B, C, and D.

5. Results

The results were examined to evaluate teachers' behavior in the classroom. The collected data were analyzed to determine the extent to which management strategies were employed and if there was any relationship between employment of the classroom management strategies by teachers and students' achievement. Table 1 shows variations in the mean scores and standard deviation of employed management strategies.

Table 2 demonstrates the mean and standard deviation for the students' scores in the final exam and teachers' employment of the management strategies.

To respond the second research question and in respond for any relationship between teachers' employment of the management strategies and students' English scores, Pearson correlation coefficient was run, the result of which is presented in Tables 3 and 4.

To see whether students achievement can be predicted by teacher management strategies or not, the regression is done, which is presented in Table 5.

Table 1. Descriptive statistics for the employed management strategies

	Organization strategies	Teaching strategies	Teacher–student relationship strategies	Punish–reward strategies	Total strategies
N	123	123	123	123	123
Mean	25.99	35.84	34.24	19.96	116.02
Standard deviation	4.74	6.70	6.65	4.47	16.25

Table 2. Descriptive statistics for the teachers' employment of management strategies and students' scores

Teachers	Number of students in class	Mean/standard deviation of students' scores in the final exam		Mean/standard deviation of applied management strategies	
		Mean	Standard deviation	Mean	Standard deviation
Teacher A	30	16.07	2.51	116.13	19.07
Teacher B	32	17.13	2.46	125.28	13.72
Teacher C	31	15.78	2.78	113.38	15.27
Teacher D	30	14.73	2.75	108.20	12.20
Total	123	15.94	2.73	116.02	16.25

Table 3. Pearson correlation coefficients between teachers' management strategies and students' achievement

		Students' achievement	Teachers mdnagement strategies
Students' achievement	Pearson correlation	1	.185*
	Sig. (1-tailed)		.021
	N	123	122
Teachers' management strategies	Pearson correlation	.185*	1
	Sig. (1-tailed)	.021	
	N	122	122

*Correlation is significant at the 0.05 level (1-tailed).

Table 4. The Pearson correlation between students' achievement and each part of teacher management strategies

		Mean	Organization	Teaching	Relationship	Punishment–reward
Mean	Pearson correlation	1	.084	.184*	.063	.067
	Sig. (2-tailed)		.355	.041	.492	.462
	N	123	123	123	123	123
Organization	Pearson correlation	.084	1	.557**	.128	.379**
	Sig. (2-tailed)	.355		.000	.165	.000
	N	123	123	123	123	123
Teaching	Pearson correlation	.184*	.557**	1	.479**	.290*
	Sig. (2-tailed)	.041	.000		.000	.001
	N	123	123	123	123	123
Relationship	Pearson correlation	.063	.126	.479**	1	.218*
	Sig. (2-tailed)	.492	.165	.000		.015
	N	123	123	123	123	123
Punishment–reward	Pearson correlation	.067	.379**	.290**	.218*	1
	Sig. (2-tailed)	.462	.000	.001	.015	
	N	123	123	123	123	123

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table 5. The regression

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Standard error	β		
1	(Constant)	13.644	1.829		7.460	.000
	Organization	−.026	.067	−.045	−.390	.698
	Teaching	.091	.051	.222	1.774	.079
	Relationship	−.018	.044	−.045	−.422	.674
	Punishment–reward	.018	.061	.029	.296	.768

6. Discussion

One of the major objectives of this study was to determine the extent to which Iranian high school teachers apply classroom management strategies. The reported findings indicate that these strategies (organizing, teaching management, teacher–student relationship, and teacher sanction–reward strategies) are partially applied by Iranian high school teachers in different degrees. With the mean score of 35.84 and 34.24, teaching management and teacher–student relationship strategies were, respectively, used more than the others, while organization and punishment–reward strategies have got the least mean scores (25.99 and 19.96). Data also indicate that the participants admitted that their teachers' main priority is teaching, and maintaining a good classroom interaction. Findings also made it clear that they do not put much emphasis on punishment–reward strategies. One more point worthy of attention is the fact that there is not a great difference among the mean score of teachers' employment of management strategies, since the mean of employed management strategies ranges from 108.20 to 125.28. This implies that there is a kind of homogeneity among the strategies Iranian EFL teachers utilize for managing their classes which can be a consequence of the centralized educational system at work in the country. We consider such a dominant trend an obstacle to teachers' creativity and initiations. Since every class can be a unique context for teachers' expertise such as the

dominance of the employment of certain strategies can be considered as an issue which demands further research. Perhaps an in-service course on the efficacy of creativity in classroom can help teachers to adopt various strategies according to their classroom conditions.

The second aim of this study was to explore the relationship between applying classroom management strategies and the EFL students' achievement. As Table 3 and Table 4 specify, the results of the correlation revealed that there is a weak positive correlation ($r = .185^*$, $p < 0.05$) between students' English scores and the extent to which their teachers' apply classroom management strategies in EFL classrooms at the level of 0.05. These findings are not in line with Adeyemo's (2012) results who found strong positive relationship between classroom management skills and students' achievements in physics. Such finding reveals that in addition to adopting the management strategies, teachers need to consider other influential factors such as, learners' and learning strategies, and teaching methods to achieve successful educators.

Doing regression, it was found out that we cannot predict the students' performance by the mentioned strategies. The results of which are presented in Table 5.

7. Conclusion
Based on the results of the study, the given sample of the Iranian high school teachers honored teaching and teacher–student relationship strategies more than organization and punishment–reward strategies. Therefore, it is concluded that there is a weak positive relationship between applying assertive management strategies and the students' achievement at the level of 0.05 ($r = .185^*$, $p < 0.05$). While the results of the current study shed more light on the importance of teachers' managing skills and the relationship between teachers' effectiveness and students' achievement, findings call for teachers' stress and emphasis on other effective factors in classroom as well and develop creative approach to adjust such strategies with classroom conditions. The findings have implications for Iranian educational administrators, especially given the in-service training programs for EFL teachers to efficiently practice classroom management strategies.

In spite of the attempts in conducting the current research, some limitations need to be acknowledged. Firstly, the study was limited in scope and conducted with a limited number of students who studied in high school. Thus, the findings of this study need to be verified with different groups of the students and different scopes. Secondly, this study investigated the students' opinions concerns their teachers; therefore, further research can be conducted using techniques such as observation, interview, and other ways of data collection to verify the findings.

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Appendix A

The questionnaire used in the study taken from Shawer (2010)

Appendix (A): Student-teacher survey questionnaire

Kindly circle <u>only</u> *one* group:　　　　(Group: **A**)　　　　(Group: **B**)

This questionnaire aims to examine your observations of your teacher's use of a number of classroom management strategies in your classroom. Your help in completing this questionnaire is very much appreciated. Thank you in advance for the effort and knowledge you kindly agree to contribute to this research. I assure you of complete confidentiality and anonymity.

Please read each statement and insert the response (**1, 2, 3, 4** or **5**) that tells HOW TRUE OF YOU THE STATEMENT IS in the box next to the statement. You must insert only <u>one</u> answer in each box.

1 = **Never** means that the statement is <u>not at all</u> true of *your teacher* or *you*.
2 = **Very little** means that the statement is <u>very rarely</u> true of *your teacher* or *you*.
3 = **A little** means that the statement is true of *your teacher* or *you* <u>less than half</u> the time.
4 = **Medium** means that the statement is true of *your teacher* or *you* <u>about half</u> the time.
5 = **Much** means that the statement is true of *your teacher* or *you* <u>almost all</u> the time.

Answer in terms of how well the statement describes *your teacher* or *you*. Do not answer how you think you should be, or what other people do. There are no right or wrong answers to these statements.

SECTION 1: YOUR CLASSROOM OBSERVATION OF *TEACHER ORGANISING* STRATEGIES

1. the teacher follows specific and strict routines of accessing and returning resources............................

2. the teacher follows specific and strict routines of handing in work and assignments...............................

3. the teacher follows specific and strict routines of going to toilet...

4. the teacher specifies a strict time of entering the classroom, where nobody can enter beyond it.................

5. the teacher follows specific and strict routines of seating the students..

6. the teacher follows specific and strict routines of checking student attendance.................................

7. the teacher comes to lectures on time ....

8. the teacher misses lectures...

SECTION 2: YOUR CLASSROOM OBSERVATION OF *TEACHING MANAGEMENT* STRATEGIES

1. the teacher chooses stimulating tasks that sustain our interest (content interest criterion)..........................

2. the teacher provides the topics which meet our needs (content relevance criterion).................................

3. the teacher provides <u>very difficult</u> tasks for us to do (content suitability criterion)................................

4. the teacher provides <u>very easy</u> tasks for us to do (content suitability criterion)....................................

5. the teacher provides substantial (important) content for us (content substantiality criterion).......................

6. the teacher uses group work to get us busy working instead of having side talks (attention-seeker defusing)..

7. the teacher provides extra tasks to fill in the time gap between low and high ability students ....

8. the teacher sets out time limits for us to achieve tasks, so as to seize time for learning.............................

9. the teacher looks confident in front of us...

10. the teacher seems to have clear understanding of the lesson in mind...

11. the teacher always keeps us busy doing something (no time gap without work).............. ....

SECTION 3: YOUR CLASSROOM OBSERVATION OF *TEACHER-STUDENT RELATIONSHIP* STRATEGIES

1. the teacher keeps good relationships with students..	**1.**
2. the teacher first started firm with us and then got relaxed..	**2.**
3. the teacher defuses confrontations with provocative and trouble-making students....................................	**3.**
4. the teacher stays calm and 'takes the heat out of the situation'...	**4.**
5. the teacher avoids arguing with the students...	**5.**
6. the teacher uses the names of the students...	**6.**
7. the teacher uses humour in the classroom...	**7.**
8. the teacher uses constructive criticism of students..	**8.**
9. the teacher accepts constructive criticism from students...	**9.**
10. the teacher looks alert and uses eye contact..	**10.**

....

SECTION 4: YOUR CLASSROOM OBSERVATION OF *TEACHER PUNISHMENT& REWARD* STRATEGIES

1. the teacher praises good students in public (reward/ reinforcement)...	**1.**
2. the teacher gives merit points to good students (reward/ reinforcement)...	**2.**
3. the teacher displays good work of students to the whole class (reward/ reinforcement).............................	**3.**
4. the teacher questions behaviour (he does not let unacceptable behaviour go).......................................	**4.**
5. the teacher makes students of unacceptable behaviour lose rights and privileges (punishment)....................	**5.**
6. the teacher separates trouble makers by asking each to go and sit in another place (punishment).................	**6.**
7. the teacher uses whole class punishment (blanket punishment)...	**7.**
8. the teacher involves college/ school manager when a problem escalates..	**8.**

....

Appendix B

The questionnaire was translated into Persian as follows:

پاسخگوی گرامی، این پرسشنامه جهت انجام یک کار پژوهشی تدوین شده است.
پیشاپیش از همکاری شما در تکمیل این پرسشنامه تقدیر و تشکر می شود.
لطفاً هر جمله را بخوانید و یکی از گزینه ها را که در مورد معلم درس زبان
انگلیسی شما صدق می کند علامت بزنید.
به خاطر داشته باشید که تنها مجاز به انتخاب یکی از این پنج گزینه
هستید.

1. هرگز: یعنی این جمله اصلاً درمورد معلمتان درست نیست.

2. خیلی کم: یعنی این جمله به ندرت درمورد معلمتان درست است.

3. کمی: یعنی این جمله در کمتر از نصف اوقات درمورد معلمتان درست است.

4. متوسط: یعنی این جمله در نیمی از اوقات درمورد معلمتان درست است.

5. زیاد: یعنی این جمله تقریباً همیشه درمورد معلمتان درست است.

توجه داشته باشید که در جواب دادن به جملات زیر هیچ درست یا غلطی وجود
ندارد، فقط آنگونه به این اظهارات پاسخ دهید که معلمتان را به درستی
توصیف کند نه آنگونه که فکر می کنید باید باشد.

زیاد	متوسط	کـــم	خیلی کم	هرگز	ســـــــؤال	ردیف
					معلم رویه های ثابتی را برای دسترسی به منابع و استفاده مجدد از آنها دنبال می کند	1
					معلم رویه های ثابتی را برای ارائه ی تکالیف و کارهای کلاسی دنبال می کند.	2
					معلم رویه های ثابتی را برای بیرون رفتن از کلاس (در ساعات درسی) دنبال می کند	3
					معلم زمان مشخصی را برای ورود به کلاس تعیین کرده است و هیچکس نمی تواند بعد از او وارد کلاس شود	4
					معلم برای طرز نشستن دانش آموزان قوانین مشخصی تعیین کرده است.	5
					معلم حضور و غیاب دانش آموزان را طبق قانونی ثابت دنبال می کند.	6
					معلم سروقت به کلاس می آید	7
					معلم بعضی اوقات به کلاس نمی آید	8
					معلم کارهایی می کند که باعث افزایش علاقه ی ما شود.	9
					. معلم به موضوعاتی می پردازد که به نیازهای ما مرتبطند.	10
					معلم از ما می خواهد کارهای بسیار سختی انجام دهیم.	11
					معلم از ما می خواهد کارهای بسیار آسانی انجام دهیم.	12
					معلم موضوعت درسی مهمی را به ما ارائه می دهد.	13

					معلم از کارهای گروهی استفاده می کند تا تا ما را مشغول نگه دارد به جای اینکه گوشه ای بایستد و فقط حرف بزند	14
					معلم کارها و موضوعات درسی اضافه به کلاس می آورد تا به دانش آموزان قویتر ارائه کند.	15
					معلم برای اینکه دانش آموزان موضوعی را یاد بگیرند محدوده ی زمانی تعیین می کند	16
					معلم در مقابل ما اعتماد به نفس زیادی دارد	17
					اینگونه به نظر می رسد که معلم در ذهن خود درک روشنی از درس دارد.	18
					معلم همیشه ما را مشغول انجام کاری نگه می دارد	19
					معلم با دانش آموزان روابط خوبی دارد	20
					معلم اول سختگیر بود اما رفته رفته سهل گیر شد	21
					معلم در برخورد با دانش آموزان مشکل آفرینی که تحریک شده اند آنها را آرام می کند.	22
					معلم در موقعیت های تنش زا آرام می ماند و اوضاع را نیز آرام می کند.	23
					معلم از بحث کردن با دانش آموزان خودداری می کند.	24
					معلم از اسم کوچک دانش آموزان استفاده می کند.	25
					معلم در کلاس شوخی می کند	26
					معلم گاهی کارهای دانش آموزان را مورد انتقاد قرار می دهد که سازنده است.	27
					معلم انتقادهای سازنده از طرف دانش آموزان را می پذیرد	28
					معلم از ارتباط چشمی استفاده می کند	29
					معلم در مقابل جمع از دانش آموزان خوب تقدیر می کند	30
					معلم به دانش آموزان خوب، نمره ی خوب می دهد.	31
					معلم کار خوب دانش آموزان را در مقابل همه ی دانش آموزان نشان می دهد	32
					معلم در مورد رفتار دانش آموزان حساس است و نمی گذارد رفتار غیرقابل قبول ادامه یابد	33
					معلم از دانش آموزانی که رفتار غیر قابل قبول دارند نمره کم می کند	34
					معلم دانش آموزان مشکل ساز را از هم جدا می کند	35
					معلم همه ی کلاس را تنبیه می کند	36
					وقتی مشکلی پیش می آید، معلم به مدیر خبر می دهد	37

The path to presence in performance through movement, physiological response, and mood

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Abstract: Presence may occur when actors are alert and relaxed in performance. A positive mood is associated with physical activity, but little is known about how movement qualities affect mood and vital signs of actors. This study examined the effects of vibratory, pendular, abrupt, and sustained movement qualities on the Brief Mood Introspection Scale, and physiology. Undergraduate theatre ($n = 25$) and non-theatre majors ($n = 24$) engaged in protocols of four movement qualities: vibratory, pendular, abrupt and sustained. Mood and heart rate, blood pressure, respiration rate, and temperature were measured before and after four different movement protocols. The hypothesis that the sequence of vibratory, pendular, sustained, and abrupt increased the alert, relaxed state of Presence and Arousal was rejected. It was found that systolic blood pressure increased in men across protocols. A significant interaction was found between the participants' major and "Tired." Because Tired and Arousal indicate mental and/or physical energy, a relationship between MAJOR and "Tired," combined with significant correlation between subjects and major, suggests that the protocols resulted in fatigue. Half of the mood variance is explained by the factor "major." These two significant findings suggest a relationship between mood and major as well as blood pressure and gender.

Subjects: Arts & Humanities; Medicine; Social Sciences; Theatre & Performance Studies; Drama

Keywords: performance; mood; exercise; physiology; presence; actor training; movement

ABOUT THE AUTHORS

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PUBLIC INTEREST STATEMENT

In American theatre, an engaging actor is alert and relaxed in the moment of performance. Preparation for this optimal performance state may occur through a sequence of movement qualities, vibratory, pendular, abrupt, and sustained, in a technique called the body electric. To access this experience, before and after each participant engaged in one of four movement qualities sequences, the subject completed two assessments: (1) The Brief Mood Indicator scale evaluated mood and (2) Vital signs, including blood pressure, heart rate, temperature, and respiration, indicated arousal. The alert and relaxed state known as presence creates a heightened state of awareness through which performers create a dynamic relationship between the performer, the other performers onstage, and the audience.

1. Introduction

Presence in acting occurs when the actor is deeply connected to other characters, the audience, and the environment. When an actor is intuitively inspired in a moment on stage, the actor's experience is qualitatively different from consciously playing tactics on another actor or the audience to reach a goal. Similar to the high points in one's life, like falling in love, the bond between two people who are in this state of presence is charged and alive. In *Presence: How to Use Positive Energy for Success in Every Situation*, Rodenburg (2007) defined "presence" as energy that the actor sends to and receives from a specific object or person. Goodall (2008), an experimental performance writer, considered presence to be compelling and enigmatic charisma in live performance. As the actor savors each moment in such a state, s/he shares memorized text as if speaking it for the first time. Presence is the opposite of stage fright. As the actor transforms into the character, letting go of personal agency may elicit fear that blocks energetic flow. The actor may forget his or her lines, freeze like the proverbial deer in the head-lights, or tremble uncontrollably with stage fright. Wilhelm Reich coined the term "character armor" as a chronic fear that locks the body into patterns of structural tension to "protect against the stimuli from the outer world" (Reich, 1949, p. 389). This trembling or freezing as a result of this fear is, according to voice teacher Michael Morgan, involuntary (Morgan, 2008). As an actor taking class with Broadway actress Betty Buckley, Preeshl learned that stage fright could be transformed into a "heightened state of awareness" (Betty Buckley, personal communication, September 13, 1999). Most actors fear stage fright and seek presence. To better understand, and possibly even invoke, the state of presence, this study proposed a method to test a path to presence through a sequence of movement qualities.

Legendary acting teacher and director Constantin Stanislavski offered a seminal example of presence in acting in his book, *Building a Character,* in which theatre student Kostya transformed from an acting student into the character of the critic as he applied makeup and donned his costume in his dressing room. Kostya looked at himself in the mirror, and recalled, "I rubbed ... And went on rubbing [makeup] on my face ... I trembled ... my heart pounded ... I powdered myself at random ... [and] smeared [make-up] ... straightened my coast and gave a tug to my cravat ... with a quick, sure touch" (Stanislavski, 2008, p. 16). The flow of Kostya's actions invoked the electromyographic signatures measured by Wilson (1981): abrupt, pendular, sustained, and vibratory. Wilson neither placed the electromyographic signatures in a particular order nor applied the electromyographic signatures to acting. Instead, Wilson paired the four movement qualities on two continua: pendular-vibratory and sustained-abrupt. However, in the sequence of movement qualities followed by Kostya, Artemis Preeshl observed that a consecutive sequence of Wilson's four electromyographic signatures emerged. Kostya's progression from stillness to pendular to sustained to vibratory to abrupt gave rise to a sequence of movement qualities hypothesized to achieve presence in Preeshl's body electric technique.

To inhabit the character's mind, body, and heart, the actor moves beyond self-conscious control to instinctual awareness of actors and the audience in the moment. Thus, a seemingly paradoxical height-ened state of relaxed alertness may be optimal for performance. This study intended to determine if subjects were able to obtain the optimal alert and relaxed state of presence through a particular sequence of movement qualities in the body electric technique. Developed by Artemis Preeshl, the body electric technique is designed to harness naturally occurring physiological processes tailored to trans-form the actor into a state of presence during two phases of the acting warm-up: the reflexive stage and the communicative stage. The reflexive phase releases tension and activates the body's reflexes. The reflexive phase consists of two qualities: pendular and vibratory. The vibratory quality occurs in con-scious actions or subconscious reactions. When shivering from fear, cold, rage, or fatigue, involuntary trembling may occur. In contrast, a voluntary shaking occurs, such as shaking one's fist at another driver. The opposite of vibratory quality is the pendular quality characterized by a swinging motion which occurs as a relaxed limb vacillates in response to gravity. In the body electric technique, the reflexive stage of pendular and vibratory movement qualities allows the actor to transform into the desired char-acter. The communicative phase creates a bridge between the character, other characters, and the audience through keen awareness in the immediate environment. The communicative phase is divided into two qualities: abrupt and sustained. By incorporating the dramatic elements of suspense and surprise, the actor speaks and moves expressively to attain the desired effect. Abrupt is an unexpected

or surprising movement. When the host of a party exclaims "Surprise!" the guest may involuntarily jump with astonishment. The host consciously uses shock to astound the guest. In contrast, sustained is continuous, unaccented movement. Skating on smooth ice, brushing someone's hair, or petting a compliant cat or dog exemplify this ongoing motion. According to the body electric construct, whereas vibratory and pendular qualities free the actor from habitual behavior, the abrupt and sustained qualities connect the actor to other actors and the audience. Through the body electric, the actor synthesizes intellect and instinct in character from moment to moment. To test this phenomenon, this study correlated physiological markers of heightened response (heart rate, blood pressure, respiration rate, and temperature) and mood with the sequence of movement qualities to approximate the alert, relaxed emotional state. How does this specific sequence of movement qualities from pendular to vibratory to sustained to abrupt affect the emotional and physiological states of the actor?

The body electric technique is grounded in the well-established theory of dance theorist Rudolf Laban. Laban (1950) postulated that how one habitually carries oneself and performs gestures creates character. Like markings that guide the interpretation of a musical score, Laban defined the eight Effort movement qualities to describe how one moves: Direct–Indirect, Light–Strong, Sudden–Sustained, and Bound–Free. While Wilson's (1981) theory recorded electromyographic signatures of four movement qualities paired on two continua: pendular-sustained and vibratory-abrupt, Laban's Effort movement qualities contained eight movement qualities (Direct–Indirect, Strong–Light, Sudden–Sustained, Bound–Free). The primary difference between Wilson and Laban's work is intentionality. The electromyographic signatures in Wilson's theory revealed what muscles naturally do. In contrast, because Laban observed actions that workers performed to optimize efficiency and safety of workers and athletes, he created a system of observing actions. Whereas Wilson's electromyographic signatures of the four movement qualities were based on involuntary responses, Laban's Effort qualities were intended to document intentional actions.

The body electric technique fuses instinctual reflex and intentional action. The reflexive stage of the body electric technique consists of one quality that only Wilson observed, pendular, and another quality that both Wilson and Laban observed, vibratory. Although the pendular quality may start intentionally, when a person lifts his or her arm, unless s/he chooses to hold his or her arm up, his or her arm falls in a response to gravity. Therefore, the pendular quality can be either voluntary or involuntary. Laban excluded the movement quality of pendular from his eight Effort qualities. Similarly, the vibratory state is both voluntary and involuntary. As a physiological response to hunger or cold, for example, trembling occurs. Although Laban notated the vibratory quality as extreme Bound flow, or high tension, the intention of the person is not taken into account. S/he may try to stop the trembling; however, if the trembling has a physiological base, s/he may or may not be able to stop or control the vibration. Thus, Laban's notation of Effort movement qualities did not distinguish between voluntary or involuntary vibration. In the body electric technique, the vibratory quality may be relaxed or tense, voluntary or involuntary. Therefore, the amount of tension in the vibratory quality depends physiological response, individual reaction, and personal habits.

In the body electric technique, whereas the reflexive stage tends to be involuntary, the communicative stage is more likely to be voluntary. Consequently, the communicative stage of sustained and abrupt qualities is markedly similar to Laban's Effort qualities. Sustained is continuous and ongoing; abrupt is sudden and unexpected. Although, the abrupt and sustained qualities may be intentional or involuntary in the body electric technique, it is more likely that pendular and vibratory will be involuntary and Sustainment and Suddenness will be voluntary. The body electric technique differs from Wilson and Laban's theories because of the sequencing of essential involuntary and voluntary movement qualities for actor training. If a sequence of movement qualities encouraged an actor to transform into character, then the body electric technique would pave a path to presence. Therefore, it was hypothesized that the progression from the reflexive State of pendular and vibratory to communicative State of sustained and abrupt qualities would induce the optimal performance state of presence, and that distinct physiological changes in heart rate, temperature, respiration rate and blood pressure, and mood would measure the achievement of this alert, relaxed state.

2. Literature review

Two related studies have previously been conducted to observe movement qualities in specific tasks and measure physiological responses to the vibratory quality. In "Personality and Movement Style" (Preeshl, 1984), forty subjects were observed as they performed tasks designed to elicit combinations of Laban's movement qualities such as brushing a crumb (light, indirect, and free) or pounding a nail (strong, sudden, and direct). Laban movement qualities were correlated with Carl Jung's personality traits on the Myers Briggs Type Indicator: Extrovert/Introvert, Sensing/Intuiting, Thinking/Feeling and Judging/Perceiving. Statistical results were mildly significant, indicating a correlation between Extroversion/Introversion, and the Bound–Free and Direct–Indirect continua. This observational study based in psychophysical research sparked further inquiry into body language. In a pilot study conducted by Preeshl and George (2010), "Vibratory quality and Emotional State," five subjects were encouraged to induce involuntary vibration for twenty minutes. Before and after the physical session, heart and blood pressure measured physiological changes, and the Brief Mood Introspection Scale (BMIS) measured emotional response. Heart rate and blood pressure showed a tendency to increase in the 20-minute session. Pretest/Posttest results of the BMIS indicated that emotions varied significantly after involuntary vibration. Building on these two previous studies, to determine the effects of a sequence of movement qualities on presence, measured by physiological markers and BMIS, the current study examined the effects of how the body electric sequence impacted subjects emotionally and physiologically. The body electric technique study proposed to activate involuntary and voluntary systems to lead a subject from introspective reflexivity to interactive engagement. Through the suggested movement qualities of the body electric technique, the "how" of movement qualities might provide a key to "how" an actor becomes a character.

Numerous exercise science studies have suggested the beneficial effects of exercise on mood (Berger & Motl, 2001; Weinstein, Deuster, Francis, Beadling, & Kop, 2010). Steinberg et al. (1998) reported that most single exercise session with pre- and post-psychological assessments trend toward positive affect. Yeung (1996) found that single bout aerobic/non-aerobic exercise with control groups published from 1976 to 1995 indicated reduced anxiety on the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) and reduced negative moods and increased vigor-activity on the Profile of Mood States (POMS) (McNair, Lorr, & Droppleman, 1971). Having surveyed literature on mood and exercise, Berger and Motl (2001) found that mood changes occurred through exercise in normal and clinical populations. Although exercise tended to enhance mood in single-session and longitudinal designs, further experimentation would be required to establish causality.

Although it is recognized that diverse methodological designs make comparison among studies challenging, the length of the single session is supported by the 10-minute walking study by Thayer (1989) as well as the 10-, 20-, and 30-minute ergometric bicycle study by Nair, Kastin, and Schally (1971), in which both found a favorable impact on mood on the POMS inventory after the 10-minute session. The POMS is the other primary metric used to assess mood (Hseih, 2013). McNair et al. (1971) developed this self-report assessment tool that contained 65 items on a five-point Likert scale from 0 (not at all) to 4 (extremely). The POMS has a slightly lower Cronbach α consistency rating (0.63–0.96). BMIS has a higher consistency than POMS. POMS has a lower rating on internal consistency. For that reason, Preeshl and Goerge selected the BMIS for this study.

Weinstein et al. (2010) noted that self-selection of exercise intensity is associated with the greatest improvements in mood. Gailliot (2007) suggested that the high-energy state of arousal should improve self-control. While Zajonc (1965) found that arousal heightened automatic responses, extreme sensitivity to the environment or intrapersonal stressors may impede performance. Yet, too much arousal could negatively impact performance. As a result of psychosocial stressors, Johansson, Hassmén, and Jouper (2008) found that those who exercised regularly exhibited lower stress, better concentration, and more intrinsic motivation than those who exhibited more stress. To counterbalance excess excitation, relaxation may quiet the body–mind to allow for successful recitation of text in a public setting. Streeter et al. (2010) found that yoga tended to increase parasympathetic nervous system activity. Because of the impact of mood on performance, activation of the relaxation response may allow for presence.

3. Methodology

3.1. Participants

The self-selected participants were 47 undergraduate and 2 graduate students (25 women, 24 men); ages range from 18 to 27 years old with a mix of ethnicities at a small, urban university in the South. Twenty-five participants were theatre majors; 24 participants were non-theatre majors. Major was determined by self-report and confirmed in the university database. Twenty percent were freshmen; 29% were sophomores; 27% were juniors; 20% were seniors; 4% were graduate students. In the Institutional Board of Review (IRB) research protocol, researchers disclosed risks and the University IRB approved the protocol. All volunteers were recruited through posted advertisements on the campus. Written informed consent forms included information about access to health services. All participants signed the informed consent forms. Subjects were not compensated for participation. However, five subjects requested credit toward partial fulfillment of a psychology course requirement for participation upon completion of the study. Because none of the researchers taught psychology courses, the subjects were not coerced to participate in the study. Due to the intimate nature of the university and the close relationships frequently developed between instructors and students, lack of compensation was not considered a detriment to the recruitment of participants.

3.2. Measures

When subjects arrived at the testing room, a certified family nurse practitioner screened the subjects. The family nurse practitioner held a master's degree in Nursing and had passed the state certification exam. To facilitate analysis, blood pressure was subdivided into diastolic and systolic measures; body temperature was measured in degrees Fahrenheit; heartbeats per minute determined pulse rate; respiration rate was operationalized as breaths per minute. Upon completion of vital signs testing, subjects were asked to pass through four stages for two and a half minutes per movement quality; for a total of ten minutes. Prior to and immediately after the movement protocols, subjects completed the BMIS to determine state.

3.3. Questionnaire

In a repeated-measure design, the BMIS test (Mayer & Gaschke, 1988) was administered pre-task to establish a baseline and post-task to access potential changes (see Appendix A for BMIS). The BMIS is one of the most frequently used measures of mood in psychological studies. Participants indicated how well each adjective or phrase described their present mood on a 16-item, 4-point intensity scale which ranged from (1) Definitely Do Not Feel to (2) Do Not Feel to (3) Slightly Feel to (4) Definitely Feel. This measure has been shown to have good internal reliability (Cronbach's α −.76 to .83). Researchers have maintained that the pleasant–unpleasant and arousal–calm dimensions of mood are central to cognition and understanding multi-system personality domains (Mayer, 1986). Therefore, due to the fact that the purpose of the research was to determine if subjects were able to obtain the prescribed alert, relaxed state believed to be most conducive to theatre performance, the BMIS aroused–calm mood dimension was an important indicator measure of this desired state. However, given the association of positive mood as a result of exercise, this study assessed all four subscales from the BMIS: Arousal–Calm, Positive–Tired, Negative–Relaxed and Pleasant–Unpleasant. High scores represent positive moods and low scores represent negative moods (Minimum value = 16; Maximum value = 64). High arousal is typically associated with positive mood and low arousal is associated with negative mood. It was hypothesized that Protocol A, vibratory-pendular-abrupt-sustained, led to alert and relaxed performance observed by changes in vital signs, such as lowered heart rate, elevated blood pressure, and high scores on Arousal-Calm and Positive-Tired, Negative-Relaxed and Pleasant-Unpleasant.

3.4. Procedure

A quasi-experimental design included a repeated emotional and physiological measure administered before and after a single 10-minute bout of individual, unsupervised improvization on one of four protocol sequences of vibratory, pendular, sustained, and abrupt movement qualities. During the single-bout 10-minute session, each participant was instructed to improvise on a new movement quality prompt in each 2.5-minute interval. The order of the movement quality prompts (vibratory, pendular, sustained and abrupt) was based on the four randomly assigned protocols. The methodological design

focused on the participants' physiological and emotional response to the sequence of four 2.5-minute movement quality prompts. The movement qualities were new to all participants.

The participants were assigned to one of four different protocols of the movement qualities on a first come, first serve basis. When a participant called or emailed for an appointment, the participant was given the next available protocol for their gender, whether or not the participant was a theatre or non-theatre major. For example, if the first female participant who was a theatre major was assigned Protocol A, the next female theatre major was assigned Protocol B. The physiological and mood pre- and post-measures were included to account for variability in mood and physiological response to varied sequences of the following movement qualities: vibratory, pendular, sustained and abrupt. The four protocols to which subjects were assigned varied according to the order of the following movement qualities: vibratory-pendular and abrupt-sustained. For example, the sequence of Protocol A consisted of vibratory-pendular and abrupt-sustained qualities, while the sequence of Protocol B consisted of pendular-vibratory and abrupt-sustained qualities. All possible combinations of sequences of vibratory-pendular and abrupt-sustained qualities were used in testing subjects. The characteristics of the four different Protocol sequences are provided in Table 1.

Once the participants had completed the measurement of vital signs (heart rate and blood pressure) and the BMIS, they were provided with a sequence of four movement qualities, vibratory, pendular, sustained, and abrupt from the Protocol to which they were assigned. The four words intended to capture the vibratory, pendular, sustained, and abrupt characteristics necessary in the body electric technique. After the subjects received their protocol of a sequence of four movement qualities, they were led to an adjoining room and instructed to act out the first assigned movement quality for two and one half minutes. In 2.5-minute phases, the principal researcher verbally cued the participant to change to the next movement quality in their assigned protocol. Depending upon the specific movement quality given, the acting improvisation could entail more or less mental rehearsal and physical activity. Upon completion of the Protocol of four movement qualities, subjects were again measured on their vital signs and their mood as measured by the BMIS in a post-test situation. According to the established BMIS, measures of subjects' mood were taken on emotional states such as "Active," "Tired," "Content," and "Gloomy." The dimensions of the BMIS mood are provided in Table 2.

Table 1. Dimensions of Protocols			
Protocol A	**Protocol B**	**Protocol C**	**Protocol D**
Vibratory-pendular	Pendular-vibratory	Vibratory-pendular	Pendular-vibratory
Abrupt-sustained	Abrupt-sustained	Sustained-abrupt	Sustained-abrupt

Table 2. The proportion of variance explained by the retained factors		
Variable	**Value**	**% Variance explained**
Active	0.691	69.1
Caring	0.875	87.5
Fed up	0.584	58.4
Gloomy	0.767	76.7
Jittery	0.752	75.2
Lively	0.61	61
Loving	0.883	88.3
Nervous	0.706	70.6
Peppy	0.54	54
Sad	0.815	81.5
Calm	0.698	69.8
Tired	0.692	69.2

4. Results

Subjects included 47 undergraduate students; 48.9% male, 51.1% female, of varying college majors. The majority of participants were recruited from the College of Music & Fine Arts with 48.9% studying Theatre, 2.1% Music, 6.4% Music Therapy, 4.2% Music Performance, and 2.1% Music Industry Studies. The remaining subjects had majors of Psychology (10.6%), History (8.5%), English (2.1%), Communication (2.1%), Biology (6.4%), Philosophy (2.1%), Journalism (2.1%), and Nursing (2.1%).

Subjects were initially measured on a series of vital signs including body temperature, blood pressure, respiration, and pulse rate. According to the US Department of Health & Human Statistics (2015), normal adult blood pressure is under 120 systolic and less than 80 diastolic (www.nhlbi.nih.gov) (National Heart, Lung, and Blood Institute, 2015). Based upon the findings, the blood pressure of the subjects in this study did not differ significantly from the normal range. Compared to women in the same age group, men under 45 tend to have higher and less well-controlled blood pressure (www.nhlbi.nih.gov). The tendency may explain results in Table 3.

4.1. Gender differences

In t-tests conducted to determine if any significant post-test changes occurred in blood pressure, sex of subject was found to have a statistically significant outcome on systolic pressure. No significant changes were found in diastolic pressure. t-test results indicated a significance level of 0.007, with $\alpha = .05$, in tests of sex and post-test systolic blood pressure. Levene's Test indicated a value of .661 with a significance = .421. Results greater than 0.05 indicate variability between the two groups, male and female, are nearly equal or at least not statistically significantly different. This is believed to bode well for the study as the significant difference in systolic pressure by gender can achieve more veracity.

A multivariate analysis of variance (MANOVA) was conducted as a "step down," or post hoc analysis. The MANOVA indicated no statistically significant results to be found in analyses of Protocol and vital signs. The BMIS protocol sequence given to subjects had no statistically significant effect on post-test measures of systolic blood pressure, diastolic blood pressure, respiration rate, body temperature, or pulse rate. The Hotelling–Trace coefficient, also known as Lawley–Hotelling, that tested for multivariate mean differences between the two groups, male and female, were not found to be statistically significant.

The coefficient of determination, R^2, indicating the amount of variance in the dependent variable explained by manipulation of the independent variable, were all found to be 0.00. This indicates that 0% of the variance in vital signs was explained by gender or the movement protocols given to subjects.

A MANOVA conducted on sex by post-test pulse rate was the only test to elicit a significant result. The test for sex and post-test systolic blood pressure was found to be statistically significant at the $\alpha = .05$ level. However, despite the significance of the finding, the associated R^2 indicated only 15.2% of the variance in post-test systolic blood pressure was explained by the subject's sex. This fact brings with it some measure of concern due to the fact that such a result could be due to a confounding factor of which the researchers were unaware. Alternately, this finding could be attributed to a tendency that men under 45 have toward higher blood pressure and less well-controlled blood pressure. Univariate MANOVA tests for the relationship of sex and vital signs can be found in Table 4.

Table 3. Cross tabulations of blood pressure by gender				
	Pre-test blood pressure		**Post-test blood pressure**	
Gender	**Systolic**	**Diastolic**	**Systolic**	**Diastolic**
Male	116.783	72.087	127.174	74.261
Female	104.75	64.5	115.583	69.25

Table 4. MANOVA results in univariate tests of sex and vital signs			
Variable	**Vital sign**	**Sig.**	**R^2**
Sex	Body temperature	0.594	0.006
Sex	Pulse rate	0.249	0.029
Sex	Respiration rate	0.174	0.041
Sex	Systolic blood pressure	0.007	0.152
Sex	Diastolic blood pressure	0.093	0.062

Table 5. MANOVA univariate tests of Protocol and Calm-Relaxed BMIS state			
Univariate test	**Value**	**Sig.**	**η^2**
Pillai's trace	0.618	0.829	0.047
Wilks' lambda	0.908	0.64	0.047
Hotelling's trace	0.101	0.644	0.048
Roy's largest root	0.094	0.263	0.086

MANOVA tests indicated that the sequence of movement qualities in a specific protocol given to subjects had no statistically significant effects on the ability to achieve an alert and relaxed state believed to be highly conducive to optimal theatre performance. Therefore, Protocol was not found to have had any significant effects on subjects' post-test measure of mood. Values of η^2 can be defined as the proportion of variance associated with or accounted for by each of the main effects (Tabachnick & Fidell, 2011; Thompson, 2006). The various univariate MANOVA test results can be seen in Table 5.

In a MANOVA conducted with MAJOR and the BMIS Negative-Relaxed Mood Dimension, F = 2.194, sig. = .033, partial η^2 = .456 for the relationship of reverse coded post-treatment "tired" score for subjects and major in a secondary post hoc, univariate ANOVA tests conducted automatically by the software. η^2 can be defined as the proportion of variance associated with, or accounted for, by each of the main effects, interactions, and errors in an ANOVA (Tabachnick & Fidell, 2001). The η^2 of .456 is giving us 45.6% of the variance in mood dimension score being explained by a student's major. Since "Tired" negatively correlated with MAJOR, and "Tired" may be considered as the opposite of arousal, a negative correlation of tired could infer arousal, or alertness, in a way that could contribute to the state of presence. This finding could indicate a need for further research.

4.2. Factor analysis

In accord with the previous research of Watson and Tellegen (1985) using the BMIS in their study of mood, principal-axis factor analysis was utilized in this study. Some caveat is in order before the results of this test are discussed. Factor analysis is a technique that requires a large sample size. Factor analysis is based on the correlation matrix of the variables involved, and correlations usually need a large sample size before they stabilize. Tabachnick and Fidell (2001) and Comrey and Lee (1992) advise sample sizes of at least 100 before a factor analytic technique is viable. While it is notable that in exercise studies, sample sizes typically range from 11 to 80 participants (Hansen, Stevens, & Coast, 2001; Johansson et al., 2008; Silvia, Phillips, Baumgaertner, & Maschauer 2006; Streeter et al., 2010; Weinstein et al., 2010), the factor analysis utilized in this research can best be described as exploratory due to the small sample measured.

With that caveat in mind, factor analysis using the various components of the aroused-calm BMIS dimension indicated that four factors were retained after a Principal-Component Analysis Extraction method using Varimax Rotation with Kaiser Normalization. The Kaiser-Meyer-Olkin Measure

of Sampling Adequacy provided a value of 0.632. This measure varies between 0 and 1, with values closer to 1 considered superior. A value of 0.6 is a suggested minimum. Bartlett's Test of Sphericity obtained a value of 227.781, with a significance of 0.0 using a Varimax Rotation with Kaiser Normalization. Based upon the Bartlett's value, the null hypothesis was rejected. Taken together, these two tests provide a minimum standard, which should be achieved before a factor analysis, or a principal components analysis, should be conducted (Comrey & Lee, 1992).

The communalities associated with the components of the factor analysis indicated the amount of variance that was accounted for by the extracted factors. It was noted that 69.1% of the variance in the component Active was explained by the retained factors. Variables with higher values are considered well represented in the common factor space, while variables with lower values are not well represented (University of California Los Angeles Academic Technology Services, 2015). The remaining variances for the components of the mood scale are reported in Table 2.

4.3. Principal-Component Analysis Extraction method

For the total variance explained, three components stood out. Component 1 accounted for 26.291% of the total variance in the factors. Component 2 accounted for 19.324% and Component 3 accounted for 17.080% of the total variance. Overall, four primary factors were retained in the factor analysis. Loadings indicated five variables loading under Factor 1, three variables loading under Factor 2, two variables loading with Factor 3, and two variables loading with Factor 4. Table 6 provides a Rotated Component Matrix. Only those loadings considered "high" are reported. High loadings were operationalized as any in excess of 0.50 (Comrey & Lee, 1992).

4.4. Negative binomial regression

In an effort to predict if subjects would be able to achieve the desired alert and relaxed state based on the protocol they were assigned, a negative binomial regression was performed using Stata. Results indicated no statistically significant relationships at the $\alpha = .05$ level. It is believed that the small sample size could be responsible for the lack of significance.

Three statistically significant results were found; however, reasons other than the effect of the sequence of movement qualities on physiological and/or emotional arousal may have influenced these significant correlations. First, the subjects correlated significantly with the BMIS state, "Tired" and the subject's MAJOR negatively correlated with the BMIS Negative-Relaxed Mood Dimension. Second, the systolic blood pressure of male subjects increased across protocols. The following discussion addresses the significance of the interaction of the variables of MAJOR and mood as well as gender with systolic blood pressure.

Table 6. Rotated component matrix				
	1	2	3	4
Jittery	0.825			
Nervous	0.771			
Peppy	0.702			
Active	0.656			
Calm	0.526			
Gloomy		0.868		
Sad		0.858		
Fed up		0.759		
Loving			0.93	
Caring			0.925	
Tired				0.774
Lively				0.534

5. Discussion

The hypothesis that the Protocol 1 (vibratory, pendular, sustained, and abrupt) increased the alert, relaxed state of Presence empirically indicated by physiological measures (heart rate, blood pressure, respiration rate, and temperature) and Arousal was rejected. These physiological markers did not differ significantly according to which protocol that participants were assigned.

Systolic blood pressure did increase for men across protocols. Findings on the relationships between blood pressure and gender yielded mixed results in other studies. Ewart and Kolodner (1994) found that negative traits such as depression and anger predicted prevailing blood pressure levels during daily activity in black and white adolescents. In this study, the factors of gender, social setting (in classroom vs. with friends), and nonverbal expressive style "moderated" this association of blood pressure with personality traits (p. 596). Subsequently, Räikkönen, Matthews, Flory, Owens, and Gump (1999) found that trait anxiety and pessimism contributed to higher blood pressure across gender. Previously, Schwartz, Warren, and Pickering (1994) had found that positive and negative mood contributed to differences in ambulatory blood pressure. One of the strengths of the study of Räikkönen et al. (1999) was a match between the level of occupational prestige of middle-aged men and women in their study. However, Räikkönen et al. (1999) reported that they had not found other studies that correlated the effects of trait anxiety on ambulatory blood pressure. However, Johansson et al. (2008) did not find a gender difference between mood and anxiety in response to Qigong exercise. Since men under 45 men show a tendency for higher blood pressure than women, this correlation between gender and systolic blood pressure would benefit from further study.

The Positive-Tired, Negative-Relaxed, and Pleasant-Unpleasant scales neither increased nor decreased significantly as a result of the movement quality protocols. However, a significant relationship was found between the major of the participant and the BMIS state, "Tired." The MANOVA conducted with MAJOR and the BMIS Negative-Relaxed Mood Dimension also produced a significant correlation between subjects and major in a secondary post hoc, univariate ANOVA tests. With the η^2 of .456, 45.6% of the variance in mood dimension score on the variable "Tired" was explained by a student's major.

It was anticipated that theatre majors would become more alert and relaxed in response to the Protocol "A" movement quality sequence. In theatre classes, majors warm up their bodies and voices through acting exercises. Because of this acclimation to physical and vocal exercises, it seemed likely that theatre majors would demonstrate higher positive correlations to achieve the alert and relaxed state of presence. However, theatre is an interactive activity. Because each participant experienced the protocols without other participants in the room, perhaps the lack of interaction could account for the interaction with the BMIS state, "Tired."

Another possible explanation for the theatre majors to report the feeling of "Tired" could relate to activity level. In this study, the participants chose the level of intensity in the protocols. As noted in the literature review, Weinstein et al. (2010) found that self-selection of exercise intensity is associated with the greatest improvements in mood. Therefore, the participant's choice of a high or low level of intensity may have influenced the report of "Tired" on the BMIS. Because theatre students might have more stamina from theatre training compared with participants from other majors, the theatre majors might have been expected to have a higher correlation with the BMIS state, "Tired." Furthermore, because "Tired" could indicate mental and/or physical energy, the provocative relationship between MAJOR and "Tired" could suggest that participation in the protocols influenced some of the participants to report feeling "Tired." To better assess the relationship between movement protocols and the BMIS moods of Arousal, and Tired among students from different majors, more research on the impact of voluntary and involuntary movement on mood, especially on the alert state, could further explore the relationship between movement and the optimal performance state.

6. Conclusion

The results revealed significant gender differences in systolic blood pressure and a negative correlation between the "Tired" BMIS mood and MAJOR. To the extent that Arousal correlated with a positive mood, "Tired" as mental or physical fatigue could have affected the correlation between "Tired" and MAJOR. These two significant findings suggested a correlation between mood and MAJOR as well as systolic blood pressure and gender, respectively.

The intensity of the exercise could be a relevant factor in the findings of this study. Solomon and Corbit (1973) found that positive affective was experienced following stressful activity. Contrariwise, Steptoe and Bolton (1988) and Steptoe and Cox (1988) measured mood immediately following exercise. Whereas high-intensity exercise resulted in negative mood, lower intensity exercise resulted in positive mood. The association of the mood state "Tired" with MAJOR could be important because arousal tends to correlate with positive affect (Corson & Verrier, 2007; Dolcos, LaBar, & Cabeza, 2004; Gayle, 1997; Gorn, Pham, & Sin, 2001). The lack of supervision during the movement quality protocols, which allowed for the individual's choice of intensity of exercise, may have influenced the report of "Tired."

The association of "Tired" with MAJOR could suggest further study on the impact of MAJOR on mood. Consider two studies on attention. Mather (2007) and Mendl (1999) indicated that increased attention led to the heightened possibility of survival. Brunyé, Mahoney, Augustyn, and Taylor (2009) found that high arousal could increase the ability to accurately retrieve global information. However, since Westermann, Spies, Stahl, and Hesse (1996) found that negative mood induction procedures have larger effects than positive mood inductions, the significant correlation between the negative mood, "Tired," and MAJOR might have been anticipated without implying causation (Nguyen, 2008).

The lack of significant differences between protocols on post-inducement positive and negative mood scores could suggest an alternate configuration of states. For example, the finding of Fredrickson and Levenson (1998) suggested that contentment enhanced appreciation for the present moment and one's place in the world; contentment has been shown to shorten the duration of cardiovascular arousal produced by negative emotions. Hence, the combination of the BMIS moods of Calm, Lively, Peppy and Active with Content in the scoring might approximate relaxed alertness that tends to characterize the optimal performance state.

To consider the effects of personality traits and moods in women and men, a follow-up study that compared responses of participants on the Spielberger Trait Anxiety Inventory and the Brief Mood Inventory Scale might indicated a distinction between the effects of positive and negative personality traits and moods on blood pressure in women and men. Alternately, an experimental study could sample movement qualities longitudinally in conjunction with the POMS (Lorr, Douglas, & Droppleman, 2004) to assess change as a result of treatment through the protocols over time. Because the present study showed a significant correlation between mood and MAJOR, and blood pressure with gender, to improve the methodology in a future study on movement qualities, mood, and physiological changes, utilization of a control group or wait list, randomization of subjects, observation of movement qualities, and a blinded outcome assessment would enhance the experimental reliability.

In conclusion, further research could elucidate how "Tired" related to arousal to approximate a heightened state of awareness. Since "Tired" negatively correlated with MAJOR, and "Tired" might be considered as the opposite of alertness, this negative correlation between "Tired" and MAJOR merits further study. Moreover, to better assess the relationship between "Tired" and MAJOR, a study to compare performance students and non-performance students in an observed sequence of pendular, vibratory sustained, and abrupt movement qualities in a double-blind experiment with a control group might enhance reliability. The observation of the movement qualities could yield significant information about the change from the reflexive stage to the communicative stage. Furthermore, the POMS could be substituted for the BMIS to test for correlations between observed movement qualities and

the alert and relaxed state. The new hypothesis is that observation of body electric movement quality protocols measured in motion may correlate with mood to achieve high arousal and relaxation. This further research on the transition from preparation in the reflexive stage to interactive engagement in the communicative stage could lead to a better understanding of presence in performance.

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Appendix A

Brief Mood Introspection Scale (BMIS)
by John D. Mayer

Instructions: Circle the response on the scale below that indicates how well each adjective or phrase describes your present mood.

(definitely do not feel)	(do not feel)	(slightly feel)	(definitely feel)
XX	X	V	VV
Lively	XX X V VV	Drowsy	XX X V VV
Happy	XX X V VV	Grouchy	XX X V VV
Sad	XX X V VV	Peppy	XX X V VV
Tired	XX X V VV	Nervous	XX X V VV
Caring	XX X V VV	Calm	XX X V VV
Content	XX X V VV	Loving	XX X V VV
Gloomy	XX X V VV	Fed up	XX X V VV
Jittery	XX X V VV	Active	XX X V VV

Overall, my mood is:

Very Unpleasant   Very Pleasant

-10 –9 –8 –7 –6 –5 –4 –3 –2 –1 0 1 2 3 4 5 6 7 8 9 10

Please Note: The "Overall, my mood is" section is usually omitted, although some people use it and fold it into the overall score.

Original citation: Mayer and Gaschke (1988) [Scoring instructions are described there]

Some other articles that have used the scale*:

- Kokkonen and Pulkkinen (2001).
- Halberstadt, Niedenthal, and Kushner (1995).
- Hall and Baum (1995).
- Mayer, Allen, and Beauregard (1995).
- Mayer and Hanson (1995).

*The scale has been used in many other articles; I do not have a comprehensive list at this time. If you know of other uses, I would be delighted to hear of them.

Embracing the complexity of educational programmes

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Abstract: Systems of monitoring and control have left many educators and organisations in the field of post-compulsory education struggling to find ways to meet the needs of an increasingly diverse society. Education is complex. Many educators would agree that it is influenced by many, often contradictory, voices and power structures. Based on the findings of a case study involving multiple programmes in a post-compulsory education institution in Aotearoa/New Zealand, this paper aims to unravel this complexity for the case of educational programmes. It describes how programmes can be seen as complex systems, created by people and directed by discourses in society, some of which are more influential than others. If programmes are seen as complex systems, the experience of struggle as referred to above can be understood as a consequence of the attempt to control the complexity rather than work with it. This control limits the possibilities for development and innovation. Alternatively, as this paper will explain, acknowledging and embracing the complexity of programmes helps open up spaces for innovation that would otherwise remain hidden. It is argued that the ultimate space for change is educators' personal and collective responsibility for the discourses in society they choose to follow.

Subjects: Curriculum; Curriculum Studies; Education Politics; Post-Compulsory Education

Keywords: curriculum; programme design; post-compulsory education; complexity

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PUBLIC INTEREST STATEMENT

The quality of post-compulsory education is often presented using simplified means such as predefined standards and league tables. These are controlled through systems requiring educational programmes to fit within prescribed frameworks and monitoring regimes.

Yet, post-compulsory educators are continuously expected to meet the needs of an increasingly diverse and complex society. However, the control systems are unable to cater for this complexity, and they also put limits on opportunities for development and innovation. Therefore, as an educator, it is easy to feel trapped.

This paper looks at educational programmes in a different way. It considers them as "living" entities that cannot be controlled, but are continuously influenced by the complexity of values and beliefs in society. When embracing this idea, this paper shows how new and empowering spaces for innovation of programmes open up that can help meet the widely diverse needs of society and students engaging in post-compulsory education.

1. Introduction

Educators and organisations working in the field of post-compulsory or higher education are continuously challenged to meet the needs of an increasingly diverse society. Yet, in Aotearoa/New Zealand, graduate outcomes of educational programmes are increasingly nationally prescribed and monitored; programmes have to fit predefined models and structures and are subject to rigorous approval and accreditation processes; learning outcomes are prescribed in minute detail; and moderation processes control assessments and sometimes also teaching methods and learning materials. Once a programme has been approved and is being taught, it is subject to educational performance indicators and accountability reports, and changes to the programme usually involve additional paperwork and approval processes.

As an educator working in this system, it is easy to feel trapped. The limitations put on attempts to innovate seem so overwhelming that it is tempting for educators and educational organisations either to not bother with making changes or to just tweak within the small space of autonomy that they have left.

Education is complex. Many educators would agree that it is influenced by many, often contradictory, voices and power structures. Based on the findings of a case study involving multiple programmes in a post-compulsory education institution in Aotearoa/New Zealand, this paper aims to unravel this complexity for the case of educational programmes.

If programmes are seen as complex systems, the feelings of being trapped as referred to above can be explained as a consequence of the attempt to control the complexity rather than work with it. As such, the control limits the possibilities for development and innovation. However, acknowledging and embracing the complexity of programmes can help identify spaces for change and innovation, and open up those spaces that would otherwise remain hidden.

The structure of this paper is as follows. Section 2 uses scholarly literature to explain the concept of complex systems as relevant to this paper. Subsequently, the research project that underpins the findings and the argument in this paper is described briefly in Section 3. Section 4 then presents how findings from this research project have created a picture of educational programmes as complex systems. Finally, in Section 5, spaces for change and innovation within these systems are identified and explained.

2. Complex systems

Complexity theory claims that phenomena can be understood as complex systems, which consist of innumerable constituents that connect, interact, organise and re-organise in countless ways (Mason, 2008). It has its origins in the natural sciences, among other things to understand ecosystems. There appears to be a growing body of literature applying this theory to help increase our understanding of education (e.g. Davis, Sumara, & Luce-Kapler, 2008; https://ejournals.library.ualberta.ca/index.php/complicity/index; Osberg & Biesta, 2010).

There is no single definition or conceptualisation of complexity or complexity theory (Aldaheff-Jones, 2008). A major distinction between different conceptualisations is whether or not a system is deterministic, i.e. whether the new possibilities that emerge from a complex system are foreseeable or not (Aldaheff-Jones, 2008; Osberg & Biesta, 2007). This depends on whether the complex system is closed or open. Determinism is related to closed systems, which do not interact with the outside world. Open systems, on the other hand, interact continuously with their environment, allowing adaptation and development in unpredictable ways (Osberg & Biesta, 2007). Because an open system's constituents are interconnected and the system interacts with the environment, such a complex system cannot be broken down in its parts, without losing some essential characteristics (Davis et al., 2008). This makes it difficult to create a picture of the whole of the system. The only way to get an indication of what the system looks like is to study patterns within the system that are identified in the moment (Smitherman, 2005).

The interactions between an open complex system's constituents and the environment create triggers and disturbances that shape subsequent interactions within the system, and cause the system to respond and change (Davis et al., 2008), thus creating new possibilities for the system as a whole. This process allows an open complex system to learn and develop without the help of an overseer (Davis et al., 2008; Mason, 2008). In other words, an open complex system is dynamic: it is not designed or developed, but it develops itself.

What holds a complex system together is its internal redundancy (Davis et al., 2008), i.e. the similarity in its constituents. This redundancy allows the constituents of the system to work together and give the system robustness and stability. The redundancy can be explained through the influence of power (Mason, 2008), as follows: as the system's continuous interaction with the environment creates new constituents, the system continues to adapt, but this adaptation is not random. Prevailing power structures in a complex system "lock-in" new constituents and steer them in a particular direction. Power in this sense can be defined as "the directional course of the phenomenon that enjoys the dominant inertial momentum over other competing phenomena" (Mason, 2008, p. 40). New constituents outside the dominant powers will not have any impact on a system's direction until the number of these constituents has reached a scale of sufficient complexity to allow the system to move in a different direction, i.e. to effect change.

A complex system needs redundancy for its cohesion and strength. However, too much redundancy leads to an unintelligent system that is unable to cope with situations of crisis (Davis et al., 2008), and ultimately such a system will die. For a complex system to survive and continue to develop in the long term, redundancy in the system needs to be balanced with diversity. Increasing the diversity leads to an exponential increase in possibilities which "enable novel actions in response to shifts in the grander context" (Davis et al., 2008, p. 196).

The above characteristics of complex systems can be identified in educational programmes. Section 3 describes the research project that led to this finding, and is followed by an explanation how the research data suggested considering programmes as complex systems.

3. Research methodology

The doctoral research project that underpins this paper concerned an interpretive case study by the author into understanding programme design practice at a polytechnic in Aotearoa/New Zealand. Polytechnics are post-compulsory education organisations which teach a wide range of vocationally oriented study programmes to people over the age of 15. The length of most programmes varies from 12 weeks to 3 years. Programmes range from foundation to undergraduate degree and sometimes postgraduate studies.

The research project sought to attain an understanding of programme design through investigating the meanings embedded in practitioners' own social constructions of their design practices (Baker & Johnson, 1998; Burr, 2003; Schwandt, 2000). Programmes in this regard are defined as a sequence of courses (a.k.a. units, modules, papers or subjects) that lead to a qualification. Only programmes leading to sub-degree qualifications were included in this study.

To study programme design from an institution-wide perspective, eight senior managers and academic leaders in the institution were interviewed. In addition, the institution's Academic Statute and Quality Management System documents were analysed as they provide institution-wide direction on programme design. Furthermore, five existing programmes across the institution were selected and relevant people involved in design practice of these programmes were interviewed. Across these programmes, these people included eight managers, nine teachers, four programme-coordinators/teachers, two representatives from industry standard-setting bodies and one programme design advisor. For one programme, the programme document was analysed plus a programme approval meeting was observed.

The interviews were semi-structured. Participants were asked what they found important when making programme decisions, and why. Decision-makers at the institutional level and in one programme were interviewed about design at both programme and course levels. From these interviews, plus the document analysis and the observation notes, initial findings were developed. The remaining four programmes were only studied at either course or programme level. They were used to either amend or confirm the initial findings, thus allowing some analytical generalisation (Yin, 2003).

Informed consent was gained for the interviews and the use of the documents. Interviews were audio-recorded, transcribed and edited. The latter involved summarising the transcripts by identifying the substantive elements that would contribute to meaning-making, in the participants' own words, so the summaries would continue to validly reflect the actual interviews (Gillham, 2005). The edited transcripts were approved by participants before they were used for analysis.

For the data analysis, the stance was taken that people's perspectives as presented in interviews and documents are not only shaped by their worlds, but they also shape the world, as people "talk" their perspectives "into being" (Heritage, 1997, p. 161) when interacting with others, and in doing so, they influence the perspectives of others (Bloome & Clark, 2006; Holstein & Gubrium, 2008).

This implies that the research data are not just the participant's straight answers to the interview questions, but also, and more importantly, her/his meanings that account for these answers in the context of her/his world. To unravel these meanings, it was important to take into account how the participant provided the information—e.g. what language s/he uses or what s/he does not say—in addition to what information s/he provides (Baker & Johnson, 1998; Holstein & Gubrium, 2008). Holstein and Gubrium (2008) explain this approach as a concern with both "discursive practice"—i.e. what people say or write in documents— and "discourses-in-action"— i.e. how they say or write this. They refer to Foucault's definition of discourse as "practices that systematically form the objects of which they speak" (Foucault, 1972, p. 54), a definition that highlights the interaction between what is spoken and how it is spoken, and which was adopted for this study. By analysing the interplay between discursive practices and discourses-in-action, as Holstein and Gubrium (2008) suggest, it was possible to unravel which discourses were brought into practice as people constructed their programme design practice perspectives.

Following this approach, the analysis of the transcripts, documents and observation notes then concentrated on two questions: (1) What do decision-makers find important when making programme decisions? (2) Why do they find this important? Extracts from the data were identified that indicated answers to one or both of these questions, in the form of either what was said or written, or how it was said or written. The identified extracts are referred to as "considerations" in this paper. Subsequently, NVivo® was used to help cluster related considerations into themes.

The next steps consisted of explaining the themes and their interrelationships in order to identify the political, educational and societal discourses that were in action within the data, and gain the deep understanding of programme design that was sought in this project.

Section 4 explains how the research data suggested explaining programmes as complex systems. It also describes how the discourses that appeared to be "in action" in the data can be seen as the powers that steer programmes as complex systems.

4. A programme as a complex system
The research data provided a myriad of considerations regarding what people find important in making programme decisions and why they find this important, and there were obviously many more considerations that remained hidden during the research process. The full set of these spoken and unspoken considerations can be seen as making up programmes as complex systems, in the following way.

There were three types of considerations in the data, which are summarised in Figure 1 and explained below.

(1) The first type of considerations identified which aspects of education are seen as belonging to programmes and which are not. These considerations distinguish programme design practice from the wider practice of education in general and as such create a boundary around what is to be considered part of a programme as a complex system and what is part of the "outside world". For example, "how to assess" was identified as a programme consideration, but "introducing a smoking ban on campus" was not. Such a boundary gives a programme a stable identity, i.e. it ensures that people have a common notion about the concept of a programme. Across the data, it was found that a programme was bounded by considerations in the following six categories: (1) programme intentions, including purposes, goals and objectives; (2) programme structure and teaching methods; (3) administration, resourcing and management; (4) student assessment; (5) programme evaluation; and (6) consultation and development processes. In each category, multiple sub-categories of more detailed decision-making topics were found.

(2) The second type of considerations expressed who is considered to have roles and responsibilities in programme decision-making. This type also creates a boundary around the concept of a programme in the sense that it captures whose voice is included in the programme and whose is not. It was found that it is not a single person who has a voice, but a complex construct of people across the institution, particularly including managers at all levels, teachers, academic and student support people, and the Academic Board, which is the cross-institutional committee overseeing the assurance of academic quality. Programme documents were also found to be an important part of this construct. Hardly any evidence was found that students or people outside the institution were assumed to have a role in programme design matters.

(3) The third and final type of considerations was formed by the constituents that collaboratively make up a programme as a complex system: the actual programme deliberations and the rationale for these. These considerations were found in the data in six different forms, as summarised in Figure 2. They are explained below. Each form is illustrated with a quote as a typical example from the data.

• *Words and expressions* that people use to articulate programme considerations and decisions. For example, "[…] we would be looking at producing work-ready graduates out of the certificates and diplomas" (Institutional decision-maker). This example expresses the purpose of certificate and diploma programmes. The words that are used simultaneously create a picture of a programme as a production process, the product of which are work-ready graduates.
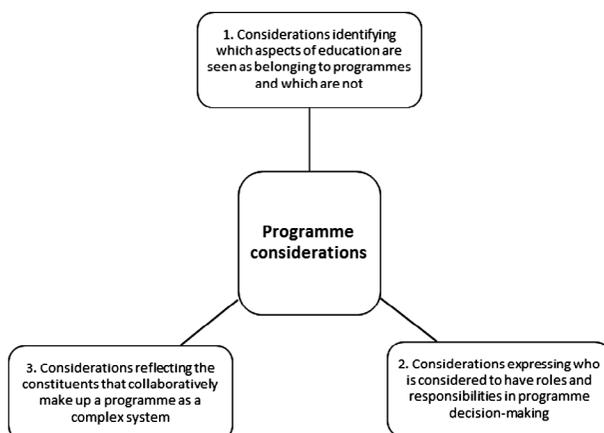

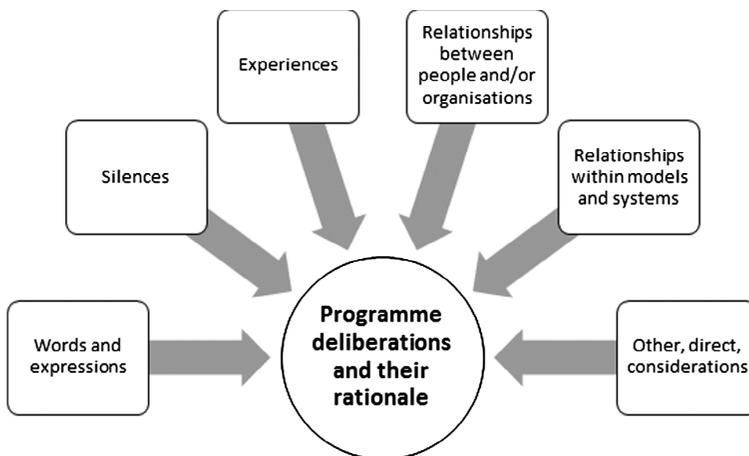**Figure 1. Three types of considerations as identified from the data.**

Figure 2. Six different forms of programme deliberations and their rationale that collaboratively make up the constituents of a programme as a complex system.

- *Silences* that remain unspoken or unwritten, but can be deduced from what is spoken or written and from how this is spoken or written. For example, "Summative assessments may be conducted in Te Reo Māori. Conditions and requirements may apply and these are documented in the [Quality Management System] or programme regulations". The silence in this clause from the institution's Academic Statute is that all assessments are normally conducted in English.

- *Experiences* that reflect personal life experiences from inside or outside the programme or the institution which people consider in making programme decisions. For example, "Something that influenced me strongly was the attitude or our own daughter, and our son, and I learned quite a lot from them about what young people's needs are" (Institutional decision-maker). This personal experience contributed to decisions on student needs and how these needs can be met in the programme.

- *Relationships between people and/or organisations* that are found in people's expressions of professional, moral and political responsibilities to others, and in their assumed and assigned roles and responsibilities in relation to programmes. An example is the following consideration of political responsibility to the government: "It is important that [the students] can achieve the course because the ministry require [*sic*] course completions and they monitor our completions and that will get more so" (Manager).

- *Relationships within models and systems* that express how internal relationships of components within a model or system are used to inform decision-making. An example is the following illustration of using relationships between course levels on the New Zealand Qualifications Framework (NZQA, n.d.) to help define the sequence of courses in a programme: "I'd be hoping that [programme developers] are picking [courses] like level 1 before level 2 before level 3 for example, but it does not always work that way" (Institutional decision-maker).

- *Other, more direct, considerations, which are not included in the above forms.* For example, the following is a direct consideration about resourcing of a programme: "If we are a business unit, which I guess we are, we need to think business-wise, which is technology and infrastructure change and we need to change with it" (Teacher).

Summarising, the constituents of a programme as a complex system can be seen as countless considerations, words and expressions, silences, experiences and relationships that are contributed by the people involved. The system is bounded by the inclusion of selected aspects of education only and of the voices of a particular group of people only.

The programme's constituents connect, interact, organise and re-organise within people's own thought processes, and through the interaction of the people involved. The organisation of the constituents appeared most obvious in the groups of similar constituents found across participants and

documents and identified as themes in the data. For example, one theme consisted of similar words and expressions that collaboratively pictured a programme as a production process, the purpose of which is to produce graduates for the workforce. Another theme consisted of similar considerations regarding student entry into programmes, which indicated that everyone should be able to enrol in a programme, and that the institution should carry the consequences of the student's enrolment and provide services to support students during their studies. Each theme demonstrates the redundancy that is needed to allow the constituents of a complex programme system to work together and provide stability to the system. In all, 71 themes were identified from the data.

A complex programme system is open because of the involvement of people. It is people who contribute the constituents to the system, and their lives consist of more than just being involved with programmes: they interact with other people and with the world outside a programme through their everyday lives. They bring experiences from these interactions into the programme, and these experiences in their turn interact with the existing constituents of the system. An example of such an experience is the following:

> All of our [teachers] come from private schools 'cause that's all that was available so we know what the training was like. We've tried to replicate that, plus more, because we're a longer programme. We've worked really hard at making sure we ensure those higher standards. (Programme Coordinator)

This interaction between the multiple people involved and the "outside world" is continuous. It ensures that new constituents are continuously brought into the system. This implies that a programme has no "overseer", i.e. there are no people who could be identified as having full control over the design of a programme. More than that, there is no such thing as "the design of a programme". A programme is developing continuously, from the moment of its inception until it dies. This idea challenges the notion of distinct programme design and implementation stages, which has become accepted in Aotearoa/New Zealand post-compulsory education under the influence of national education policies introduced in the early 1990s (Govers, 2010). Instead, at any moment in time, a programme "is". It has become what it is now as a result of the interactions of the constituents and it is "ever changing, ever stable, ever alive" (Doll, 2005, p. 55). A programme can therefore only be studied in the moment and from a certain perspective, which was referred to earlier as studying "patterns in the moment" (Smitherman, 2005). In this research project, the identified considerations were generated at particular points in time and with particular people. If the same programmes were studied now and even with the same people, the findings would create a changed picture of the complex programme system.

It was noted earlier that 71 themes emerged from the data, which were explained as demonstrating the redundancy in the system. This redundancy went even further in that the themes appeared to be interconnected through discourses in society that were found to be "in-action" in the data. The themes were shaped by those discourses, and simultaneously, by being shaped, they also strengthened the influence of the discourses within the system. In this way, discourses in society act as power structures that steer complex programme systems in particular directions.

An example is the following. Market discourses have influenced education in Aotearoa/New Zealand since 1989 (Olssen, Codd, & O'Neill, 2004). In this research project, market discourses appeared to shape various themes in the data. Words which express programmes as a product manufactured by an institution and sold to students-as-customers created a theme that pictured a programme as a consumable product. The purpose of such a programme is to sell as many products as possible, and to do so, it is important that customers are satisfied. This perceived importance of customer satisfaction was also reflected in other themes, such as: the importance to meet customer needs; student support should involve meeting their needs and wants; and students should have a voice because they are paying customers. Additionally, a theme named "market considerations"

expressed the concern about how the institution could grow or at least retain its share of the student market.

Market discourses were chosen here as an example because they belong to a consistent range of discourses which "regard the community as founded upon economic relations" (Ball, 2006, p. 39), and can be summarised as neoliberal. They include, but are not limited to, human capital theory, agency theory, new public management, contractualism, managerialism, public choice theory, utilitarianism and above-mentioned market discourses (e.g. Boston, Martin, Pallot, & Walsh, 1996; Codd, 2005; Harris, 2007; Olssen et al., 2004). Neoliberal discourses appeared to be the dominant influence in the findings. Of the 71 themes identified from the data, 40 could be explained as having been shaped by neoliberal discourses. Twelve themes could be understood through humanist, social change or communitarian discourses, while another 12 themes had the potential to shape alternative directions for the system, but they did not seem to have had sufficient power to do so, and were "gathered up in the path" of neoliberalism (Mason, 2008, p. 40). An example of the latter was found in themes that indicated decision-makers' sense of responsibility to students. On the one hand, neoliberal discourses shaped themes that reflected responsibility to students in the role of customers, i.e. as people who (potentially) purchase the programme as a product. On the other, alternative discourses shaped themes which also explained a responsibility to students, but as fellow human beings who are seeking support in their development. The dominance of neoliberal discourses ensured that themes which expressed a responsibility to students-as-customers outnumbered the alternative perspectives. The dominance also silenced the alternatives through the adoption of multi-explanatory language, i.e. words or expressions that can have many and potentially widely differing meanings, but with which no one will disagree. After all, how many educators would disagree with the expectation that they have a responsibility to students? The adoption of multi-explanatory language and subsequent lack of debate about its meaning allow the dominant discourse to prevail. These findings resonate with Olssen's observations on the development of lifelong learning discourses, showing "how educational and economic practices mutually condition and adapt to each other" (Olssen, 2006, p. 213).

Finally, seven themes did not seem to have been shaped by discourses in society. Six of those consisted of the personal experiences of the people involved, and formed examples of how the programme system interacted with people-as-systems. The seventh non-discourse-related theme demonstrated decision-makers' concern for the survival of the programme and the institution, possibly because survival of the programme supports people's own survival in earning a living. Likewise, survival of a programme seemed paramount in helping keep the institution alive. The latter strengthens the idea of a programme as an open complex, "living", system, which needs to interact with its environment for its own survival, and by doing so, it not only helps shape the environment but also supports the survival of the environment (Stacey, Griffin, & Shaw, 2000), that is, in this case, the survival of the people and the institution.

5. Identifying spaces for innovation and change

At first sight, acknowledging an educational programme as a complex system can be so overwhelming compared to working with models in which the complexity is reduced and controlled that it seems to make the task of innovation and change even more daunting. However, if complexity is acknowledged, it provides insight into and opens up spaces for change which remain otherwise hidden. The idea of "spaces" aligns here with that of "enabling constraints", which allow complex systems to "maintain a delicate balance between sufficient structure, to limit a pool of virtually limitless possibilities, and sufficient openness, to allow for flexible and varied responses" (Davis et al., 2008, p. 193).

Firstly, considering a programme as a complex system acknowledges that a programme is necessarily inclusive of the perspectives of all people involved. It helps see the programme through the eyes of others and therefore value others as important and indispensable contributors to the programme system. This insight provides a language and opens up a space for empowering dialogue

about the range of contributing perspectives, and how they will create possibilities for new directions to emerge in the system.

Secondly, embracing complexity helps understand that programmes not only need redundancy but also diversity. Diversity increases the number of possibilities in the system and allows the emergence of alternatives needed by a programme in order to cope with crises. This helps ensure the programme's survival and development in the long term. New ideas enter a programme system via people's experiences and relationship with the environment. Therefore, increasing diversity in the system means diversifying people's experiences and their relationships with the environment. From the complex programme system described in this paper, the following possible ways to realise this arise:

- Enriching the experiences and professional relationships of all people involved through professional development. To increase diversity, this professional development needs to reach beyond reinforcement of the dominant—in this case, neoliberal—discourses;
- Increasing the number of people involved. This will increase the number of experiences and relationships, and therefore the number of possibilities, but only if the new people do not bring more of the same, as this would only increase redundancy. For example, in a team of teachers who all have an industry background, this might mean bringing in new people with experience in secondary school teaching, or people who identify with other ethnicities, have a different first language, have different abilities, are of a different age or gender, have different personal life experiences, etc;
- Involving students as programme decision-makers. This means development of programmes *with* instead of *for* students, using students' experiences and relationships with the world to dramatically increase the possibilities for the system's development. In addition to diversification, this would also enable a programme to steer away from "planned enculturation", which is promoted through outcomes-focused discourses, towards an emergent curriculum (Osberg & Biesta, 2008), where students can "explore the social and economic milieu and to construct personally meaningful understandings of the world and their place in it" (Ayers & Carlone, 2007, p. 477).

However, just diversifying the experiences and/or relationships in these three ways does not necessarily diversify the system (Arnold, 1993). The new experiences and relationships must be integrated in the programme system and the people who contribute them need to be acknowledged as equal contributors. Only then are the new experiences and relationships able to connect with all other constituents of the system allowing new possibilities to emerge (Davis et al., 2008). Secondly, the new experiences and relationships must be of sufficient scale and complexity for alternative directions to emerge (Mason, 2008). It is therefore important that professional development, bringing in new people and involving students as programme decision-makers occur across all aspects of a programme and at all levels of programme decision-making within an organisation.

A space for educators to realise this diversification can be found in the autonomy of the people involved with the programme. In the research project, the relationships between the people involved appeared to be structured in alignment with agency theory (Boston et al., 1996): the government as principal has a "contract" or agreed relationship with the institution as agents, and subsequently the institution as principal has "contracts" or agreed relationships with departments and teachers as agents. It was however found that none of the constraints set by these "contracts" dictated who should be involved with a programme. The complex programme system had used the space that autonomy within the constraints provided to construct the group of people involved and define their roles and responsibilities. This implies that this same autonomy offers space to integrate new and diverse experiences and relationships into the system, by revising the group of people involved and redefining their roles and responsibilities.

Other spaces to diversify the system are found in multi-explanatory themes or concepts. For example, "we have a responsibility to students" and "assessments should be fair" have different meanings within different discourses. In the research project, the meanings of such themes were dominated by neoliberal discourses, but their mere existence and acceptance within the system create space for dialogue about their various meanings. For example, in programme discussions, educators could ask: "You talk about assessments having to be fair; what does the word 'fair' mean to you?" The resulting discussion can act as a positive feedback loop (Davis et al., 2008) to strengthen alternative discourses. Other seeds of alternative discourses already found in the system can also be supported to blossom in this way, for example, by initiating and continuing conversations about the meanings of learning, knowledge and teaching.

Considering programmes as open complex systems implies giving up the illusion of predictability and control and accepting that the development of a programme is controlled by the dynamics of the system, and not by individuals or institutions. This implies that the outcomes of a programme system cannot be predicted. As a consequence, the outcomes of any two programmes taught at different institutions are not predictable and almost certainly differ, even if those programmes use the same programme documents, course materials and assessments. Education decision-makers who promote, e.g. collaborative development of programmes, often for purposes of resource efficiency, ignore the dynamics of programme systems not shown in the documents, including the ongoing adaptation of the system after the programme documents have been completed. For example, educators reflect on their experiences in the programme and bring their reflections back into the system in the following year; or new teachers' previous experiences or teachers' interactions with new groups of students will change the courses they teach. As a consequence of these interactions, new possibilities continue to emerge, the programme continues to adapt and the outcomes of the programme continue to change.

It is important to note, however, that this does not imply that the outcomes of a programme cannot be influenced. The research project has shown how discourses in society influence the direction of the programme. This influence can even create an illusion of predictability, as the following illustrates. Measurement of programme outcomes tends to occur through assessment, which measures the outcomes of student learning, and/or evaluation, which measures the effectiveness and efficiency of the programme. Constituents concerning assessment and evaluation are however integral to a complex programme system. This means that they shape and are shaped by the same discourses that direct the system as a whole. Therefore, they can act as a self-fulfilling prophecy, creating an illusion of predictability and controllability of the outcomes they are measuring.

Thus, the unpredictability of outcomes implies that educators must accept that the impact of their contributions to a programme is unavoidably uncertain, but that they do have the power to influence the direction of the system. This implies that the direction of influence—i.e. the discourses that shape the educational process—becomes more important than the focus on outcomes. Instead of being narrowed down by prescribed outcomes and frenetic efforts to monitor and control these outcomes, programmes require no more than decisions on the directions of influence. To do so, it is important to be continuously reminded that a programme is an instrument for education. Education "directs the kind of learning that takes place"; it "purposely shapes the subjectivity of those being educated" (Osberg & Biesta, 2008, p. 314). Hence, deciding on the "right" direction of influence is an enormous responsibility for educators and education organisations.

Unfortunately, complexity theory is unable to provide guidance in this matter. Complexity theory does not concern itself with what ought to be, and therefore ethics and values are inherently absent in complexity theory (Fenwick, 2009; Morrison, 2008). Instead, ethics and values are located in the discourses that steer the direction of a complex programme system. In the research project, neoliberal discourses appeared dominant, but that would not necessarily be the case for programme systems in other contexts.

So where does this leave responsibility? Considering a programme as a complex system does not imply that certain discourses are right and others are wrong. However, it does imply that a too narrow development in the direction of one particular type of discourse—in this project they were neoliberal discourses—endangers the survival of a programme. This paper has explored spaces that allow influencing away from the dominant discourses to increase the possibilities for a programme's survival and continued development. To do this, diversification is needed to help shape programmes that are inclusive of others and of alternative ways of thinking. But this does not take away the responsibility of the people involved. As educators, we are subject to the discourses in our society, and we have a choice to either follow or resist them. If we refrain from making this choice, we will be absorbed into and continue to reinforce the mainstream discourses. This leaves us with the ultimate space for change: our personal and collective responsibilities to debate and decide which discourses to follow. This means that we have a responsibility to think critically about the discourses we choose to follow and to be mindful of the possible consequences of our considerations, experiences, relationships and of the words, expressions, models and systems we use, so we can un-silence the silences and contribute to the sustained development of our programmes and of education for all people.

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Social–emotional competencies among teachers: An examination of interrelationships

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Abstract: Teachers' social–emotional competence is crucial for promoting a positive learning environment to the students. However, the research on teachers' social–emotional abilities is very limited. This study examined the relationship between emotional abilities and self-efficacies and empathy among teachers, hypothesizing that teachers' self-efficacy belief mediates the relationship between the other two variables. We found a strong positive association between the three social–emotional competencies, and direct and indirect (via teachers' self-efficacy) effects of emotional self-efficacy on empathy. These results suggest that teachers' belief in the ability to regulate their emotions contributes to teachers' empathy in both ways.

Subjects: Emotional Development; Teacher Education & Training; Teacher Training

Keywords: emotional self-efficacy; teacher's self-efficacy; empathy

1. Introduction

In the last decade, research suggest that socially and emotionally competent teachers set the tone for strong and supportive relationships between teachers and students (Jennings & Greenberg, 2009). These relationships are fundamental for the healthy development of students in schools and are positively associated with students' academic performance, achievements, social functioning, school engagement, and learning motivation, and negatively associated with behavioral problems

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Meirav Hen, PhD is a practicing clinical psychologist and the head of the department of psychology in Tel-Hai academic college in northern Israel. I practice, teach, and research in the areas where education meets psychology. Specifically, I am interested in teachers' social–emotional competencies, and how do they contribute to teaching and learning processes. I am also interested in how emotional processes are associated and effect learning in higher education. Lately, I have focused my research on topics that are related to academic procrastination, including researching teachers' procrastination in their work place.

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PUBLIC INTEREST STATEMENT

Caring teachers set the tone for strong and supportive relationship between teachers and students. These relationships are fundamental for the healthy development of students in schools and are positively associated with students' academic performance, achievements, social functioning, school engagement, and learning motivation. Interestingly, behavioral problems and dropping from school are often negatively associated with teachers who care. The aim of this study was to examine how teachers self-beliefs in their emotional and teaching abilities will contribute to their empathy toward their students. Findings of this research indicated that when teachers feel confident about their emotional and teaching abilities, they tend to be more caring toward their students. These findings support the notion that in order to enhance teachers' empathy and contribute to the student–teacher relationship, teachers' positive self-beliefs must be in the focus of teachers' training.

and dropping from school (Baker, Grant, & Morlock, 2008; Bernstein-Yamashiro & Noam, 2013; Murray & Zvoch, 2011; Spilt, Koomen, & Thijs, 2011). Jennings (2011) argued that social–emotional competence provides the necessary skill base and dispositions that help teachers to form supportive relationships with their students, effectively manage their classrooms, and successfully implement social and emotional learning. Elias (2009) argued that to be a social–emotional competent teacher means not only to have the skill, but also to be aware and manage oneself and to be aware and manage the relationships with others. He believed that teachers who feel confident about their emotional skills will better recognize and understand students' emotions and their place in the students' behavior (Elias, 2009). Further, these teachers can more effectively respond to the students' needs and instill trust and respect (Jennings & Greenberg, 2009). Other studies that examined specific social–emotional competencies in teachers indicated that both the feelings of self-efficacy and empathy were positively related to the teacher's positive attitudes toward special education students (Hen, 2010), students with disabilities (Barr, 2013), culturally diverse students (McAllister & Irvine, 2002), students with behavioral difficulties (Yoon, 2002), and other students with special educational needs (Stojiljković, Djigić, & Zlatković, 2012).

While there is a fair amount of literature discussing the importance of teachers' social–emotional competencies (Elias, 2009; Jennings, 2011) and some research concerning the contributions of these competencies to teachers' overall practice (Murray & Zvoch, 2011; Spilt et al., 2011), the literature that examines the interrelation between these social–emotional competencies is scarce (Goroshit & Hen, 2014a). It is clear that teachers' empathy contributes their ability to meet students' overall educational needs, and boost students' confidence in the school climate (Cooper, 2004). However, what are the social–emotional competencies that are involved in the enhancement of teachers' empathy? And how do they relate to each other? The focus of this study was to add to this line of literature by examining the interrelation between teachers' emotional and teaching self-efficacies, and teachers' empathy.

1.1. Teacher's empathy

Baron-Cohen (2003) defined empathy as the drive to identify another person's emotions and thoughts, and respond to these with an appropriate emotion. This drive, he believes, provides a way to make sense of, and predict another person's behavior. Lam, Kolomitro, and Alamparambil (2011) argued that empathy is an individual capacity to understand the behavior of others, to experience their feelings, and to express that understanding to them. It is a complex, multi-dimensional concept that has moral, cognitive, emotive, and behavioral components (Mercer & Reynolds, 2002). Empathy has been conceptualized in many different ways (Stojiljković et al., 2012).

Cooper (2010) argued that teacher empathy is a required teaching skill that promotes a positive learning environment to students. Tettegah and Anderson (2007) defined teachers' empathy as the ability to express concern and take the perspective of a student. Such teachers serve as a model of morality for their pupils, by engaging them in positive interaction. Cooper (2004) found that empathic teachers contribute to children's self-efficacy and to their motivation to learn. Empathic teachers were also shown to strengthen their pupils' sense of belonging to their schools, and their relationships with teachers and peers (Schutz & DeCuir, 2002). Empathic teachers possess high moral standards, successfully communicate with their students both emotionally and mentally, and encourage them to create similar relationships with others (Jennings & Greenberg, 2009). Although research supports the view that supportive learning environments, including empathic and supportive teacher practices, are conducive to student learning and achievement, teacher empathy is often overlooked, and it is unclear how it can be enhanced (Arghode, Yalvac, & Liew, 2013). Several studies suggested that teachers' self-efficacy beliefs contribute to their practice and performance and therefore may contribute to their relationship with students and their empathy (Stephanou, Gkavras, & Doulkeridou, 2013). Goroshit and Hen (2014a) found that while gender, years of experience, and an academic degree did not predict empathy among teachers, emotional self-efficacy was a strong predictor. Further, Goroshit and Hen (2014b) found that both emotional and teachers' self-efficacies contribute to empathy in teachers, but the contribution of teaching self-efficacy was larger. This

finding may suggest that teachers' beliefs in their teaching abilities contribute more than their belief in their ability to regulate their emotions to their level of empathy. However, this assumption will be further discussed in the following paragraph, and will serve as a basis for this study.

1.2. Teachers' self-efficacy

According to Banduras' social-cognitive theory (1982), self-efficacy beliefs reflect highly contextual-ized knowledge structures that affect appraisal processes, and guide actions (Caprara, 2002). Teachers teaching self-efficacy beliefs are task-specific self-beliefs concerning teachers' teaching performance (Friedman, 2003). It was found to be associated with a wide range of teaching behav-iors including teaching performance, teaching strategies, teaching styles, class management, and control over the teaching–learning process (Putman, 2012). It has also been associated with teach-ers' self-states including burnout, job satisfaction, well-being, self-regulation, and stress manage-ment (Klassen & Chiu, 2010; Skaalvik & Skaalvik, 2010). Finally, teachers' self-efficacy beliefs were positively associated with student achievements, student and teacher motivation, attitudes toward misbehaved students, and inclusion of children with learning disabilities and mild mental retarda-tion (Roll-Pettersson, 2008).

More recent studies that extended Bandura's (1977) original theory on task-specific self-efficacy suggested that peoples' broader-level self-beliefs that operate across activities and situations con-tribute in different ways to specific domains of individual functioning (Caprara, 2002). When people reflect on their experiences in specific tasks, they construct beliefs about their capabilities in broader domains of functioning, and these broader clusters of self-beliefs in relation with the task-specific self-beliefs will affect appraisal processes, and guide actions (Di Giunta et al., 2010).

People widely differ in how well they manage their emotional experiences of everyday life, not only because they differ in skills but also because they differ in their perceived capabilities to under-stand and regulate their emotions (Caprara et al., 2008). Studies indicated that the beliefs individu-als hold about their ability to identify, express, and regulate emotions in themselves, and in others, help them manage their negative feelings, buffer the perturbing effects of aversive experiences, fa-cilitate adaptive coping, and lead to rewarding and enriching social exchanges and experiences (Bandura, 2001; Folkman & Moskowitz, 2000). Therefore, emotional self-efficacy beliefs refer specifi-cally to the beliefs people hold about their ability to regulate their emotions. On the other hand, teaching self-efficacy beliefs specifically refer to teacher's self-beliefs about their teaching abilities. These two concepts are similar in the way they examine self-beliefs; however, they differ in the com-petence they examine and also in the type of self-beliefs they present. Emotional self-efficacy pre-sents a broad-level type of self-belief, while teaching self-efficacy refers to a specific task (e.g. teaching).

Following the above literature and recent studies, we assumed that emotional self-efficacy be-liefs, which refer to teachers' self-beliefs about their abilities to regulate emotions, may be a broad domain contributor to teachers' empathy. We expected that teachers' self-beliefs about their teach-ing abilities that serve as task-specific self-beliefs will have a mediating effect in this relationship. In other words, we assumed that higher emotional self-efficacy will contribute to higher teachers' self-efficacy, and they both will contribute to higher empathy in teachers.

2. Method

2.1. Participants and procedure

This study is based on a convenience sample of 312 teachers from several schools that agreed to partici-pate in a study about their teaching practices. The sample consisted of 71% females and 29% males, with a mean age of 40.6 years (SD = 11.1, range 22–69) and mean years of teaching experience of 14 years (SD = 11, range 1–42). 53% of the participants graduated from a general college, 32% from university, and 14% from a teaching college (e.g. a 3-years college for teachers in Israel). 51% of the teachers in the sample are elementary school teachers, 35% are high-school teachers, and 14% junior

high-school teachers. To assure that the participants from different contexts do not differ significantly in sense of main research variables, we performed comparisons between different schools and graduate institutions. These comparisons revealed no significant differences between participants.

The data were collected by research assistants in 10 schools in northern and central Israel. The assistants explained to the participants that the purpose of the study was to deal with attitudes and perceptions of teachers and that participation was voluntary and anonymous. 350 questionnaires were distributed in total and 312 were filled and returned to us, with the refusal rate amounting to about 11%. Completing the questionnaire lasted 20 min on average. All participants were assured that the data will be kept confidential and used only for research purposes.

2.2. Instruments

2.2.1. Empathy
Empathy was measured using the Inter-personal Reactivity Index (IRI, Davis, 1983). This instrument contained 28 statements on a 5-point Likert scale (from 1—*does not describe me at all* to 5—*describes me well*) measuring 4 dimensions: (1) perspective taking (e.g. *I believe that there are two sides to every question and try to look at them both*), (2) empathic concern (e.g. *I often have tender, concerned feelings for people less fortunate than me*), (3) fantasy (e.g. *I really get involved with the feelings of the characters in a novel*), and (4) personal distress (e.g. *Being in a tense emotional situation scares me*). The validity and the dimensionality of the English version IRI scale were investigated using factor analysis, testing convergent and discriminant validity (Davis, 1983). In addition, this scale was validated in different countries (see, e.g. Cliffordson, 2001 for Sweden, Fernández, Dufey, & Kramp, 2015 for Chile and Siu & Shek, 2005 for China).

For the purposes of our study, we used three out of four dimensions. The internal reliabilities of the scales were: α = .82 for perspective taking, α = .80 for empathic concern, and α = .84 for fantasy. The questionnaire was adjusted to school situations by incorporating images of teachers and students in the items, for example: "I often see things from the pupil's perspective" instead of "...from another's perspective" (Hen, 2010).

2.2.2. Emotional self-efficacy
To measure emotional self-efficacy, we used Emotional Self-Efficacy Scale (Kirk, Schutte, & Hine, 2008). This instrument comprised 32 items on a 5-point Likert scale (from 1—*does not describe me at all* to 5—*describes me well*). Each item represents one of the four dimensions: (1) understanding emotions (e.g. *I know what causes my negative feelings*), (2) perceiving other's emotions (e.g. *I am able to recognize other person's negative feelings*), (3) facilitating emotions (e.g. *I know how to use positive feelings to produce good ideas*), (4) regulating emotions (e.g. *I am able to change negative feelings into positive ones*). This instruments' validity has been tested and established in different populations, like university students (Dacre Pool & Qualter, 2012) and young adolescents (Qualter et al., 2015), and in different ethnic groups, like Turkish students (Totan, 2014). In addition, this instrument was tested for test–retest reliability and was found to be reliable (Kirk et al., 2008). In our research, the internal reliabilities of the dimensions were: α = .83 for understanding emotions, α = .89 for perceiving other's emotions, α = .87 for facilitating emotions, and α = .84 for regulating emotions.

2.2.3. Teaching self-efficacy
To assess teachers' self-beliefs toward their teaching, we used a Teaching Self-Efficacy scale (Friedman & Kass, 2002). This instrument included 33 items on a 5-point Likert scale (from 1—*does not describe me at all* to 5—*describes me well*) measuring 2 dimensions: (1) the classroom context (e.g. *I think I know when to involve my students in decisions concerning learning issues*), (2) the school context (e.g. *I think I can play an important role in solving serious school problems*). In the current research, the internal reliabilities of the dimensions were: α = .86 for classroom context, α = .91 for school context.

To assess the robustness of the regression coefficients to the possibility of spurious associations, we used four additional variables in line with previous studies on teachers' empathy. These included age, gender (1—male), academic degree (1—M.A., 0—B.A., or B.Ed. as a proxy for education), and years of teaching experience (see e.g. Castillo, Fernández-Berrocal, & Brackett, 2013; Stojiljković et al., 2012).

2.3. Analysis strategy

2.3.1. Parcels

To measure our dependent and independent constructs, we created parcels of items. Parcels are usually computed by mean scoring of multiple indicators representing the same construct. In cases of relatively large number of indicators, parcels are often preferred over single items, because they allow one to reduce the number of indicators and thereby to avoid measurement problems such as method of variance, correlation between items' measurement errors, and cross-loadings of items representing one factor, on another factor (Sass & Smith, 2006). Although this technique is sometimes criticized as a way "to sweep problems under the carpet" (see, e.g. Marsh, Nagengast, & Morin, 2013), we find it appropriate in our case due to high inter-item consistency of our scales and subscales.

2.3.2. Data analysis

As a preliminary stage of our analysis, we created a bivariate correlation matrix between our research variables: parcels of items representing each theoretical construct and control variables (see Table 1). Then, using structural equation modeling, we performed a simultaneous confirmatory factor analysis, where our three constructs (emotional self-efficacy, teaching self-efficacy, and empathy) were represented by latent variables, and their indicators were represented by items parcels' means.

Afterward, taking into account the control variables, we tested a model where emotional self-efficacy was a predictor, teaching self-efficacy was a mediator, and empathy was a predicted variable. This model has been tested twice: first with teacher self-efficacy as a full mediator (see Figure 1(A) and second as a partial mediator (see Figure 1(B)). These two nested models have been compared using Chi-square difference test, and the best fitting model has been chosen.

| Table 1. Pearson correlation coefficients between the research variables												
		1	2	3	4	5	6	7	8	9	10	11	12
1	Understanding		.76***	.46***	.54***	.40***	.14*	.19**	.38***	.39***	−.11	.01	.20**
2	Perceiving			.57***	.71***	.51***	.16*	.26***	.35***	.48***	−.11	.02	.25***
3	Facilitating				.63***	.58***	.33***	.25***	.17*	.43***	−.05	.02	.21**
4	Regulating					.53***	.23***	.27***	.32***	.54***	−.07	−.03	.21**
5	Class context						.43***	.27***	.20***	.49***	.01	.09	.34***
6	School context							.06	.01	.17**	.08	.04	.20**
7	Fantasy								.09	.30***	.03	−.01	.21**
8	Empathic concern									.48***	−.12*	−.07	−.04
9	Perspective taking										−.11	−.01	.14
10	Gender (1-male)											.15*	−.07
11	Academic degree (1-MA)												.33***
12	Years of work experience												
	M	3.68	3.71	3.30	3.36	3.45	3.25	2.81	4.13	3.58	.28	.20	11.55
	SD	.54	.55	.61	.55	.44	.93	.64	.55	.57	.45	.40	11.03

*p < .05.

**p < .01.

***p < .001.
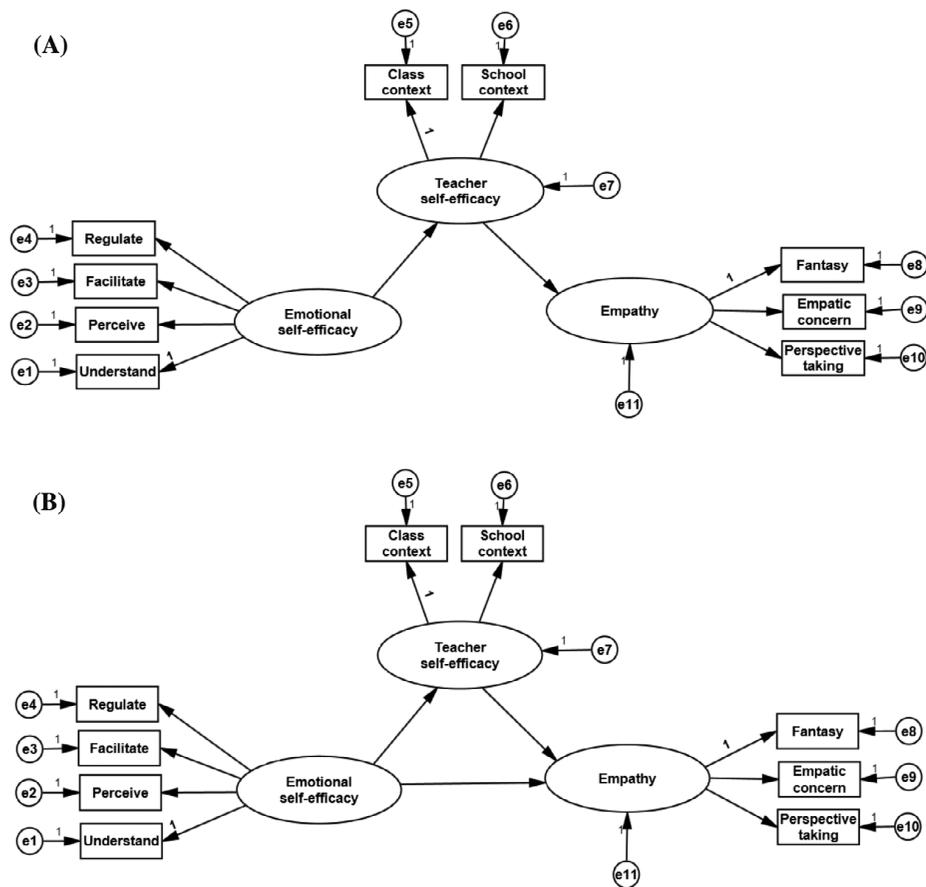
Figure 1. Full (A) and partial (B) mediation models.

Note: Control variables were omitted from the figures to simplify the graphic representation of relationships between variables.

3. Results

Examination of correlation matrix between the research variables revealed positive correlations between emotional self-efficacy and teaching self-efficacy parcels. These correlations were stronger for class-context parcel rather than school-context parcel. Similar pattern appears in correlation between empathy and teaching self-efficacy parcels, where the correlations of class-context and empathy parcels are stronger as well. In addition, there are positive correlations between emotional self-efficacy and empathy parcels. Finally, the control variables showed weak or no correlations with the empathy parcels (see Table 1).

Results of confirmatory factor analysis showed a good model fit (χ^2 = 40.66, df = 22, p < .01, χ^2/df = 1.85, *CFI* = .98, *TLI* = .97, *RMSEA* = .06, *PClose* = .35). All standardized factor loadings were above .40 and there was no cross-loading. All these support the scheme of construction of our latent variables.

Full structural equation model for prediction of empathy by emotional self-efficacy with teaching self-efficacy as a full mediator explained 49% of variance in empathy, but the model fit was relatively poor (see Figure 1(A) and Table 2).

Addition of direct path from emotional self-efficacy to empathy increased model explained variance up to 53% and improved the model fit (see Figure 1(B) and Table 2). Based on comparison between the two models, we concluded that the partial mediation model fits the data better, suggesting that emotional self-efficacy has direct as well as indirect positive effect on teachers' empathy.

Table 2. Standard and bootstrap estimates and confidence intervals for mediating effect of teacher's self-efficacy

IV	DV	Effect (standardized)			Model fit
		Direct	Indirect		Total	
		βp	βp	Bootstrap95% CI($N = 2{,}000$)	βp	
Full mediation model[1]						$\chi^2 = 94.81$, *df* = 41, *p* < .001, χ^2/*df* = 2.31, *CFI* = .96, *TLI* = .93, *RMSEA* = .07, *PClose* = .05
Emotional SE	Teacher SE	.73<.001				
	Empathy		.52<.01	.36; .66	.52<.01	
Teacher SE	Empathy	.71<.001				
Partial mediation model[2]						$\chi^2 = 67.83$, *df* = 40, *p* < .01, χ^2/*df* = 1.70, *CFI* = .98, *TLI* = .96, *RMSEA* = .05, *PClose* = .49
Emotional SE	Teacher SE	.67<.001				
	Empathy	.47<.001	.22<.01	.07; .37	.69<.001	
Teacher SE	Empathy	.33<.01				
Model comparison						Δχ^2 = 26.98, Δ*df* = 1, *p* < .001, Δ*CFI* = .02

[1]R^2 of Teacher SE = .60, R^2 of empathy = .49.

[2]R^2 of Teacher SE = .52, R^2 of empathy = .53.

Decomposition of effects showed that the direct effect is twice stronger than the indirect one and that both effects are statistically significant.

4. Discussion

This study examined to what extent specific-task and broader-level self-efficacy beliefs contribute to empathy in teachers. Following recent research (Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003; Caprara et al., 2008; Di Giunta et al., 2010), the present study hypothesis was that emotional and teaching self-efficacy beliefs will predict empathy in teachers, while teaching self-efficacy beliefs will mediate the relationship between emotional self-efficacy and empathy among teachers.

The main findings indicated that emotional self-efficacy has a direct as well as an indirect positive effect on teachers' empathy and that teaching self-efficacy partially mediated this relationship. These findings support the notion that teachers who believe in their efficacy to identify and regulate emotions will be able to be empathic toward their students, and that it is only partially mediated by teaching self-efficacy beliefs.

These findings support the findings of Caprara et al. (2008) regarding the direct contributions of emotional self-efficacies to young adults' positive emotions and prosocial behaviors and strengthen the argument that regarding the dominance of broad-domain self-efficacies. It further suggests that teachers' beliefs about their teaching abilities are important and relevant to teachers' empathy (Cooper, 2004), but is only partially involved when teachers feel confident to handle their emotions (Jennings, 2011). Interestingly, these findings stress the relevance of enhancing emotional self-efficacy among teachers. Further findings indicated that both self-efficacies and empathy are positively related, especially regarding the class context. This supports the idea that the three constructs represent the larger domain of teachers' social–emotional competencies, and that self-beliefs are associated with beliefs toward others (Fried, 2011; Jennings & Greenberg, 2009). This association becomes more apparent in the class context, where most teachers are on their own, and must depend on their inner self-beliefs (Stephanou et al., 2013).

Finally, our findings indicated that empathy was weakly or not associated with teachers' gender, academic degree, or experience. Our findings add to the inconsistency of findings relating to

teachers' empathy (Arghode et al., 2013; Cooper, 2010), and stress the need to further study this emotional competence in teachers (Tettegah & Anderson, 2007).

The limitations of this study pertain mostly to the sample and to the self-reported measurements. Although the sample was of good size, it was composed mostly of female teachers who teach in elementary or high school. Junior high-school was less represented. This might suggest a limitation to generalization of findings across male teachers and all school levels. In addition, this research employed only self-report questionnaires, which may bias the findings as well, and was a cross-sectional study, which does not allow concluding about causal relationships between research variables.

Future studies should address these limitations, and further examine teachers' social–emotional competencies, and how they contribute to affective teacher–student relationships. Additional research should explore task-specific and broad-domain self-efficacies in teachers, to better understand the relationship between them, and their associations to empathy and self-beliefs toward others. Finally, future research should emphasize ways to enhance teachers' social–emotional competencies, and the specific roles of task-specific and broader-level self-efficacies.

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Teachers' perceptions of examining students' thinking: Changing mathematics instructional practice

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Abstract: This paper seeks to illuminate teachers' perceptions of the challenges and benefits of systematically examining students' thinking as part of a professional development program in elementary mathematics education. Using a framework of models of conceptual change and principles of discomfort, three elementary teachers' perceptions of their experiences with reform-oriented mathematics instruction and systematically examining students' thinking were analyzed. Analysis of interview data yielded five organizing themes. Findings offer insight into understanding the efficacy of examining students' thinking as a professional development strategy.

Subjects: Continuing Professional Development; Mathematics & Numeracy; Teaching & Learning

Keywords: conceptual change; discomfort; motivation; qualitative research; reform-oriented mathematics; self-efficacy

1. Introduction

Over the past two decades, organizations such as the National Council of Teachers of Mathematics (NCTM) (1991, 2000, 2014) and the National Governors Association Center for Best Practices and Council of Chief State School Officers (NGA Center & CCSSO) (2010) have attempted to improve the teaching of mathematics by outlining standards for instructional practices and student learning. These standards describe classrooms in which students engage in worthwhile mathematical tasks, participate in robust mathematical discussions, and develop deep mathematical understanding through the use of various models and representations. Acknowledging the key role of the teacher in the classroom (Mewborn, 2003), NCTM has also called for teachers to have a deep understanding of the mathematics they teach, to facilitate

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PUBLIC INTEREST STATEMENT

In general, change is not easy. Sometimes, changes are frustrating and paralyzing. At other times, changes are educative and empowering. This paper examines the changes experienced by three elementary teachers as they examined their students' thinking and incorporated what they learned into their lessons. The teachers' comments shed light on the importance of positive self-efficacy and motivation in overcoming challenges and making positive and long-term changes.

meaningful mathematical discourse, and to reflect on the outcomes of each lesson (National Council of Teachers of Mathematics, 2007). Such instruction requires teachers to examine students' mathematical thinking and to use that examination to inform their lessons. The implementation of such reform-oriented techniques requires a substantial change in the beliefs and attitudes of most teachers toward teaching mathematics—a change that can be quite challenging.

This study explored teachers' perceptions of changing their own instructional practice as a result of focusing on students' mathematical thinking. The following research questions guided the study:

- What do elementary teachers perceive as challenges and benefits of systematically examining students' thinking?
- How do elementary teachers perceive the impact of examining students' thinking on their professional growth?

2. Literature review

Among the various options for professional development programs (Loucks-Horsely, Stiles, Mundry, Love, & Hewson, 2010), examining students' thinking has been demonstrated to be influential in transforming how teachers view their role in the classroom and how they implement reform-oriented instructional techniques (Hawley & Valli, 2000; Love, Stiles, Mundry, & DiRanna, 2008). The following sections highlight key ideas related to examining students' thinking and the processes of changing instructional beliefs, knowledge, and practice.

2.1. Examining students' thinking

Little (1999) describes the examination of students' thinking as "the systematic, sustained study of student work, coupled with individual or collective efforts to figure out how that work results from the practices and choices of teaching" (p. 235). The use of student work in professional development gives teachers the opportunity to examine their teaching practices in the context of their own students' learning needs, and the disequilibrium often caused by such an examination acts as a catalyst for transformational thinking (Thompson & Zeuli, 1999). Thus, as teachers examine students' thinking, they are more likely to make meaningful changes in their instruction. Various protocols exist for the examination of students' thinking as found on the websites for National School Reform Faculty (http://www.nsrfharmony.org/) and Looking at Student Work (http://www.lasw.org/). Despite the variety of protocols, they generally follow the same general format (Loucks-Horsely et al., 2010):

- Identification of a focus or goal by answering the question: "What do we want to learn from the student work?"
- Selection of student work that relates directly to the identified goal and outcomes.
- In-depth analysis of student work and its relationship to teacher practice.
- Reflection on the implications and applications of what is learned to teaching.

Through this reflective process, teachers begin to apply current research and think differently about their teaching practices (Everett, Luera, & Otto, 2006; Fullan, 1999). Reflection enables teachers to objectively examine their practice and to make necessary changes to improve it.

Research has suggested that as teachers examine student work and witness learning results, they are more likely to make sustained and effective changes to their teaching knowledge, beliefs, and practices (Borko, Jacobs, Eiteljorg, & Pittman, 2006; Carpenter, Fennema, & Franke, 1996; Jacobson & Lehrer, 2000). For example, in a follow-up study on a professional development program focused on students' thinking, Franke, Carpenter, Levi, and Fennema (2001) found that four years later all 22 teachers in the study still incorporated children's thinking into their lessons. They also found that half of the teachers had continued their own learning and had become intimately knowledgeable about their current students' mathematical thinking. Likewise, Busi and Jacobbe (2014) and Doerr (2006) reported increased levels of teachers' understanding of the diversity of students' thinking and how that diversity may be

used to inform instruction. Kazemi and Franke (2004) described their work with ten elementary teachers during monthly meetings to examine and analyze students' thinking. At the beginning of the school year, these teachers found it difficult to identify the details of students' problem-solving strategies. However, as they gained more experience with examining and discussing student work, these teachers became more adept in recognizing mathematical ideas embedded in their students' thinking and in designing future instruction based on their students' needs.

2.2. Changing instructional beliefs, knowledge, and practice

Many factors influence teachers' experience with changing their instructional beliefs, knowledge, and practice. Gregoire's (2003) Cognitive-Affective Model of Conceptual Change (CAMCC) describes the transformation process of teachers when faced with conceptual change in their subject matter beliefs (see Figure 1). Change that occurs in a classroom is affected by how the teacher perceives personal goals and prior beliefs in relation to the reform message presented. The CAMCC model suggests that weak motivation to change, perceived lack of subject matter knowledge, or indifference toward the change can result in a superficial belief change. On the other hand, a teacher with strong motivation to change and who possesses sufficient self-efficacy—belief in one's ability to produce an effect (Bandura, 2001)—can experience a more powerful conceptual change in belief and attitude. The degree to which a teacher embraces change depends upon prior beliefs and experiences. Contextual factors, including teachers' time and available resources, also influence change. Gregoire (2003) suggests that teachers should be given the opportunity to practice incorporating change into their classrooms while receiving feedback and assistance during implementation. Those who wish to implement change need to recognize that increasing teachers' motivation alone is not enough to change their beliefs. Teachers need time to reflect on the challenge and receive appropriate conceptual support. Lastly, a teacher's epistemological beliefs will also have an effect on changes made in the classroom (Gregoire, 2003).

As teachers consider changing instructional practice, they likely encounter varying degrees of discomfort and uncertainty that may impede the process of change. As a result of a 3-year study of middle school teachers' implementation of a reform-oriented mathematics curriculum, Frykholm (2004) identified four types of discomfort: (a) cognitive, (b) beliefs-driven, (c) pedagogical, and (d) emotional. The question remains, however, as to whether these types of discomfort are debilitating or educative in teachers' change processes. Frykholm (2004) suggests that debilitating discomfort most likely arises when teachers lack sufficient content knowledge (cognitive discomfort), strongly disagree with the philosophy of reform-oriented curricula (beliefs-driven discomfort), or possess a low tolerance for discomfort (emotional discomfort). Teachers experiencing debilitating discomfort are less likely than teachers not experiencing such discomfort to sustain any lasting change of practice. However, teachers' abilities to tolerate discomfort seem to correlate positively with a view of discomfort as educative and part of the learning process. Frykholm (2004) suggests that beliefs-driven and emotional discomforts possibly present the most debilitating impact on teachers' change processes.

Teachers' beliefs about themselves also enable them to exercise control over their thoughts and actions and to be self-organizing, proactive, self-reflecting, and self-regulating. A teacher's self-efficacy (i.e. belief in one's ability to produce an effect) determines thoughts, actions, feelings, and self-motivation (Turner, Warzon, & Christensen, 2011). These effects or actions are produced through cognitive, motivational, and affective processes (Bandura, 2001). As new challenges are posed, a teacher normally experiences some amount of stress. Teachers with high self-efficacy approach difficult tasks as challenges to be mastered (Bandura, 2001). This attitude leads them to set challenging goals and maintain strong commitment to those goals. When setbacks or failures occur, they increase their efforts. When teachers believe that they have enough resources and skills to cope with the challenges, then positive change is likely to occur. In contrast, teachers who doubt their capabilities shy away from difficult tasks, which they view as personal threats. They have low expectations for themselves and a low level of commitment to goals. When faced with difficulties, they dwell on their personal deficiencies or other obstacles rather than focusing on the tasks at hand.
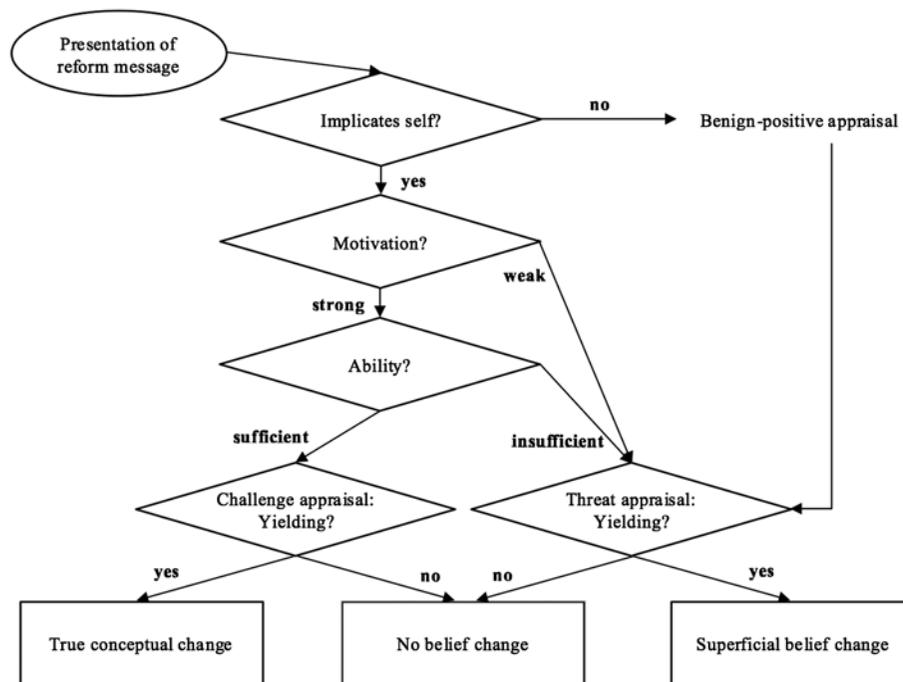
Figure 1. Cognitive-affective model of conceptual change (Gregoire, 2003).

The literature also reveals reasons why teachers may resist change. According to Zimmerman (2006), individuals may fail to recognize the need for change because they perceive the current situation as more desirable than trying something new. More effort might be required to develop new skills or habits, so they prefer to maintain the status quo. Also, previously unsuccessful efforts at change may cause teachers to be skeptical of other attempts. Further, familiar ways of doing provide a sense of security for most people. Teachers may lose this sense of security when faced with changing established instructional patterns. Zimmerman (2006) stated that proposed changes in instruction may threaten teachers' expertise and skill in teaching. They may not feel confident in their abilities to implement the change; therefore, they may resist it.

3. Methodology

This study was part of a larger mixed methods study that examined teachers' growth and change with respect to their knowledge, beliefs, and attitudes related to mathematics teaching and learning (forthcoming). In this larger study, 52 elementary teachers participated in a 2-year Elementary Mathematics Endorsement Program, hereafter referred to as Endorsement. The 18-credit Endorsement included coursework on learning principles, research-based teaching strategies, and mathematics content specific to grades K–6 (e.g. whole number operations, rational numbers, geometry, algebra). Teachers' growth was measured by reflective journal assignments throughout the Endorsement and by the administration of pre- and post-assessments given at the onset and completion of the Endorsement. The pre- and post-assessments measured teachers' knowledge, attitudes, and beliefs related to mathematics teaching and learning and were, respectively:

- Learning Mathematics for Teaching (LMT) Instrument (Hill, Schilling, & Ball, 2004)
- Self-Report Survey: Elementary Teachers' Commitment to Mathematics Education Reform (Ross, McDougall, Hogaboam-Gray, & LeSage, 2003)
- Integrating Mathematics and Pedagogy (IMAP) Web-Based Beliefs Survey (2001)

Teachers in the Endorsement designed a capstone project during the last semester of coursework in which they systematically examined their students' thinking and used it to inform their instruction. Through this project, teachers had the opportunity to implement the principles and practices

that they had learned during their coursework, to evaluate the results of their implementations, and to reflect on their instructional practice. Teachers reported the results of their projects in a written format of their choice (e.g. formal paper, outline, PowerPoint presentation, or theatrical production) and made "poster session" summary presentations to their colleagues and district administrators. This paper focuses on the teachers' perceptions at the end of the Endorsement having reflected on their instructional practice and their students' thinking in the capstone project.

3.1. Participants

Three elementary teachers who had completed a capstone project in the Endorsement were interviewed on their experience—one fifth-grade teacher and two sixth-grade teachers with a combined 56 years of teaching ranging from 16 to 21 years. These elementary teachers were chosen because of their unique profiles on the pre- and post-assessments from the larger study—either making significant or negligible gains on each assessment. At the time of the interview, each teacher had a bachelor's degree and was pursuing a master's degree in education. The selected teachers teach students in three different schools in one school district.

Ethical considerations were upheld in accordance with current guidelines (National Commission for the Protection of Human Subjects of Biomedical & Behavioral Research, 1978). Teachers' participation in this study was solicited after their completion of the Endorsement, and their participation or non-participation had no effect on their employment or academic status. Having given informed consent, teachers were free to withdraw from the study at any time and were not required to respond to any interview question that they felt uncomfortable answering. Teachers' privacy was maintained through the use of pseudonyms, and security measures were taken to safeguard the collected data. The following sections give a description of each participant's school and classroom.

3.1.1. Shannon

The first teacher, Shannon, teaches fifth grade in an elementary school of about 450 students. In her classroom, students sit in groups of four with their desks facing each other. A SMART Board™ is located at the rear of the classroom along with a roundish table for small-group meetings. A whiteboard at the front of the classroom displays the daily schedule and assignments. The walls and bulletin boards display posters, student work, and other visuals for a variety of subjects. The mathematics displays include a number line and posters for place value, divisibility rules, and mathematics vocabulary words. Shannon's enthusiasm for learning shines through in her teaching, and she is attentive to her students' needs.

Shannon was selected for this study because the pre- and post-assessments indicated that she started with limited knowledge and traditional attitudes toward mathematics instruction and demonstrated a major shift toward reform mathematics by the end of the Endorsement. Additionally, the beliefs measure indicated that she started with views already well-aligned with reform mathematics instruction.

3.1.2. Barbara

The second teacher, Barbara, teaches sixth grade in an elementary school of about 750 students. In Barbara's classroom, students sit in groups of five or six at long rectangular tables. Each table is equipped with a supply center: a plastic crate with pencils, colored pencils, glue sticks, and hanging file folders for keeping students' loose papers. Below each supply center, there is a space for students' textbooks when not in use. A roundish table at the front and a rectangular table at the rear of the classroom provide spaces for small groups to meet. The walls are lined with student-created posters. The whiteboard at the front of the classroom displays the daily schedule and a list of the learning objectives for each lesson. Barbara's infectious smile greets all who enter her classroom, and she strives to engage her students in meaningful mathematics lessons.

Barbara was selected for this study because, like Shannon, the pre- and post-assessments indicated that she started the Endorsement with limited knowledge and somewhat traditional attitudes toward mathematics instruction, but exhibited beliefs already well aligned with reform mathematics

instruction. However, unlike Shannon, the pre- and post-assessments indicated little change in her knowledge and attitudes toward reform mathematics by the end of the Endorsement.

3.1.3. Natalie

The third teacher, Natalie, teaches sixth grade in an elementary school of about 750 students. In Natalie's classroom, students sit at desks arranged in either pairs or longer rows. A whiteboard and pull-down screen is located at the front of the classroom along with two computer stations and a document camera. A roundish table for small-group meetings is located at the rear of the classroom. The walls and bulletin boards display posters for a variety of subjects. The mathematics displays include student-generated posters for calculation procedures and professionally made posters for place value, geometry, fractions, and other mathematics symbols. Natalie has high expectations for her students in both academics and behavior, and she provides a supportive environment for her students' success. She warmly greets students individually as they enter the classroom and shows genuine concern for their well-being.

Natalie was selected for this study because the pre- and post-assessments indicated that she started with limited knowledge and very traditional views of mathematics instruction and demonstrated a major shift toward reform mathematics instruction by the end of the Endorsement.

3.2. Data collection and analysis

The purpose of this study was to explore teachers' perceptions of changes their own instructional practice as a result of systematically examining students' mathematical thinking. Therefore, interviews provided the main source of data for analysis. One semi-structured interview was conducted with each teacher following an observation of the teaching of a mathematics lesson on the same day. Questions on the interview protocol focused on the process of systematically examining students' thinking, the teachers' opinions of the capstone project, and the teachers' perceptions of how the examination of students' thinking impacted their instructional practice (see Table 1). Interviews lasted 20–30 minutes and were conducted during teachers' preparation time at their convenience. Interviews were audiotaped and transcribed within one week of the interview (Creswell, 2012). Next, individual follow-up questions were emailed to each participant along with a copy of the participant's interview transcription. This resulted in chains of email conversations that provided further data for analysis and clarification on the initial interview responses.

A thematic analysis of the data involved (a) preliminary reading and exploration of the interview transcripts, (b) generating initial codes and pulling direct quotes to highlight patterns, (c) collapsing of categories into organizing themes, and (d) identifying patterns in the organizing themes to determine global themes (Boyatzis, 1998; Braun & Clarke, 2006). This analysis identified three global themes and several organizing themes (see Table 2).

Validity and reliability were established through triangulation of different data sources (Merriam, 2009; Yin, 2009): (a) interview responses, (b) classroom observations, and (c) member checking by sharing preliminary results of the analysis with the participants who provided feedback on the accuracy of the interpretations (Merriam, 2009). To support the construct validity of the study, the data were compared with established literature on teacher change (e.g. Bandura, 2001; Frykholm, 2004; Gregoire, 2003; Turner et al., 2011) to determine if the findings were consistent with current trends or whether the findings provided new insights.

4. Findings

The following sections describe the three categories of organizing themes that emerged from the analysis of the semi-structured interviews: perceived challenges, perceived benefits, and perceived change and growth.

4.1. Perceived challenge of systematically examining students' thinking

The one organizing theme that emerged relating to perceived challenges of systematically examining students' thinking was *uncertainty of getting started*. The teachers' comments on this topic

Table 1. Semi-structured interview protocol for teacher's experience with examining students' thinking	
Category	**Interview prompts**
Capstone project	Tell me about your capstone project.
	Why did you decide to focus on this particular topic?
	What did you learn from doing your capstone project?
Difficulties	How have you found the experience of examining students' thinking in your classroom?
	What did you find difficult while systematically examining your students' thinking?
	Why was it difficult?
	What did you like about examining students' thinking in your capstone project?
	If you were to systematically examine students' thinking again in your classroom, what would you want it to look like?
	What would you do differently?
Change and growth	How would you describe your teaching practice and philosophy?
	Can you think of a memorable story that exemplifies this practice?
	In your opinion, how did the capstone project influence your teaching of mathematics?
	In what ways do you think you have changed the most in your teaching of mathematics?
	How do you think students best learn mathematics?
	Tell me about your typical math lesson.
	What else would you like to share with me about your experience with your examination of students' thinking?

Table 2. Global and organizing themes in the thematic analysis	
Global themes	**Organizing themes**
Perceived difficulties of systematically examining students' thinking	Getting started
Perceived benefits of systematically examining students' thinking	Opportunity to reflect on practice
	Gaining knowledge to inform teaching
Perceived change and growth in instructional practice	Increased awareness of students' needs
	Broader perspective and sustained learning

centered around the enormity of narrowing down a specific aspect of students' thinking to examine. For example, Barbara commented, "[It was difficult until] I could figure out what I wanted. That was the hard thing of all the different things …. Once I zeroed in, then it all fell into place. But it was like, 'Oh, I could do this! Or I could do this!'"Natalie also felt uncertain, even after having decided on a topic, as illustrated by her comment "I wasn't sure if what I was doing was right." She also recalled that the process was very time consuming. Shannon felt the most overwhelmed by the process. She reflected,

> It was tough. It was. In fact, it stressed me out because I didn't really know how to do it …. I even took off a day. I took a personal leave day to sit down and do it because it stressed me so badly.

In terms of Frykholm's (2004) Teacher Discomfort framework, the concerns caused by this challenge could be classified as either cognitive or emotional discomfort. The cognitive discomforts created by not knowing exactly how start the project combined with the emotional discomforts of feeling overwhelmed had potentially debilitating effects. Shannon's comment that the enormity of the project

"stressed [her] out" reflects this emotional discomfort. However, each of these teachers successfully completed their capstone project of systematically examining student work. Perhaps their success was due to a high sense of self-efficacy, which helped them to approach the undesirable tasks as challenges to be mastered, rather than impossible undertakings (Bandura, 2001).

4.2. Perceived benefits of systematically examining students' thinking

Two organizing themes emerged relating to perceived benefits of systematically examining students' thinking. The first theme to emerge from the teachers' responses was the benefit of *reflecting on their teaching practice*. For example, Shannon recounted the following realization:

> This telling, getting up and just showing [the students] how to do it … I could see where it was not as effective …. I thought, 'There's something missing here.' I didn't know what it was but [I knew] there had to be more.

Likewise, Barbara reflected, "For me personally, it just made me look inward and really made me think. How can I fine-tune this? How can I tweak this to make it better?" Both of these teachers demonstrated high levels of self-efficacy, in that they believed that they had the ability to identify and make positive changes in their instructional practice. They took ownership of their instruction and sought to improve it.

The second organizing theme that emerged was *gaining knowledge to inform teaching*. Many of the comments related to this theme followed directly from teachers' comments on the value of reflection, discussed previously. For example, when discussing her experience, Shannon stated, "It's the knowledge and the informing that counts for me—what I learn that I can take back with my kids." She went on to describe how she planned her instruction based on her examination of students' thinking. "I realized [that I needed to] put proofs and put conjectures and have [the students] prove—have them use mathematical language to express how they say it and how they're thinking." Likewise, Barbara recognized the benefit of closely examining students' thinking.

> One of the things that we're really trying to push is to get to those students who are not getting it, and then figuring out a way that we can help them. That's what [examining student thinking] did. It was helping me zero in and see how I could help move them along.

Shannon further pointed out parallels between systematically examining students' thinking and lesson study (Lewis, Perry, & Hurd, 2004). She recognized both as processes for making instructional changes based on her students' needs.

> It's kind of like lesson study …. I'm not someone that likes to just do things exactly patterned. I like to say, 'Ok this is lesson study. Now how is it going to fit in? I'm going to change this and I'm going to change that and I'm going change this.' That's me. Ha-ha. I'm that kind of a teacher. I can't teach out of a textbook. I take my lessons, I start from scratch, and I pull all my resources together and I build on my lessons.

In terms of Gregoire's (2003) CAMCC, the enormity of systematically examining students' thinking may have been viewed by these teachers as a threat because of perceived insufficient ability (i.e. cognitive discomfort, not knowing how to do it) in this area. However, the actual project was viewed as a worthy and attainable challenge. It appears that for these teachers, the perceived benefits of systematically examining students' thinking overpowered the debilitating effects of discomfort, resulting in an overall positive experience for these teachers.

4.3. Perceived change and growth in instructional practice

Two organizing themes emerged related to teachers' perceived change and growth in instructional practice. First, when asked about what they had learned from systematically examining students' thinking, the teachers' responses reflected an *increased awareness of student needs*. For example, Barbara learned to be more patient with students who needed "a little bit more time and practice. It

just took more time—practice, practice, practice." Likewise, Natalie remarked, "I just learned that kids learn things in different ways .... So that's the thing that I learned the most—that kids are adaptable."

Second, the teachers' comments reflected a *broader perspective and sustained learning*. For example, Natalie recognized connections to instructional practice other than mathematics.

> I think it just broadened my vision a lot more. Just going through the process of it and seeing what the kids learned broadened what I knew .... It carries over into reading comprehension strategies and what we do there, and how I can differentiate.

Shannon observed that since systematically examining her students' thinking, she has learned new things on a consistent basis.

> I find when we share strategies and we look at [problems] in different ways, [the students] make connections that they normally wouldn't make .... And I make connections as a teacher. Every year, I'm always surprised when someone comes up with something, and I go 'Wow! That just builds on mine!' So it's exciting.

Likewise, Natalie remarked on her own learning, "I must have learned something because it's still here. It's still with me, and I still do it. Now it's a natural part of what I do. So I think overall ... as difficult as it was ..., it was so beneficial." In terms of Gregoire's (2003) CAMCC, these comments are reflective of true conceptual change.

5. Discussion

The three teachers interviewed for this study had similar, yet unique experiences with systematically examining their students' thinking and enacting instructional change. Their comments provide insight into how teachers perceive changes in their instructional practices.

Shannon already held reform-oriented beliefs, and she experienced a major shift in knowledge and attitudes related to mathematics education. She acknowledged this change and recognized that she had gained knowledge from many "different points of view." This openness to new and different approaches to teaching contributed to Shannon's change process. She recognized the need to improve her teaching and perceived the change as an attainable challenge. She readily implemented reform-oriented teaching practices as she learned and studied about them. For example, she recounts that prior to her capstone project, her instruction involved presenting the students with multiple methods to solve an addition or subtraction problem and expecting the students to choose the method that best suited them. By examining her teaching practice, Shannon realized the value of having the students use mathematical language to explain conjectures and prove methods in their own words—as opposed to the teacher telling and explaining how and why methods work. This focus on students' thinking and use of mathematical language is closely aligned with reform-oriented mathematics (National Council of Teachers of Mathematics, 2014). Instructional change occurred naturally for Shannon. Her belief structure already aligned with the change, and she did not experience beliefs-driven discomfort (Frykholm, 2004). The cognitive and pedagogical discomfort that she did experience proved to be educative rather than debilitating.

Barbara already held reform-oriented beliefs related to mathematics education. However, according to the pre- and post-assessments, her knowledge and attitude remained more traditional. Similar to Shannon, she was open to changing her instructional practice, and used the capstone project as an opportunity to "look inward" to examine her teaching style. This self-examination prompted Barbara to make small adjustments, and to "fine-tune" her teaching to make it more effective and more compatible with current research. Many of Barbara's instructional practices already reflected reform-oriented mathematics instruction (e.g. the use of manipulatives to build students' conceptual understanding). However, her view that struggling students just need to practice more and be more organized reflects a more traditional attitude toward mathematics instruction. In regard to her

teaching practice, Barbara experienced little discomfort (Frykholm, 2004), and so did not to enact sizable changes in her instructional practice (Gregoire, 2003).

   Natalie experienced a major shift toward reform-oriented mathematics instruction. She recognized that this change was not superficial; even three years after completing her culminating project, she has continued to implement the teaching practices developed in the process. For example, prior to systematically examining her students' thinking, she had focused her teaching on a single method for solving specific problem types. Since she started to examine her students' thinking, Natalie has come to value students' discussion of alternative problem solving strategies—an instructional practice strongly aligned with reform-oriented mathematics. This awareness of students' learning processes "broadened [her] vision," strengthened her motivation to assimilate new teaching practices, and increased her perceived ability to enact the change (Gregoire, 2003). Even though the instructional change was difficult, she embraced it and had confidence that it would help her students learn mathematics more deeply.

6. Implications

Just like students, teachers have a variety of skills and dispositions that affect their learning and growth trajectories in professional development situations. It is important for designers of professional development to recognize the challenges that many teachers face as they attempt to make changes and improvements to their instructional practice. At the same time, when using the examination of students' thinking as a professional development strategy, facilitators should provide adequate support so that any discomfort experienced is educative rather than debilitating.

7. Limitations and future research

This study was designed to examine how elementary teachers perceived the change in and development of their teaching practices related to mathematics, therefore the sample size was limited to three teachers. However, the small sample size of the study may limit the generalizability of the results. All of the teachers in this study teach in the upper elementary grades in the same school district. It is possible that findings may differ with teachers from different backgrounds or in different teaching situations. Future research could be conducted with teachers of other grade levels and in other locations to determine similarities and differences with the findings of this study. Additionally, this study focused on making instructional changes in mathematics. Further research could be conducted to see if similar results are found with making instructional changes in other academic areas.

8. Conclusion

This study supports the value of systematically examining students' thinking as a professional development strategy. Despite the challenges, the teachers in this study had overall positive experiences with the process in their classrooms. The teachers identified challenges and benefits related to examining students' thinking and reflected on their growth and on how their instructional practice had changed. Themes emerging from the study suggested that although these teachers found it difficult to begin the process, they appreciated the opportunity to reflect on their practice and gain new knowledge to inform their teaching. They recognized an increased awareness of their students' needs in mathematics as well as in other content areas. These teachers' perceptions of the challenges and benefits of examining students' thinking offer insight into understanding its influence as a professional development strategy.

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Changing practice: An evaluation of the impact of a nature of science inquiry-based professional development programme on primary teachers

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Abstract: This study investigates how a two-year continuing professional development (CPD) programme, with an emphasis on teaching *about* science through inquiry, impacted the experiences of, approaches to and attitudes towards teaching science of 17 primary teachers in Dublin. Data sources included interview, questionnaire and reflective journal strategies. Data gathering focussed primarily on enabling teachers to reflect on their experiences of teaching about science through inquiry while implementing the Irish primary science curriculum. Teachers were also asked to consider their own changes in teaching science, as change in practice is a key indicator of successful professional intervention. Encouragingly the findings have shown that participation in this CPD programme appears to have been central to empowering these Dublin teachers to break away from rather traditional, didactic, theory-laden views of science teaching and to tackle more child-led, open-ended modes of learning. The data also revealed a number of aspects of the CPD model which the teachers perceived to be beneficial at translating inquiry into their

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PUBLIC INTEREST STATEMENT

Educational authorities in many countries have voiced concerns over the declining interest of children in science education. Research has recommended the wider use of inquiry-based approaches in the teaching of primary science to help overcome this decline.

In 2003, a new primary science curriculum began to be implemented in Ireland. This curriculum promotes an inquiry-based approach to learning science. However, since its implementation various research studies have highlighted concerns regarding the teaching and learning of primary science in Ireland, including infrequent employment of inquiry-based methodologies and lack of confidence amongst primary teachers in teaching science.

This article explores the relationship between teacher involvement in an inquiry-based, sustained, collaborative professional development programme and how this programme impacted their confidence and change in classroom practice. Findings reveal that as a result of their involvement in the programme teachers' confidence in teaching science increased and their instructional practice in science lessons became more inquiry based.

classrooms, in particular: the active, hands-on approaches; the collaboration and the duration of the CPD itself. Based on the findings of this study, implications for professional development are considered.

Subjects: Adult Education and Lifelong Learning; Primary Education -Teaching Practice; Teacher Education & Training

Keywords: primary science; inquiry-based science education; nature of science; continuing professional development

1. Introduction

Research indicates that children's interest in science declines as they move through primary school (Murphy & Beggs, 2003; Murphy, Beggs, Carlisle, & Greenwood, 2004; Murphy, Neil, & Beggs, 2007; Pell & Jarvis, 2001). A number of factors have been put forward to explain this decline, including: inappropriate curriculum content, preparation for national tests, type of teaching and lack of experimental work. However, according to Murphy et al. (2004), the decline is less apparent when children are involved in practical, investigative activities. Over the past two decades there has been a worldwide move towards utilising inquiry-based science education (IBSE) curricula and teaching methodologies in primary school classrooms (Akerson & Hanuscin, 2005; Cuevas, Lee, Hart, & Deaktor, 2005; Murphy, Murphy, & Kilfeather, 2011). In Europe, the European Commission published a report (Rocard et al., 2007) on concerns about the declining interest of young people in science education. One of the main recommendations of the report was the wider use of inquiry-based approaches in the teaching of primary science to help increase the engagement and interest of pupils in science.

In Ireland a significantly revised primary science curriculum (PSC) was introduced in 1999, although formal implementation did not commence until 2003. While the revised PSC (Department of Education and Science [DES], 1999a) does not explicitly refer to IBSE methodologies, it emphasises an IBSE approach embedded in a social constructivist epistemology. In addition to the emphasis placed on the development of pupils' scientific conceptual understanding and skill development, the PSC also aims at supporting pupils in developing a scientific approach to problem-solving, emphasising understanding and constructive thinking.

Prior to implementation of the PSC in 2003, all primary teachers participated in nationally organised professional development. This consisted of two days' in-service workshops in an identical format provided to all schools, with one additional day for school planning. The sessions focussed on providing an overview of the PSC with opportunities for teachers to engage in limited exemplar "hands-on" activities. Since the initial two days in-service prior to implementation in 2003, no further national Continuing Professional Development (CPD) programme has been made available to support primary teachers in teaching science.

Since the roll out of the PSC in 2003 various research studies have been published that highlight concerns regarding the teaching and learning of primary science in Ireland. These include: infrequent employment of hands-on investigative and inquiry-based methodologies; lack of confidence amongst teachers in teaching science; poor scientific content and pedagogical knowledge amongst primary teachers and insufficient provision of long-term professional development programmes for teachers (Department of Education and Skills, 2012; Murphy & Smith, 2012; Murphy et al., 2011; National Council for Curriculum and Assessment [NCCA], 2008; Smith, 2013). One of the key aspects for improving the teaching of primary science that has repeatedly been identified in international research is the need for effective CPD for primary teachers (Murphy & Beggs, 2005).

This article considers some of the salient features of a recent CPD programme in primary science that took place in Ireland and examines the impact that participation in this CPD programme had on teachers' confidence in, attitudes towards and practices in teaching science. The conceptual

framework for the current study is based on Desimone's (2009) core conceptual framework (p. 184) for studying the effects of professional development on teachers and pupils.

- Teachers' participation in effective professional development
- Changes in teachers' scientific pedagogical knowledge and attitudes towards IBSE and primary science
- Changes in teachers' classroom practice
- The instructional changes promote increased pupil learning.

This paper reports on data relating to the first three steps of Desimone's framework. In particular this article addresses the following two research questions:

(1) To what extent did the CPD programme impact on teachers' experiences of, approaches to and attitudes regarding teaching science?
(2) What were the teachers' perceptions of the most effective components of the CPD programme?

2. Review of the literature

The PSC in Ireland, in common with developments in many such curricula internationally, seeks to promote an inquiry-based approach to learning science (DES, 1999a). IBSE has been advocated as an essential focus for school science, with its potential to enthuse and motivate pupils and to permit the development of crucial intellectual skills in addition to facilitating the acquisition of scientific knowledge (Artique et al., 2012; Harlen, 2010; Krogh & Thomsen, 2005; Murphy, Kilfeather, & Murphy, 2007; Murphy et al., 2011; Rocard et al., 2007). Scientific inquiry in this sense goes beyond the following of practical protocols to verify established outcomes, despite this approach being common in some school science curricula (e.g. DES, 2004). Supporting teachers' skills in facilitating this aspect of science would therefore appear to be a key to improving curricular implementation.

Broadly speaking the term, inquiry refers to an *act of building and testing knowledge*. A process that requires the active role of the pupil, the learning of science starting with *questions* rather than answers, and drawing on what is already known, but going beyond it (Artique et al., 2012, p. 4). Harlen (2010) asserts that there is more to inquiry than "hands-on experience" and outlines other key aspects of the inquiry process, including making observations, asking questions, planning and carrying out investigations, interpreting and reporting data. Harlen (2010) also maintains that

> Inquiry, well executed, leads to understanding and makes provision for regular reflection on what has been learned, so that new ideas are seen to be developed from earlier ones. It also involves pupils working in a way similar to that of scientists, developing their understanding by collecting and using evidence to test ways of explaining the phenomena they are studying. (p. 3)

Abd-El-Khalick et al. (2004) outline differences between inquiry *in* science and inquiry *about* science. They define inquiry *in* science as "an instructional approach intended to help pupils develop understandings of science content" and inquiry *about* science as "inquiry as an instructional outcome" (p. 398). They assert that pupils learn to do inquiry in the context of science content and develop epistemological understandings *about* science and the development of scientific knowledge as well as relevant inquiry skills. The term nature-of-science (NoS) is frequently used in reference to issues *about* science and relates to matters regarding what science is, how it works, how scientists work as a social group and how science influences and is influenced by society.

The research literature has highlighted numerous benefits of learning *about* science. Some contend that when pupils learn *about* the nature of science (Nos) in science class, they become more aware of the developmental NoS and science as a human activity, making it more interesting for them to learn (Abd-El-Khalick, 2012; Khishfe & Lederman, 2007; Mc Comas, Clough, & Almazora, 1998). Others

contend that pupils who leave school with contemporary understandings *about* science have a better understanding of science concepts and scientific inquiry, a greater interest in science and have a better appreciation of science's role in contemporary society (Craven, Hand, & Prain, 2002; Driver, Leach, Millar, & Scott, 1996; Lederman, Antink, & Bartos, 2014; Murphy, Kilfeather, et al., 2007).

If it is accepted that teaching *about* science is an important aspect of school science then it would be essential for teachers to have well-developed pedagogical knowledge *about* science. Research indicates, however, that this is not generally the case for many primary teachers (Lederman, Abd-El Khalick, Bell, & Schwartz, 2002; Pomeroy, 1993). The authors contend that if teachers were provided with professional development that focuses on learning *about* science and learning *in* science pedagogy, teachers would become more confident about using more child-led, inquiry-based approaches. Previous work with pre-service primary teachers in an Irish context had already indicated that this approach could be beneficial in this regard (Murphy & Smith, 2012; Murphy et al., 2011).

However, aside from decisions of content, another imperative to consider is the way in which the CPD should be structured so as to support teachers most effectively and hence promote substantive changes in classroom practice.

3. Professional development

Professional development is defined as a process that leads to improvements in teachers' knowledge, classroom practice and pupils' learning outcomes (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009; Desimone, 2009; Loucks-Horsley, Stiles, Mundry, Love, & Hewson, 2009). There is considerable criticism in the literature of "traditional" forms of CPD (e.g. Desimone, 2009; Hawley & Valli, 1999; Hoban, 2002; Loucks-Horsley et al., 2009). Hawley and Valli (1999) claim that, "Conventional approaches to professional development, such as one-time workshops, typically do not lead to significant change in teaching methodologies" (p. 129). Hoban (2002) argues further, that such approaches do not consider: the context of the school, attitudes of teachers to change, and that teacher change is more a process than an event.

The last two decades have seen the growth of an extensive body of research illustrating the various features of "effective" professional development needed to improve teaching and pupil outcomes (summarised by e.g. Darling-Hammond et al., 2009; Desimone, 2009; Guskey, 2002). Guskey (2002) argues that the primary goal of professional development is to generate transformation in teachers' classroom practice, in teachers' attitudes and beliefs, and in the learning outcomes of pupils. Even though educationalists have suggested diverse features of effective professional development, common features have been identified from an abundance of research into professional development. (e.g. Darling-Hammond et al., 2009; Desimone, 2009; Guskey, 2003; Loucks-Horsley et al., 2009). These include: focus on content, active learning, coherence, duration and collective participation (Desimone, 2009). These features imply that professional development is more than a series of one-off workshops; it is a way of putting knowledge into practice within a community of actively engaged practitioners. Guskey (2002) recommends three guiding principles necessary in the planning of effective professional development programmes: (a) acknowledge that change is an ongoing and complicated process, (b) ensure that teachers obtain frequent feedback on pupil learning progress and (c) provide continued follow-up, support.

Traditionally, programmes of professional development, as understood in the Irish context, tend to be provider-driven "one-off" courses, or short modular courses provided by the DES. Recent reports (Organisation for Economic Cooperation & Development, 2009; Teaching Council of Ireland, 2009) identified concerns relating to CPD in Ireland. Namely, that provision is still generally short-term and mainly relates to implementation of national curriculum programmes, with little prominence given to the professional development needs of individual teachers. There is considerable criticism in the literature of such forms of CPD (e.g. Desimone, 2009; Hawley & Valli, 1999; Hoban, 2002; Loucks-Horsley et al., 2009). Hawley and Valli (1999) claim that, "Conventional approaches to

professional development, such as one-time workshops, typically do not lead to significant change in teaching methodologies" (p. 129).

4. Design and methods

4.1. The CPD programme

The main aims of this two-year CPD programme were to bring about progressive changes in teachers' confidence in and approaches to teaching *about* science through inquiry while implementing the PSC. The study was conducted in 10 primary schools in the Dublin urban area. Involvement of the schools was based on a commitment on the part of each school principal that at least two teachers from the school would be enabled to participate in the CPD programme for the full two years. The participating teachers taught classes in the upper primary age range (age 8–12 years).

4.1.1. Content

Throughout the workshops social constructivist approaches to teaching and learning science as advocated by the PSC (DES, 1999a) were modelled and encouraged. The workshops provided teachers with opportunities to engage with and reflect on a range of different teaching methodologies and resources that were grounded within a social constructivist framework. These included: the use of concept cartoons and concept mapping as means of formative and summative assessment; ways to plan, conduct, record and report fair test and open-ended investigations; and the use of digital technology in planning investigations, recording, interpreting and analysing results, and in reporting and presenting findings. A range of different teaching methodologies suitable for teaching science, as outlined in the PSC were modelled throughout the workshops. These included: closed activities; teacher-directed and child-led open investigations; activities designed to provide pupils with opportunities to develop particular science skills; and using digital technologies in science class.

There were two underlying themes that ran through every workshop. Namely pedagogy regarding the use of: inquiries *about* science and; inquiries *in s*cience. Inquiries *about* science are tasks that do not focus specifically on scientific content, but focus on a particular aspect *about* the NoS (e.g. how scientists work, the tentative NoS, subjectivity and objectivity in science). Inquiries *about* science introduce a concept about science to the children using a non-science context. The children do not have to try to grapple with scientific content; they just focus on the particular aspect *about* science that is being addressed. These aspects are initially introduced to the children using a non-science context as it makes it easier for the children to reflect on and to consider these issues when they are carrying out scientific investigations. Aspects *about* science that were addressed on the CPD programme included science as a body of knowledge, the nature of scientific inquiry, science as a human activity, how science and society are affected by one another, and the importance of the history of science in science education. The *Tricky Tracks,* the *Tube and the Cube* activities (Abd-El-Khalick & Lederman, 1998) are examples of the type of inquiries *about* science with which the teachers engaged during the programme.

Inquiries *in* science, on the other hand, are activities that have a scientific context but also focus on different aspects *about* science. The content in the inquiries *in* science in the CPD programme was drawn from the *Living Things, Energy and Forces, Materials and Environmental Awareness and Care* strands in the PSC (DES, 1999a). These inquiries provided the children with opportunities to plan and carry out a range of investigations in order to answer different scientific questions. As well as developing children's scientific content understanding and skill development, these activities also aimed at affording pupils with frequent opportunities to reflect on and discuss issues relating to the NoS.

4.1.2. Workshops and implementing approaches in the classroom

Over the course of the programme there were 18 three hour long workshops. These assumed a hands-on participatory approach whereby the teachers, working in small groups, had the opportunity to engage with the various activities and investigations prior to teaching them in their classrooms. There were ample opportunities in every workshop for the teachers to discuss and reflect on

the different activities. In between each workshop the teachers were required to try out the different activities and methodologies, with which they had engaged during the workshops, in their classes. A major feature of each workshop was the building up of trust between the participants as a group, and with the researchers. Teachers were encouraged to share and reflect on their experiences (both successes and challenges) of implementing the different approaches and activities in their classes. Traditionally, with quantitative research the researcher undertakes "detached" role. However, qualitative research cannot be as objective. The researchers had a key role to play in this study trying to provide merited ideas for enhancing the capacities and attainments of the teachers involved. Based on the researchers' knowledge of professional development, science education and experiences carrying out research, they believed that they were qualified to carry out this research and bring a unique perspective to the interpretations. The intervention programme used in this research was designed by the researchers. Thus, the researchers' beliefs and values regarding the teaching of science and what constitutes effective professional development (informed by the research literature) were embedded in the research. However, every effort was made to ensure objectivity when analysing the data.

Over the course of the programme the researchers provided ongoing support for all the participants. This took the form of visiting all the participants in their schools, a virtual learning environment (Moodle), and e-mails. The researchers assumed various roles during these visits including teacher, co-teacher, observer and working with groups of children.

4.2. Participants

Twenty-two teachers signed up to the programme. However, at the beginning of the second-year five of the teachers had to drop out of the programme for personal and professional reasons. Three new teachers joined the programme for the second year. Only 17 of the teachers participated in the project for the entire two years. This paper reports on the findings from data gathered from these 17 teachers.

Table 1. Personal characteristics of participating teachers (*n* = 17)		
	Frequency	**Percentage**
Gender		
Male	03	18
Female	14	82
Teaching experience		
0–5 years	02	12
6–10 years	09	45
11–15 years	01	06
16–20 years	02	12
Over 20 years	03	18
Highest qualification in science		
Junior/inter certificate state exam (age 16)	04	24
Leaving certificate state exam (age 18)	10	60
Degree	01	06
None	02	12
Science professional development courses attended		
Post graduate diploma in science education	01	06
Curriculum implementation in-service days	08	48
Summer course in teaching college	04	24
Other	04	24
None	05	30

These 17 teachers represented a range of backgrounds in terms of: years of experience in teaching; prior science qualifications; and previous attendance at science education-related professional development courses (Table 1).

4.3. Data collection

Over the past twenty years or so, researchers (e.g. Creswell 2003; Johnson & Onwuegbuzie, 2004) have advocated using features of both quantitative and qualitative methods in the same study i.e. a "Mixed Methods approach" to research. Patton (2002) stresses that researchers: "need to know and use a variety of methods to be responsive to the nuances of particular empirical questions and the idiosyncrasies of specific stakeholder needs" (p. 585). Owing to the nature of the research questions, a mixed-methods approach was deemed the most appropriate approach to this study. According to Johnson and Onwuegbuzie (2004) a mixed-methods approach, "allows researchers to mix and match design components that offer the best chance of answering their specific research questions" (p. 15). To this end, data were gathered via questionnaires, interviews and reflective journals. Teachers were asked to consider their own change in classroom practice of teaching science, as change in practice is a key indicator of successful professional intervention (Darling-Hammond et al., 2009; Guskey, 2002). The teachers were also asked to reflect on components of the CPD programme that they believed were effective in supporting their professional development.

4.3.1. Teacher questionnaire

The format for the questionnaire used in this study was adapted from a questionnaire used with pre-service teachers in an earlier study looking at the impact of a pre-service course on teaching about the NoS (Murphy & Smith, 2012). There were three sections in the questionnaire. The first section (A) gathered information regarding professional qualifications and context. Section B asked teachers to rate their confidence about teaching all areas of the curriculum, in a bid to establish how confident they felt teaching science in comparison to the other areas of the curriculum. Finally, Section C sought to gain information about the teachers' views about science, their attitudes towards and practices in teaching science, and their conceptions of NoS. This section contained three open-ended questions and 39 statements about NoS and classroom practice to which the respondents had to indicate the extent to which they agreed/disagreed with each statement. It is important to note that for the purpose of this paper only the data gathered from the teachers' responses to questions in Section A and the open-ended questions in Section C are reported.

Piloting of the questionnaire was carried out with four non-participating, qualified teachers to ensure acceptable content validity. Participants were asked to complete the questionnaire at the beginning of the first CPD workshop of the programme, and at the end of last CPD session. Entry and exit questionnaires were matched for each of the participants so that their responses could be triangulated with other data gathered. This prevented the responses from being anonymous; however, confidentiality was assured for this process. To determine content validity a panel of three educators reviewed all of the items in the questionnaire for readability, clarity, comprehensiveness and to ensure they addressed the objectives and purposes of the programme.

4.3.2. Interviews

A semi-structured interview schedule was designed and aimed at establishing teachers' experiences within the two-year CPD programme and their perceptions of how their pedagogical knowledge of science had developed. After piloting with two non-participating teachers, interviews were conducted by the researchers at the end of the two-year CPD programme. Interviews were taped and transcribed for analysis.

4.3.3. Reflective journals

At the beginning of the CPD programme the teachers were given a reflective log. They were asked to complete the reflective log after each workshop and after teaching the different activities back in their classrooms. A general list of questions was compiled and agreed on by the researchers and teachers. However, it was made clear that this list of questions was only a guideline and that the

teachers did not have to adhere rigidly to the list when reflecting on the workshops and science lessons they had taught. The purpose of the reflective journals was to gain an insight into the teachers' ideas and experiences of learning about and implementing the new methodologies over the two years of the programme.

4.4. Data analysis

Glaser and Strauss (1967) "constant comparative" method of data analysis was utilised. When the data from the questionnaires, interviews and reflective journals were analysed, a set of categories that provided a "reasonable" reconstruction of the data collected was developed. Category names were ascribed to the units of meaning and the data were then grouped into categories with related content. As recommended by Lincoln and Guba (1985), rules for inclusion were devised as "propositional statements". These propositional statements communicated the meaning that was embodied in the data collected under each sub-category. The responses from all three data sources were initially explored under three categories that related to the research questions. A number of sub-categories then emerged in all three categories, as outlined in Table 2. Three raters rated the questionnaire, interview and reflective journal data and an inter-rater reliability of 97, 96 and 96%, respectively, was established.

5. Findings

The findings are presented according to the categories and sub-categories (Table 2) that emerged from the analysis of the questionnaire, interview and reflective journal data.

5.1. Teachers' perceptions of the impact of the CPD programme on their professional development and classroom practice

5.1.1. Pedagogical knowledge

Prior to the CPD intervention, the teachers were asked what they hoped they would gain from participating in the CPD programme. In the initial questionnaire all 17 of the teachers indicated that they hoped to develop their pedagogical understanding of and confidence in teaching science. The desire to learn about methodologies that would engage pupils, would involve active, discovery-based learning, and that would facilitate collaborative learning were also referred to in response to this question. Typical responses included, "to get a better understanding of how to teach science and new methods of how to teach" and "I hope to become a better teacher of science".

Table 2. Categories that emerged from analysis of questionnaire, interview and reflective journal data	
Category	**Sub-categories**
Teachers' perceptions of the impact of the CPD programme on their professional development.	• Pedagogical knowledge • Confidence • Attitudes
Teachers' perceptions of the impact of the CPD programme on classroom practice	• Teacher directed Vs Child- led • Development of science skills • Language and dialogue • Reflecting/thinking skills • Pupil collaboration • Problem solving • Children's attitudes towards science
Teachers' perceptions of the CPD model	• Duration • Collaboration • Reflective practice • Hands-on

In the exit questionnaire and interviews the teachers were asked "what they had gained from participating in the CPD programme?" All of them maintained that they had learned a range of new methodologies for teaching science. The teachers indicated that these were not approaches with which they had engaged or content that they had addressed in their teaching prior to their participation in the programme.

> Lots of new ideas on what and how to teach science, especially Nature of Science ... and ways to help children develop their scientific skills, like questioning, observing and inferring etc. (Exit questionnaire)

In the interviews 14 of the teachers also reported that they now teach science more frequently than they had prior to their involvement in the programme.

5.1.2. Confidence

Somewhat surprisingly, only five of the teachers asserted in the initial questionnaire that they hoped to gain confidence in teaching science. However, in the exit questionnaire and interviews all of the teachers stated that they felt more confident about teaching science as a consequence of their participation in the CPD programme. A range of reasons were provided. Perhaps predictably, the teachers emphasised that having the opportunity to carry out activities for themselves in the CPD sessions was a means of gaining confidence to undertake them in the classroom:

> I didn't feel in any way confident teaching science before ... But now, since doing the science workshops I feel way more confident teaching science ... and the fact that we experienced the activities ourselves during the workshops really helped me. (Interview)

However, significantly in relation to the teaching *about* science focus of the CPD programme, a key issue cited by teachers in developing their confidence in the classroom was their altered perspective on scientific subject knowledge. In the initial questionnaires, a problem stated by many of the teachers was that they did not have the requisite scientific knowledge to deal with questions from children. This fear of not being able to answer pupils' questions was a cause of concern for the teachers. However, in the reflective journals and interviews the teachers asserted that they had come to realise that it was not absolutely necessary to know all the answers in order to teach science to their pupils.

> I feel more confident teaching science now because it's not something where I feel I have to be the expert who knows the answers to everything ... (Interview)

The researchers do not wish to imply from this that enhancing teachers' subject knowledge is irrelevant to generating confidence in primary science teaching. On the contrary, it is contended that helping teachers to understand about the tentative, developmental nature of scientific knowledge empowered them to embark on a journey of inquiry and fact-finding together with their pupils, rather than scientific knowledge presenting a formidable barrier that had to be overcome in advance of any teaching. However, factors other than science knowledge can affect teacher effectiveness in primary science. These include teachers': interactions with children in lessons; capacity to select appropriate experiences for pupils; and attitudes towards the subject. According to Golby, Martin, and Porter (1995) if teachers appreciate in a broad sense the NoS then they can involve pupils in enjoyable science activities. Furthermore, they state "teaching is not principally about telling facts but about finding meaning in experience" (p. 299). Effective professional development programmes should afford participants time to discuss and develop their ideas as well as enhancing their subject knowledge.

5.1.3. Teacher directed V child-led investigations

In the exit questionnaires and interviews all 17 teachers indicated that, prior to the programme, when they had been conducting hands-on activities in science class these had tended to be teacher-directed. Typically they would conduct an experiment and let the children watch or they would give

prescribed steps for the children to follow. In the exit questionnaires and interviews the teachers asserted that they had moved towards more child-led approaches, where inquiry was now the focus when teaching science. Significantly, all of the teachers were explicitly reflective of the fact that they were now adopting roles as facilitators of the children's learning in science and moving away from more didactic approaches.

> It has made me more confident in teaching science in school. It has allowed me to be less rigid in following recipe style investigations. The children enjoy science much more by being more involved in designing their own investigations and doing the science activities themselves. (Exit questionnaire)

Teachers' responses in the reflective journals revealed that at the beginning of the CPD programme they felt "out of their comfort zones" when they initially began to implement the new methodologies, as these were not approaches to science that they had typically used prior to the CPD programme. Journal entries and interview data alike indicated that prior to the CPD these teachers placed a strong emphasis on their pupils following *scientific steps* and *learning scientific facts* and that they tended not to afford their pupils opportunities to develop their understanding *about* science or to carry out their own inquiries:

> The children came up with the ideas of what was the best bubble. They then decided on what THEY[1] wanted to test, how THEY would test it, how THEY would make a fair test, how THEY would record their results, how THEY would present their results ... The different groups came up with a variety of different ways to carry out their investigations and to present their results. I used this opportunity to highlight how there is no one scientific method that every scientist rigidly adheres to ... . (Reflective Journal, Year 1, Month 10)

It was also apparent from the teachers' responses in both the reflective journals and the interviews that, as a result of the CPD programme and their newfound knowledge of teaching *about* science, this situation appears to have reversed, with less insistence, for example, on pupils *getting the right answer* and more emphasis on pupils *coming up with their own methods for answering a scientific question*. One teacher commented that:

> ... [Before the CPD] I would really just have thought of science as a body of knowledge that you kind of had to impart to the kids ... Whereas now, you look more at aspects of Nature of Science, like for example science as a creative process and how scientists get knowledge (Interview)

As stated in the literature review section, one important component of effective CPD is that teachers utilise ideas from the CPD in their classes (Desimone, 2009; Guskey, 2002). It would appear from the interview, questionnaire and reflective journal data, that these teachers had tried out the new methodologies for teaching science that they had learned about during the workshops. These findings are perhaps not surprising as one of the requirements of the programme was that the teachers had to implement the workshop methodologies in their classrooms. What is interesting about the data obtained was the teachers' perceptions of the positive impact learning *about* science through inquiry had on their pupils' experiences of school science.

5.1.4. Development of pupils' science skills

The teachers offered a range of reasons as to why they believed teaching *about* science was an important component of primary science. Data from the reflective journals and interviews in particular indicated that all of the teachers felt strongly that learning *about* science through inquiry had a considerable positive impact on the application and development of pupils' scientific skills. In their journals the teachers frequently reflected on the range of scientific skills their pupils had been applying while engaging with the inquiries *about* science. These included: questioning; making observations and inferences; predicting; planning and carrying out independent investigations; recording,

analysing and interpreting results—which accord well with the key skills explicitly mentioned in the Irish PSC (DES, 1999a).

The data from the reflective journals were analysed prior to the interviews being conducted. As the teachers had reflected in their journals on how the inquiries *about* science activities helped develop pupils' scientific skills, this was raised in the interviews. All 17 teachers reiterated that they believed that engagement with the inquiries *about* science did support the development of a range of science skills. Typical responses included:

> ... You can see them ... without being prompted now, making observations and inferences, making predictions. They can carry out or plan their own investigations a lot more easily than they would have before ... And even, say, discussion and recording results ... they do a lot more of the skills automatically (Interview)

5.1.5. Pupil collaboration
The reflective journal data also revealed that all the teachers thought that engagement with the inquiries *about* science activities provided frequent opportunities for their pupils to work collaboratively. A typical quote:

> The group discussions were wonderful. The children were in small groups and therefore the quieter children seemed to contribute more. Some groups got quite animated at times trying to show each other examples of how things move or how they work (Reflective Journal, Year 1, Month 3)

When asked how engagement with the inquiries about science activities impacted on children's experiences of school science. The majority (14) of the teachers stated that they believed that learning about science through inquiry provided more opportunities for collaboration in science class, a significant skill in relation to scientific working. The teachers reflected both on teachers and pupils collaborating together to find solutions and pupils collaborating with one another.

> ... It's more that we work together as a group ... It's the children as well having a huge involvement in everything ... and I'm finding now that in my own classroom, that science is a time where we all become involved and we're all hands-on and we're all asking questions (Interview)

5.1.6. Language development
All of the teachers also reported that while engaging with the inquiries *about* science, pupils were collaborating and developing language skills while planning, conducting, recording and reporting back on their investigations. An emphasis was placed on the use of oral language skills when pupils were describing investigations, interpreting results and discussing evidence they had gathered to support their theories. Additional opportunities for oral language development were provided when pupils had to discuss and justify decisions they had made during their different inquiries.

5.2. What were the teachers' perceptions of the most effective component of the CPD programme?
In the questionnaires and interviews the teachers were asked a range of questions regarding their perceptions of effective professional development. The teachers identified several characteristics of the professional development model that they believed lead to changes in their teaching practice. The four most frequently discussed characteristics of effective professional development outlined by the teachers were: active participation; collaboration; reflective practice and the duration of the professional development programme.

5.2.1. Active hands-on approach
A key factor for effective professional development that the teachers cited in the exit questionnaire and interviews was active participation. The teachers reported that the CPD programme provided them with frequent opportunities to engage with a range of hands-on, reflective, inquiry-based

activities that were relevant to their classroom practice and helped them develop a better understanding of science pedagogy.

> This CPD programme was a lot easier [than other forms of CPD] because you were involved in it. It's the same for children … it just sticks in your head when it's hands-on (Interview)

> I really enjoyed the workshops … they were so hands-on and practical and easy to understand. It was very easy to take the work we did in the workshops into the classroom (Exit questionnaire)

Another reported benefit of engaging with the activities during the CPD workshops was that teachers were faced with similar situations and dilemmas as those that their pupils would face. Engaging with and reflecting on the activities in the workshops gave teachers an insight into some of the problems their pupils might encounter when engaging with the science activities in the classroom. The following comment supports this claim:

> We were practising how we should be teaching science … we were put into the position of the children and I experienced some of the problems and obstacles they can face when learning science … It was interesting to see how different groups [teachers] came up with different ideas to do the investigations. This also gave me an idea of the different ideas my pupils might come up with when they would be doing the investigations themselves (Interview)

Data from the reflective journals corroborated the findings from the questionnaires and interviews. The following reflective journal extract is representative of the teachers' comments on the need for professional development to be active in nature.

> Having actually done the investigation myself in the workshop I saw how straightforward it was and how enjoyable it was and it gave me the confidence to actually do the experiment in class. (Reflective Journal, Year 1 Month 9)

Overall, the teachers maintained that for a professional development programme to be effective it needs to actively engage them as learners.

5.2.2. Collaboration

All 17 teachers asserted that a particularly positive aspect of this CPD model was the strong emphasis placed on collaboration. There was a general consensus that unlike other forms of professional development that they had attended, this model provided frequent opportunities for them to work with other teachers on the programme.

> I have learned a huge amount from talking to other teachers and getting their perspectives … we worked collaboratively on a path towards deeper understanding of the Nature of Science (Interview)

The teachers also indicated that the on-going sharing of ideas and meaningful discussions with other teachers on the programme helped inform their approaches to teaching science more broadly.

> … meeting other people [teachers] as well and seeing how things do or don't work and, you know, getting new ideas [from other participants] and, if it [a particular activity] didn't work for me, seeing what the other teachers did that was different, and [to hear about] what worked for them (Interview)

Evidence from the data suggested that all the teachers developed "critical friendships" (Costa & Kallick, 1993) around the teaching and learning of science, with the other participating teacher(s) in their school. All the teachers indicated that these critical friendships were a particularly positive aspect of their engagement with the CPD programme and enabled them to work together in planning lessons, developing resources, teaching lessons and reflecting on the teaching and learning of NoS.

> I think having two teachers in the same school [on the programme] was really useful because we both worked well together and we bounced ideas off each other all the time. Sometimes I'd go into her class for her lesson if it was a new lesson or she'd come into mine and help on a day to day basis (Interview)

Twelve of the teachers also collaborated closely with teachers in their schools who had not taken part in the CPD and eight organised whole school CPD sessions to extend the benefits of their experience to their colleagues.

> During our staff meeting our principal gave us time to talk about the methods of teaching science we had learned about during the programme. We also did a few short workshops with our staff. These workshops gave them the chance to try out some of the activities we had done so they could try them out with their classes (Interview)

> We are doing a series of workshops with staff so they can benefit from what we learned (Interview)

This led to meaningful collaboration in a number of schools where teachers who did not participate in the CPD programme even sat in teachers' (who had taken the CPD programme) classrooms to observe them teaching science.

> Myself and [the other participating teacher] colleague presented to the whole staff ... 60–70% of teachers have come back looking for ideas and lessons. I have people [teachers] come in to my class, watch me teach science ... they will go off and try it themselves (Reflective Journal, Year 2 Month 8)

The design of this CPD model had intentionally recruited more than one participant from each school, in order to foster a collaborative approach from the outset. It was hoped that this would facilitate further sharing of ideas back in those teachers' schools to the non-participant colleagues, and the evidence suggested that this had happened. A broader outcome of the project, however, was the development of a professional learning community (Hord, 2009) between participants from different schools. Over the course of the programme the teachers began to exchange ideas and resources with participating teachers from other schools, exchanges which all teachers found particularly beneficial.

> I learned a huge amount from talking to other people and getting their perspectives. For example, Teacher 2 [teacher from a different school] on the course ... I have learned so much from conversations with her regarding the ways that she was addressing the activities [from workshops] with a similar age group to me, I was able to come back [to school] and say "okay" I'm going to try some of those ideas (Interview)

Overall, it would appear that the collaborative approach that was fostered between participants on the CPD programme, during workshops, had developed further and translated into developing those collaborative approaches and relationships in other professional settings.

5.2.3. Reflective practice

A very important feature of the workshops was to provide teachers with opportunities to critically reflect on their roles as teachers and as learners, with a view to bringing about change in their classroom practice. Reflective practice included discussions about: the research-based methods modelled in the workshops; teachers' experiences as pupils in the workshops; successes and challenges of using activities back in the classroom.

Confirmation of the development of self-reflection and group reflection is apparent from the following comment that was typical of those made by teachers during interviews and exit questionnaires.

> I found it really useful to talk to teachers in other schools who are teaching the same age group. You can share ideas and resources. It is something I rarely get a chance to do and I think it is very important for a teacher. It helps you think about what you are teaching and see if there are other ways you can go about teaching (Interview)

However, it is important to note that it was not until the latter part of the project (start of Year Two) that the teachers fruitfully began to develop their capacity for self and group reflection. This is very understandable as many of the teachers were not accustomed to sitting around a table discussing their teaching practice. Time was required to build up trust. The on-going nature of the CPD programme gave the participating teachers' time to reflect on their teaching and instigate changes in their classroom practice.

5.2.4. Duration
Data from the interviews revealed a strong consensus amongst all the teachers that the traditional type of in-service courses that they had experienced prior to this CPD programme tended to be too short in duration and yet overloaded with content. They also claimed that the brevity of the other types of courses did not allow them the opportunity to return to their classrooms and try out what they had learnt and to discuss their practice at a follow-up workshop. Furthermore, in the previous in-service workshops the teachers had attended no additional support was available to them once the workshop was completed. Therefore, they tended to abandon new approaches at a very early juncture. This finding supports Guskey's contention that "If the use of new practices is to be sustained and changes are to endure, the individuals [teachers] involved need to receive regular feedback on the effects of their efforts". (2002, p. 387).

> With the one off, one weekend professional development, you get lots of ideas. You might take two or three ideas from that … if they don't go right [in the classroom] you forget about it and don't do them again (Interview)

Insufficient time to get to know other teachers was another reported negative aspect of the short in-service courses, with which the teachers typically engaged prior to this CPD programme.

> Other courses [CPD] are over such short time periods you don't get to know anyone, here you build up a relationship. In this programme I got to know the teachers from other schools very well. We had good discussions in the workshops, particularly when we were working in groups, but also in the whole class discussions that we had every workshop (Interview)

Discussing the current CPD model had caused the teachers to reflect on the inadequacies of earlier types of CPD experienced and, indirectly, to pinpoint the features of the current CPD model that had been beneficial. Significantly, all participants spoke favourably and more directly of the duration of the model, which they indicated introduced new developments in a gradual way and provided a long-term sustainable form of CPD. The teachers outlined a number of benefits of the longer duration of this CPD model with which they had engaged.

All the teachers stated that one of the most significant benefits of this longer term approach to CPD was that it provided them with considerably more frequent opportunities to try out the new ideas in their classrooms and regular opportunities to share their experiences with the other participants.

> Spreading it [CPD] out over that length [two years] definitely enhanced the professional development … you get a chance to test them [workshop activities] out … come back, discuss them [activities in classroom] and share with other people (Interview)

In the exit questionnaires, the teachers also reflected on what they perceived to be the benefits of a longer duration CPD programme. Typical comments included,

> ... because it [the CPD programme] was on-going you knew well if it [innovative approach]
> did not work out for you back in the classroom you could talk about it at the next workshop,
> or contact one of the lecturers (Exit questionnaire)

The teachers maintained that this more gradual approach to CPD was more effective and that they learned a considerable amount from each other's experiences:

> With this [CPD programme] because it was a two-year programme, we were slowly building
> up various different things and it was learning from each other, we could see the progression
> ... it was an evolving process (Interview)

6. Discussion and conclusion

The findings from this study demonstrate the potential of a targeted participatory professional development programme to bring about positive changes in teachers' confidence in and approaches to teaching science.

Prior to engaging with this CPD programme the teachers asserted that they hoped they would develop their pedagogical understanding of and confidence in teaching science. The evidence suggests that these aspirations were met. It would appear from the data gathered that the opportunities afforded to the teachers, for engaging with and reflecting on inquiry-based approaches to teaching science in the classroom, has resulted in change in their experiences of, approaches to and attitudes regarding teaching science.

In particular, the main focus of these teachers' science lessons seems to have moved away from teacher-led expositions of scientific content towards a greater emphasis on the application and development of pupils' scientific skills. Inquiries *about* science as a "lens" through which to view science and hence science teaching appears to have been central to empowering the teachers in the current study to break away from rather traditional, didactic, theory-laden views of science teaching and to tackle more child-led, open-ended modes of learning. Teachers in particular appear to have been embracing views of the tentative, developmental and human-centred NoS as core aspects of their new teaching approaches.

The teachers' reflections on teaching *about* science throughout the CPD programme indicate their belief that teaching *about* science as part of the PSC provided their pupils with more frequent opportunities to discuss their ideas, to plan and carry out their own investigations, to apply a range of scientific skills and to work collaboratively. Thus, including inquiries *about* science as part of the PSC appears to have provided a possible means by which to enact an improved implementation of the PSC (DES, 1999a), with its greater emphasis on inquiry. This type of paradigm shift with consequent benefits also mirrors issues raised in the international arena in relation to school science teaching (Rocard et al., 2007) and, significantly, the current study provides a possible means by which to support such change.

Furthermore, the methodologies were not merely rehearsed or repeated by teachers following on from CPD, but in many cases the CPD appeared to have changed the teachers' whole view of how science teaching should be done. Significant changes in teaching practices had occurred with all the participating teachers and for some, at least, these were rooted in a change of viewpoint about the purpose and significance of an investigative culture in the classroom. The teachers also reported greater professional confidence and use of group work. The benefit in terms of teachers' enhanced confidence with using IBSE in classroom practice is a significant outcome of this study.

The enhancement of dialogical skills reported by the teachers as a consequence of implementing the CPD methodologies to science teaching is especially encouraging in the light of recent requirements in Ireland for primary teachers to devote additional weekly time to these core skills (DES, 2012). In a primary curriculum that is perceived to be overloaded (NCCA, 2008), this could lead to a

reduction in time allocated to other subjects such as science. It is our contention that utilising inquiries *in* and *about* science has the potential to promote genuine integration of oral language objectives from the English curriculum (DES, 1999b), whilst still affording the recommended amount of time for teaching science. Whilst inquiry-based focus of this science CPD programme appears to link to significant impact on the teachers in the current study, the model for the CPD should also be acknowledged as being key to the effectiveness of the CPD.

Teachers in the study pointed to a number of aspects of the CPD model, which they perceived to be beneficial. These were in general, the same ones identified in the research literature (Darling-Hammond et al., 2009; Desimone, 2009; Guskey, 2003; Loucks-Horsley et al., 2009) as significant factors of effective professional development design, namely: active participation; reflective practice; collaboration and duration of programme. The authors attribute the positive findings of the present study to the careful design and implementation of the professional development programme. The success of the programme was likely due to the fact that the model drew together the core features identified as fundamental for successful professional development and good teaching (Desimone, 2009) and adapted them to the needs of the participants. The programme provided teachers with opportunities to engage in a range of inquiry-based activities that their pupils would subsequently experience i.e. the programme modelled the approach to teaching and learning that teachers were then expected to carry out in their classrooms. Such an approach provided the teachers to shape and pace activities and discussions to suit their individual needs (Smith, 2013). According to Bandura (2000) if teachers actively engage in application of skills and knowledge during their own learning, they are more likely to implement the skills and knowledge in their classrooms.

The collaboration in particular appears to have gone beyond the interactions initially envisaged by the authors in recruiting at least two teachers from each of the participating schools. Teachers asserted that they had collaborated with their "partner" teachers. In some cases, participating teachers also took the initiative to become facilitators for CPD within their own schools (Hogan et al., 2007), which is testament to their enhanced confidence as classroom practitioners of science. Once the teachers established a trust and rapport amongst themselves and with the authors, the majority of them engaged in in-depth open pedagogical dialogue and critical reflection. Pritchard and McDiarmid (2005) argue that reflective practice is a key feature needed for effective teaching and professional development. Participants also developed informal networks within the group as a whole, which extended beyond the discussions in the CPD workshops (Hord, 2009). Such networking with colleagues offered the participants different learning experiences that they could not obtain from expert-led activities.

Teachers also spoke positively about the duration of the CPD, in particular the fact that it afforded them opportunities to try out new ideas and then gain feedback in subsequent sessions. Duration of CPD has been noted previously as a key factor in effective CPD provision for science education (Ingvarson, Meiers, & Beavis, 2005; Supovitz & Turner, 2000). The on-going nature of the programme afforded the participating teachers the opportunities and time to develop their pedagogical and content knowledge and capacities to critically reflect on their teaching practice, with a view to bringing about change in their classroom practice. Such opportunities concentrated on key issues and happenings in the teachers' experiences of teaching science and relating these to important insights from the research literature associated with teaching practice. Although the exit interviews were held some months after the completion of the CPD, it remains to be seen whether these apparently substantial changes in practice and professional enhancement continue in the longer term.

The selection of participants for the programme could be viewed as a potential limitation of the study. This confined the study to limited geographical locations. However, examination of the participants (Table 1) shows that they by and large reflect the general teacher population in terms of qualifications, gender and teaching experience. A second limitation of the study could be that the data were gathered immediately at the end of the second year of the programme. A follow-up study that would examine the extent to which these teachers are still utilising the CPD methodologies and

whether they continue to hold positive attitudes towards teaching science a number of years after the CPD would reveal the true impact the CPD has had on these teachers' practices in teaching science.

It is evident that this group of teachers has been affected in a range of positive ways by their experiences of this CPD programme. It is acknowledged that this study was only conducted on a small scale, albeit over a lengthy timeframe. However, the authors consider that the evidence for depth of change is sufficient to warrant the development of CPD courses for other teachers (nationally and internationally) of a type and content similar to that described in the present study.

The current study was aimed at remediating some of the concerns regarding the teaching of primary science in Ireland in that it endeavoured to develop teachers' pedagogical knowledge in teaching *about* science through inquiry so that they would develop the requisite pedagogical knowledge and skills and confidence to implement the PSC using its intended methodologies (DES, 1999a). The findings have shown that engagement with and reflection on different methodologies for teaching *about* science through inquiry has had a positive impact, with all 17 teachers in this study reporting that they now; teach science more frequently; include NoS content in their science lessons; employ inquiry-based methodologies when teaching the PSC; and have more confidence in teaching science. It would appear important, therefore, that curriculum advisors and developers recognise the apparent benefits of developing teachers' pedagogical knowledge in teaching *about* science through inquiry on developing teachers' confidence in employing more inquiry-based approaches to teaching primary science.

Even though this was a small-scale study the authors believe that it has important implications for professional development in primary science in Ireland and internationally. The findings of this study also reveal that the programme can be characterised as effective using three steps of Desimone's (2009) core conceptual framework. Teachers identified Desimone's core features as fundamental for successful professional development and good teaching (step 1). The results also demonstrated that the teachers' participation had a positive impact on their science knowledge and attitudes to teaching science (step 2) and classroom practice (step 3). Further research within the present study will attend to step 4 of Desimone's model—investigating pupils' attitudes to school science changed as a result of their teachers' participation in the programme (step 4).

A key challenge for professional development providers in the future is investment in the development of a system of high-quality professional development in the area of primary science. Features of effective professional development such as those proposed by Desimone (2009) could be used as a framework when planning future models of professional development. At present in Ireland professional development is mainly concerned with achieving the needs of the system. According to O'Sullivan, McMillan, and McConnell (2011) "it is about building teacher skills rather than capacity. The focus is on curricular change rather than developing the person of the teacher" (p. 8). There is a need for a more balanced approach between professional development that supports the needs of the individual teacher and that of the system. The results of this study suggest that the model used can lay the fundamentals for effective alternative models of professional development.

The model used in the present study was successful in the context of primary science in Ireland. The main features of this model are broad enough to be tailored globally, particularly in other countries where inquiry-based experiences form core pedagogies.

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Note

1. The teacher put "THEY" in capitals for emphasis in her reflective journal.

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The role of experience in teachers' social representation of students with autism spectrum diagnosis (Asperger)

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Abstract: Support from teachers is a key strategy for accommodating students with Asperger syndrome (AS) diagnosis in the mainstream classroom. Teachers' understanding and expectations of students, i.e. their social representations (SR), have a bearing on how they interact and accommodate, but little is known about why. Therefore, the current study examined the idea that teachers' SR of these students are influenced by their previous experience with AS. To this end, Swedish mainstream teachers were invited to anonymously answer a web-based questionnaire ($N = 153$). An association task was used to obtain data on teachers' SR and the content and structure of the SR were explored. Our results suggest that work-related experience of AS and/or private experience shape teachers' SR of these students relative to teachers with no experience. Moreover, teachers with previous experience had more SR elements related to environment and learning factors while teachers without previous experience had more elements related to the individual's behavior. Teachers with private experience produced fewer positive elements compared to those with work-related experience only. These results highlight the role of contextual factors and prior experience in forming SR. We conclude that contact with students with AS, e.g. during teacher training, could facilitate accommodation in mainstream schools.

Subjects: Disability Studies - Sociology; Inclusion and Special Educational Needs; School Psychology; Social Psychology; Teaching & Learning

Keywords: autism spectrum disorder; Asperger diagnosis; teacher experience; social representations; inclusion; social representation theory

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PUBLIC INTEREST STATEMENT

Preventing students with Autism Spectrum Disorder (ASD) from dropping out of school is a worldwide concern and in particular for teachers in mainstream classrooms. Teachers' understanding and expectations have bearing on how they interact with and accommodate these students. Therefore, the current study examined whether various kinds of experience influence how teachers in Sweden perceive students with AS. Experiences seem to play a vital role in teachers' positive view of inclusion of students with ASD. Teachers with private experience were less positive than teachers with work-related experience. Prior contact with students with ASD e.g. during teacher training could facilitate accommodation in mainstream classrooms.

1. Introduction

Preventing students with Asperger Syndrome (AS) from dropping out of mainstream education is a worldwide concern (Mavropoulou & Avramidis, 2012; Moores-Abdool, 2010; Probst & Leppert, 2008). Policy underscores an inclusive agenda (Humphrey & Lewis, 2008; Isaksson, Lindqvist, & Bergström, 2007), but schools have yet to live up to this goal given the number of students with AS who drop out of school (Parsons & Lewis, 2010; Swedish National Agency for Education [SNAE], 2009). One problem in implementing the policy is that personnel often have little or no specific training since their basic education lacked this (Hein, Grumm, & Fingerle, 2011; Robertson, Chamberlain, & Kasari, 2003; Starr & Foy, 2012; Syriopoulou-Delli, Cassimos, Tripsianis, & Polychronopoulou, 2012). Given the policy of inclusion teachers likely meet students with AS in the general classroom, but we do not know how they perceive or deal with them.

AS is a pervasive disorder that affects how a person makes sense of the world, processes information, and relates to other people and it is one of three entities within the broader Autism Spectrum Disorder in DSM IV (American Psychiatric Association [APA], 1994). It has not been clear whether AS qualitatively differs from high-functioning autism; therefore, there is a debate on whether or not AS is a single condition or on a spectrum (see e.g. Baron-Cohen, 2008 & Kaland, 2011). Although the new DSM V (APA, 2013) does not highlight the sub-entities, AS is still used as a term and many people have already received the diagnosis and it is still included in the ICD-10 (Tsai & Ghaziuddin, 2014).

One factor that may determine how successful teachers are in providing an inclusive environment for students with AS is their experiences and beliefs (Armstrong, 2013; Avramidis & Norwich, 2002; Emam & Farrell, 2009). Indeed, experiences generated from a traditional medical approach that focuses on "deficits" might result in low expectations and more exclusion. On the other hand, a social model of disability where the environment plays an increasing role in defining educational barriers might lead to a different environment and more inclusion (Thomas & Loxley, 2007). Although teacher training programs have developed robust models for understanding student diversity, the unique experiences students with AS bring to the school arena pose new sets of challenges (Mavropoulou & Avramidis, 2012; Moores-Abdool, 2010; Probst & Leppert, 2008; Starr & Foy, 2012). Given the situation today, most teachers rely on their own previous experiences in order to be effective inclusion educators (Hattie, 2012; Mavropoulou & Avramidis, 2012; Sharma, Forlin, & Loreman, 2008). Hence, a positive expectation towards including students with AS may be a prerequisite for success (Emam & Farrell, 2009; Jordan, 2008) and this in turn is dependent on the teacher's personal experience (Jovchelovitch, 2007). Such experiences are normally incorporated in and expressed via one's belief system.

The beliefs that teachers bring to the classroom are a reflection of so-called social representations (SR) (Harma, Gombert, & Roussey, 2013; Jodelet, 2008; Moscovici, 2000). Moscovici (2000) described social representation as an array of values, ideas, and practices that forms a coherent order among phenomena and shared with a group. The representation supplies people with codes for explicitly naming and classifying objects and phenomena in order for people to communicate with each other. Therefore, SR acts as a guide for teachers' actions by integrating teachers' collective memories with their individual practical experiences and thus determines their practices and behavior (Howarth, 2004; Ratinaud & Lac, 2011; Walmsley, 2004). These representations are expressed in behavior (Harma et al., 2013; Howarth, 2004; Moscovici, 2000). Hence, in the educational arena, SR can be seen as signposts for how teachers will act in the classroom to provide students with AS an inclusive environment. For example, the SR of teachers concerning students with AS, encompasses a focus on the disabling aspects and special needs of the individual suggesting that inclusion could well be compromised (Linton, Germundsson, Heimann, & Danermark, 2013). In order to develop better programs, there is a clear need to understand better how experience affects the development of SR and in turn how these might be related to actual practice (Linton et al., 2013).

2. Social representation theory

The theory of social representations (SRT) is relevant in that it helps to understand the underlying collective meaning of things like inclusion (Moscovici, 2000; Walmsley, 2004). Two processes, anchoring and objectifying, are involved in generating SR. Firstly, in order to give the new object a familiar face, we anchor it in a thought process based on experience and memory. Hence, our experience is fundamental in these processes where we anchor the "new" in something already known to us through memories of past experiences (Jovchelovitch, 2007; Moscovici, 2000). Secondly, objectifying is the mechanism by which we transfer this meaning to something already existing in our life (Moscovici, 2000). Consequently, the basic ideas and understanding are reflected in our SR and may be analyzed by way of SRT. In other words, by studying teachers' SR, we shed light on teachers' common sense knowledge of students with AS and their accommodation for them in the school setting, since SR guide their behavior and practice (Harma et al., 2013; Howarth, 2004; Walmsley, 2004).

3. The role of experience

Previous experience such as direct face-to-face contact might play a crucial role in the development of SR and conceptions of individuals with AS. Specifically, unfamiliar concepts, such as AS, are assessed in terms of discrepancy from the norm which unconsciously help us in the interpretation of phenomenon (Moscovici, 2000). According to SRT, our understanding of the present is based on past experience and ideas at hand, by integrating it into prior experiences and memory (Jovchelovitch, 2007).

Several studies suggest that experience is vital in how teachers perceive and include students with AS. For example, prior experience with students with disability has been shown to be more important in forming teachers' perceptions than an in-service training course (Sharma et al., 2008). Moreover, work-related experience of students with AS plays an important role in teachers' perception of them (Syriopoulou-Delli et al., 2012) and influences how open they are to inclusion (Glashan, Mackay, & Grieve, 2004). This may help explain why teachers with experience of disabilities also demonstrate more confidence in including students into the mainstream classroom (Arthur-Kelly, Sutherland, Lyons, Macfarlane, & Foreman, 2013; McGregor & Campbell, 2001). Thus, an important aspect of the inclusion of students with AS may be the teachers' previous contact with AS (Humphrey & Lewis, 2008; Huws & Jones, 2010), and the impact of this experience may be accessible via SR.

While experience appears central, it would be premature to conclude that all experience of AS is uniformly positive. For example, in their study of pre-service teachers Forlin and Chambers (2011) found that the more prior interaction with students with disability the less favorable support of inclusion. As AS is often difficult to detect, teachers who do not know how to identify and act upon these learning, may experience students with AS as a challenge that reduces their ability to provide appropriate support (Probst & Leppert, 2008; Starr & Foy, 2012). This in turn might induce stress among students and teachers. For the student, it could lead to increased anxiety and absenteeism (Batten, 2005) and for teachers, desolation and difficulty in providing an inclusive classroom (Sciutto, Richwine, Mentrikoski, & Niedzwiecki, 2012). Consequently, there is a need to bring to light the impact previous experience of AS might have on teachers and teaching practice (Avramidis & Norwich, 2002; Linton et al., 2013; Sciutto et al., 2012).

While experience from the school is central for teachers, another important source of experience is from one's (private) personal life (McGregor & Campbell, 2001). Here again, private experiences, such as with a family member with a disability, does not necessarily generate positive views on inclusion (Bradshaw & Mundia, 2005). Hence, the experience teachers bring to the classroom from their private lives are important to bring into light since their consequences on inclusive education are not obvious to school administrators (Cooper, 2011; Soles, Bloom, Heath, & Karagiannakis, 2008). To our knowledge, no study to date has examined teachers' SR of students with AS where both school and private experience has been included.

In summary, there are several reasons why it is important to shed light on the role of teachers' experience on their SR of students with AS. As noted above, life experiences involving students with AS might influence values, beliefs (SR) which are the base for attitudes (Moscovici, 2000) and also provide "craft" knowledge (Parsons et al., 2011). Attitudes to inclusion are multifaceted but shaped by factors such as personal experience and confidence in providing appropriate educational opportunities (Arthur-Kelly et al., 2013). However, studies examining why teachers relate the way they do with students with disabilities in general and with AS in particular are scarce (Parsons et al., 2011; Sciutto et al., 2012). In Sweden, for example, projects specifically targeting individuals within the autism spectrum 2001–2010 received only 1% of all funded disability research (Rönnberg, Classon, Danermark, & Karlsson, 2012). None of these projects looked at the educational provision for learners with AS. The knowledge gained by studying teachers' SR, which is anchored in their prior experiences sets the stage for identifying whether experience of students with AS, shapes their SR. This knowledge could translate into inclusive classroom practices since SR guides behavior. By exploring SR held by teachers with and without experience, it is possible to develop new knowledge and practicum for pre-service and in-service teacher education in order to improve inclusion.

4. Aim and research questions

The overriding research aim is to explore the relationship between experience and teachers' SR of students with AS. Specifically, we address three major questions: (1) To what extent does experience make a difference in teachers' SR of students with AS?; (2) Does work-related experiences of AS impact on teachers' SR of students with AS?; and (3) Do private experiences of AS influence teachers' SR of students with AS?

5. Methods

Overview. Participants were invited by school administrators to complete an anonymous questionnaire via a link to a website where they could complete the questionnaire. When teachers linked into the website, they were asked some demographic questions such as sex, education, level, and years of teaching. In order to capture teachers' SR, participants were asked to spontaneously respond with the five first words that came to mind when presented with a stimulus phrase concerning AS ("students with Asperger diagnosis"). The questionnaires were administered and delivered anonomyously via an electronic link. We surveyed teachers as to their previous experience with AS. Comparisons were made between (1) phrases produced by teachers with and without experience and (2) phrases produced by teachers with private experience only and work-related experience only. The data were summarized by using descriptive statistics, relative risk increase (RRI), and matrix trees.

5.1. Participants

A total of 170 mainstream teachers from six municipalities in central Sweden took part in this research project. Table 1 summarizes their demographics. The present study draws on 153 of these teachers as 17 did not specify their experiences and therefore they were omitted from the analyses. A total of 76.8% of the teachers included in the current analysis were women and the average age was 46, 9 (SD = 10.3). The ethical principles set up by Helsinki Declaration have been followed in the gathering of data.

5.2. Word association method

The free word association method, which is based on participants providing free associations to a stimulus phrase, has been developed for singling out components of the SR (Abric, 2003; Parales Quenza, 2005). The response phrases to the stimulus cue are the cognitive elements of the SR (Bodet, Meurgey, & Lacassagne, 2009; Ferreira, Corso, Piuvezam, & Alves, 2006; Moloney, 2010; Parales Quenza, 2005). By using the frequencies and rank order of the phrases produced, the organization and structure of a social representation is determined (Abric, 2001; Ferreira et al., 2006; Joffe, 2002). Thus, this method employs a combination of the elements in a hierarchical structure in exploring a social representation and not simply a sum of the elements (Abric, 2001; Molinari & Emiliani, 1996; Parales Quenza, 2005). In accordance with this theory, the social

Table 1. Participants' sex, grades, and years of teaching experience and whether they are qualified/not qualified teachers (*N* = 170)		
Participants		***N***
Sex	Male	35
	Female	130
	Unknown	5
Level of teaching	Female	
Kindergarten-3	100%	43
4–6	90%	30
7–9	66%	32
High school	61%	46
Other		29
Years of teaching	≤6 (17%)	29
	≥7 (78%)	132
	Unknown (5%)	9
Qualified	91.2%	156
Not qualified	8.2%	14

representation has central elements that are stable and reveal the meaning of the representation; they serve a normative function. The peripheral elements are less stable and might change in different contexts and between individuals. In order to present this combination of elements and reveal their organization, Flament (1981) developed the *matrix tree* which graphically displays the hierarchy and the links among pairs of elements. Such a matrix tree consists of **nodes**, or circles, which represent entities, and **lines**, drawn between the nodes to indicate a connection between them (Solé, Corominas-Murtra, Valverde, & Steels, 2010; Wiles et al., 2010). Since the size of the nodes is based on frequency, the matrix tree illustrates the most central categories. Furthermore, the size of the lines between the nodes reflects the frequency of teachers reporting both categories so the link between the elements is graphically depicted. Consequently, by constructing a matrix tree the most important elements and links of the social representation are graphically displayed (Bales & Johnson, 2006). This method involved the following three steps.

Step1. Free association

Using the expression "student with Asperger diagnosis" as our cue, we asked teachers to write down the first five words that came to mind when this expression was presented to them. It is the sponta-neous character of the utterance that facilitates access to the person's associations and hence to the semantic field covered by the stimulus phrase.

Step 2. Ranking

After spontaneously producing five phrases, the respondent was asked to reflect upon the phrases and classify them from the most important to that which he/she considered least important of the student with AS.

Step 3. Valence

The respondents were asked to give the valence, that is, whether the meaning of each phrase they had produced had a positive, neutral, or negative tone.

Thus, we had a corpus of items that provided us with the content of the representation. Two quantitative indicators are associated with them: (1) the frequency of the appearance of the categories (shown by the size of the node) and (2) the co-occurrence of categories shown by the size

of the lines presented in matrix trees. The frequency of occurrence was calculated in Excel, and a χ^2 test was performed. In order to compare the groups which all had different baselines, we studied their relative relationship. RRI is used for computing event rates of groups with different baselines (Lachin, 2011). In presenting our empirical findings, we used the RRI to describe and compare which categories were most frequent. Here, the base group (P1) was the group of teachers with experience, while the reference group (P2) was the group of teachers without experience. The relative risk ratio, which can be described in terms of increase, is the difference between P1 and P2 (P1 − P2) divided by P2, and expressed as a percentage.

In the second step of the data analyses, the co-occurrence ties between the categories were measured and presented in a matrix showing the links among pairs of categories. By applying the software Iramutec (Ratinaud, 2009), which is an *r*-based interface designed to identify structure and hierarchy of the SR, an in-depth analysis was carried out (Abric, 2001; Alves-Mazzotti, 2011). By defining the categories as circles and the co-occurrence relationships as lines, word networks for analyzing structure properties of social representation were revealed (Solé et al., 2010; Wiles et al., 2010) The thickness of the lines was in proportion to the number of co-occurrences and the size of the circles was in proportion to the number of mentions but only to a certain degree, the largest circle was 10 times bigger than the smallest one which supplied the proportional borders for the rest of the circles. By considering the frequency of appearance in relation to the co-occurrence of categories displayed in matrix trees, we gained insight into the most prominent elements of the social representation. These protruding elements were supposedly managing the representation as they had more links to other categories than did the other elements (Bales & Johnson, 2006; Coronges et al., 2007).

6. Data collection

6.1. Categorization
Before analyzing the data, and to simplify it, we grouped the different phrases in the sample into 27 semantic categories, on the basis of the similarity among their meanings (Linton et al., 2013). The categorizing was done by two members of the research team ACL and PG and two teachers. Synonymous phrases were grouped together even when they differed grammatically, for example, need/needs. Phrases with equivalent semantic meaning such as "isolate themselves," "loner," "a lone wolf," "sits at home," and "shy" were put in one and the same category named "social isolation." The valence of the produced phrase was important in the categorization process and sometimes produced a dichotomy. For example, when the word "clarity" had a negative charge it created a new category "need for clarity." A more detailed description of the categorization is available elsewhere (Linton et al., 2013).

The participants were screened according to prior experience of students with AS. Firstly, a division into two subgroups of teachers with experience or no experience of students with AS was performed. Secondly, teachers with experience of AS formed three different groups; one group of teachers with combined private and work-related experience, one group of teachers with work-related experience only, and one group with private experience from outside the workplace only. A two by two table was created (Table 2). The current sample is based on 707 phrases produced by 153 teachers. There were 111 teachers with experience and 42 teachers without any experience with AS. The teachers with experience produced 509 phrases (*M* = 4.59) while teachers without experience produced 198 phrases (*M* = 4.71).

7. Results
Overview. In order to evaluate the role of experience, we first examined possible differences in the valence of the phrases provided in the free association. Then, we compared the frequency of categories of (a) teachers with versus without experience and (b) teachers with work-related versus private experience of students with AS by calculating RRI. Thereafter, we performed similarities

Table 2. Groups of teachers in relation to their private and/or work-related experience					
Private					
Work	**Yes**		**No**		**Total**	
	n (No. of phrases)	***Valence**	**n (No. of phrases)**	**Valence**	**n (No. phrases)**	**Valence**
Yes	46 (207)	(+) 42% (0) 31% (−) 27%	39 (182)	(+) 40% (0) 29% (−) 30%	85 (389)	(+) 41% (0) 30% (−) 28%
No	26 (120)	(+) 34% (0) 29% (−) 36%	42 (198)	(+) 38% (0) 28% (−) 34%	68 (318)	(+) 36% (0) 28% (−)35%
Total	72 (327)	(+) 39% (0) 30% (−) 30%	81 (380)	(+) 39% (0) 28% (−)32%	153 (707)	(+) 39% (0) 29% (−) 31%

*Note the valence of the words is given as the percent of all mentions of the group.

analysis of categories, displayed in the matrix trees, in order to explore whether there was a difference in the structure and organization of the SR in relation to the four different groups of teachers. The size of the line visually illustrates the co-occurrence of categories in matrix trees.

7.1. Valence
Overall, teachers demonstrated relatively positive valences to the words provided, but there were some notable small differences between the groups. For example, the most frequent positive mentions were found among teachers with work-related experience only, (42%), while the least positive charge was found among teachers with private experience only, (34%). While the negative charge was most frequent among the teachers with private experience (36%), the least negative valence was found among teachers who had work-related experience only (27%). Taking the differences in the positive and the negative phrases together, teachers with private experience relative to teachers with work-related experience responded with 17% less positive phrases.

7.2. The occurrence of categories
First, we compared the occurrence of categories of teachers with and teachers without experience of AS. In addition, a comparison of the co-occurrence of the categories was graphically illustrated in matrix trees. Since our results indicated (Table 2) that there was a difference in valence between teachers with private and work-related experience only, we proceeded to compare these groups for differences in the frequency and co-occurrence of the categories. Once again, while we expected our groups to have many similarities because they have similar culturally and educational backgrounds, we focused on the differences related to having different forms of experience with AS.

7.2.1. Differences and similarities in the frequency of categories
In Figure 1, the percent mentions for each category is presented in descending order. Teachers with experience of students with AS had the most mentions in the category "special interest," but the largest difference relative to teachers without experience was for the category "environmental adaptation at school" (6%; $p < 0.05$) in comparison to teachers without experience of AS. On the other hand, teachers without experience had most mentions in the category "intellectual profile," but they more often mentioned the category "different perception" (3.4%; $p < 0.05$) than did teachers with experience. Thus, teachers with experience of AS showed partly different results from teachers without experience.

   In order to compare the percent mentions of the two different groups, the RRI was calculated. Table 3 shows the categories in descending order according to the difference between the teachers with experience versus teachers without experience expressed in RRI. The categories which were more frequent among teachers with experience in relation to the teachers without experience are presented in descending order. For example, the category "environmental adaptation at school" has an RRI of 100(0.09 − 0.03)/0.03 = 200, i.e. 200%, among teachers with experience of AS. This means that the
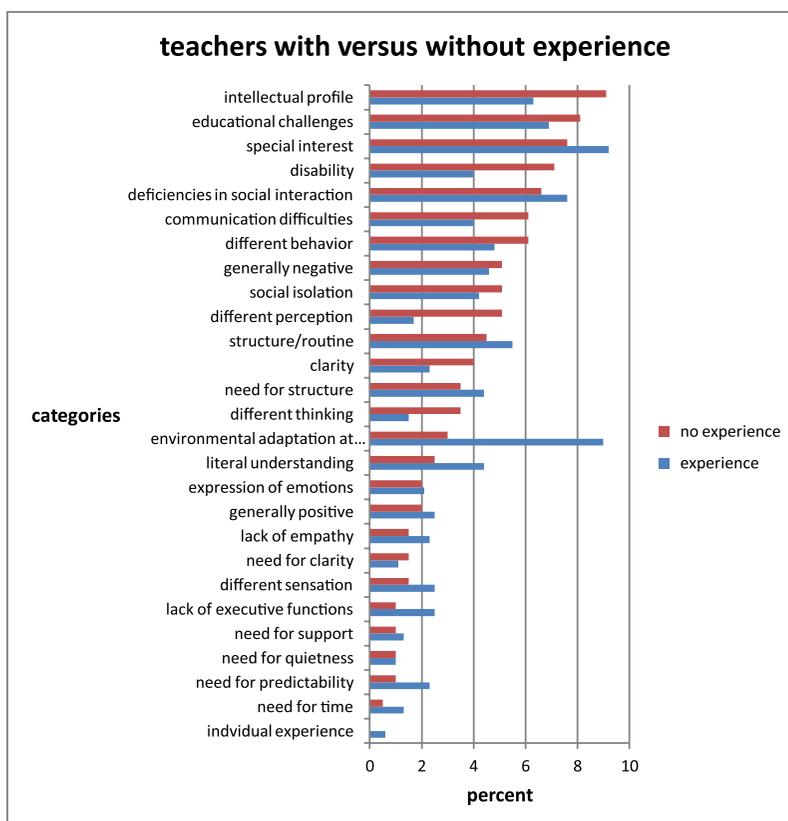
Figure 1. The percent mentions of each category for teachers without experience compared to those with experience in descending order according to teachers without experience.

likelihood that the category "environmental adaptation at school" will be mentioned is increased by 200% for teachers with experience relative to teachers without experience. Other frequently mentioned categories are "need for time" (RRI = 160%), "lack of executive functions" (150%), "need for predictability" (130%), and "literal understanding" (76%). As is shown below (Table 3), a few of the RRIs are smaller than 20% (our cut-off level for major differences between the groups) such as "deficiencies in social interaction" (15%), "need for quietness" (10%), and "expression of emotions" (5%).

The categories which were more frequent among teachers without experience are shown in descending order in Table 4. The most outstanding categories were "different perception" (RRI = 200%) and "different thinking" (RRI = 133%). Categories which only had a smaller difference (less than 20%) in RRI between the groups are found at the end of Table 4: "generally negative" and "educational challenges."

Teachers with experience of AS showed partly different results from teachers without experience. Their most frequent categories are connected to educational activities such as "need for time," "lack of executive functions," and "need for predictability." While important differences are shown above there was nevertheless considerable consensus between the two groups of teachers concerning some of the elements of the representations. There is a slight propensity among teachers without experience to think more about educational challenges and negative aspects.

7.3. Similarities analysis: matrix trees

In Figures 2 and 3, the co-occurrence of categories is presented. The graph pertaining to teachers with experience (Figure 2) shows "special interest" and "deficiencies in social interaction" as the dominating elements of their SR. "Special interest" was the prime element of the representation among teachers with experience of AS. This is in accordance to occurrence of frequency (see

Table 3. The percent of mentions of each category and the difference between the groups expressed in RRI (in descending RRI order)

Categories	Experience (%)	No experience (%)	RRI (%)
Environmental adaptation at school	9.0	3.0	200
Need for time	1.3	0.5	160
Lack of executive function	2.5	1.0	150
Need for predictability	2.3	1.0	130
Literal understanding	4.4	2.5	76
Different sensations	2.5	1.5	67
Lack of empathy	2.3	1.5	53
Need for support	1.3	1.0	30
Need for structure/routines	4.4	3.5	26
Generally positive	2.5	2	25
Structure/routines	5.5	4.5	22
Special interest	9.2	7.6	21
Deficiencies in social interaction	7.6	6.6	15
Need for quietness	1.1	1.0	10
Expression of emotions	2.1	2.0	5

Note: The most frequent categories among teachers with experience in comparison to teachers without experience.

Table 4. The percent of mentions of each category and the difference between the groups expressed in RRI (in descending RRI order)

Categories	No experience (%)	Experience (%)	RRI (%)
Different perception	5.1	1.7	200
Different thinking	3.5	1.5	133
Clarity	4.0	2.3	74
Communication difficulties	6.1	4.0	53
Intellectual profile	9.1	6.3	44
Disability	5.6	4.0	40
Need for clarity	1.5	1.1	36
Different behavior	6.1	4.8	27
Social isolation	5.1	4.2	21
Educational challenges	8.1	6.9	17
Generally negative	5.1	4.6	11

Note: The most frequent categories among teachers without experience in comparison to teachers with experience.

Figure 1) and demonstrated in two different ways; firstly, the most frequent and therefore most bold lines were connected to "special interest" and secondly, this category had the most categories connected to it with 45% of the total 197 links of the tree.

Another smaller hub which contained 25% of the total 197 links could be identified around "deficiencies in social interaction" where elements related to needs and behavioral aspects were in focus such as "intellectual profile," "need for quietness," and "need for support." In addition, there was a center of elements concerned with the structural level, organized around "environmental adaptation at school," "educational challenges," and "structure and routines." It corresponds well with Table 3 where the focus is on environmental adaptation.

Figure 2. A matrix tree diagram of responses from teachers with experience (total number of links is 197).

Note: The numbers are only valid within this maximum tree.

Two centers of categories emerged in the matrix tree for teachers without experience (see Figure 3). The most prominent center was grouped around "intellectual profile" which had 38% of the links and brought together "deficiencies in social interaction," "different behavior," "generally negative," "social isolation," and "special interest." A smaller center was found around "educational challenges" which had 18% of the links.

In total, the graph pertaining to teachers with experience had "special interest" as the dominating center and categories attached to it related to the learning processes such as "need for structure/ routines," "literal understanding," and "lack of executive functions." While the center around "intellectual profile" for teachers without experience mirrored the behavioral aspects and had a focus on deficits; however, the category "special interest" is a resource in educational provision.

7.3.1. Teachers with work-related versus private experience of AS

The difference between teachers with work-related experience and teachers with private experience is shown in Tables 5 and 6 where the categories are listed in descending order. The difference between the groups is expressed in RRI. Note that the most frequent categories among teachers with work-related experience are shown in Table 5 while the most frequent categories among teachers with private experience are shown in Table 6.

Among teachers with work-related experience, the largest difference relative to no work experience was found in the categories "intellectual profile" (RRI = 95%) and "generally positive" (94%) (see Table 5). They are more frequently associated to "intellectual profile," "different perception," "executive functions," and "communication difficulties." Also, teachers with work-related experience had more mentions in "generally positive" than did teachers with private experience only did.
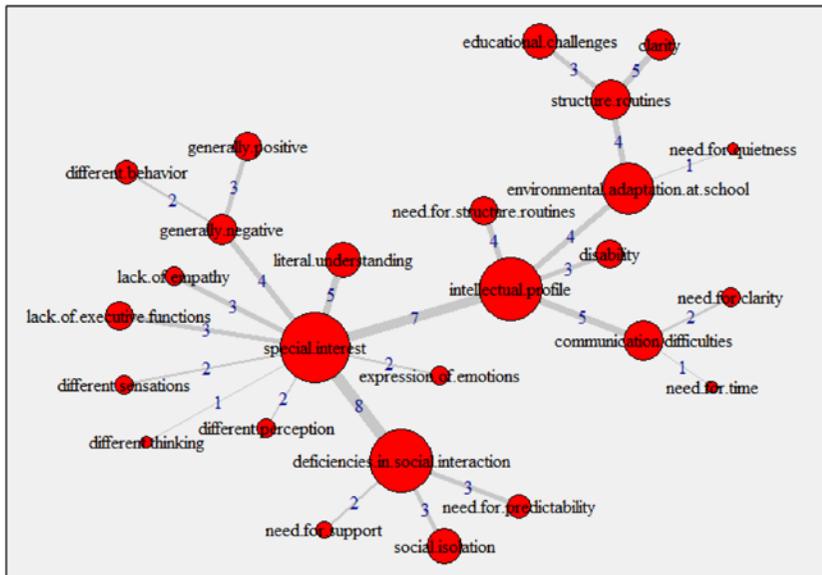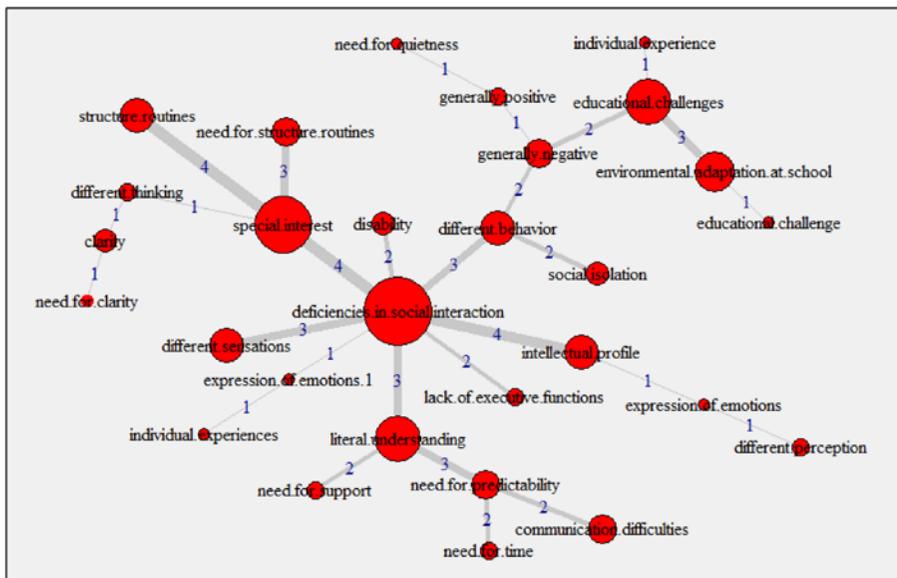
Figure 3. A matrix tree diagram of responses from teachers without experience (total number of links is 94).

Note: The numbers are only valid within this maximum tree.

The categories that were most prominent among teachers with private experience specifically were: "different thinking" (RRI = 400%), "different sensations" (263%), "literal understanding" (263%), and "need for time" (240%) (see Table 6).

In sum, teachers with work experience more often associated to learning; "intellectual profile," "different perception," "executive functions," and "communication difficulties." The categories that were most prominent among teachers with private experience specifically accentuated differences and need for time. There seemed to be a consensus regarding "generally negative," "structure / routines," "lack of empathy," and "educational challenges" where the difference in RRI was less than 20% between the two groups (Tables 5 and 6).

7.4. Similarities analysis: matrix trees

The co-occurrence of the elements for teachers with work-related experience is shown in the matrix tree in Figure 4. The most dominating element was "special interest" which had a positive valence. Its importance is mirrored in two ways, the thickness of the links to "deficiencies in social interaction" and to "intellectual profile," also, the category had 41% of the total 82 links. Moreover, traces of another center are found around "intellectual profile."

The maximum tree for teachers with private experience had a slightly different structure than the tree for teachers with work-related experience only (see Figure 5). Among teachers with private experience, outside the workplace, the most pronounced category was the negative "deficiencies in

Table 5. The percent of mentions of each category for teachers with work-related experience (w) compared to those with private experience (p) and the difference between the groups expressed in RRI (in descending RRI order)

Categories	Work-related experience (%)	Private experience (%)	RRI (%)
Intellectual profile	8.2	4.2	95
Generally positive	3.3	1.7	94
Communication difficulties	6	3.3	82
Lack of executive function	2.7	1.7	59
Different perception	2.7	1.7	59
Clarity	2.7	1.7	59
Need for quietness	1.1	0.8	38
Need for clarity	1.1	0.8	38
Social isolation	5.5	4.2	31
Expression of emotions	2.2	1.7	29
Disability	3.8	3.3	15
Environmental adaptation	9.3	8.3	12
Educational challenges	8.2	7.5	9
Lack of empathy	1.6	0	0

Note: The most frequent categories among teachers with work-related experience in comparison to teachers with private experience.

Table 6. The percent of mentions of each category for teachers with private experience compared to those with work-related experience and the difference between the groups expressed in RRI (in descending RRI order)

Categories	Private experience (%)	Work-related experience (%)	RRI (%)
Different thinking	2.5	0.5	400
Different sensations	5.8	1.6	263
Literal understanding	5.8	1.6	263
Need for time	1.7	0.5	240
Different behavior	5.8	2.7	115
Need for support	1.7	1.1	55
Need for predictability	3.3	2.2	50
Deficiencies in social interaction	10	8.2	22
Need for structure/routines	3.3	2.7	22
Generally negative	4.2	3.8	11
Structure/routines	5.0	4.9	2
Individual experience	1.7	0	0

Note: The most frequent categories among teachers with private experience in comparison to teachers with work-related experience.

social interaction." This category had 39% of the 57 links as compared to 19% of the links among teachers with work-related experience.

While the dominant hub for teachers with work-related experience was "special interest," the corresponding center was "deficiencies in social interaction" for teachers with private experience. This indicates that private experience partly endorses a different structure and organization of the elements of the representations than does work-related experience.

Figure 4. A matrix tree diagram of responses from teachers with work-related experience (total number of links is 82).
Note: These numbers are only valid within this maximum tree.

Figure 5. A matrix tree diagram of responses from teachers with private experience (total number of links is 57).
Note: These numbers are only valid within this maximum tree.

8. Discussion

This study compares teachers with and without experience of students with AS on the content and structure of their SR of these students. Also, we studied the role of private experiences in contrast to work-related experience at the school. We have used the concept of SR as an analytical approach, with an emphasis on experience and in doing so; our objective has been to grasp both the unifying and the differing dimensions of social thought. In fact, we find that different types of experience show an association with the structure and organization of teachers' SR. Hence, the SR may be understood in relation to three conditions: no previous teaching experience with these students; personal experience at work; and, private experience acquired outside the school. Let us examine these more closely.

First, with regard to previous experience of students with AS, experience with AS may be central in creating an inclusive school. Teachers with experience, for example, appear to decode the surface behavior and think in terms of how the school might be better adapted for these students. For example, they associated to the categories "special interest" and "environmental adaptation at school", but they also focused on the "need for time" and bring forward the "lack of executive functions" which is a key component in most knowledge acquisition. They acknowledge "literal understanding," "need for predictability," and diverse ways of processing information through different sensations. This correlates well with previous research showing that teachers' willingness to include students with AS increases with the amount of time they have interacted with such pupils (Humphrey & Lewis, 2008; Huws & Jones, 2010; Yuker, 1994). In contrast, teachers without experience focused on "different perception," "different thinking," "communication difficulties," and "intellectual profile." While individual characteristics are mentioned by both of the groups, there is more focus on behavioral manifestations among teachers without experience. Using the biological impairment as a starting point for educational support for students with different needs is assumed to act inconsistently with the notion of enhancing inclusion (Gibbs, 2007). If teachers perceive behaviors as disruptive it is likely that students with AS receive non-mainstream provision instead of developing better practice around the behavior since teachers are the key agent for successful inclusion (Armstrong, 2013; Sharma et al., 2008). The difference between the two subgroups indicates that there is a risk that teachers without experience of children with AS may form a biased image of these learners which some researchers e.g. Huws and Jones (2010) suggest could possibly be altered by having substantial face-to-face encounters with them.

Second, work-related experience also appears to be associated with positive views about inclusion. For example, teachers with work-related experience more often mentioned the "generally positive" category than did teachers with private experience only. This indicates that they are more prone to include students (Glashan et al. 2004; Sharma et al., 2008) and resonates well with previous research which suggests that attitudes to inclusion seems to demonstrate a strong relationship with classroom management behavior (see e.g. Gibbs & Powell, 2012). Teachers with work-related experience seems to view these students' perception differently; also they are more focused on their lack of executive functions, which indicates that they may accommodate for students with AS (McGregor & Campbell, 2001; Syriopoulou-Delli et al., 2012).

Third, private experiences are associated with a more intimate understanding of how AS influences communication and routines. Teachers with private experiences, for instance, focused on "deficiencies in social interaction," "different sensations," "literal understanding," "different behavior," and "need for predictability." These are elements that would be accentuated in the private sphere where there may be more opportunities for these to occur. Senses are prominent in situation where clothes might be rejected because of an unpleasant sensation, taking showers is sometimes pain-related and consistency of foods can be problematic. Importantly, misunderstandings due to literal interpretation and need for predictability are consequences of inclusive education may not be evident to teachers in the school setting but quite noticeable at home (Sciutto et al., 2012).

The valence of the total positive and negative phrases given by teachers with work-related experience was 17% more positive than the valence given by teachers with private experience, a finding in line with previous research (Glashan et al., 2004; Humphrey & Lewis, 2008; Syriopoulou-Delli et al., 2012). Also, since private experience is a more ubiquitous experience (e.g. McGregor & Campbell, 2001; Starr & Foy, 2012), teachers with such experience may be more realistic about the required support needed the mainstream classroom (Forlin & Chambers, 2011).

One explanation for the differences observed in the structure of the SR for teachers with various experiences might be that Swedish national policies provide a framework for inclusion, however, the municipalities have freedom in their interpretation of inclusion policies and the implementation process can be drawn-out (Isaksson, Lindqvist, & Bergström, 2007; SNAE, 2008). Thus, teachers in this study may be at different phases of working with inclusion. Teachers with work-related experience

have probably been introduced to improvement strategies while teachers with private experience only, might still regard the problems as residing within the student and not in the school environment and want the segregated alternative to ensure teaching resources for students' individual educational support. Thus, they have less accepting attitudes to students' difficulties as a result of organizational or environmental shortcomings. Our findings suggest that private experience partly endorses a different structure and organization of the elements of the representations than does work-related experience. The focus on needs as well as personal traits could be due to remnants of segregated forms of schooling. Another factor might be teachers' negative feelings from inadequate inclusion experiences, since this is typically reported in surveys conducted by SNAE (2003). An additional interpretation of the above could be that private experience gives an insight into the inclusive classroom experience as stress inducing for students with AS. This could be perceived as partly due to teachers' lack of knowledge about the specific disability (Mavropoulou & Avramidis, 2012; Moores-Abdool, 2010; Probst & Leppert, 2008).

The revealed difference among teachers with private experience is consistent with the known high levels of anxiety, depression, and school absenteeism among students with AS (see e.g. Batten, 2005). The stress and anxiety levels of students with AS in inclusive classroom can go unnoticed by educators but are more obvious in the home context (Cooper, 2011; Soles et al., 2008). However, this interpretation is not in accordance with the idea of inclusion where the importance of meeting the needs of all students, ensuring quality education and maximizing student participation is underscored (UNESCO, 1994). Hence in the Swedish case there is a need for more research in educational provision specifically targeting students with AS (see e.g. Rönnberg et al., 2012; SNAE, 2009).

This research is not without limitations. First, the sample and thereby the number of phrases provided is restricted. Nevertheless, the structure of the SR indicates consistent similarities and differences based on prior experience and the matrix trees underscore how these contribute to form the social representation. Second, because the sample was collected from six municipalities located in the central part of Sweden, the findings of this study may not be generalized to all teachers. Third, the web surveys were distributed via school principals; hence, the researchers did not have information about the teachers who did not respond to the survey. Such information could enhance interpretation of the findings.

9. Conclusion

In summary, our findings show that there is a correlation between teachers' experience and their SR of students with AS. Those with experience are generally more positive to inclusion of students with AS in the classroom. However, those with private experience have a more intimate understanding of the possible special needs of students with AS. While this understanding might serve to better prepare the learning environment in the schools, it could also lead to less inclusion since these teachers are more aware of the problems these students have at school. Our study suggests that experience is a key to understanding why teachers do or do not support inclusion and therefore it provides a possible avenue for improving inclusion. Finally, our findings underscore the need for additional research on teachers' SR of students with AS and inclusion and how these might be utilized in providing the best educational opportunities for students.

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Teacher education policies, practices, and reform in Scotland: Implications in the Indian context

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Abstract: India, a country of 1.27 billion, nowadays needs reforms, improvements, and new approaches in teacher education to cater to the demands of changing economy and society. This call to improve teacher education becomes more significant considering the fact that 50% of India's current population is below the age of 25 and over 65% below 35. There are two ways to proceed in this direction. First, making an internal review and assessment of present scenario of teacher education and suggesting need-based measures. The second one is to learn from those countries that have recently reviewed their teacher education systems and are continuously working for the betterment of teacher education. Following second approach, present paper analyzes teacher education policies, practices, and reform in Scotland, argues that concerns and commitments to reform teacher education in India and Scotland are similar, and suggests implications of Scottish experiences in the Indian context.

Subjects: Education; Education & Development; Education Policy; Newly Qualified Teachers; Secondary Education; Teacher Training; Teaching & Learning

Keywords: teacher education; policies; practices; reforms; Scotland; India

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PUBLIC INTEREST STATEMENT

Teacher education is an issue of continuing interest, debates, and discussions for academicians, governments, policy-makers, and the general public. The reason is simple, teachers are essential to enhancing the quality of learning, and teacher education is responsible to mold quality teachers. Following this connect, almost every country would like to improve their teacher education system and follow different measures for this purpose. Scotland is one such country where teacher education system is going through a process of reform and advancement. The policies and practices adopted in Scotland to reform their teacher education system may act as a road map for all those countries who wish to improve their teacher education systems. Extending this argument, researcher discusses about teacher education in Scotland in the hope that it is an interesting and useful reading for all those who would like to learn that how teacher education systems function and aspire its betterment.

1. Background

Teacher education has gained special importance these days as teachers' abilities and qualities are identified as decisive to students' learning (Misra, 2014a). The *11th Education for All Global Monitoring Report* (UNESCO, 2014) makes it clear that good teachers are essential for enhancing the quality of learning, and teacher education is important because of its impact upon teacher quality. Besides, the teacher education systems have to also take into account the ever-emerging changes and challenges emancipating from society, economy, and technology, as observed by Townsend (2011, p. 373), "The past 20 years has seen more changes in education than since education systems first became formalised in the mid to late nineteenth century. These changes have been brought about partly by technological developments, partly by increased globalization and partly by changed demographics." Summarizing these challenges, a Report from Department for Employment and Learning (2010) in UK, emphasizes that schools and teacher education providers are facing considerable challenges on a number of fronts, including concerns over underachievement and the links between underachievement and social inclusion; the developing economic agenda; providing for special educational needs and inclusion; and dealing with the social issues facing young people and disaffection from education.

Teacher education systems across the globe are expected to deliver in the backdrop of all these expectations, changes, and challenges. In other words, reforms, improvements, and new approaches in teacher education become imperative (Misra, 2014b). The reason is that present generation of would-be teachers are coming from different social backgrounds, having different learning experiences, and preparing them to work in different educational settings. A Report of HKIED (n.d., p. 6) observes, "For teachers and teacher education, powerful challenges are being driven by substantial changes in political, social and economic forces. These include the growth of an interconnected, complex global economy, unprecedented developments in communication technologies, and the effect of changing social mores on school and classroom environments. In many countries, education reform is driven by a community's perception of falling educational standards reflected in reduced student learning outcomes." These societal changes are presumed to influence teacher education (Buchberger, Campos, Kallos, & Stephenson, 2000). Furthermore, the demands on teachers are becoming more and more complex and this represents true challenges to the profession: multicultural classrooms, integration of students with special needs, use of information and communication technologies, demands for more accountability and evaluation, interactions with the community and the parents, etc. (Eurydice, 2004).

By wide consensus, we can say that a dramatic societal shift is underway, and the gradual emergence of a new technologically textured, knowledge-based form of social existence and organization in society place teachers, as well as teacher education, before new demands and challenges. Teacher education of today needs a change in vision and action to cater to these demands of changing societies, as a position paper on Teacher Education Policy in Europe suggests that an effective teacher education policy should be built in parallel with education policy in general (TEPE, 2007). Considering this as well as the other crucial observation regarding teacher education that those education reforms who do not take into account teacher education are condemned to inefficiency (OECD, 1998), the task of renewal of teacher education becomes apparent. Following these global trends and local demands, India, a country of 1.27 billion people, is gearing up to professionalize and modernize their teacher education system to be in sync with current social, cultural, technological, and economic situations; and to produce quality teachers to bring improved student learning outcomes. This call to improve teacher education in India becomes more significant considering the fact that 50% of India's current population is below the age of 25 and over 65% below 35.

National Council for Teacher Education (NCTE—statutory body of teacher education in India) is of the view that teachers play an important role in shaping the future of the country and hence it's important that a lot of attention is paid on the quality of teachers churned out every year (NCTE, 2015). In India, teacher education is expected to produce teachers who are responsive and sensitive to the social context of education, will keep the varying needs of learners in focus, and work for national

concerns of achieving the goals of equity, parity, social justice, and excellence (NCERT, 2005). The present system of teacher education in India lags behind to fulfill these promises and has faced severe criticism over the years. For example, existing teacher education curriculum was termed as too technical and obsolete requiring drastic changes to make it applicable in contemporary Indian school and society. Some of the teacher education institutions were also blamed of producing unqualified teachers (NCTE, 2015). Summing up the current status of teacher education in India, a Report from NCTE (2009, p. 8) states, "Teacher education as a whole needs urgent and comprehensive reform." This report further observes, "...there is a need to innovate with different models of teacher education" (NCTE, 2009, p. 8).

Far away from India, the Donaldson review report on teacher education in Scotland affirms, "Career-long teacher education, which is currently too fragmented and often haphazard, should be at the heart of this process, with implications for its philosophy, quality, coherence, efficiency and impact" (Donaldson, 2011, p. 2). Scotland, one of the four nations that constitute the United Kingdom (UK), has a population of about 5 million and is a discrete jurisdiction within the devolved governance arrangements of the UK. Regarding teacher education, Scotland has adopted a different approach in significant ways to the current neoliberal agenda that dominates in many Anglophone countries, and in particular the US and England. To make grass root changes in teaching profession, Scotland is stressing more on teacher autonomy and professionalism, rather than age old notions of performativity and accountability. Reflecting on these observations, it can be argued that concerns and commitments to reform teacher education in India and Scotland are similar and measures adopted in Scotland for revamping and reorganizing teacher education may also be useful in the Indian context. Extending this argument, the present research was conducted to:

- Study the policies and practices of teacher education in Scotland.
- Analyze the recent teacher education reform in Scotland.
- Identify useful teacher education policies, practices, and reform from Scotland to benefit teacher education in India.

2. Methodology

This research is mainly based on the review and analysis of policy document and practices as well as other available literature and statistics related to teacher education in Scotland. During his stay in Scotland, the researcher had a number of discussions with teacher education specialists, policy-makers, and practitioners and these inputs have also been used to describe existing teacher education system and recent teacher education reforms in Scotland. The researcher would also like to clarify that teacher education in Scotland is going through a reform mode (following Donaldson's Review) in recent times and this has some bearing on the provided information.

3. Education system in India and teacher education: an overview

As a federal structure of governance, India has a central government and 28 state governments. As per the constitution of India, education comes under the *concurrent list*, meaning both central and state governments have a say over the issues of education. Usually, broad policy and legal framework on education is provided by the Central Government but the implementation of various programs and schemes are undertaken largely by state governments. The school system in India has four levels: lower primary (Class I–V), upper primary (Class VI–VIII), secondary (Class IX–X), and higher secondary (Class XI–XII). Students have to learn a common curriculum largely (except for regional changes in mother tongue) till the end of secondary education, i.e. Class X. At higher secondary level (Class XI and XII), students are exposed to different educational streams like Arts, Commerce, Science, etc. There are mainly three types of schools in India—Schools by central government, schools by state governments, and private schools. Central government run two types of schools—Central Schools (Kendriya Vidyalayas-KVs) that function from classes I to XII, and Navodaya Schools (Navodaya Vidyalayas—NVs) that function from classes VI to XII. Both these schools are affiliated to the Central Board of Secondary Education (CBSE). The second category is of schools run by different state governments. These schools function from class I to XII, and majority of children in India study in these

schools. These schools are affiliated to their own State Boards. The third category is of private schools. These schools are either affiliated to CBSE or State Boards or ICSE Board (a board offering International Baccalaureate (Misra, 2015). The main aim of teacher education is to produce quality teachers for all these schools.

Teacher education system in India has evolved over time and is based on the recommendations contained in various Reports of Committees/Commissions on Education. There are mainly two types of teacher education programs in India named as pre-service and in-service. The purpose of pre-service training is to prepare teachers for the school system and in-service training intends to improve the capacity of existing school teachers. NCTE is responsible for planned and coordinated development of teacher education in India. The NCTE lays down norms and standards for various teacher education courses, minimum qualifications for teacher educators, course content, duration, and minimum qualification for entry of student–teachers for the various courses. It also grants recognition to institutions (government, government-aided, and self-financing) interested in undertaking such courses and has in-built mechanism to regulate and monitor their standards and quality (MHRD, 2015). Teacher education in India is institution based, along with internship programs in real classroom settings and is provided by teacher training institutions, universities, affiliated colleges, private and open universities in India. The educational requirement for becoming a primary and secondary school teacher is different. People who wish to teach primary school should minimum pass higher secondary examination with 50% marks and have a professional degree in teaching named Bachelor in Elementary Education (B.El.Ed.). For becoming a teacher at secondary school, one needs to be postgraduate in the subject one wishes to teach and a professional degree in teaching named Bachelor of Education (B.Ed.) (NCTE, 2015).

4. School education in Scotland

Scotland has a long and distinguished history of universal public education (The General Teaching Council for Scotland, 2013). In Scotland, political responsibility for education at all levels is vested in the Scottish Parliament and the Scottish Government's Education and Lifelong Learning Department. State schools are owned and operated by local authorities (there are 32 local authorities, each with responsibility for the schools in their area) who act as Education Authorities. There are also a number of independent privately run schools in Scotland, many of which come under the umbrella of the Scottish Council of Independent Schools (http://www.scis.org.uk). Inspections and audits of educational standards at school level are conducted by two bodies: the Care Inspectorate inspects care standards in preschool provision; and Her Majesty's Inspectorate of Education (HMIE) within Education Scotland is responsible for the inspection of pre-school, primary, education, further and community education (The General Teaching Council for Scotland, 2013).Government-funded schools are free for children aged 5–19. There are also few private schools in Scotland.

Schooling in Scotland is divided into two phases—primary school (age 5–12 years) and secondary school also called as high school (age 12–18 years). Pupils remain at primary school for 7 years (called as Primary one–seven). Then aged eleven or twelve, they start secondary school for a compulsory 4 years (called as S1, S2, S3, S4) with the following 2 years (S5, S6) being optional. Schools are open to pupils for 190 days a year. Secondary schools generally offer a similar range of subjects at each stage, in line with Curriculum for Excellence (CfE) that was launched from school session 2012–2013. This new CfE (www. ltscotland.org.uk/understanding the curriculum) offers a broad and deep general education from early years (aged 3) through to the end of S3 (typically age 15) and senior phase of education (typically 15–18). Talking about (CfE), the website of Scottish Government claims, "Curriculum for Excellence (CfE) represents a different approach to learning in schools and in the way education is delivered in nursery, primary schools, secondary schools, colleges, the workplace and the community. It takes a new approach to what, how and where young people learn, through less rigid learning paths, with the aims to raise standards, improve knowledge and develop skills by providing a coherent, more flexible and enriched curriculum from 3 to 18. Ultimately it aims to develop 'four capacities' *in young people which are: successful learners, confident individuals, effective contributors and responsible citizens*" (The Scottish Government, 2013a).

During schooling, local authorities and schools are responsible for planning and supporting young people to make successful transitions to young adulthood and the world of work. The school leaving age is generally 16 (after completion of National 4S/5S), after which students may choose to remain at school and study for Higher (S5) and Advanced Higher (S6).In Secondary school, pupils are subject to continuous assessment according to the internal procedures of each school and are promoted automatically to the next class. In the first two years of lower secondary education (S1/S2), assessment is carried out in accordance with the assessment, testing, and reporting policy for 3–14-year-olds. Usually in S4, pupils begin to take the National Qualifications (OECD, 2007). These national qualifications named as Scottish Qualifications Certificate are provided by the Scottish Qualifications Authority (http://www.sqa.org.uk/sqa/CCC_FirstPage.jsp). Pupils can go to university at the end of S5 (Highers). Highers provide the entry requirements for Scottish universities where degrees are normally 4 years long; however, recently it is more common for students to remain until S6, taking further Highers and/or taking Advanced Highers.

5. Teacher education in Scotland: policies and practices

The preparation of teachers in Scotland remains different from other UK provision, particularly in England. Since devolved government was introduced to the UK in 1998 with the establishment of a Parliament in Scotland and Assemblies in Wales and Northern Ireland, education policy in the UK has become markedly differentiated. Westminster retains responsibility for the educational system and policy in England, but the Scottish Parliament has responsibility for educational matters in Scotland (O'Brien, 2012, p. 42). The Scottish system of teacher education is markedly different and distinctive one within the UK. For example, in contrast to England, both primary and secondary teacher education is part of University system in Scotland. The current provision of teacher education in Scotland includes some very particular features like the move towards a university base for initial teacher education (ITE), creation of a series of standards, and specific provisions for continuing professional development (CPD) of teachers (Menter & Hulme, 2011).

The history of teacher education in Scotland dates back to nineteenth century. Before, the nineteenth-century school teachers in Scotland were not receiving any formal professional training. Whilst some schools required their teachers to have a master's degree, or at least some evidence of having attended one of Scotland's four ancient Universities, many had to appoint teachers who had few qualifications. By 1834, the Church was convinced of the need for a more systematic approach to the training of teachers (The University of Edinburgh, 2013). In a way, teacher education became professionalized in Scotland in the later half of nineteenth century, as observed by Menter, Hulme, Elliot, and Lewin (2010, p. 9), "Through the late 19th Century and the 20th Century, teacher education in Scotland became increasingly professionalised with initial qualifications and arrange of postgraduate opportunities being provided by colleges of education and universities." Since 1984, ITE qualifications in Scotland have been delivered through degree-level studies. Initially, these were provided in the colleges of education which, following the *Sutherland Report*, subsequently merged with universities across Scotland in 1990s (The Scottish Government, 2013b). The specific policies and practices of teacher education in Scotland are discussed in the next ten sections.

5.1. Teacher education providers

ITE in Scotland is currently provided by the seven Universities (Aberdeen, Dundee, Edinburgh, Glasgow, Sterling, Strathclyde, Highlands and Islands and the West of Scotland), with the Open University in Scotland making a small amount of specialist provision. All ITE programs require to be approved by Scottish Ministers under Regulation 4 of the Teachers (Education, Training, and Recommendation for Registration) (Scotland) Regulations 1993 (The Scottish Government, 2013b). Under the terms of the Teachers (Education, Training, and Recommendation for Registration) (Scotland) Regulations 1993, Scottish Ministers, in consultation with the General Teaching Council for Scotland (GTCS) and HMIE, decide the entry requirements for admission to teacher education courses in Scotland (The Scottish Government, 2010).

5.2. Categorization of teachers and admission procedure

There are mainly two types of school teachers in Scotland—primary teachers and secondary teachers. Primary teachers are responsible for teaching primary classes one to seven and secondary teachers teach for S1 to S6. The distinctive feature of teacher education in Scotland is that both primary and secondary school teachers get their teacher training from Universities. For first-degree courses (B.Ed.), students are required to apply through the Universities and Colleges Admissions Service (UCAS). For Postgraduate (or Professional) Diploma in Education (PGDE) courses, they have to apply through UCAS Teacher Training. The UCAS processes all applications that are received for secondary courses from September to June. The closing date for PGDE primary courses is 1 December in the year preceding the start of the course. The UCAS forwards the applicant's application to the University of her/his choice. Afterwards, concerned universities select the candidates based on their academic qualification and performance in the interview (UCAS, 2014). In addition to academic qualifications, the Universities also expect from a candidate to demonstrate a genuine interest in working with and educating children of the age one wishes to teach.

5.3. Entry route and requirements for primary school teachers

There are currently two routes that qualify one as a primary school teacher in Scotland:
* Four-year undergraduate degree course (B.Ed.); or
* One-year PGDE (Primary) course following a degree.

The entry requirements for an undergraduate degree in Primary teaching include:
* Three Highers (or equivalent) (one of these must be English at Grade C or above).
* Two Standard Grades (or equivalent) (one of these must be Maths at Credit level or Intermediate 2).

The entry requirements for the PGDE (Primary) course include:
* A degree from a UK university (or an equivalent degree from outside the UK).
* Higher English at Grade C or above (or equivalent).
* Standard Grade Maths at Credit level (or equivalent).

Besides these requirements, Universities also want to see evidence that one has studied at least two of the following subjects: Science, Social Studies, Expressive Arts, Religious and Moral Education, Technology and Modern Languages.

5.4. Entry route and requirements for secondary school teachers

There are mainly two ways to become a secondary teacher in Scotland:
* A combined degree (sometimes known as a joint or concurrent degree), including studying a subject, studying education, and school experience; or
* A PGDE course following a degree.

The entry requirements for combined degree programs vary by program and by university, however, a National Qualification in English at Scottish Credit and Qualifications Framework (SCQF) Level 6 (e.g. Higher Grade) or an accepted alternative is a prerequisite for all teacher education programs and a National Qualification in Maths at SCQF Level 5. The entry requirements for PGDE (Secondary) are based on the SCQF credit points which are standard across all Scottish universities. The minimum entry requirements for admission to all PGDE (Secondary) programs state that one only requires an Ordinary level undergraduate degree (The Scottish Government, 2014). However, due to many programs being oversubscribed and the intensity of competition for places, universities usually ask for a degree at Honors level.

5.5. Teaching and training provisions

Universities across the Scotland design their courses to meet teacher training expectations in best the possible way. Universities are free to design and transact curriculum in different ways but this has to be in conformity with prescribed guidelines and standards. Normally, teacher education institutions are expected to prepare student teacher to cope up with new *CfE* that aims to increase the emphasis

on numeracy, literacy, and pupil choice and covers the areas of: expressive arts, health and well-being, languages, mathematics, religious and moral education, sciences, social studies, and technologies (Education Scotland, 2014). Besides, the Universities are also expected to prepare a teacher fit for purpose, as demanded by GTCS "Guidelines for Initial Teacher Education Programmes in Scotland" (2013), "Programmes must ensure that student teachers meet the requirements of the Standard for Provisional Registration (SPR), which is part of the Standards for Registration2, mandatory requirements for Registration with the General Teaching Council for Scotland." Considering these demands and expectations, Universities provide different type of teaching and training activities for student teachers.

Teaching and training activities for primary education usually comprise:
• Professional studies
• Subject/curriculum studies relating to teaching all primary subject areas across all stages of the primary age range (3–12 years)
• Teaching practice during which all primary subject areas are taught.

The training program for primary teachers involves courses on campus interspersed with placements undertaken in schools. Most on-campus learning is through lectures and workshop groups. During the study, trainees have to follow the chronological sequence of pupil development—the focus is initially on early years, moving to the middle primary and then upper primary years.

Teaching and training activities for secondary education usually comprise:
• Professional studies.
• Subject/curriculum studies relating to the specific subject one is academically qualified to teach across all stages of the secondary age range 12–18.
• Teaching practice in the subject one is qualified to teach across all stages of the Secondary age range.

The training program for secondary teachers is split between learning at university and placements in schools. School placements are meant to offer opportunities for trainees to work with teachers and pupils in the classroom, develop teaching skills, and allow one to use the concepts and skills learned during their classes in universities. The trainees are also supposed to consider the distinct education needs of individual pupils, and develop their own theories about teaching.

5.6. Professional and societal expectations from teachers

Talking about the overall aim of ITE in Scotland, GTCS "Guidelines for Initial Teacher Education Programmes in Scotland" (2013) state, "The overall aim of programmes of initial teacher education is to prepare student teachers to become competent, thoughtful, reflective and innovative practitioners, who are committed to providing high quality teaching and learning for all pupils." Teachers in Scotland are supposed to engage in collaborative enquiry, reflection, and self-evaluation, focused on improving teaching to improve learning, to be proactive in this area, and ensure that they have ownership of their professional learning (The Scottish Government, 2014). Talking about this issue, *Teaching Scotland's Future Report* emphasizes, "Education policy should support the creation of a reinvigorated approach to twenty-first century teacher professionalism. Teacher education should, as an integral part of that endeavour, address the need to build the capacity of teachers, irrespective of career stage, to have high levels of pedagogical expertise, including deep knowledge of what they are teaching; to be self-evaluative; to be able to work in partnership with other professionals; and to engage directly with well-researched innovation" (Donaldson, 2011, p. 19).

5.7. Teacher registration and standards framework

It is a legal requirement for any teacher teaching in a Scottish state school to be registered with GTCS. Being registered not only allows an individual to teach, but it also provides assurances to employers, parents, and children that teachers meet a national standard of teaching. To be eligible for registration in Scotland, one must have a relevant degree and a recognized teaching qualification at SCQF

level 9 or above. Teachers who have gained their teaching qualification outside Scotland cannot automatically teach in a Scottish local authority school. They are required to apply for registration and may have to undertake a period of probation. Scotland also has a unique teacher induction scheme for newly trained teachers. Under this scheme, new teachers who have trained in Scotland are guaranteed a probationary teaching post in a Scottish local authority school for a full school year (190 teaching days) for their first year in teaching. This experience also helps them to reach the GTCS Standard for Full Registration (SFR). The introduction of a standards framework has been another key element of Scottish teacher education as it has four sets of Standards for teachers that define the knowledge and understanding, skills and abilities, values and personal commitments expected of teachers: Standard for Initial Teacher Education; SFR; Standard for Chartered Teacher; and, Standard for Headship (Christie, 2008).

5.8. CPD provisions

In Scotland, a new emphasis has been placed on CPD for all teachers. CPD that is defined as "The range of experiences that contribute to teacher development is very wide and should be recognised as anything that has been undertaken to progress, assist or enhance a teacher's professionalism" became an entitlement and expectation of all teachers following the implementation of the recommendations of the *McCrone Report—A Teaching Profession for the 21st Century* (SEED, 2001)). CPD is for everyone; teachers, chartered teachers, principal teachers, deputy head teachers and head teachers alike. The extensive range of CPD opportunities available to Scottish Teachers are intended to support and equip them with the skills and knowledge required to keep pace with the rapidly changing educational and professional environment. *A Teaching Profession for the 21st Century* introduced an additional, contractual 35 h per annum for all teachers. CPD is now a statutory element of a teacher's working life as they are required to agree an annual CPD Plan with their immediate managers and to maintain a record of the CPD activities they have undertaken (The Scottish Government, 2003).

5.9. Training to teachers

The ICT in Education Vision of Scotland suggests that educators must take full advantage of the opportunities offered by technology in order to raise attainment, ambition, and opportunities for all. This vision is underpinned by the five ICT in education objectives, which are to: change the culture of the use of ICT; improve confidence in the use of ICT; promote new behaviors for teaching using ICT; deepen parental engagement; and strengthen the position on hardware and infrastructure. Similarly, a report from HMIE states that the confidence and competence of teaching staff in the use of ICT is a key determinant of the effective use of ICT for teaching (HMIE, 2007, p. 3). Following this observations, teacher training institutions in Scotland prepare future teachers to use ICT in a way that enriches their teaching, through, for example, the use of animations, simulations, and online video as well as appropriate use of Internet sites. The ultimate aim of ICT training to teachers is to develop enough confidence and competence to enable them to make effective use of ICT in their teaching.

6. Teacher education reform in Scotland: concerns and suggested measures

There have been three major reviews as well as a number of smaller reviews of teacher education in Scotland over the past 10 years. The major reviews were recommended by Scottish Executive, while smaller reviews mainly included reports of HMIE on various aspects of ITE, such as the report on Student Teacher Placements in 2005 (HMIE, 2005). First major review of ITE, commissioned from the external consultants Deloitte and Touche, was completed in 2001. This review provided a summary of the existing ITE provisions and also suggested a number of areas for further development, such as training in classroom management and responding to special needs among learners (Scottish Executive, 2001). Second major review was completed in 2005 when a committee was appointed by the (then) Scottish Executive to carry out a more discursive analysis of the ITE provisions. This second stage review called for, among other things, better partnerships between providers, local authorities, and schools (Scottish Executive, 2005). Commenting about the outcomes of these two major reviews, Menter and Hulme (2011, p. 389) observe, "This did lead to some improvements in the communication and

organisation of, for example, school placements in ITE. However, it would be fair to say that neither stage of this review of ITE led to radical changes in provision. Indeed, both reviews indicated that by and large the quality of ITE provision was strong in Scotland."

Third major review of ITE was initiated in 2009, when, Graham Donaldson, a retired Senior Chief Inspector at HMIE were asked by the Scottish Government to conduct a fundamental review of teacher education in Scotland and produce a report. Donaldson's terms of reference were wide ranging and he established a highly consultative process by which to undertake the review, emphasizing his desire to base his report on "evidence." This evidence included his own visits to various stakeholders within Scotland as well as inviting formal submissions from any interested parties. There was an online questionnaire for completion by teachers and a literature review on teacher education in the twenty-first century (Menter et al., 2010). In his review report, Donaldson covered and critically analyzed the entirety of teacher education. Talking about his intentions, Donaldson (2011, pp. 4–5) reported, "Human capital in the form of a highly educated population is now accepted as a key determinant of economic success. This has led countries to search for interventions which will lead to continuous improvement and to instigate major programmes of transformational change." Through this review report, Donaldson analyzed the prevailing trends in teacher education in Scotland and raised a number of issues. Donaldson review report deeply touched upon various aspects of teacher education in Scotland under four sections: twenty-first-century teachers and leaders, getting the right people in the right numbers, building twenty-first-century teachers and leaders, and career-long learning for teachers and for leadership.

Following schematic analysis presents before us a better and clear understating of the *Donaldson Review Report by* highlighting concerns raised and measures suggested for different levels of teacher education in Scotland:

Level	Concerns	Suggested measures
Entry	• Attracting highly talented individuals • Making teacher education a first-choice occupation • Managing student numbers • Having proper assessment of the applicants • Matching supply and demand • Managing effective change in teacher education	• Attract students from different sectors and experiences • Establish a national assessment center • Carry diagnostic assessments of the competence of applicants • Improve workforce planning model
Initial training	• Preparing "fit for purpose" teachers • Building all-round capacity of teachers • Ensuring proper balance between theory and practices • Improving quality and impact of the placement experience • Specifying role and responsibilities of different stakeholders • Developing leadership skills among teachers • Capitalizing the growing potential of ICT • Training of teacher educators and mentors	• Emphasize on those areas where teachers experience greatest difficulty • Offer high-quality blended learning and part-time provisions • Plan closer working amongst different stakeholders • Use high-quality distance-learning approaches for training • Offer greater flexibility and personalization in teaching learning process • Make teaching a research-informed profession • Establish a college of school leadership • Look for postgraduate provisions

Level	Concerns	Suggested measures
Professional develop-ment	• Making education degrees beyond the education • Offering lifelong CPD provisions for teachers • Addressing additional support needs of teachers • Gaging the effectiveness and impact of teacher education programs • Make returning pathways for teaching	• Provide alternative options of employ-ment • Make flexible "in" and "out" provisions for trained teachers • Offer interesting variations in existing degrees • Develop a new "Standard for active registration" • Establish "CPD find" a national "one stop shop" • Offer online CPD programs for teachers • Support teacher educators to take agreed program of CPD

As stated above, Donaldson review report came up with a number of suggestions and made 50 recommendations to help build the professional capacity of Scottish teachers, and ultimately to improve the learning of the young people of Scotland. After receiving the report, the Scottish Government has fully accepted the recommendations and immediately initiated a number of steps for implementation of suggested measures. In November 2012, the government established a National Implementation Board to take forward the work on implementing proposals to improve the full spectrum of teacher education. The National Implementation Board is working with a range of partners on seven key projects. Besides, government has also initiated steps to implement this report at local level. For this purpose, information about the report including the number of reflective questions was sent to head teachers of schools (Education Scotland, 2014). In the backdrop of all these observations, it may be argued that recent reforms of teacher education in Scotland have sought to enhance the professional knowledge base of teaching, to raise standards within teaching and the 2011 status of the profession.

7. Teacher education polices, practices, and reform in Scotland: implications in the Indian context

Talking about the strengths and distinct features of Scottish teacher education, Teaching Scotland's Future Review Report affirms, "Having an all-graduate profession, bolstered by the existence of a framework of standards set by the GTCS, structured induction for newly qualified teachers, the valuable contributions to professional learning made by national organisations, local authorities, teacher and head teacher associations, and contractual provision for teachers to engage directly in the education of new colleagues and to pursue their own CPD all place Scotland in a strong position when compared with other countries internationally" (Donaldson, 2011, p. 2). This system has further improved with the steps taken by successive governments in the form of various reviews and implementation of suggested actions. In other words, a number of policies and practices from Scottish system of teacher education can be emulated for betterment and reformation of teacher education in India. Some of these policies and practices are discussed as under.

7.1. Establishing National/States-Level Teacher Workforce Planning Directorates

In Scotland, ITE is a subject where numbers are controlled. Annually, in consultation with an advisory group comprising representatives of GTCS, the local authorities, teacher unions, and the universities, the Scottish Government carries out a teacher workforce planning exercise and issues a letter of guidance to the Scottish Funding Council to determine overall intakes and the distribution between universities (Donaldson, 2011, p. 22). This process regulates supply and demand and helps institutions deal with periods of both high and low demand for teaching posts. In contrast, there is no such mechanism for modeling of predicted teacher numbers in India. Indian teacher education system works on fixed number of seats for institutions. At present, there are 14,047 teacher training institutions in India with an annual intake of 1,103,457 students (Government of India, 2012). Institutions in India produce same number of trained teachers every year, irrespective of the fact that how many teachers

are actually needed. As a result, India is producing higher number of teachers than required and this surplus workforce is a cause of concern for both government and society. Like Scotland, establishment of "National/States Level Teacher Workforce Planning Directorates" in India will be a useful step to tackle teacher surplus situation. These Directorates will provide teacher demand projections on an annual basis, and these projections will help regulate the number of teachers to be trained every year.

7.2. Improving partnership between schools and universities

Talking about the importance of school university partnership, GTCS indicates, "Teachers who work in schools, in local authorities and in universities can each offer a quite different set of experiences and perspectives to the enquiry process and it is important that partners recognise and are able to draw upon the particular strengths each can contribute. Each can operate as an external stimulus to the other and, when trusting relationships are forged, learning with and from each other should become both process and outcome. At this important early stage in the development of meaningful professional enquiry practices in Scottish schools, partnership working between schools, local authorities and universities is necessary" (GTCS, 2014). Following this call, Education Scotland has initiated the School Improvement Partnership Programme to encourage staff to learn from each other, experiment with their practice, and monitor and evaluate change. Education Scotland is also brokering national partnering and links across authorities and university researchers to develop a shared commitment to improving outcomes for all children and young people. In comparison, there is no such focus on forging partnership between schools and universities in India. These institutions usually work in separate zones and occasionally collaborate with each other. Therefore, taking clue from Scottish polices, Indian teacher education system can look forward to establish well-supported partnerships between schools and universities for attaining sustained improvement and raised attainment at school level.

7.3. Implementing stronger quality assurance and accreditation procedures for ITE

In Scottish education system, the GTCS seeks to ensure that programs of ITE are professionally appropriate and demanding and lead to registration as a primary or secondary teacher. The other notable aspect of the system is that Accreditation applies to programs and not to higher education institutions. When a program has been accredited by the Council on an unconditional basis, it is entitled to run for a period of up to 6 years with an interim evaluation highlighting any developments and/or enhancements in the content, nature, duration, or structure of the program (GTCS, 2006, 2013). In India, NCTE and National Assessment and Accreditation Agency has signed a MoU for assessment and accreditation of teacher education institutions. There are mainly two concerns about this assessment and accreditation procedure, first, it is more a kind of voluntary rather compulsory activity, and second, this is an institution-based assessment and accreditation. Therefore, introduction of Scottish provisions like mandatory assessment and accreditation of teacher education institutions as well programs in India will ascertain the professional acceptability of teacher education programs leading to prepare professionally competent and dedicated teachers.

7.4. Offering extensive range of CPD activities for teachers

In Scotland, a wide range of national and local organizations provide CPD for teachers. The LTS website contains a wealth of material, much of which is linked to CfE. It also provides numerous central and regional events as well as organizing the annual Scottish Learning Festival. It has developed Glow, a national school education intranet, to promote networking and exchanges of resources and information. HMIE, in addition to publishing reports on specific aspects of education, works with LTS in helping to identify areas of need and sources of good practice. ... Most CPD is provided by local authorities and includes central training as well as supporting school or community-based professional development. They are increasingly devolving more CPD to schools and encouraging them to work in networks, clusters, or learning communities. The provision of centrally delivered courses is decreasing (Donaldson, 2011, p. 65). In comparison to these provisions, the notion of CPD for teachers in India appears in a narrow sense (in-service training) and offers limited opportunities (Misra, 2014c). Commenting on the present scenario of CPD provisions for school teachers in India, Bolitho and Padwad (2010, p. 7) argue, "Professional preparation consists of short pre-service teacher education

courses with limited field exposure and practical relevance. … Ongoing professional development, i.e. CPD, can be seen in a very restricted, narrow sense and there are limited opportunities and support for the CPD of serving teachers." Usually, CPD of teachers in India is equated with in-service training programs. Therefore, like Scotland, Indian agencies may also work on two fronts. First, making CPD a compulsory element of a teacher's working life, and second, asking different organizations to offer extensive range of CPD activities for teachers, especially at local level.

7.5. Moving from initial to career-long professional learning

Career-long professional learning recognizes that teacher education is a continuous process from the point a student teacher begins their qualification, continuing throughout a teacher's career. Ensuring that the teaching profession embraces the concept of career-long learning is integral to professionalism and is a central policy challenge. This concept lies at the heart of teacher education in Scotland. It is also central to the revised suite of Professional Standards which includes a new Standard for Career-Long Professional Learning. The Standard for Career-Long Professional Learning has been developed to support teachers choosing to reflect on this Standard as part of their professional learning. As they progress through their careers, this Standard will help them identify, plan, and develop their own professional learning needs and to ensure continuing development of professional practice (GTCS, 2012b). In other words, concept of career-long professional learning for teachers is not fully embraced in India. There is no specific institutional mechanism to support teachers to continue to develop their expertise and experience across all areas of their professional practice. Therefore, like Scottish provisions, Indian agencies may also look for evolving an approach and mechanism for providing appropriate and sustained career-long professional learning opportunities for teachers.

7.6. Developing a system of online profiling for professional development and practices of school teachers

In Scotland, all GTCS registered teachers are required to participate in the professional update process. The key purposes of professional update for teachers are: to maintain and improve the quality of teachers and to enhance the impact that they have on pupils' learning. In professional update, teachers are required to update their details on the GTCS Register MyGTCS. This register allows teachers to maintain a professional learning record and share this on an ongoing basis. MyGTCS has the facility to allow a teacher to share their record by "switching on" or "switching off," which allows their line manager to view their record as part of an ongoing system of professional review and development. The teacher can choose when to share on/off their professional learning record on an ongoing basis and also when to submit their professional learning record as part of the sign-off 5-year process (GTCS, 2014). In other words, Indian system lacks such type of institutional mechanisms for online profiling of school teachers. To amend this situation, responsible agencies may look forward to establish an e-portfolio portal for online profiling of professional development and practices of school teachers. This provision will certainly have wide-ranging impacts for a number of actors like teachers, teacher education providers, schools, researchers, and educational planners.

7.7. Devising standards for teacher registration

Scottish system of standards for teacher registration provide a gate-keeping function for entry into teaching in Scotland and it should be noted that Full Registration continues to be the baseline Professional Standard for Competence. The SPR specifies what is expected of a student teacher at the end of ITE who is seeking provisional registration with GTC Scotland. Having gained the SPR, all provisionally registered teachers continue their professional learning journey by moving towards the attainment of the SFR. The SFR is the gateway to the profession and the benchmark of teacher competence for all teachers. The requirements of SFR are in addition to, and follow the successful achievement of, the SPR. In nutshell, these standards constitute the capability of teachers in relation to teaching, in which learners, parents, the profession itself, and the wider community can have confidence (GTCS, 2012a, p. 2). Learning from these Scottish provisions, agencies in India may also devise appropriate standards for teacher registration having professional values at the core. These standards will be particularly helpful to ensure the faith of parents and society towards teachers and teaching community.

7.8. Adopting ways from GTCS to strengthen NCTE

The GTCS was one of the first teaching councils in the world when it was set up in 1965. In 2012, legislation passed by the Scottish Parliament made it the world's first independent, self-regulating body for teaching. The notable feature being that Local authority officers, members of HMIE, Principals of Colleges of Education, teacher union leaders, politicians, and civil servants had worked closely together and generally shared many of the same aspirations for education in Scotland under GTCS (Menter & Hulme, 2008). The GTCS is entrusted a number of tasks and responsibilities that mainly includes:

- Maintain the register of teachers in Scotland.
- Set the Professional Standards expected of all teachers.
- Support the successful operation of the teacher induction scheme.
- Manage the scheme of professional update, which was launched in August 2014.
- Operate and promote professional recognition to support teachers' expertise and experience.
- Operate and maintain the Student Placement System.
- Accredit programs leading to the award of GTCS Standards, including ITE at Scottish universities.
- Advise the Scottish Government on matters relating to Scotland's teachers.
- Offer a dedicated MyGTCS account to all registrants enabling them to log professional learning and access a range of support tools.

Like Scotland, India also has the NCTE as a statutory body for teacher education. The main objective of the NCTE is to achieve planned and coordinated development of the teacher education system throughout the country, the regulation and proper maintenance of Norms and Standards in the teacher education system and for matters connected therewith. The mandate given to the NCTE is very broad and covers the whole gamut of teacher education programs, including research and training of persons for equipping them to teach at pre-primary, primary, secondary, and senior secondary stages in schools, and non-formal education, part-time education, adult education, and distance (correspondence) education courses (NCTE, 2011). On comparison, it may be stated that NCTE may also adopt some features like maintaining the online register of teachers, setting the professional standards, providing professional recognition to teachers, and launching a dedicated portal to all registrants enabling them to log professional learning and access a range of support tools for betterment of teacher education and teachers in India.

7.9. Identifying institutions to develop and offer school leadership programs

As part of its wide-reaching proposals for changing teacher education and leadership development, the Scottish Government has established a Scottish College for Educational Leadership (SCEL). This college aims to support leadership development at all levels for teachers and education practitioners across Scotland. As a core part of Teaching Scotland's Future, the College is intended to support improvements in Scottish education by developing high-performing leaders equipped to tackle the significant task of leading and managing in challenging and changing times (SCEL, 2014). On similar terms, India has National University of Educational Planning and Administration (NEUPA). Related to school leadership, this University mainly organizes pre-service and in-service training programs in the area of educational planning and administration and conducts research in various aspects of educational planning and administration (NEUPA, 2006). But this University undertook lot of activities and is not fully concentrated to train teachers and principals' for school leadership role. The other notable aspect is that in a country like India, where there are millions of school teachers, a single institution is not sufficient to meet all the school leadership training needs. Taking clue from the recommendations of Teaching Scotland's Future, "high-performing systems grow and develop tomorrow's leaders in a planned and progressive way" (Donaldson, 2011, p. 79), India may also look for identifying a good number of institutions and entrusting them the responsibility to develop and offer school leadership programs for teachers.

8. Conclusion

There is great diversity in teacher preparation programmes internationally depending in large part on the economic, political, and social contexts that exist within each country (Cooper & Alvarado, 2006, p. 13). Societal expectations and cultural shifts demands that we must learn from each other for betterment of teacher education, as observed by Oscarsson (2007), "Teacher education has traditionally been closed within national borders … International cooperation is a major step to be taken towards more openness in this field." Following this approach, present paper highlighted a number of Scottish policies, practices, and reform that can be of immense help for the betterment of Indian teacher education that is one the largest teacher education systems of the world. One can hope that implementation of suggested measures will ultimately help realize the vision of National Policy on Education in India that "The Government and the community should endeavor to create conditions which will help motivate and inspire teachers on constructive and creative lines" (Government of India, 1986).

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Educating artists in management – An analysis of art education programmes in DACH region

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Abstract: Labour force in the art sector is characterised by high qualification, but low income for those people who perform the core contribution in art, i.e. the artists. As artists are typically self-dependent in managing their business, they should have managerial skills besides those skills necessary to perform their artistic core activities. If the lack of managerial skills is a reason why artists fail to make a living from their talent, then this chain of cause and effect could be ruptured by adequate educational opportunities. This paper analyses the curricula of a wide range of institutions offering art education programmes and identifies their managerial learning content. In doing so, we focused on German-speaking countries, the so-called DACH region (i.e. Germany, Austria and Switzerland, whereas D, A and CH are country codes). We identified and analysed 159 course syllabi of 81 art universities, schools and academies. The results of our study indicate a lack of managerial learning contents: a vast majority of institutions follow a rather traditional approach to art education, focusing solely on artistic competences. We suggest the implementation of managerial learning contents to better prepare art students for successful careers in the arts.

Subjects: Arts; Curriculum; Curriculum Studies; European Studies; Management Education; Post-Compulsory Education

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PUBLIC INTEREST STATEMENT

Artists are typically self-dependent in managing their business. This requires artists to be highly skilled in both their artistic core activities and also their managerial ones. As the average artist is characterised by low income from the artistic activity, we question whether the education in managerial skills is sufficient to make a living from their talent. We analysed 159 course syllabi of arts curricula of 81 art universities in the German-speaking countries with respect to the integration of courses with managerial topics. Our study revealed that art curricula in Austria, Germany and Switzerland show a tremendous lack of managerial education within art curricula. As a result, we suggest implementing such non-artistic learning contents in art curricula to better prepare art students for successful careers in the arts.

Keywords: education in arts; art syllabi; management in arts; curriculum; arts; education; DACH region

1. Introduction

Labour in the art sector is characterised by a high degree of qualification, expensive and long-term education, low income, minimally regulated career paths, pitched competition, extremely severe market selection and high risk (Menger, 1999; Montag Stiftung Bildende Kunst Bonn, Akademie der bildenen Künste Wien, & Verlag für moderne Kunst, 2008; Schelepa, Wetzel, & Wohlfahrt, 2008). These are the main drivers for the high share of artists who pursue their careers part-time or have multiple professional engagements. Both, the highly competitive pressure on the art market and the increasingly lowered financial public support for the arts require artists to think and act economically.

The art and cultural sector or, respectively, the creative industries are significant contributors to the European economy. In 2010, the cultural and creative industries accounted for 3.3% of Europe's over-all gross domestic product (GDP) and employed 6.7 million people (3% of total employment) (an increase of 15.5% compared to 2004) (European Commission, 2012). Notably, the fashion sector and high-end industries are sectors that rely strongly on cultural and creative input; these sectors employ five and, respectively, one million people. In addition, employment in the high-end industries is expected to double by 2020 (Frontier Economics, 2012; IDEA Consult, 2012). Furthermore, in contrast to the overall downturn of European employment rates in the years 2008 and 2011 (European Commission, 2011b), employment in the cultural and creative industries proved to be much more resilient (European Commission, 2012). In other words, the cultural and creative industries are strong and, therefore, significant contributors to European economy.

Moreover, the cultural and creative industries have an immense impact on other sectors of the economy such as tourism (Mandl, Dörflinger, Gavac, & Hölzl, 2006). For example, in Austria, a country with a well-established tradition of tourism, culture has become a stronger direct contributor to wealth than tourism. In addition, as culture is a main point of attraction for tourists (culture tourism), it also contributes indirectly to this sector, making culture vital for the overall Austrian economy (Mandl et al., 2006).

However, despite the prospering business in cultural and creative industries, the majority of the core contributors to this sector—the artists—are continuously confronted with low income and high risk on the labour market (Schelepa et al., 2008; Schulz, Zimmermann, & Hufnagel, 2013). Various studies (e.g. Baier, 1995; Beckman, 2001; Schelepa et al., 2008; Schulz et al., 2013) have analysed the social situation of artists in various European countries. A common denominator of these studies is that, while there are a few high earners, the majority of artists face precarity, a phenomenon that is known as "superstar phenomenon" (Schulze, 2003).

Recently, several authors (Daniel & Daniel, 2014; Fanthome, 2013; Mietzner & Kamprath, 2013; Thom, 2015) have investigated the required skill sets for artists. Business and management skills and knowledge were considered as essential elements in a successful artist's competence portfolio.

This paper emphasises the situation in the German-speaking countries (Germany, Austria, Switzerland; DACH region); these three countries form an economic and cultural subspace within Europe and, there-fore, have mutual political and social influences, as well as cultural and artistic interchange (Schelepa et al., 2008).[1] Beyond discussing the living and working situation, this paper investigates the educational situation of artists in DACH region. We claim that attempts to remedy the situation for artists by focusing on the labour market and supporting financially (e.g. with subsidies) have short-time effects only. Striving for long-term effects, though, requires throwing levers in artists' education.

This paper is structured as follows: First, we give a brief overview of the historical background of the artistic profession and the art sector. Then we discuss the socio-economic situation of artists in DACH region in Section 2.2. After outlining artists' qualification requirements—in particular with

respect to (self-)management skills—in Section 2.3, we present the educational situation of artist in DACH region in Section 2.4. Section 3 describes the research approach of our investigation. Section 4 presents the results of our study, which we interpret and discuss in Section 5. We conclude our work in Section 6 with an overview of our findings.

2. The artistic profession in its context

2.1. Artists and artisans

When referring to artists, we should be aware that artists are a heterogeneous group of people, whereas the heterogeneity refers to the variety of professional approaches to art, the spirit of artists and their self-image (cf. e.g. Benhamou, 2003; Menger, 1999). While, historically, the terms *artisan* and *artist* had been used synonymously, a semantic split (Table 1) gradually emerged since the Renaissance and was codified in encyclopaedias, treaties and various institutions during the eighteenth century (Shiner, 2001, p. 115). Accordingly, an artist is viewed as a person of genius detached from the world that sacrifices him- or herself for the arts. In contrast, artisans are perceived as experts in their fields who apply their skills for reproductive imagination in the fields of art.

Interestingly, it appears that despite this split of qualities, the term "artist" dominates public discussion even when referring to artisans. We believe that the terms "artist" and "artisan", as conceptualised by Shiner (2001) (Table 1), reflect the two extremes (i.e. archetypes) on a continuum (Bauer, Viola, & Strauss, 2011); therefore, throughout our paper, the term "artist" will refer to artists, artisans and any hybrid form thereof.

In the absence of a legal definition for any artistic profession, it is difficult to perform analyses in this area (Karttunen, 1998; Menger, 1999). The most cited definition of artists appears rather vague (UNESCO, 1980):

> "Artist" is taken to mean any person who creates or gives creative expression to, or recreates works of art, who considers his artistic creation to be an essential part of his life, who contributes in this way to the development of art and culture and who is or asks to be recognized as an artist, whether or not he is bound by any relations of employment or association.

Due to this vagueness, various ways can be found in the literature attempting to narrow down artistic professions to measureable characteristics. For instance, a study on the social situation of artists published by the Austrian Federal Ministry for Education, Arts and Culture in 2008 (Schelepa et al., 2008) used seven criteria to define professional artists, whereby at least one of these criteria had to be met:

- membership in a professional representation or community of interests,
- membership in a collecting society (e.g. society for musical performing or mechanical reproduction rights),

Table 1. From the co-meaning to the split of semantics "artist vs. artisan" (Shiner, 2001)		
Before the split	**After the split**	
Artist/artisan	**Artist**	**Artisan**
Talent or wit	Genius	Rule
Inspiration	Inspiration/sensibility	Calculation
Facility (mind and body)	Spontaneity (mind over body)	Skill (body)
Reproductive imagination	Creative imagination	Reproductive imagination
Emulation (of past masters)	Originality	Imitation (of models)
Imitation (nature)	Creation	Copying (nature)
Service	Freedom (play)	Trade (pay)

- receipt of financial support for artistic activities from public institutions,
- publication of at least one artistic activity in the form of an exhibition, production, performance, etc. in the previous five years
- graduation from an artistic curriculum and/or
- income from artistic activity.

One major reason for the difficulty in defining artists—and, as a consequence, the artistic labour market—may stem from the fact that the "definition of art and culture has obviously been broadened as cultural policies have developed" (Menger, 1999, p. 542). Therefore, studies on artists (Karttunen, 1998) and/or their employment situation and career patterns shall be interpreted carefully. In particular, comparative interpretations are difficult to be performed as studies may have been based on differing definitions of the artistic profession.

When analysing statistical surveys and studies around the artistic profession, one has to be aware and consider that most of the available data does not only consider professional artists, but also include amateurs. However, the revenues that amateurs receive for their artistic activities are generally lower than those received by professionals. By including amateurs, the calculated average annual income for artists as a whole is statistically depressed. Many studies (e.g. Alper & Wassall, 2006; Schelepa et al., 2008) argue that amateurs, who are paid less than others or "have to" follow jobs apart from artistic activities, want to make their living from artistic work but are not able to do so due to market forces. In fact, most amateurs and semi-professionals do not seek to pay their living with artistic work, but regard it as an interesting and well-paid hobby (Abbing, 2003).

Again, the absence of an adequate definition (Karttunen, 1998; Menger, 1999) for what constitutes an "artist" gives rise to such misconceptions. For instance, Schelepa et al. (2008) tried to sort out non-professionals by setting the criterion that a person has to be member of a professional representation or collecting society. Membership in such organisations is, though, not a guarantee for professionalism, as a single publication, exhibition, etc. is often sufficient for being accepted as a member. For this reason, amateurs who want to earn some (minor) royalties or have their interests represented also join such organisations.

This bias of existing studies notwithstanding, the socio-economic situation of the average (non-superstar) artist is precarious, as we will present in Section 2.2. Due to the bias in existing studies on the artistic profession, we draw mainly on data from public statistical institutions in presenting the socio-economic situation of the average artist. Data from such public statistical institutions are usually highly aggregated; however, we believe that such official statistical data collected on a broad basis may be more reliable for the purpose of our study than data from studies focussing on specific aspects. We emphasise that the data used in our study is a snapshot of the current situation for the majority of artists. For this reason, absolute values shall be interpreted rather as indicators for the situation than as strictly formal numbers.

2.2. The socio-economic situation of the average artist

Although some artists range among the best-paid professionals, the average income in the arts is much lower than in comparable professions (Abbing, 2002; Adler, 2006; Alper & Wassall, 2006; Schulze, 2003). The art markets are winner-takes-all markets (Abbing, 2002; Adler, 2006), where a relatively small number of people have extremely high income and dominate the market ("superstar phenomenon"), while the large majority faces low income (Adler, 2006; Rosen, 1981; Schulze, 2003).

In fact, the financial situation of average artists is rather precarious. Frequently, artists pursue multiple jobs and/or projects at the same time and have rather insufficient social health or retirement pension insurance coverage (ERICarts, 2014; Schelepa et al., 2008). In addition, the borders between work and private life, and between employment and unemployment often become blurred (Schelepa et al., 2008).

Artistic work is often characterised by individuality and uniqueness (Abbing, 2002; Rothauer, 2005), this pursuit of individuality and the heterogeneity of the work areas and interests make it difficult to build a joint representation of interests for artists. Many small, heterogeneous representations of interests (for writers, composers, actors, etc.) hinder effective lobbying activities that could improve future working and living situations. Therefore, there are currently no clear occupational titles (Karttunen, 1998, 2001; Rothauer, 2005), which could be fixed by law, and also no generally accepted professional fees or hourly rates for artistic work (Rothauer, 2005).

The lack of economic appreciation for artistic work (Austin & Devin, 2009) and the lack of clarity about art professions are reflected in the working conditions in the arts. In contrast to other occupational areas, artists are confronted with an extremely high share of atypical labour conditions. Contract types vary from the classical-dependant employment to self-employment, from temporary appointment to contract work on the basis of professional fee rates, from non-remunerated freelancer activity to jobs with compensation for expenses (Beckman, 2001; Montgomery & Robinson, 2003; Schelepa et al., 2008; Throsby, 2007).

Only long-living art organisations, such as orchestras, operas and art or music academies, are able to employ the majority of their artistic labour force on the basis of long-term contracts (Towse, 1996). Long-term contracts and straight-lined careers are rather exceptional among artists as a whole; therefore, the request for flexibility is one core attribute of artistic professions. Art organisations and artists themselves mostly combine various types of employment.

Nevertheless, the high share of self-employed persons—and among those, the high rate of people running their own one-person business—is one of the most distinguishing characteristics of performing activities in the field of art and culture.

In the European Union (EU27), 25% (2009) of all workers in the cultural sector are employed on the basis of part-time engagements (compared to only 19% among total employees in the European Union); and 6% (2009) of the "cultural workers" hold several jobs (compared to 4% among total employees in the European Union) (European Commission, 2011a).

However, artists as a professional group have not always been poor. The existence of large groups of artists with low average incomes is mostly a twentieth-century phenomenon, which became particularly intolerable after Second World War (Abbing, 2002). Since then, improving the economic position of artists has played an important role in subsidisation policies in the Western European countries (Frey, 2003). Considering that the economic position of artists remained bad or even deteriorated implies that these efforts were largely ineffective (Abbing, 2002).

2.2.1. The socio-economic situation in Austria

The Austrian micro census from the year 2010 reported 130,500 workers in cultural professions (4% of all Austrian workers) (Bachinger et al., 2013): 33,532 people in the profession group of "professional writers, fine artists, and performing artists" (ISCO occupational group 245), 35,667 in the software and games sector, 23,714 in advertisement, about 10,000 people in architecture and design and 4,964 people in broadcasting and television (Bachinger et al., 2013). In total, the cultural and creative sector generated a turnover of 18.2 billion Euros and contributes about 3.5% (2010) to Austrian economy (Bachinger et al., 2013). From 2008 to 2010, this sector grew three times faster than the entire economy (Bachinger et al., 2013).

Table 2 illustrates the numbers of employed and self-employed workers in cultural jobs in different art genres in Austria. As can be seen from this table, in every genre with the exception of "design", the number of self-employed persons is lower than that of employed persons. Interestingly, in the field of broadcasting and television, the ratio of employed persons is extremely high (99% of all 4,964 persons working in this field are employed (Bachinger et al., 2013)).

Table 2. Employment in the field of culture in Austria (2010) (Bachinger et al., 2013; Worm, 2013)			
Art genre	**Total number of art workers**	**Number of employed art workers**	**Ratio of employed art workers among total art workers (%)**
Architecture	14,924	9,466	63.43
Design	2,183	762	34.91
Music, literature, arts and performing arts	33,532	21,537	64.23
Broadcasting and TV	4,964	4,915	99.01
Software and games	35,667	27,899	78.22
Publishing	9,793	9,049	92.40
Video and film	5,695	4,080	71.64
Advertisement	23,713	15,409	64.98
Creative and cultural sector in total	*130,471*	*93,117*	*71.37*

With an employment ratio of about 70% (i.e. 71.37% in 2010 (Bachinger et al., 2013; Worm, 2013) and 70.8% in 2011 (Statistik Austria, 2014b, p. 195)), Austrian workers in cultural jobs are self-employed twice as often as the Austrian labour force in general (i.e. about 15% in 2013 (Statistik Austria, 2014a)). Interestingly, particularly in the domain of artistic design, the majority (about 75%) of the labour force is exclusively self-employed (Bachinger et al., 2013).

Considering the high educational level among artists (cf. Section 2.4.1), the average remuneration of artists is drastically below that of the average labour force (Baier, 1995; Beckman, 2001; Montgomery & Robinson, 2003; Schelepa et al., 2008; Schiffbänker & Mayerhofer, 2003). For instance, a survey revealed that about half of the interviewed graduates (1991/92 and 1992/93) of the Viennese art academies had a monthly net income of less than € 726 (i.e. the at-risk-of-poverty threshold at that time) at their disposal (Baier, 1995). In 1998, only 2.3% of Austrian artists were ranked in the highest income group (highest income decile) with an average monthly income of more than € 4,360 (Schiffbänker & Mayerhofer, 2003), reflecting the "superstar phenomenon" (Rosen, 1981; Schulze, 2003). In contrast to these top earners, 46% of fine artists, 30% of musicians and 17% of performing artists had an income below the at-risk-of-poverty threshold (€ 726) (Almhofer, Lang, Schmied, & Tucek, 2000; Schiffbänker & Mayerhofer, 2003).

Another survey revealed that the remuneration for artistic work is not only low, but also irregular for about 81% of Austrian artists (Schelepa et al., 2008), indicating that only 19% of artists have a regular income (Schelepa et al., 2008). Artists are mostly engaged for individual projects, which are short term only (i.e. a few weeks or months). This short-time horizon for employment, the irregular sequence of different jobs with different durations and the multiplication of short-term contracts result in a complex situation characterised by a lack of sustainability due to a discontinuity in work and short-notice ad hoc employment (Benhamou, 2003). This extremely unsatisfactory situation decreases artists' alternatives and options to plan their income and family life.

Furthermore, a survey indicates that the yearly average net income of Austrian artists from their artistic work amounts to about € 4,500 (Schelepa et al., 2008). Even if all kind of revenues (i.e. revenues gained by non-artistic as well as artistic activities) are considered, an artist's average net income per year amounts to no more than € 12,400 (Schelepa et al., 2008), which is far less than that of self-employed or salaried Austrian workers in general (self-employed: € 24,077 (average gross income per year 2011); salaried employees: € 19,752 (average net income per year; 2011) (Statistik Austria, 2012, p. 11)).

Table 3. Income situation in various art genres 2008 in Austria (Schelepa et al., 2008)		
Art genres	Average net income per person per year from artistic activities (€)	Average total income per person per year (including income from non-artistic activities, €)
Arts on average	About 4,500	About 12,400 (exclusively self-employed artists on average about 6,700)
Performing arts	About 8,000 (often dependent employed)	About 12,000
Film	About 8,000	About 17,500
Music	About 4,900	About 19,000
Literature	About 3,000	About 13,100
Fine arts	About 3,000	About 10,600

In general, the ratio of artists living at-risk-of-poverty is very high: about 37% of Austrian artists (Schelepa et al., 2008) live below the at-risk-of-poverty threshold (Austria 2007: € 1,064 monthly (Statistik Austria, 2009)), compared to 19.4% (2008) of the total population (Statistik Austria, 2009). Considering the average equivalence income or the weighted per capita income (on the basis of the number and age of the household members), respectively, indicates that the income of artists is much lower than that of the average Austrian population (Schelepa et al., 2008). However, there are differences between artists of different art genres. Table 3 shows that fine artists and writers in particular suffer from a precarious income situation (net income from artistic activities: € 3,000 per year).

Due to the variety of artistic institutions in the performing arts, artists in this art sector are often employed in standard employment relationships, and hence "only" 17% of performing artists have to live with an income below the poverty level. In contrast, about 30% of musicians and about 46% of fine artists live beyond this level (Almhofer et al., 2000). Because of this low remuneration level for artistic activity, the share of additional non-artistic occupation is particularly high in the field of the fine arts (Schelepa et al., 2008).

2.2.2. The socio-economic situation in Germany
In Germany, the cultural and creative industries generated a turnover of € 137.3 billion (2010) (Schulz et al., 2013) (an increase of 23% compared to 2003). A total of 959.936 (2012) "cultural workers" (defined as musicians, vocalists, actors, fine artists, film/television/audio artists, designers, architects, game and software programmers and other cultural professions) could be identified, with 126,285 persons in the field of design and the fine arts and 102.213 in the field of architecture (Schulz et al., 2013).

Professions in art and culture are characterised by a huge share of self-employed persons. In Germany, the share of self-employed persons among artists is about four times higher than the average one of the German population (BMWi, 2014). In 2012, about 25% of all workers in cultural professions were self-employed (BMWi, 2014). Particularly writers, fine artists, composers and freelancers in the fields of dance, performance and theatre have to be mentioned in this context (Haak & Schmid, 1999). In contrast, the general self-employment rate in Germany is about 6% (DeSTATIS, 2014).

The average annual income of professions included in the German social security system for self-employed artists (*Künstlersozialkasse*) amounted to € 14,992 (2012) (Künstlersozialkasse, 2014). For instance, in Berlin, self-employed artists live with a net income half that of other self-employed individuals in the same region (Mundelius, 2009, p. 143). According to a German micro census in 2009, about one-fifth of German self-employed artists live beneath the current at-risk-of-poverty threshold (BMWi, 2009a). The monthly average income of male artists amounted to € 1.092 (2009) and of female artists to € 931 (2009) (Schulz et al., 2013, p. 159); and about 73% (2006) of fine artists and 55% (2006) of performing artists could not live solely from their artistic work (Dangel, Piorkowsky, & Stamm, 2006, p. 20). Musicians, in contrast, seem to face slightly less economic risks as more than 55% (2006) of self-employed musicians were able to live from their artistic work (Dangel et al., 2006,

p. 20). Overall, confronted with such difficult living situations, about 21% of self-employed artists reported to seek for more certainty by engaging in an additional permanent, salaried job, while 8.4% were considering giving up their artistic profession (Dangel et al., 2006).

2.2.3. The socio-economic situation in Switzerland

About 1.4% (2009) of total employment in Switzerland was engaged in the cultural sector (ERICarts, 2014). Nineteen-thousand and twenty-eight (2009) people worked in the music industry, while 6,907 (2009) worked on the literature and book market (Weckerle & Theler, 2010). Another 11,006 (2009) people worked in the area of the performing arts, while 6,742 (2009) people worked in the film industry and 7,128 (2009) worked on the art market (Weckerle & Theler, 2010).

The working situation of Swiss artists is quite similar to the one in Germany and Austria. The share of cultural workers in total employment of Switzerland was 1.40% (2009), the share of self-employed in cultural employment was 12.10% (2009) and the share of self-employed in total employment was 15.17% (2009) (ERICarts, 2014).

Weckerle and Söndermann (2003) emphasise the "precarious" situation of many artists in Switzerland. Beside self-employment, project-orientated part-time engagements dominate the Swiss artistic labour market (Weckerle & Söndermann, 2003). For instance, the Swiss professional association "visarte" has established that 2,300 fine artists live with an annual average net income of only CHF 30,000 (about € 19,780).

2.3. Art and (self-)management requirements

A crucial requirement for any artistic profession is commitment (Dudek, Bernèche, Bérubé, & Royer, 1991; Eikhof & Haunschild, 2007). A large part of this high dedication is, though, rarely rewarded with an adequate income. Many artists are not able to determine the value of their work (Abbing, 2002; Austin & Devin, 2009; Caserta & Cuccia, 2001). While some artists consciously accept disadvantages such as existential fear and self-exploitation for the benefit of self-determination, self-fulfilment and autonomy (Dudek et al., 1991; Eikhof & Haunschild, 2007; Throsby, 2007), undervaluation is frequently due to a lack of self-confidence or shame (Dudek et al., 1991). On the other hand, artists frequently lack management and commercial knowledge and skills (Eikhof & Haunschild, 2007; Menger, 1999). The lack of business knowledge is one of the most common reasons why artists fail to make a living from their talent (BMWi, 2009b).

Inevitably, every artist has to deal with economic or management issues (Eikhof & Haunschild, 2007; Menger, 1999). Consequently, an appropriate educational background in the field of management and commerce are—in addition to artistic talent, of course—key qualifications for success. While artists are not expected to become financial or bookkeeping experts, all artists face "simple" (entrepreneurial) questions during the course of their career, such as: What is my target group—who will buy my work? How many works (or performances) do I have to sell to make my living? What should be the price of my work or service? (BMWi, 2009b).

The conception of the artist who thinks and acts with business sense is not an invention of current market pressures, but rather was present in all eras in history of art (e.g. Rembrandt van Rijn, Peter Paul Rubens, Hans Makart, Andy Warhol or Jeff Koons). For instance, from the Gothic to the Baroque period, studios of painters were medium-sized companies; works were created based on division of labour and remunerated by clients according to the adduced expenditure of time and effort (North, 1996).

Albrecht Duerer (1471–1528) is an outstanding example for an artist who acted with great business sense. His economic success was principally based on the fact that his work reflected the taste of a great number of customers. He was also one of the first fine artists who (around 1498) signed his pieces of art with his initials ("AD"). These monograms became Duerer's trademark and guaranteed the authenticity of his works. Duerer also advocated his copyright, when he brought to trial a Venetian engraver who had copied some of Duerer's works and had sold them on the market (around

1506). Based on copyright—conferred by Maximilian I—Duerer prohibited any further reproduction of his graphics. Duerer was also organised in a business sense with regard to the production and distribution of his work. In his studio, he produced approximately 200–500 copies of his printings, employed numerous salesmen and kept the books meticulously (North, 1996, pp. 32–33).

Furthermore,—to name some other examples—at the peak of his popularity (about 1830), the famous Austrian musician Johann Strauss, Sr. (1804–1849) employed 300 musicians who played in groups of 25 each at diverse balls (Ginsburgh & Throsby, 2006, p. 139). Andy Warhol (1928–1987) was an artist who had an excellent command of the balancing act between art and commerce. His experience as a commercial designer enabled him to break out of the conventional gallery business and to transform experimental art into commercial goods and vice versa.

2.4. The educational situation of artists
The level of education is extremely high among artists in Europe: In each of the studied countries, the share of labour force with tertiary education was much higher in the cultural sectors than in total employment (European Commission, 2011a, p. 64). About 53% (2009) of the European "cultural workers" were university graduates (European Commission, 2011a, p. 71), compared to 26% (2011) (European Commission, 2011c) university graduates among the total European labour force (Mischke & Wingerter, 2012, p. 20).

2.4.1. The educational situation in Austria
In Austria, people with jobs in the cultural field frequently have a high educational level. The ratio of university graduates among persons in the field of culture is about 34.3%, whereas only 16.6% (2013) (Statistik Austria, 2014a) or, respectively, 15.8% (2012) (Statistik Austria, 2013, p. 33) of Austrian's total labour force are university graduates.

Basically, artists pass a multilevel (theoretical and practical) education or training (Almhofer et al., 2000, p. 46). Figure 1 displays the significance of academic education for all domains of art. Academic education seems particularly high in the field of music (about 60%). However, in the performing arts, private training makes up an important education path with about 31% (Figure 1) (Schelepa et al., 2008). Only a minority of artists (about 3.4%) uses other formal education forms, such as seminars, workshops or summer/winter schools (Schelepa et al., 2008).

For all types of artists, continuing education is an important factor for competitiveness and even survival. However, in practice, the emphasis in this context is mainly put on the core artistic abilities,
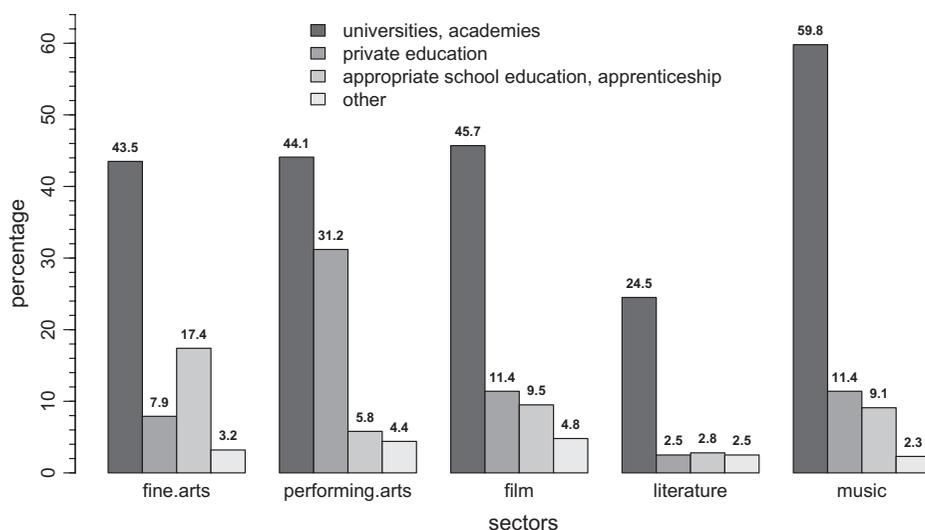
Figure 1. Artistic education paths in percentage values 2008 in Austria (*n* = 1,798, multiple responses) (Schelepa et al., 2008).

whereas continuing education in non-artistic areas is rather uncommon among artists: only 20% of Austrian artists pursuing continuing education activities participate in non-artistic programmes. Such non-artistic programmes are mostly chosen in the fields of languages (12%) and computing (11%). Interestingly, artists rarely attend courses in the field of (art) management (about 7%). The reasons for this low rate are presumably the lack of awareness and the absence of adequate courses (with respect to the subject matter of the courses, course durations and costs). High course fees and the lack of time are also important reasons why Austrian artists do not take advantage of any further education (Schelepa et al., 2008).

Comparing the high rate of university graduates among artists and the extremely poor working and income situation raises the question whether the current (academic) art education adequately prepares their students for their professional future. Thus, one of the strongest points of criticism on art curricula is their failure to prepare their students for the economic reality of (self-employed) professional lives on the art market (Almhofer et al., 2000).

2.4.2. The educational situation in Germany
Similar to the situation in Austria, workers in Germany's cultural sector also show a rather high level of education. Compared to a share of 26% (2011) (Mischke & Wingerter, 2012) of university graduates among German employees, amongst workers in the cultural sector, this share is almost twice as high; it reaches 48% (2009) (European Commission, 2011a, p. 71). In spite of this high level of education, the country's "cultural-workers" do not feel "well-trained": According to an official investigation concerning "Culture in Germany" (German Enquete Commission, 2007), many artists do not feel prepared for the complex and competitive artistic labour market. The report indicates that current educational structures at universities and further education programmes only allow the acquisition of additional qualifications and knowledge (for instance, "generic skills") to a limited extent. Thus, the main point of criticism is the lack of interdisciplinary subjects in artistic education, as students do not seem to be prepared for the pitfalls of highly dynamic and complex career paths. In its final report, the German Enquete Commission "Kultur in Deutschland" conjectures that art universities only offer insufficient "crash-courses" in the field of management and self-employment (German Enquete Commission, 2007).

2.4.3. The educational situation in Switzerland
Compared to other countries in Europe, the share of university graduates among "cultural workers" is relatively low in Switzerland: The university entry rate of students in areas such as art and humanities is 20% below the OECD average (OECD, 2014, p. 341). The share of university graduates among "cultural workers" reaches 42% (2009), compared to about 38% (2009) among total employees in Switzerland (European Commission, 2011a, p. 71).

3. Research approach
The socio-economic situation of artists has given rise to severe criticism of current art curricula. This paper analyses current art curricula in the German-speaking area (DACH region) with respect to the integration of courses with managerial topics. More specifically, this paper addresses following research questions:

• Do art curricula in DACH region area include courses with managerial or economic topics? And if yes, to what extent are such courses offered?

• What significance do these courses take within the curricula with respect to obligation (compulsory vs. elective subject) and course ECTS (European Credit Transfer System) points in relation to a whole curriculum's ECTS points?

Basically, this research has explorative character aiming at providing a descriptive overview of the current situation. The study was conducted by means of an online research. In a first step, relevant institutions were identified via online research (81 institutions; see Appendix A). In a second step, these institutions' websites and course brochures were analysed concerning learning contents in the
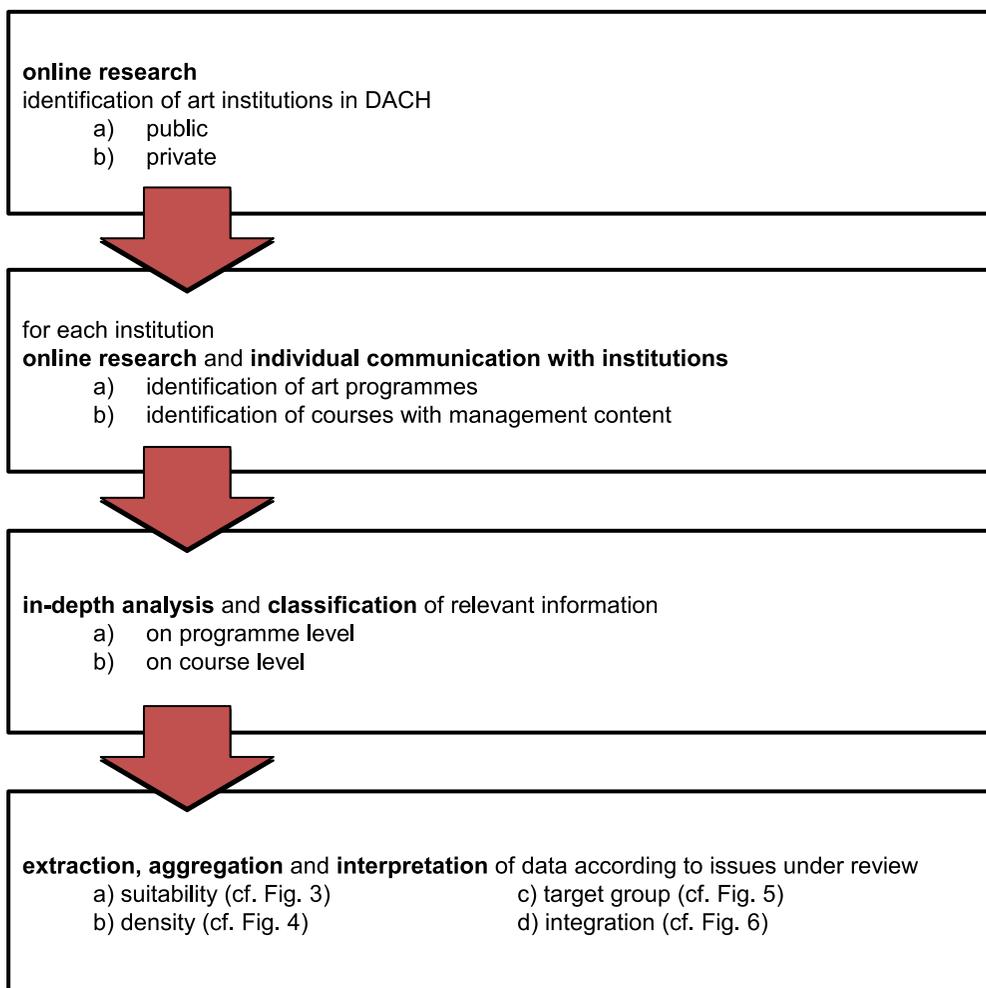
online research
identification of art institutions in DACH
      a)   public
      b)   private

for each institution
online research and **individual communication with institutions**
      a)   identification of art programmes
      b)   identification of courses with management content

in-depth analysis and **classification** of relevant information
      a)   on programme level
      b)   on course level

extraction, aggregation and **interpretation** of data according to issues under review
     a) suitability (cf. Fig. 3)   c) target group (cf. Fig. 5)
     b) density (cf. Fig. 4)   d) integration (cf. Fig. 6)

Figure 2. Process of analysis: steps and their sequence.

offered curricula and course syllabi (159 courses). Using common techniques of text and content analysis, the curricula of art studies were analysed concerning practice-oriented training and economic/management-relevant topics such as business studies, marketing, accounting or law for artists (including intellectual property rights) (McCalman, 2005).

First, we analysed academic *art curricula* for managerial learning contents. Second, we analysed *art management curricula, business-related art programmes* (private and academic) as well as *art management courses and seminars* (with a minimum course length of several days). Figure 2 provides an overview of the process of analysis; it shows the performed steps taken throughout the analysis, together with their sequence.

4. The study: analysing art curricula and syllabi with regard to managerial knowledge and skills

Analysis of academic curricula in the arts with regard to economic, respectively, practice-orientated learning contents shows a rather poor situation of art education in DACH region. Most notably, Austria offers marginal academic education possibilities in the context of business management or marketing for art professions. Particularly, learning content that would support future artists in entering the art market and driving their professional career, such as courses in marketing, financing, business administration (including bookkeeping), self-management, are offered mainly by private institutions, charging rather high course fees.

Analysis also raised the question concerning the cost-performance ratio of such courses. Most of the private institutions give similar specifications regarding course contents in the syllabus such as, for instance, basic principles in marketing, business administration and law. But with respect to duration, the content of courses may differ strongly.

Furthermore, high costs and required time (long-lasting, full-time courses) may represent an obstacle for professional artists to attend such courses. For (self-employed or employed) artists, it is most likely impossible to attend full-time courses, as attending the course would mean they have to sacrifice time they require for artistic work or/and generating revenues they need so badly.

As this study was conducted as an online research, this additional research question could not yet be answered; it will be subject to future research.

4.1. The situation in Austria

Only one out of the eight Austrian art universities (including two private universities) does not offer any business-related courses as part of its art curricula; this is the Academy of the Fine Arts of Vienna; despite in-house and external discussions concerning the implementation of managerial contents in art curricula (Montag Stiftung Bildende Kunst Bonn et al., 2008), it does not have any such course in its portfolio. All other institutions do offer courses in this context, although the contents and the course lengths are in most cases extremely limited (1–2 ECTS points[2]). In addition, such non-artistic courses are mainly offered on an optional basis (elective courses).

In this regard, the University of Music and Performing Arts of Vienna, particularly the Institute for Cultural Management, is an exception, offering a scale of courses in the field of cultural studies and management (e.g. cultural business administration, exhibition management, law and communication, etc.) that can be attended by in-house and also external students. As one of few, this university offers also instrumental diploma studies with focus on music management (workload: 15 ECTS points). Also, the University of Applied Arts of Vienna offers courses with cultural management topics (management in the arts, 2–3 ECTS points) in the entire set of its curricula. Additionally, graduates of art and cultural theory studies may register for the postgraduate study "art & economy" (4 semesters, € 2,330 per semester). The University for Art in Linz is the third Austrian university with an offer of art management, respectively, practice-relevant content (practice-orientated studies and management, 2 ECTS points).

The other art universities in Austria offer non-artistic, respectively, management courses only to a limited extent. The University of Music and Performing Arts in Salzburg (Mozarteum Salzburg) offers only two compulsory subjects in this context in its diploma studies of performing art (stage and media law, 1 ECTS point; organisation of work routine, 5 ECTS points). Additionally, the Mozarteum Salzburg offers in its master's study "vocals" an emphasis on the education of management skills (major field of study: cultural management).

The situation in the University of Music and Performing Arts in Graz is similar to the one in Salzburg. Non-artistic topics are only educated in courses in the field of law (theatre and contract law; about 1.5 ECTS); planning and project management; or press, public relations and journalism (each 1–2 ECTS points).

The Austrian private university, Anton Bruckner Privatuniversität, offers a variety of optional subjects in the field of art management (business administration, marketing, public relations, law, computing, etc.) in its master's studies. Additionally, "cultural management" may be chosen as a major field of study (workload: 13 ECTS points) in instrumental curricula. However, the only compulsory subject in this context is "theatre law" (about 0.5 ECTS points).

The second Austrian private university, Konservatorium Wien Privatuniversität, offers courses in the fields of self-management and law (2 ECTS points), business experience, theatre law and production management (2–4 ECTS points).

In summary, almost all art universities in Austria offer courses with some kind of art management-related topics. These courses' length—and, thus, the depth in which these contents can be taught—is, however, very limited. Considering the total workload of an average bachelor study (about 180–240 ECTS points), the time extent of the majority such art management courses (1–2 ECTS points) is marginal, as the important business-relevant topics can hardly be communicated in a profound way in such a short time. Even the more comprehensive offering of managerial courses at the University of Music and Performing Arts of Vienna (instrumental diploma studies with focus on music management, workload: 15 ECTS points) and at Anton Bruckner Privatuniversität (course on "cultural management", workload: 13 ECTS) does not seem sufficient for a thorough education in the respective fields.

To some extent, the lack of practice-oriented training and economic/management-relevant learning contents in art curricula is compensated by co-operation between educational institutions. For instance, the curriculum "applied musicology" (co-operation of University Klagenfurt and Kärntner Landeskonservatorium for Music and Acting) tries to improve the career chances of instrumental students (practice-relevant modules, 12 ECTS points). The University of Vienna (Institute for Theatre, Film and Media Sciences) offers in co-operation with the private Institute for Cultural Concepts the university course "culture and organisation" (two semesters, € 4,800). Additionally, the University of Vienna offers in co-operation with the Wiener Volkshochschulen GmbH various continuing education programmes in the field of art and economy ("Werkstätte Kunstberufe", up to three semesters, each € 250–1,086).

In Austria, private institutions play an important role in the impartment of business knowledge for artists. Among the analysed Austrian courses in the field of art and management (n = 43), only 18% (41%) seem suitable for artists (Figure 3), as they have a limited course length (3–14 days) and can be attended for rather low costs (€ 100–900). About 60% of the investigated courses range at a price level above € 1,000 and 12% of the courses cost more than € 10,000.

Nevertheless, the majority of the analysed courses is characterised by highly practical components (internships, case studies, guest lectures by experts and practitioners from art/cultural institutions and business) and a limited number of participants (on average 20 participants).

■ courses with the stated target group "artists", but due to course length, full time study, and/or high costs unsuitable for artists
■ courses suitable for artists (low costs, limited course length)
■ courses suitable for management personnel in the cultural sector
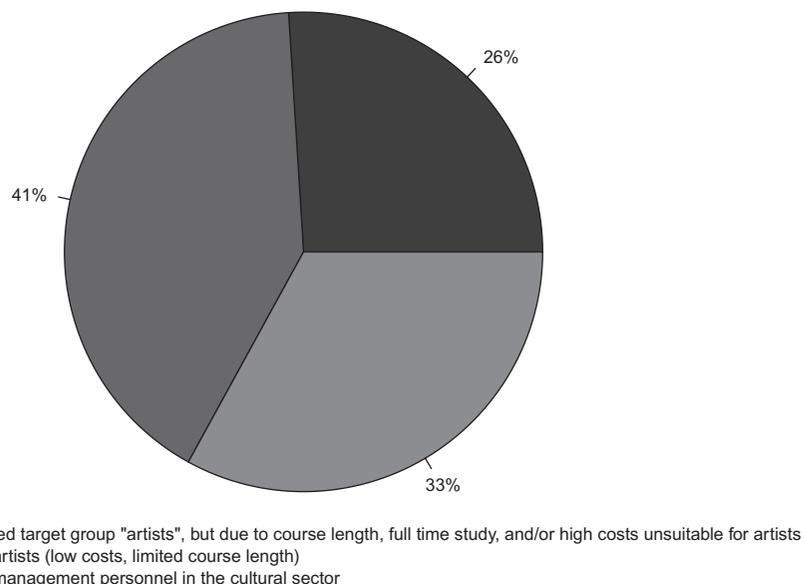
Figure 3. Programmes (private and academic) in the field of art management 2008 in Austria (n = 43).

4.2. The situation in Germany

Among the art universities (*n* = 51) in Germany, almost one-third (29%) of art institutions do not offer any business-related programmes, whereas the majority (71%) includes business-related educational contents in varying "density": 16% offer managerial courses in low density (i.e. only few courses in few curricula), another one-third (29%) offer managerial courses in medium density (i.e. only few courses in many curricula), and only about one-fourth (26%) offer in all their art curricula either compulsory subjects (more than 2 ECTS points) in the fields of marketing, business administration and law, or modules of specialisation in this context (high density). Furthermore, they support students through career service centres.

In particular, two German academic service centres have to be mentioned in this context: the Career and Transfer Service Center of the Art Universities of Berlin and the Centre for International Art Management. In both cases, several art universities collaborate in order to be able to offer their art students further education in the field of management, marketing, business administration and help them in their career entry.

Figure 4 illustrates the ratios of art universities in Germany with business-relevant programmes according to the course density described above.

Analysis of the educational situation for artists in Germany shows that among the offered programmes in the field of art management (*n* = 96), only 31% seem to be suitable for artists (Figure 5), as the majority of the programmes with the stated target group "artists" offers only very long-lasting (1–2 years), respectively, full-time courses at very high price levels (78% at price levels above € 1,000).

4.3. The situation in Switzerland

For Switzerland, our analysis of the educational situation for art students with regard to their management or business-related skills shows that among the 18 analysed art universities, 12 offer programmes in this context. Among these 12 programmes, 6 offer art management courses to a great extent (modules of specialisation, etc.). Interestingly, the analysis indicated that in Switzerland, the business-related education of art students is especially high in the field of design.

■ art universities that do not offer business−related programmes
■ art universities with very limited managerial offerings (few courses offered in few curricula)
■ art universities with a medium−sized managerial offerings (few courses in many curricula, some specialization modules)
□ art universities with an emphasis on business−related programs (significant offering of arts management−related courses in all art curricula)

Figure 4. Offer of business relevant programmes in art universities 2008 in Germany (*n* = 51).

■ courses with "artists" as the stated target group (but with high costs and time requirements that make them unsuitable)
■ courses suitable for the target group "artists" (low costs, limited course length)
■ courses suitable for the target group "management personnel in the cultural sector"
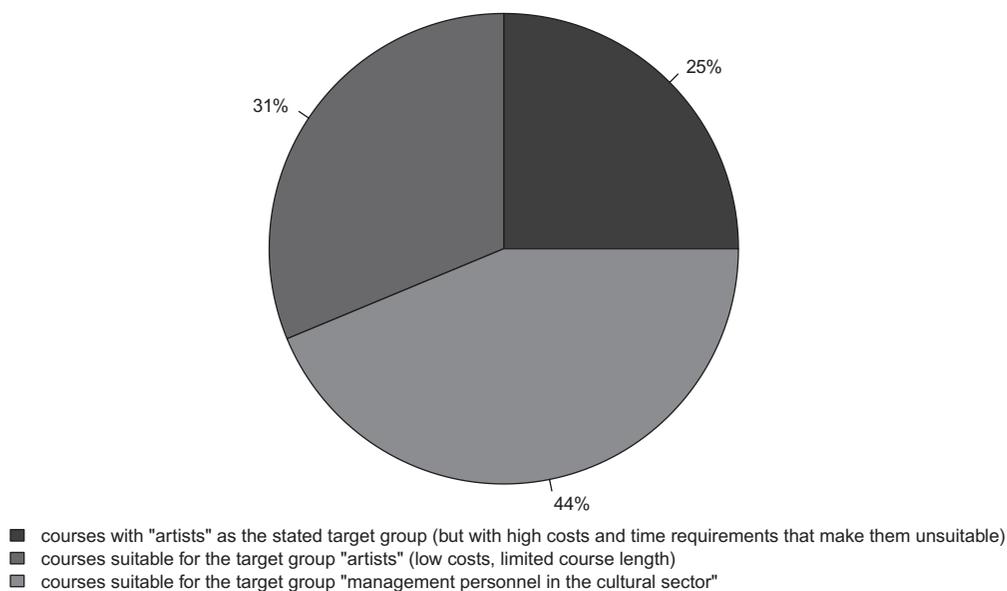
Figure 5. Programmes (private and academic) in the field of art and management 2008 in Germany (*n* = 96).

Regarding course offers in continuing education (private and academic) in the field of art management in Switzerland, the majority of the 15 analysed courses were (with respect to their topics) relevant for managers in the art sector, while only 5 of the investigated were (with respect to their topics and course duration) relevant for artists. However, regarding the course prices (prices: CHF 1,100–15,000), all of them seem to be offers in a rather high price segment. Compared to the annual average net income of Swiss fine artists, if CHF 30,000 (Weckerle & Söndermann, 2003) or to the Swiss average worker income of CHF 71,638 per year (OECD, 2007), such courses, though, seem to be affordable for artists. Concerning the price-performance ratios (e.g. a three-day course focussing on fundraising for CHF 1,100), none of them seem to be reasonable for artists to invest in these educational offers.

5. Interpretation and discussion of the results

After having collected, analysed and presented data for each of the three countries in the DACH region separately, we will now compare the results among these countries. Furthermore, we will discuss selected alternative approaches from the Anglo-American area to provide examples.

Austria offers only limited possibilities for artists to learn and further develop their management respectively business-relevant skills and knowledge. As Austria is a relatively small country, the supply might seem adequate, but considering the cultural standing of Austria and the great importance of culture for Austria's economy, the supply of business-relevant courses for artists seems to be insufficient.

Switzerland is one step ahead and puts a stronger emphasis on business-relevant topics in academic art curricula, particularly in the field of design. Also the majority of German art universities educates in art management-related topics or offers career service centres in order to support their students in their career planning. Still, in both countries, there are many art universities that do not offer any or only a few art management courses: 29% of the investigated 51 German art universities and 30% of the investigated 20 Swiss art universities do not offer any business-relevant courses.

In order to provide some examples of alternatives, we searched for documented research in the Anglo-American area that might allow for comparison and/or serve as a motivating approach. Such an exemplary study was undertaken for the subject "How schools, colleges, and universities are addressing integrated programmes between the arts, business and entrepreneurship programs"

(Weaver & Bowman, 2006). Among 83 interviewed educational institutions in the USA, about 61% offer "art economic" programmes, and among the 39% of institutions that currently do not offer such programmes, 77% realised the lack of such topics (Figure 6).

The offered "art economic" programmes contain courses such as entrepreneurship, marketing, bookkeeping, strategic management, business law.

The study of Weaver and Bowman (2006) does not allow to conclude to what extent these interviewed US institutions offer their "art economic" programmes. However, the vast majority of the analysed education institution offers practice-oriented courses, respectively, courses with economic/management-relevant topics such as business studies, marketing, accounting and law for artists (86% in the United Kingdom and 67% in the USA).

For instance, the Columbia College Chicago offers courses such as "Self-Management for Artists" or "Music Business Affairs", "Music as a Career", "Career Building Workshops" with the aim to facilitate students in "[...] how to acquire an agent, how to network, conduct oneself at job meetings and navigate the shark-infested waters [...]" (Columbia College of Chicago, 2009). For vocal and theatre students, the University of London offers courses in the field of "Career Management" with focus on "[...] communicating strategies for reflective practice and self-evaluation and personal management for career planning [...]" (University of London, 2009). Main issues of these courses are the current cultural and subsidy policy, management structures, marketing strategies and self-promotion.

Many of the analysed art colleges in the United Kingdom and the USA offer additionally so-called "Career Development Centres" or "Career Service Offices". These service facilities help graduates in entering the art market and developing a career under various aspects such as sustainability and/or flexibility. Seminars, training courses, personal coaching and workshops should support students in their transition to self-employment and independence (Royal College of Music London, 2008).

Overall, in line with the German Enquete Commission (2007), we conclude that art universities have the responsibility to prepare art students for their complex career paths. We claim that artists should at least have the opportunity to elect specific business-related courses to enrich their art studies. In general, the regret is smaller if know-how acquired in a management course has never been applied compared to the regret if financial losses or risks disturb the path of an artist due to a

- ■ There is a defined programme of study that integrates art and business.
- ■ We are in the process of defining a programme.
- ■ There is no defined programme, however we have recommended courses.
- ▫ There are no programmes or recommended courses sequences.
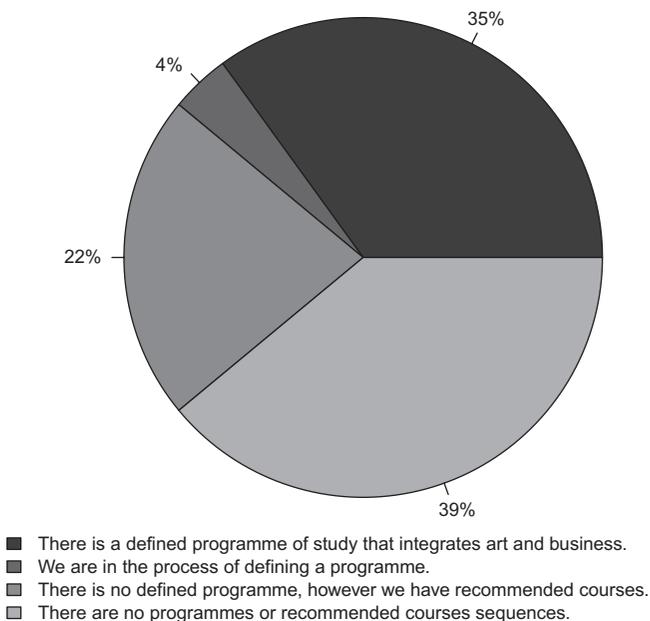
Figure 6. Offer of economic contents in art studies 2005 in the USA (Weaver & Bowman, 2006).

lack of management know-how. From an educational policy point of view as well as from the view-point of the pubic, it seems preferable to integrate management courses into art programmes. We claim that artists should be placed in a position to know relevant markets and their mechanisms, adapt to economic changes, get along or conquer new markets and work areas; this aim should be considered in the artistic education by integrating business and management courses into art programmes.

6. Conclusions and recommendation

Although the art sector is a highly profitable market, the income and the living situation of artists, who actually perform the core activities without which there would not be any art market or only a fragment of it, are below the average income level of the overall population. This fact is striking as the cultural sector is an important part of European economy (2.6% of the European GDP) and grows faster than the entire economy. Even though artists in the cultural sector are part of a profitable segment of the economy, they seem not to participate adequately in this sector's revenues. Although the art sector is characterised by the so-called "superstar phenomenon", the distribution of earnings among non-superstars is expected to be fair and at average level (compared to the average popula-tion). Reality looks much different, though.

We emphasise that for a successful career, an artist needs additional competences besides a profound artistic education. Knowledge of business administration, marketing, organisation and knowledge of the own legal rights and duties should be part of any artistic education.

For a better understanding of the educational situation, we analysed the curricula of institutions educating in art in DACH region; overall, we identified and analysed 159 course syllabi of 81 art universi-ties as well as similar art schools and academies. The main conclusion that can be drawn from our study is that the education of artists does not match the current requirements of (self-employed) professional artists, as professional artists are key-players in a highly dynamic and demanding art market with strong competition. For DACH region, the presented analysis shows a rather poor educational situation of art-ists with respect to the implementation of management topics and practice-oriented management training in art curricula. In most cases, future artists do not have sufficient possibilities to further develop their non-artistic abilities—that are highly relevant in practice—in an educational context. At universities and academies, non-artistic courses are offered only to a very limited extent (with regard to covered topics and time). Consequently, future artists have to fully rely on their own experiences and learning-by-doing, and/or hints and tips by better-informed and established colleagues and mentors.

If art universities and academies would teach applied management topics in compulsory courses, economic mishaps, wrong decisions and strategic mistakes (that may happen especially at the be-ginning of a professional art career due to ignorance or inexperience) could be avoided. Sensitising students—as future artists—to economic and management topics by creating awareness of such managerial issues and by developing competences for collecting, evaluating and acting upon ade-quate information would be highly beneficial.

Our study reveals that the German government and also many German universities recognised the importance of implementing such non-artistic or interdisciplinary topics into art curricula. To accelerate this development, the German Enquete Commission (2007) recommends to further implement qualifications in the fields of (self-)management, self-employment, copyright and ancil-lary rights. Additionally, it recommends art universities to put emphasis on advisory, further educa-tion and development programmes, especially in the fields of business start-up, secure existence and competence for innovation.

As our study indicates, Germany shows good approaches in implementing management and prac-tice-orientated topics into the art education system and follows the example of the USA and the United Kingdom. By comparison, Austria and Switzerland are behind in offerings of managerial

courses in artistic education. Still, the Anglo-American area seems to be ahead in its offers compared to DACH region.

Based on our findings, we suggest increasing the managerial education at art education for following reasons:

- Managerial skills are crucial for professional careers of artists and indispensable for a sustainable career development. The Anglo-American area could serve as an example, as these countries already regard a practice-orientated art education as an obligation for a reputed art education institution.
- On an international level, the educational profiles of art graduates are currently not comparable. In order to improve the competitive position of artists in DACH region vs. the Anglo-American area, curricula have to be pushed to a—at least to some extent—comparable level.
- New media and technologies highly influence the artistic activities. The artistic activity is experiencing an upheaval, which (future) artists have to be prepared for and adapt to for survival. Only developing appropriate management and technological skills will allow them to make a career out of their work.

While our research focused on DACH region, further research shall be broadened both, horizontally and vertically. On the horizontal level, further research will analyse the art education in other countries; it seems advisable to perform a stepwise analysis focusing on various groups (e.g. with a common educational system and/or cultural background) because such a modular approach is more likely to provide compact results and to-the-point recommendations. On a vertical level, it is necessary to investigate the education of artists not only at universities and academies, but also to tracing the educational paths and profiles in other educational settings, such as continuing education classes. Another promising research approach considers various art markets, their mechanisms and characteristics—possible segmentations might refer to the type of art (e.g. music, fine art) or cultural regions (e.g. Anglo-American area) and identifies specific requirements.

Finally, if the lack of business knowledge is an essential driver why artists might fail to make a living from their talent, then this chain of cause and effect could be ruptured by adequate educational opportunities. It even seems worthy of discussion if such educational opportunities are ultimately even for the public benefit. If so, offering such educational opportunities is even obligatory for governmental authorities in welfare states.

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Notes
1. Although DACH region forms a common economic and cultural subspace; they differ in educational systems and cultural policy. For instance, Switzerland considered culture a private matter until the early 1970s (ERICarts, 2014).
2. One ECTS point corresponds to a workload of about 25–30 h. European Bachelor studies (about eight semesters) comprise between 180 and 240 ECTS points (European Commission, 2009).

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Appendix A. Investigated art universities and academies in DACH region

Country	University
Austria (10)	University of Vienna, Academy of the Fine Arts of Vienna
	University of Music and Performing Arts of Vienna
	University of Applied Arts of Vienna
	University of Music and Performing Arts of Salzburg (Mozarteum)
	University of Music and Performing Arts of Graz
	Art University of Linz
	Anton Bruckner Privatuniversität
	University Klagenfurt
	Konservatorium Wien Privatuniversität
	University of Vienna
Germany (51)	Berlin University of the Arts
	Academy for Music and Theatre Hamburg
	University of Music Fribourg
	University of Music and Performing Arts of Stuttgart
	University of Music (Karlsruhe)
	University of Paderborn
	University of Music "Hanns Eisler" Berlin
	Humboldt-University Berlin
	University of Music and Theatre Hannover
	University of Music and Theatre Munich
	Robert Schumann University Düsseldorf
	University of Music (Münster)
	Academy of the Fine Arts (Mainz)
	University of Music (Mainz)
	University of Music "Franz Liszt"
	University of Music and Theatre Hamburg
	Film Academy Baden-Württemberg
	University of Bayreuth
	University of Performing Arts "Ernst Busch"
	University of Frankfurt
	University of Music and Performing Arts (Frankfurt)
	University of Giessen
	University of Applied Sciences of Schwaebisch Hall
	Berlin Weissensee School of Art
	Academy of the Fine Arts (Essen)
	Braunschweig University of Art
	University of Art (Bremen)
	University of the Fine Arts (Dresden)

(*Continued*)

Appendix A (*Continued*)

Country	University
	Art Academy Düsseldorf
	University of the Fine Arts (Frankfurt am Main)
	University of Art and Design (Halle)
	University of the Fine Arts (Hamburg)
	Academy of the Fine Arts (Karlsruhe)
	Art University Kassel
	University of Music of Cologne
	Academy of the Fine Arts Munich
	Academy of the Fine Arts Münster
	Academy of the Fine Arts Nuremberg
	Academy of the Fine Arts Stuttgart
	University of Music and Theatre Rostock
	University of Music and Theatre Leipzig
	University of Music Detmold
	Staatliche Hochschule für Gestaltung Karlsruhe
	Muthesius Art University
	Art University of Media Cologne
	University of Graphik und Buchkunst Leipzig
	University of design Offenbach am Main
	University of the Fine Arts Saar
	Bauhaus-Universität Weimar
	Folkwang-University Essen
	University of Film and Television Potsdam
Switzerland (20)	University of Art and Design Basel
	University of Music Basel
	Basel School of Design
	Bern University of the Arts
	University of Lausanne
	University of Art and Design Lausanne/University of the Fine Arts Geneva (reunion)
	Academy of Music Lausanne
	University of Theatre Lausanne
	University of Music Geneva
	University of Art and Design Luzern
	University of Music Luzern
	Zurich University of the Arts

(*Continued*)

Appendix A (*Continued*)

Country	University
	University of Applied Sciences and Arts of Southern Switzerland
	Academy of Physical Theatre
	Academy of Music Fribourg
	Conservatoire Neuchâtelois
	University of Music Lugano
	University of Arts (Ecole cantonale d'art du Valais)
	F + F School of Art and Media Design
	School of Art and Design St. Gallen

Inquiry into the teaching and learning practice: An ontological-epistemological discourse

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Abstract: Tertiary education has been actively moving over the last two decades from the lecturer-centred to the student-centred approach, focusing more on "what the student does" rather than on "what the student is" or "what the teacher is". We, as academics, teacher educators, and teachers, do attend many workshops and seminars promoting student-centred learning. However, the question that arises is "are we prepared to truly develop from the conventional lecture-based learning, which is hard to eliminate, to the innovative student-centred learning, which may be hard to accept, adopt, and sustain?" The way we plan, organise and deliver knowledge might be mostly epistemological. However, there exists an ontological stance on how we perceive knowledge and on our belief—informed opinions—of "the most effective pedagogy" in organising and emphasising such knowledge. This paper will present a personal reflective study on the ontological–epistemological discourse that a novice academic experienced in first accepting the idea of a student-centred learning approach, implementing such strategy and in reflecting back on this experience. This study promotes a rethinking of our teaching and learning practice as an ontological and epistemological form of inquiry and generates insights which may be further extended and researched. This paper finally offers a reread of the

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Ahmad Samarji is an academic at the Department of Education, Lebanese American University, Beirut. He is also an adjunct fellow of Victoria University, Melbourne, Australia. His diverse expertise and interests in education include: STEM education, forensic science and forensic medicine education, ICT in education (ICTE), internationalisation of the curriculum and higher education role in knowledge management and sustainable growth. Throughout his everyday research and teaching and learning, Samarji pays particular attention to educators' and teachers' professional development, lifelong learning and reflective practice. Samarji's paper is one of the several papers developed by academics at the College of Education (Victoria University) which inquires into teachers' educational growth and professional development through the Praxis Inquiry Model. The model prompts teachers to think and rethink their teaching practice and respond to contemporary issues of importance and relevance to teaching and learning.

PUBLIC INTEREST STATEMENT

This paper offers a critical analysis into developing professional practice in general and the practice of teachers in particular. The paper argues that professional development and growth require a thorough conversation between our internal beliefs, perceptions and attitudes (ontology) and our behaviours, acquired knowledge, experience and practices (epistemology). When exposed to situations where they actively engage in efficient methods and practices, professionals (e.g. teachers) consciously and subconsciously start rethinking their initial beliefs and attitudes towards their everyday practice and start changing them in a manner which reflects the conversation across an internal lens and an external one. Inquiry into such conversation can provide insights into why people respond differently to training or professional development sessions. Even participants (e.g. teachers) who seem to resist change (e.g. student-centred approach) can be markers to trainers to rethink ways that prompt a more successful conversation (O-E Discourse) between participants' ontological lens and epistemological experiences.

Experiential Learning Cycle of the Praxis Inquiry, a model established and adopted by the College of Education, Victoria University, Melbourne.

Subjects: Education Studies; Educational Research; Higher Education; Philosophy of Education

Keywords: teaching and learning practice; Praxis Inquiry; student-centred learning; epistemology; ontology; ontological–epistemological discourse; self-determined learning

1. Introduction

Tertiary education has been actively moving over the last two decades from the lecturer-centred teaching and learning strategy to the student-centred teaching and learning approach, focusing more on "what the student does" rather than on "what the student is" or "what the teacher is" (Biggs & Tang, 2007). There has been a global awareness within academia on the necessity of developing the lecture-mode teaching and learning settings within universities to a more active, engaging and mutual students–lecturer–university relationship. Hence, many universities have been running professional development programmes, seminars and workshops for academics in an attempt to promote students' active engagement in both lectures and tutorials. However, the adoption of student-centred teaching and learning practices is not as easy and feasible in universities as it may be in schools for a number of reasons, the least being the lengthy content that a lecturer needs to cover within a short period of time.

Victoria University, Melbourne Australia, organises a Graduate Certificate for Tertiary Education (GCTE) as part of the professional development required for novice academics and for a number of academics seeking promotion. One of the main focuses of the GCTE is to promote student-centred teaching and learning practices both in lectures and tutorials. The underpinning theme of the GCTE is the "Praxis Inquiry" (Burridge, Carpenter, Cherednichenko, & Kruger, 2010), a model developed and adopted by the School of Education at Victoria University. Academics enrolled in the programme experience Praxis Inquiry when they develop their current practice through experiencing a cyclic process which starts by describing practice, explaining practice, theorising practice and finally changing practice.

This paper presents a critical personal reflective study of the challenges a novice academic, who was enrolled in the GCTE, experienced in changing his practice from the "conventional steady lecturer-based mode" to the more "engaging student-centred mode". This study offers a deep philosophical analysis of the ontological–epistemological phases that this novice academic passed through as he inquired into his practice and finally developed it. By doing so, this paper offers a philosophical reread of each of the phases of Experiential Learning Cycle of the Praxis Inquiry and proposes a philosophical framework which may be generalised to other professional development programmes.

2. Informing literature

The debate about what is ontological and what is epistemological was, is and will continue to be a deep philosophical one. Which notion precedes is a question similar to the question "which came first: the hen or the egg"? Before this paper approaches such a debate and articulates a stance from, it is beneficial to explore ontology and epistemology each as a term, concept and perception.

2.1. Ontology

In simple terms, ontology is the philosophical inquiry into "reality, nature of existence, or being" (Mills, Durepos, & Wiebe, 2009, p. 630). Ontology also focuses on the lenses "through which we see and experience the world" (Allison & Pomeroy, 2000, p. 92). Human perception is a reflection of an "ontological level of reality, which manifests its categorical novelty in the emergence of meaning" (Albertazzi, 2010, p. 199). Chappell (1997) in his read and analysis of *Descartes' Ontology* adopts common nouns such as "being", "entity" and "item" in referring to the being of things and to the

ontological categories of items. Hence, ontology deals with existence and being and with "what can be rationally understood"—even partially, in relation to such existence and being (Poli, 2010, p. 1). Ontological discussions are often problematic, where debates arise around ontological issues between the physical and concrete visible "being", the invisible "being" to the perceived "being" or "reality" and the relativity of such perceptions to each individual, society and culture (Mills et al., 2009). Along with these debates, philosophical inquiries are set about "what is ontic?; that is, what is really real" (Mills et al., 2009, p. 629).

This paper will adopt a working definition of ontology as being the inquiry about the being and identity of a practitioner (e.g. teacher, educator and lecturer) and all the perceptions formed around such being and identity.

2.2. Epistemology

Epistemology is the philosophical questioning of knowledge, the assumptions upon which it is based and therefore questioning what we "do know" and "can know" (Allison, 2000, p. 13). Epistemology has moved beyond the "static environment" of "individual knowledge and its acquisition" to inquire "information change, its flow among groups and its place within interaction" (Girard, Roy, & Marion, 2011, p. 1). Epistemological inquiries focus on—but is not limited to—"the concept of knowledge, evidence, reasons for believing, justification, probability, what one ought to believe, and any other concepts that can only be understood through one or more of the above" (Fumerton, 2009, p. 1). Similar to ontology, this field of philosophy incorporates "epistemic" questions; that is, what is valid knowledge? (Fumerton, 2009, p. 1).

This paper will adopt a working definition of epistemology as being the inquiry about the concept of knowledge which constitutes best practice for a practitioner (e.g. teacher, educator and lecturer).

2.3. Ontology vs. epistemology

In his reconstruction of social theory, Giddens heavily emphasises the members of a society or community as ontological individuals and agents who "reflexively produce and reproduce their social life" (1979). He argues that the conceptualisation of individuals as knowledgeable agents and the understanding of their everyday activities—an epistemological standpoint—form the basis of the ontological security: "a belief in the reliability and durability of social life" (Tucker, 1998, p. 76). In his distinction between front- and back-stage behaviour when discussing ontological security, Giddens argues that "the back-stage is a place where self-conceptions can be repaired, and people can engage in criticism of and resistance to front-stage demands and conventions" (1987, p. 62).

Epistemology, as a stance, an interpretation and application, lies in the basis of Dewey's arguments about truths and inquiry. Dewey believes that truth does not lie "in its correspondence to something wholly outside experience" (Tiles, 1990, p. 104), but rather exists in an "experienced relation among the things of experience" (Dewey, "Middle works", p. 126). In other words, Dewey argues that truth of something or about someone does not exist in the ontology of this something/someone, but rather in our epistemological experiences with this something/someone.

> It would be a great gain for logic and epistemology if we were always to translate the noun "truth" back into the adjective "true", and this back into the adverb "truly"; at least, if we were to do so until we have familiarized ourselves thoroughly with the fact that "truth" is an abstract noun, summarizing a quality presented by specific affairs in their own specific contents. (Dewey, "Middle works", p. 118)

Dewey approached ontology from an epistemological stance, arguing that our ontological perceptions of the past or future are formed from a present experience which stands for something that is not present: past or future (Tiles, 1990). Both Dewey and Giddens believed in one or the other in the interdependency of epistemology and ontology and broadly in an epistemological–ontological

continuum. However, Dewey gave more weight to epistemological stances in such interdependent continuous relation, whereas Giddens gave more weight to ontology in this respect. Similarly, a number of scholars argued for the coexistence between knowing (epistemology) and being (ontology) (Polanyi, 1969; Thomson, 2001). This coexistence will be further explored in this article as an ontological–epistemological "discourse", where discourse in such context is referred to as a "conversation" and a "process of reasoning" (Mills et al., 2009, p. 304) across ontological choices and epistemological inquiries to better understand teaching and learning.

Despite the stance of this paper in adopting the coexistence between ontology and epistemology, separation between the two concepts is necessary—yet complex—in order to categorise certain inquiries as mainly rooted within ontological choices versus others which demand epistemological decisions. To facilitate this uneasy and unholy separation, this paper will employ the lens of social psychology to assist in classifying what is ontological versus epistemological in data analysis and the discussion that follows.

In social psychology, thinking takes place on two levels: "intuitive" and "deliberate" (Kruglanski & Gigerenzer, 2011). Hence, thinking occurs both at an unconscious and automatic level and at a conscious and deliberate level (Myers, 2010). Nobel laureate psychologist Kahneman (2011) argues that humans do thinking, both fast and slow. Hence, this paper will consider the intuitive, unconscious and slow thinking as "ontological". On the other hand, the deliberate, conscious and fast thinking which is directly influenced by the knowledge transactions displayed will be classified as "epistemological". For example, the pre-informed opinions and perceptions of a teacher about what constitutes good practice will be classified as "ontological". However, the response of a teacher to a certain situation, problem and/or inquiry will be classified as "epistemological".

3. Challenges for change

This paper will refer to the learning cycle that the leading author (LA) experienced as part of the professional development programme he enrolled in and completed. At the beginning of March, 2010, the LA started his career as a novice academic at Victoria University (VU). Four months later, an opportunity to enrol in the GCTE program emerged. The LA voluntarily chose to enrol in this programme as he believed that it was a critical opportunity in his professional development as a novice academic. One of the major focuses of the GCTE was improving and developing the current teaching and learning practice of academics enrolled in the programme. Such improvement was informed by the Experiential Learning Cycle of the Praxis Inquiry (Figure 1).

The GCTE course comprised 8 units of study, underpinned by the Praxis Inquiry notion:

- Learning Matters at Victoria University (AET4100)
- Negotiating Learning (AET4101)
- Learning and Diversity (AET4102)
- Student Assessment (AET4103)
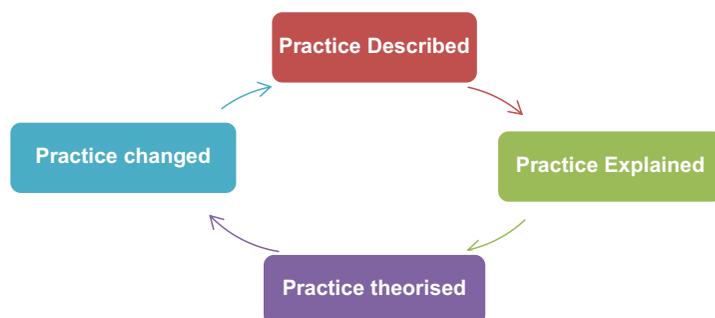
Figure 1. Experiential learning cycle of the Praxis Inquiry Model (Burridge et al., 2010, p. 23).

- Designing for Learning (AET4104)
- Managing Learning (AET4105)
- Improving Practice (AET4106)
- Teaching Portfolio (AET4107)

Throughout these units, the various phases of the Praxis Inquiry Learning Cycle were critically reflected upon. The LA annotated the concerns, challenges and conceptions he had in his inquiry for professional development in each of the eight units which comprised the GCTE. Those annotations were then analysed in order to identify the stance of the LA during each phase of the Praxis Inquiry Learning Cycle:

Practice described: Units AET4100 and AET4102 required the LA to describe his current teaching and learning practice in a critical self-reflective manner. At the time, the LA's practice was mainly focused on him as being the instructor whilst encouraging questions and catering for limited group work activities for two main reasons: the lengthiness of the content and the fear of losing management of the classroom with too many group work tasks.

Practice explained: Units AET4101 and AET4103 required the LA to explain his current practice in terms of other practices and experiences. During this phase, the LA experienced being both an observer of others' practices and an observee, where colleagues enrolled in the GCTE observed the LA at more than one occasion whilst delivering his unit. The LA observed and experienced the programme coordinator of the GCTE running a number of activities based on the Jigsaw Approach. The theme underpinning this approach was to promote student-centred teaching and learning practices. The LA was impressed with the effectiveness of the Jigsaw Approach but felt uneasy and anxious in adopting it, given his concerns about losing the discipline in the classroom and being unable to cover the planned content during the planned duration.

Over the course of the GCTE, the LA experienced the programme coordinator facilitating additional activities and workshops using the Jigsaw Activity. Subsequent to such exposure to a number of situations where teaching and learning was facilitated using a student-centred approach, the LA became more convinced than ever on the success and effectiveness of the student-centred approach for a number of reasons. First, the LA, himself, made the most out of the activities that were run via the Jigsaw Approach. His learning was optimised by peer discussion, learning and teaching and by the ownership he experienced, especially when he was required to explain what he mastered to members of other groups. Second, the LA noticed that the programme coordinator was in full control of the classroom and of the teaching and learning taking place whilst facilitating, coaching and guiding, rather than instructing. By doing so, she (the programme coordinator) gained the respect and admiration of all academics enrolled in the GCTE. Third, the peer learning, discussion and teaching that were taking place saved a lot of time which would have been wasted on the teacher ensuring that each student understood the activity and gained the competency planned within such activity.

Practice theorised: Subsequent to his experiences with the Jigsaw-designed activities, the LA started a deep rethinking and reconsideration of his current practice. Such rethinking mainly took place over units AET4104 and AET4105. The LA began generalising a number of conceptions towards improving and developing such practice. The LA now believes that student-centred learning is neither a threat to the teacher's competencies and management of the teaching and learning process nor a waste of time. On the contrary, it is a reflection of the confidence and capability of the teacher in promoting effective teaching and learning practices.

Practice changed: Following rethinking and theorising his teaching and learning practice, the LA started changing his practice unit AET 4106: Improving Practice. He started adopting the Jigsaw Approach in the delivery of a number of topics in his classroom. He adopted group work in mainly
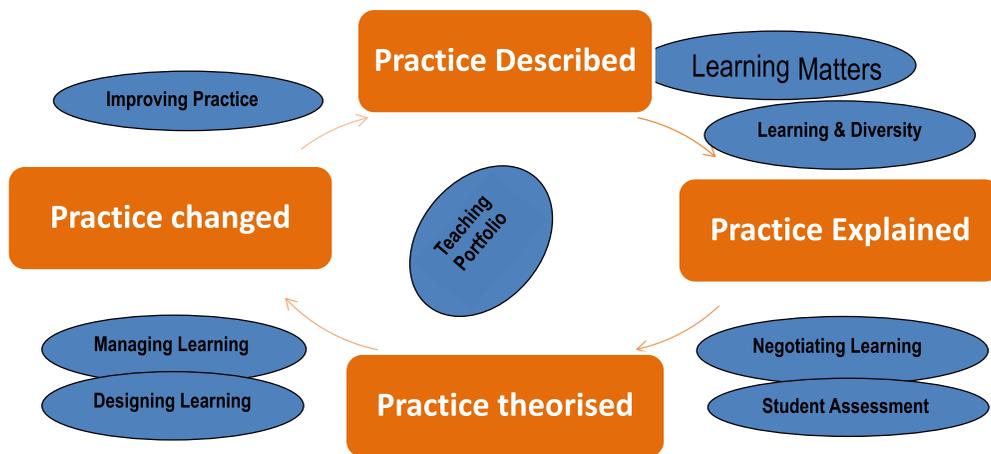
Figure 2. The Praxis Inquiry journey throughout the GCTE.

every session he delivered following some modelling. By doing so, the students who did not understand the aimed concept from the modelling had a second, third and fourth chance to acquire the concept through peer learning, peer discussion and through the extra support the LA was providing to each group as he was facilitating the lesson and circulating from one group to the other. The LA became more confident in the effectiveness of his teaching and learning practice and received impressive feedback from his students, colleagues and seniors.

The final unit of the GCTE was AET4107: Teaching Portfolio, where each student in the programme created a portfolio of his/her overall Praxis Inquiry journey throughout units AET4101–AET4106. These portfolios were discussed and evaluated by the unit coordinator, the teaching staff of the programme and the enrolled students. Figure 2 demonstrates the Praxis Inquiry Journey throughout the eight units of the programme.

4. A deep philosophical analysis of the Praxis Inquiry

This paper, based on the arguments of many scholars, adopts the position of continuum between being and knowing: ontology and epistemology. In many instances, situations and examples, it might be hard to tell whether a perception, conception, action and/or reaction is ontological or epistemological, as it might be both. However, for the purposes of the analysis, this paper will assume a conception to be mainly ontological as long as it lies between the individual and himself/herself, i.e. the individual is talking to himself/herself. Once, the individual shares, applies and/or communicates such a conception, the process then becomes mainly epistemological. By adopting this assumption, this paper rethinks the phases of the Praxis Inquiry which the LA experienced from an ontological–epistemological stance.

The phase of "practice described" seems to be a call for ontological response, where the LA reflects upon his current practice—at the time—and reveals perceptions, feelings and conceptions mainly related to his "being": How he perceived the image of the lecturer as being the instructor? How he believed students' learning was mainly his responsibility? How he feared that student-centred approaches might pose a risk of losing his management of the classroom and of wasting time required to cover the planned content?

The phase of "practice explained" seems to call for an epistemological inquiry, where the LA experienced situations where knowledge is organised and applied in a certain context: organising the Jigsaw activity, implementing it with all peer learning, discussions and teachings which accompanies such implementation, etc.

The phase of "practice theorised" seems to demand ontological choices, where the LA thinks to himself: rethinks his current practice, reconsiders the pedagogies applied and rethinks his concerns.
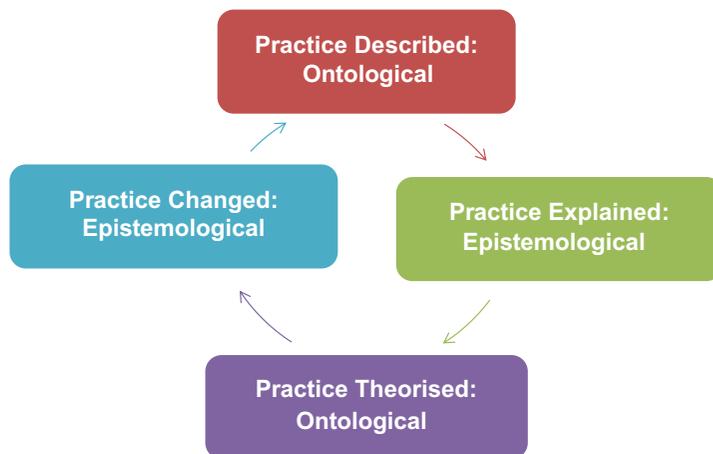
Figure 3. Ontological–epistemological development of the experiential learning cycle of the Praxis Inquiry Model.
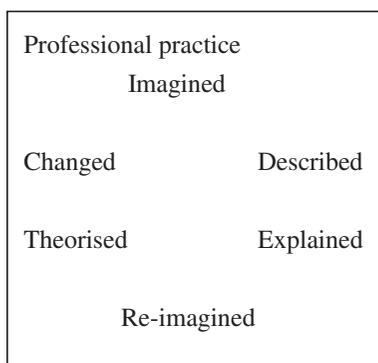
Figure 4. Praxis Inquiry cycle (Arnold et al., 2012).

Finally, the phase of "practice changed" seems to call for epistemological responses, where the LA applies the rethought stances and conceptions within a new context. Hence, the Experiential Learning Cycle of the Praxis Inquiry develops in the following model (Figure 3).

The Experiential Learning Cycle of the Praxis Inquiry has been recently further explained and developed to incorporate two phases on top of the existing four phases (Arnold, Edward, Hooley, & Williams, 2012). The first is Practice Imagined and it precedes Practice Described. The second is Practice Re-imagined. Figure 4 presents the further developed Praxis Inquiry Cycle.

Whilst this paper will only consider the initial four phases of the Praxis Inquiry Cycle, the categorisation of both the Practice Described and Practice Theorised phases as being mainly ontological acknowledges Arnold et al's. preceding phases: Practice Imagined and Practice Re-imagined (2012). Practice Described is viewed in this paper as a phase where all the feelings, imaginations and perceptions integrate whilst individuals attempt to describe their practice. Likewise, Practice Theorised is considered mainly ontological as it incorporates the re-imagination and retheorising of perceptions following explaining the practice, Practice Explained Phase.

5. The missing link: back to the ontological–epistemological continuum

The philosophical analysis of the Praxis Inquiry provides philosophical projections for each phase of this inquiry. However, a scrutiny of such analysis suggests that there is a missing link somewhere between the phases of Practice Described (initial ontological stance) and Practice Explained (experienced—yet, still initial—epistemological stance), on the one hand, and the Practice Theorised (new ontological stance) and Practice Changed (new epistemological stance), on the other. Referring back to the literature and to the big idea of the ontological–epistemological continuum provides this missing link.
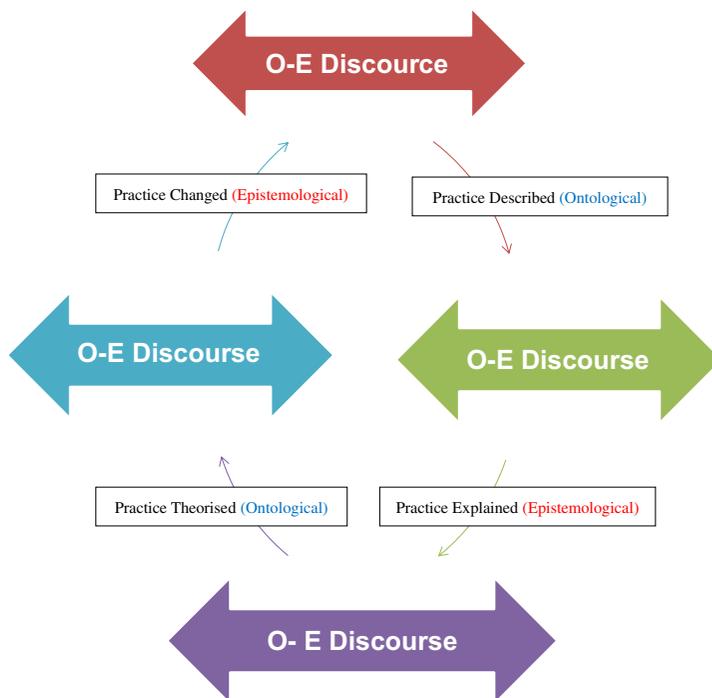
Figure 5. The developed O-E discourse model of Praxis Inquiry.

Following the initial ontological (Practice Described) and epistemological (Practice Explained) stances, there is a deep and thorough ontological–epistemological discourse (O-E Discourse) taking place. This discourse is what shifts Practice Explained to Practice Theorised by reconceptualising the initial ontological stance (Practice Described) into a new ontological position (Practice Theorised). This discourse continues between the new reconceptualised ontological stance, following theorising the practice, and the initial epistemological stance (Practice Explained). The result of this discourse is recontextualising the initial epistemological stance into a new epistemological position. This is because the way the LA applied the knowledge in his classroom after rethinking his practice—although inspired by his observations during the practice explained phase—is personalised and reflective of his identity and different from the way the GCTE program coordinator applied knowledge.

Likewise, an O-E Discourse shifts the recontexualised epistemological stance into a default or initial ontological stance (Practice Described) and the cycle starts all over again as the LA moves on with his practice, experiences and professional development. By identifying the missing link, the phases of the Praxis Inquiry develop into the following model (Figure 5).

6. Implications of OED for teacher education

Participation by the LA in the GCTE is offered as an example of how immersion in challenging practice can result in new ideas and understandings being formulated. The implication for professional learning generally and for teacher education in particular is that practice that is orthodox and conformist does not necessarily challenge ideas and understanding and does not necessarily generate new practices for change and improvement. Unlike conservative approaches, practices that require tacit and/or explicit integration of ontological and epistemological processes will involve negotiation of interesting and often unorthodox problems and dilemmas for both students and teachers and for which answers are unknown or at least problematic. For teacher education, project teams could negotiate investigation of a range of serious educational problems in schools and set about proposing a range of solutions without prejudice. If it is considered by the project team that ontologically all humans want to learn and that central to all learning is the "social act" (Mead), then epistemologically, a range of activities will be conducted and investigated in relation to language use and the construction of meaning. Discussion amongst learners (students and teachers) as projects unfold

and problems are confronted and resolved will therefore be essentially ontological–epistemological in character, as distinct from more conservative approaches that are teacher directed and rely on predetermined knowledge being transmitted. Conceptualising teaching and teacher education as requiring democratic and informal ontological–epistemological discourses around negotiated projects of student and teacher interest conjures up classrooms that are fundamentally different to traditional formats. Teaching strategies for schools and for teacher education that focus on praxis inquiry structures, for instance, will often need to be primarily "site-based" in schools so that problems and issues can be discussed immediately, changes made and impacts observed in continuing cycles of professional practice. This is a challenge for teacher education in ensuring that practice and theorising of practice occurs "on the spot" and that the theorising of and reflection on practice alerts practitioners to discourses of ontology and epistemology as they take place.

7. Conclusion

The OED that the LA experienced through each of the phases of the Praxis Inquiry Model as he attempted to describe, explain, theorise and retheorise, and develop his professional practice as a teacher educator and academic was significant. The ontological fear of the perceived inversely proportional relationship between managing learning and students' ownership in the teaching and learning process was epistemologically neutralised through exposure to settings where students enjoyed a great deal of ownership of the education process, whilst the teacher was equally enjoying a professionally managed and facilitated teaching and learning process. The LA has since been more convinced and confident—ontologically—and more capable and equipped—epistemologically—in facilitating teaching and learning practices that are student centred and which grant students' ownership in the teaching and learning process.

This paper offers a reread and rethink of the phases of the Praxis Inquiry Model (Figure 1) by projecting a philosophical framework. Such framework developed the Praxis Inquiry Learning Cycle to a model which rethinks such a cycle from ontological and epistemological perspectives (Figure 3). The model further develops (Figure 5) subsequently in devising the ontological–epistemological discourse, a process which offers an explanation of the reconceptualisation and recontextualisation of stances which take place throughout the various phases of the Praxis Inquiry.

This paper offers a lens for viewing professional development and personal sustainable growth as functions of OEDs. The OED might seem a pure philosophical projection on the Praxis Inquiry Cycle. However, the OED can be viewed as a mechanism which supports sustainable and lifelong learning growth and development on professional, social and personal levels. The OED can also be employed as a diagnostic device to find solutions to workplace challenges such as: Why do certain practitioners professionally develop whilst others are resistant to such development/change? Why do the outcomes for members of the one group who have experienced same/similar settings of a Praxis Inquiry Experiential Learning Cycle vary?

Answers to these questions and many others can be approached through inquiring into the OEDs taking place across the phases of the Praxis Inquiry Cycle: whether the OED during any of the four phases was incomplete or interrupted and hence the learning cycle was retarded. The OED can remain incomplete due to ontological reasons (e.g. the individual was not yet prepared to rethink or re-imagine her/his practice), epistemological ones (e.g. the knowledge, experience, models and examples displayed were not convincing) or a combination of both. Hence, approaching Praxis Inquiry from an OED can assist mentors and facilitators identify what extra support might be needed to help academics, teachers, pre-service teachers and practitioners, in general, in continually thinking, rethinking and developing their everyday practice.

The findings of this paper are limited to a personal reflective study. However, the generated implications support further research to inquire into the Praxis Inquiry Learning Cycle of a group of participants. The position that this paper reached (OED) strongly connects to and promotes further investigation into Dewey's notion of continuum.

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Assessing a multi-component math intervention within a cognitive-behavioral framework on the word problem-solving responses of a diverse group of third graders

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Abstract: In third grade the focus on math word problems becomes prominent. In the limited third grade research, teacher-mediated explicit instruction with multiple exemplars, teaching students to use visual representations, and the incorporation of self-strategies, have proven effective. For these practices to reach their full potential though, their content must be relevant and provide for growth to mature mathematical concepts. Based on these conclusions, additional research was needed. Therefore, the focus of this study was to evaluate the effectiveness of a multi-component word problem-solving intervention with explicit instruction strategies, multiple exemplars, the teaching of student-generated visual representations, incorporation of a self-monitoring checklist, and Common Core State Standards' appropriate curriculum. Within a multiple baseline across behaviors design, the study evaluated the paraphrasing, visualizing, and computing word problem-solving responses of 10 third graders identified as learning disabilities, at-risk, and/or ESOL. The study revealed that all students made gains in some behaviors related to problem solving. Results are discussed in relation to a cognitive-behavioral framework and individual student characteristics, including discussions of limitations and educational significance.

ABOUT THE AUTHOR

Sheri Kingsdorf runs an applied behavior analysis consultation company that provides behavioral and educational support to staff working in public and private schools, home-based therapy settings, and day-treatment centers. She remains active in academia through adjunct teaching positions and collaborative research projects with colleagues. Her research interests include behavior analytic intervention research related to skill acquisition in the populations of children with autism, learning disabilities, and English Language Learners (ELL). She hopes to further investigate the cognitive-behavioral framework introduced in this study within other academic subjects; additionally studying the role that Skinner's Verbal Behavior plays in the cognitive and behavioral processes associated with problem solving and comprehension.

PUBLIC INTEREST STATEMENT

Even for some adults, solving math word problems can be daunting. This history of struggle with word problems often begins in third grade, when they are first introduced into the curriculum. Unfortunately, the intimidation that surrounds this tough academic task can result in even teachers finding themselves without the necessary skills to address student learning in this area. Therefore, the aim of this study was to investigate a model of teaching math word problems to third graders that could be easily utilized by educators in the inclusive classroom, measure areas of learning beyond mathematical computation, and provide strategies which can continue to be used as word problems increase in complexity. The intervention outlined specific teaching procedures, taught students how to use paraphrasing and visualizing when approaching the problems, and encouraged students to monitor their solving process. Overall, we found that the students and the teacher responded favorably to the program.

1. Theoretical framework

Solving word problems is a complicated and often misunderstood process (Lai, Griffin, Mak, Wu, & Dulhunty, 2001). Over the years, prominent cognitive psychologists (e.g. Mayer, 1983; Pólya, 1957) have proposed organizational structures with embedded cognitive processes to aid in defining this ambiguous area. Synthesizing these structures and frameworks, the Organization for Economic Co-operation and Development (OCED) has outlined the following problem-solving processes: (1) understanding the problem, (2) characterizing the problem, (3) representing the problem, (4) solving the problem, (5) reflecting on the solution, and (6) communicating the problem solution (OCED, 2003). Figure 1 depicts the components of the OCED problem-solving model, including the processes, their variables, and their hypothesized relationships. Students must learn to navigate these processes in order to be successful in math problem solving, and thus teachers must find means of assessing students' proficiency in each component. To do so, the components of the problem-solving process must be translated into observable terms. The behavior analytic perspective on problem solving helps to create this translation.

In the seminal work of Gagne (1959), problem solving is described as occurring in five phases: (1) reception of the stimulus situation, (2) concept formation of which rules to adopt to apply to parts of the stimulus situation, (3) planning a course of action, (4) decision-making within the course of action, and (5) verification of process, by receiving feedback that the solution was correct or incorrect. There is clear overlap between these cognitive and behavioral models of problem solving. When merged, as depicted in Figure 2, a more comprehensive and measurable view of problem solving emerges. The process in the cognitive-behavioral model, as in the cognitive model, is depicted in a linear fashion. For novice problem-solvers, according to the cognitive-behavioral model, a student attempting to solve a word problem would move through the process in the following manner:

• Reading the word problem (reception);

• Identifying the important information and constructing a problem representation by generalizing previously learned rules for solving problems, and discriminating differences in the target problem from previously targeted problems (concept formation);

• Making a plan to solve by choosing an operation/operations and identifying the number of steps needed to solve the problem (planning); identifying operations and steps is also rule-governed and closely related to the concept formation process;
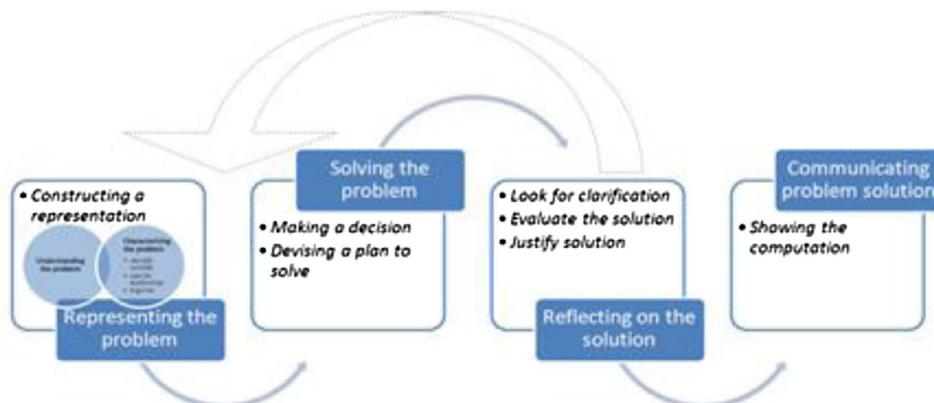

Figure 1. Cognitive model of the problem-solving process, created from OCED, 2003 guidelines.
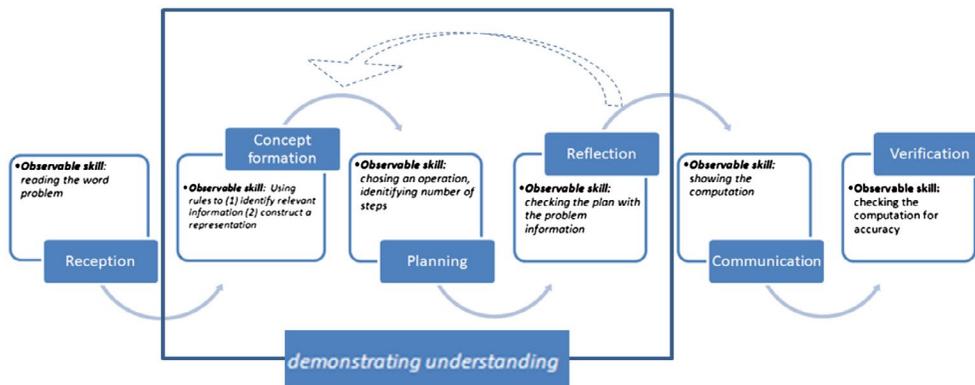
Figure 2. Cognitive-behavioral model of the problem-solving process, created based on OCED, 2003 guidelines and Gagne (1959) theory.

- Checking the plan with the problem information to make sure that the plan matches the problem information and the representation (reflection). This step cohesively brings the concept formation and planning phases together;

- Showing the work on the paper, writing down the answer (communication); and

- Checking the work and the solution by using a calculator, reviewing the steps, or using inverse operations (verification).

However, a more experienced problem-solver may move through the process in a non-linear fashion. For example, he or she may be able to skip the phase of drawing a representation of the problem, moving directly from reception to planning.

Within this cognitive-behavioral problem-solving framework, a number of behaviors need to be observed for educators to assess the problem-solving skills of students. Determining if students understand how to solve the problem is made observable by evaluating their concept formation and planning behaviors (i.e. the information they identify as relevant, the representation that they construct, operation(s) they select, and steps identified as needed). This complex combination of skills makes problem solving a difficult skill to learn and an even more difficult skill to teach.

2. Introduction and review of the literature

Sets of standards drive the curricular content focus on numbers and operations, algebra, geometry, measurement, data analysis, and probability, as well as the process focus on problem solving, connections, communication, reasoning and proof, and representation (NCTM, n.d.). In addition, the introduction of Common Core State Standards (CCSS) has strengthened this focus (Common Core State Standards Initiative, 2012). Expectations have risen to include the application of problem-solving skills to real-life scenarios. These take the form of word problems, and are present as early as kindergarten (Common Core State Standards Initiative, 2012). Although word problems are introduced early, their weight in the curriculum increases in third grade, when high-stakes testing often begins. This is mismatched however, as many third grade textbooks do not adequately address problem solving (Jitendra et al., 2005). Additionally, the majority of problem-solving research is focused on the upper grades (e.g. Montague, Enders, & Dietz, 2011; Schaefer Whitby, 2009; Xin, Jitendra, & Deatline-Buchman, 2005). With student proficiency in problem solving expected at the third grade level, finding ways to promote student success in this area is imperative.

The body of research that exists on math problem solving in the upper grades has provided valuable insight into the difficulties students experience when attempting to solve word problems, as well as the intervention strategies that address them. Teachers have identified word problems as the most prominent area of student difficulty; this is especially the case for students identified with learning disabilities (LD) (Bryant & Bryant, 2008). Montague and Applegate (1993) conducted a study to investigate the problem-solving characteristics of students with LD. They found that

problem-solving errors were more related to struggles with representing the problem and planning a solution, as opposed to operation errors. Additional research has found that students with LD struggle with word problems as they increase in complexity, making more errors and demonstrating less productive solving practices (Kingsdorf & Krawec, 2014; Rosenzweig, Krawec, & Montague, 2011). Problem complexity increases with the addition of steps, operations, and irrelevant information in the problems, translating into issues of problem type and missing information (Powell, Fuchs, Fuchs, Cirino, & Fletcher, 2008). Unsurprisingly, middle-school students who are also English Language Learners (ELL) struggle with the linguistic complexity of word problems (Barbu & Beal, 2010). This cross-curricular nature of word problems is a challenge for ELL students who may be struggling with reading comprehension. Overall, word problems are mathematically and linguistically complicated, increase in complexity throughout grade levels, and pose a challenge to many students.

As a result, numerous interventions have worked to remediate these areas of student struggle. Assistive technology, including the use of computers, audio-video devices, and calculators, has effectively increased the arithmetic and algebra word problem-solving skills of middle-school students with varying abilities (e.g. Bottge, 1999; Bottge & Hasselbring, 1993; Bottge, Heinrichs, Chan, Mehta, & Watson, 2003; Bottge, Rueda, Serlin, Hung, & Kwon, 2007). Strategy-training instruction, based on explicit teaching, using metacognitive strategies, and/or mnemonic devices, is another intervention that has successfully increased the word problem-solving skills of diverse groups of adolescents (e.g. Coughlin & Montague, 2011; Krawec, Huang, Montague, Kressler, & Melia de Alba, 2013; Maccini & Hughes, 2000; Maccini & Ruhl, 2000; Montague et al., 2011). Teaching the use of self-strategies has also proved a beneficial intervention component for increasing the correct problem-solving behavior of middle-school students (e.g. Case, Harris, & Graham, 1992; Montague, 2008). Problem structure or visual representation teaching procedures, targeting explicitly teaching students to represent the problem with a diagram or mathematical model, is yet another established intervention practice for bettering the word problem-solving skills of middle-school students across ability groups (e.g. Jitendra, DiPipi, & Perron-Jones, 2002; Jitendra, Hoff, & Beck, 1999; Jitendra et al., 2009; Xin et al., 2005). Additionally, when looking at word problem-solving strategies including middle-school students, recent meta-analyses support the use of visual representation teaching procedures (Xin & Jitendra, 1999; Zhang & Xin, 2012).

While some of the intervention strategies applied in the upper grades can be applied in the lower grades, exact replication is not always possible. Developmentally, third graders are different from middle-school students, where the majority of research has been targeted. From the perspective of cognitive development, as related to Piagetian theory (e.g. Piaget, 1970) third graders are beginning to develop concrete operations related to seriation and classification, but require concrete mathematical activities with various representations to make connections and move closer to abstract thought. In contrast, middle-school students, moving into early adolescence, are beginning to develop abstract reasoning, honing their ability to clarify important information needed in the problem, making hypotheses and inferences in problem solving, and evaluating their mathematical work (Ojose, 2008). These differences are apparent when considering an area like visual representation instruction in solving word problems. As such, third graders may benefit more from interventions focusing on using concrete objects to make visual representations (e.g. drawing a picture where each piece of important information is explicitly represented). Alternatively, middle-school students may be comfortable with the use of more abstract problem representations (e.g. drawing a diagram that uses a number sentence).

In addition to the developmental differences, curricular goals differ from grade to grade. At the third grade level, the Common Core State Standards calls for students to solve problems using all four operations (addition, subtraction, multiplication, and division), fractions, measurement, estimation of time, liquid volume, masses of objects, and geometric measurement (Common Core State Standards Initiative, 2012). These skills are vastly different from the Common Core State Standards' targets at the middle-school level, where students are expected to be learning proportional

relationships, expressions and linear equations, solving problems using area and volume, equations, using functions to describe quantitative relationships, and applying advanced geometric theories (Common Core State Standards Initiative, 2012).

Specific research teams that are targeting third graders (e.g. Fuchs and colleagues and Jitendra and colleagues) have addressed some of these limitations in the problem-solving research. The work of these teams, and a few others, has supported the use of word problem-solving interventions that incorporate explicit strategy instruction, teaching students to identify problem-type information before making a plan to solve, using multiple exemplars, encouraging self-strategies, and using visual representations (Cassel & Reid, 1996; Fuchs, Fuchs, et al., 2008; Fuchs, Fuchs, Prentice, Burch, Hamlett, Owen, Hosp, et al., 2003; Fuchs, Fuchs, Prentice, Burch, Hamlett, Owen, & Schroeter, 2003; Fuchs, Seethaler, Powell, Fuchs, & Hamlett, 2008; Griffin & Jitendra, 2009; Jitendra, Griffin, et al., 2007; Jitendra et al., 1998; Jitendra & Hoff, 1996; Leh & Jitendra, 2013; Owen & Fuchs, 2002; Seo & Bryant, 2012; Wilson & Sindelar, 1991). For a full review of this literature, including a breakdown of intervention components in each study, please refer to Kingsdorf and Krawec (2016).

Although third grade research has recognized some of the developmental limitations of the larger body of math word problem-solving studies, the researchers still struggled to address appropriate curricular goals. Specifically, the current curricular targets in the studies (e.g. word problems using only addition and subtraction operations) may have matched with the district curriculum at that time, but do not comply with the Common Core State Standards' expectations of today (e.g. word problems using all four operations). The problem-type strategies employed in all cases were also a mismatch for the Common Core State Standards' expectations by targeting categories such as buying-bag, pictographs, halves, and difference. The visual representation strategy also raises concerns, as in all cases, the visual representations used were pre-made templates provided by the teachers. Using pre-made templates, depending on the nature of the template, may not allow students to create visual representations that are concrete, aligning with the specific problem information and portraying individualized understanding of the problem. Visual representations certainly permit both concrete and abstract representations; however, third grade students need to move in a developmentally appropriate trajectory from creating individualized and concrete problem representations to the abstract. It is as important for interventions to be developmentally appropriate as it is for them to target the necessary curricular benchmarks that build toward more complex mathematical skills.

Both in mathematics as well as other academic areas, it is empirically supported that early intervention is associated with increased academic success (e.g. Reynolds, Temple, Robertson, & Mann, 2001). While Gersten, Jordan, and Flojo (2005) have recommended the value of early intervention related to mathematical problem solving, very little research has been conducted in this specific area. So, although not yet empirically supported, it seems plausible that successful mathematics word problem-solving interventions, or rather successful mathematics problem-solving teaching procedures, will have greater long-term benefit when applied in third grade, as opposed to middle school. This is likely to increase student success on standardized tests earlier in their academic career, possibly reduce the probability of student identification of LD, and even affect the need for intervention in the later grades.

3. Purpose of the study

It is clear that using explicit instruction with multiple exemplars, while teaching students to identify important problem information for use in visual representation construction, and engaging students in the use of self-strategies, is effective in improving math problem-solving skills. However, applying these intervention components in combination, while using developmentally appropriate curriculum adhering to Common Core State Standards has not yet been investigated. Because of the need for research in this area, the purpose of this study was to evaluate a math word-problem intervention for third graders, which used explicit instruction strategies with multiple exemplars, taught the use of student-generated visual representations, incorporated a self-monitoring checklist, and targeted

Common Core State Standards' appropriate curricular targets (i.e. all four operations, measurement, estimation of time, masses of objects, and geometric measurement). The specific research questions focused on the individual performance of third graders identified as LD, at-risk, and/or ESOL to determine:

- What was the effect of explicit instruction using multiple exemplars, and a self-monitoring checklist, on increasing correct paraphrasing responses on math word problems?
- What was the effect of explicit instruction using multiple exemplars, and a self-monitoring checklist, on increasing correct visual representation responses in math word problems?
- What was the cumulative effect of this intervention in the target areas of paraphrasing and visualizing on solution accuracy in math word problems?
- Were intervention effects maintained over time?
- How long did intervention implementation and mastery take when presented in a general education inclusive setting?

4. Methods

4.1. Participants and setting

One third-grade Miami-Dade County Public Schools (M-DCPS) classroom participated in the study. The school practiced inclusion but used ability grouping for classroom assignment, a common practice in the M-DCPS district. As a result, the selected third grade classroom was the lowest ability classroom, containing between 15 and 18 students throughout the course of the study (students withdrew and were added to the classroom on a rolling basis). All students belonged to one or more of the following categories (meaning, for example, that a student could be identified as LD and ESOL): LD, at-risk, and English for Speakers of other Languages (ESOL). At the time of identification for these students, the school used the discrepancy model (i.e. a student was identified as having a learning disability if his or her score on an IQ test was at least two standard deviations higher than his or her achievement test score) to identify students with LD. The school was in the process of transitioning to a Response to Intervention (RTI) model for identification. Students were considered at-risk for LD identification through the RTI model based on a "not-proficient" score in a subject area of math or reading at the start of the year assessment. All of the students identified as at-risk in this classroom scored not proficient in the math assessment area. Not all students in the study were identified as ESOL. However, all students reported speaking another language at home.

Initially, 13 students provided student assent and parent consent forms. Three students withdrew from the school prior to the start of the intervention, which resulted in 10 students being present for the full duration of the study. Specific student information is provided in Table 1. Demographic information regarding race, nationality, and language spoken at home was based on participant self-report. Information regarding age, gender, ethnicity, ESOL level, free/reduced lunch, probability-of-success score on the Florida Assessments for Instruction in Reading (FAIR), retained status, and disability status was taken from school records. The FAIR score (included in the table if students were tested) was included as a measure of student achievement in reading comprehension, since reading comprehension is a part of solving math word problems.

There was one teacher in charge of the classroom. The teacher's qualifications included: a bachelor's degree, certification in elementary education and ESOL, native speaker of English and Spanish, and 10 years teaching experience (3 years in the inclusive special education setting). The teacher self-identified as Hispanic. She presented all intervention procedures in the classroom during the mathematics class period; additionally, a special education support teacher and pre-service teacher were occasionally present in the classroom. They were aware of the study procedures and only participated as directed.

Table 1. Student demographic information										
	Age (Years. Months)	Gender	Ethnicity	Race	Nationality	Language spoken at Home	ESOL level	Identified as	Free/ reduced lunch	FAIR score	Retained
Student Z	8.4	Male	Not-His-panic	White	Serbian	Serbian	N/A	At-risk	No	–	No
Student B	8.5	Female	Not-His-panic	White	Israeli	Hebrew	N/A	At-risk	Yes	64	No
Student M	8	Female	Hispanic	White	Argentinian	Spanish	N/A	At-risk	No	55	No
Student D	8.11	Male	Not-His-panic	White	French	French	N/A	At-risk	No	60	No
Student L	8.5	Female	Hispanic	White	Argentinian	Spanish	5	At-risk	Yes	79	No
Student G	9.7	Male	Hispanic	White	Guatemalan	Spanish	5	Specific Learning Disabled	Yes	–	No
Student H	9.9	Female	Hispanic	White	Honduran	Spanish	2	Specific Learning Disabled	No	–	No
Student P	8.2	Female	Hispanic	White	American	Spanish	5	At-risk	Yes	43	No
Student J	9.7	Female	Hispanic	White	Brazilian	Spanish; Portugese	2	Intellectu-ally Disabled	No	35	Yes
Student S	7.9	Female	Hispanic	Asian	Spanish	Spanish	2	None	No	70	No

4.2. Design

A single-subject design was used to analyze individual student data. Ongoing student progress was tracked with three graphs for each student: one for paraphrasing accuracy, one for visualizing accuracy, and one for computation accuracy. The study was conducted using a multiple baseline across behaviors design (Cooper, Heron, & Heward, 2007).

The two behaviors targeted within the design were paraphrasing accuracy and visualizing accuracy. Baseline data collection on the behaviors of paraphrasing accuracy and visualizing accuracy began for all students simultaneously. Each assessment yielded a score for each behavior at each time point. After steady state responding was achieved for at least 8 of the 10 students (80%) on the paraphrasing behavior, the intervention targeting paraphrasing accuracy began; meanwhile, data continued to be collected on the visualizing behavior, which was still under baseline conditions. After at least eight of the students met criteria on paraphrasing, set at 7/8 across two consecutive sessions, the paraphrasing intervention ended and the visualizing intervention began. The visualizing intervention continued until at least eight of the students met criteria on visualizing, set at 7/8 across two consecutive sessions.

Throughout baseline and intervention, data on computation accuracy were collected. The intervention did not explicitly target computation accuracy, but rather looked at the effects of the intervention with paraphrasing and visualizing on computation accuracy.

4.3. Definition of behaviors

The three dependent variables in the study were paraphrasing, visualizing, and computation accuracy. Paraphrasing accuracy was operationally defined as writing a list of the important information in the problem, including the question (e.g. 36 kids, 1 van = 9 kids, # vans?). Visualizing accuracy was operationally defined as drawing a picture to represent the problem that included all the important information, the question (or the solution to the question), and the operation to be used. Computation accuracy was operationally defined as writing the correct answer to the word problem.

4.4. Assessments

4.4.1. Problem-solving worksheets
Data were collected throughout the study via permanent products. During each opportunity for assessment, students were presented with a researcher-created double-sided worksheet with two math word problems (e.g. "Our school is taking a class trip tomorrow. Thirty-six students are going. If each van can hold 9 students, how many vans will we need?"). All of the word problems required one step, and included one of the four operations (addition, subtraction, multiplication, and division). The skill focus in each problem aligned with the district pacing guide, which aligned with the math Common Core State Standards (Common Core State Standards Initiative, 2012). Therefore, all problems were within one of the third-grade target areas (i.e. measurement, time, and shape) and included all four operations (addition, subtraction, multiplication, and division). Additionally, to control for operation difficulty and to ensure that each operation was assessed an equal number of times, every two worksheets contained one problem from each operation, with division and multiplication separated across worksheets.

4.4.1.1. Scoring. Under each word problem, there were three headings: paraphrase, visualize, and compute. A paraphrasing response on one word problem was scored out of four. One point was awarded for including each piece of relevant information, including numbers and words/phrases/ abbreviations to clarify the relevant information; because each problem contained two pieces of relevant information, this totaled two points. Then, one point was awarded for including the question, and one point for rewording the problem (i.e. maintaining the accuracy of the problem without rewriting it verbatim). This equaled four points for paraphrasing one problem and eight points for paraphrasing each worksheet.

Similarly, a visualizing response on one word problem was scored out of four. One point was awarded for including each piece of relevant information in the picture (totaling two points for the two pieces of relevant information in each problem), one point for accurately placing either the question in the picture (using the written question or a question mark) or the solution to the question if solving had occurred, and one point for selecting the correct operation (i.e. writing the operation symbol). This equaled four points for visualizing one problem and eight points for visualizing each worksheet. For the visualization, the presence of only a number sentence, without labels or the framework of a schematic (e.g. boxes or circles to represent the information components, a number line, or a diagram) did not result in points in the aforementioned categories.

Each word problem was scored out of one for computation accuracy (thus, two points for computation accuracy for each worksheet). Feedback was not provided to the students on their specific problem performance.

4.5. Materials

4.5.1. Student checklist
During lessons, the teacher modeled the use of a researcher-created self-monitoring checklist. The students were allowed access to the checklists during each related intervention phase. An example of this checklist is provided in Appendix A.

4.5.2. Teacher script
The teacher was provided with mock scripts for the initial paraphrasing and visualizing lessons. The scripts provided think-aloud examples, such as the following: "Okay, now that I have read the problem, I am going to paraphrase it, ... I am going to check that off on my checklist." The teacher was instructed not to read from the scripts during the lessons though, and to refer to them only as examples.

4.5.3. Lesson problems
During each lesson, the teacher used researcher-created word problems that mirrored the structure of the assessment problems. To incorporate the best practice of using multiple exemplars, the teacher used novel word problems when presenting the lessons that included all four arithmetic operations.

4.6. Procedure

4.6.1. Baseline
During baseline, which included a minimum of six baseline measures (12 math word problems) over the course of two months, the teacher presented students with the researcher-created measures in a whole-class setting during regular class time. The students were given 10 min to solve each two-problem measure and were not provided with any assistance or feedback on their performance.

4.6.2. Intervention
The teacher presented the initial explicit instruction lesson on paraphrasing for one class period. The lesson focused on modeling the use of the materials and following a think-aloud procedure to solve a word problem. After modeling, the students practiced with support.

   During the second paraphrasing intervention lesson, the teacher started the math period by modeling how to paraphrase a novel word problem, as in the initial lesson. The assessment measure was then presented in the same format as in baseline. The only difference was that students were permitted to use the paraphrasing self-monitoring checklist. As in baseline, the students were instructed to complete all three sections of each problem, including paraphrasing, visualizing, and computation.

   This lesson and assessment format, as described on the second day, continued an average of three times a week. As the lessons progressed, the teacher tailored instruction based on assessment data and also modeled more efficient paraphrasing practices (i.e. writing abbreviations of the important information instead of complete sentences) and encouraged the students to do the same. The lessons continued until at least eight of the students met paraphrasing criterion of 7/8 across two consecution sessions. After paraphrasing was mastered, the visualizing intervention began, which mirrored the paraphrasing intervention procedure.

4.6.3. Follow-up
Approximately 7 weeks after the conclusion of intervention, students were presented with up to eight follow-up assessment measures, administered over the course of 2 weeks. The measure and procedures matched those described in baseline.

4.7. Inter-rater reliability and fidelity
Inter-rater reliability checks were conducted for 20% of each student's measures at baseline, intervention (paraphrasing and visualizing), and follow-up. The checks were conducted by having a second researcher score the student measure independent of the first researcher. The number of agreements on each measure for each dependent variable were divided by the number of agreements and disagreements, and then multiplied by 100 to yield a percentage agreement score. Any disagreements in scoring were discussed. The average inter-rater reliability agreement score was 95%.

   In addition, fidelity checks were conducted on the presentation of the lessons. For the initial lesson for each intervention target and at least once a week thereafter, the researcher observed the teacher presenting the lessons and completed a fidelity checklist (checklist available by contacting the first author). Fidelity checks were conducted for 80% of the paraphrasing lessons (8/10 lessons) and 78% of the visualizing lessons (7/9 lessons). The fidelity percentage score was 100% across all

observations. This score was expected due to the scripted nature of the intervention, and the continued researcher presence and support during the majority of the lessons.

4.8. Social validity

In addition to evaluating the impact of the intervention on the target behaviors, the social acceptability, complexity, and practicality of the intervention, or its social validity (Wolf, 1978), was evaluated. Two researcher-adapted social validity scales were distributed to the students and the teacher at the conclusion of the intervention. Each scale used statements to assess the value of the intervention and its outcomes, as perceived by the students and the teacher (scales available by contacting the first author).

4.9. Graphing and analysis

Individual student data were graphed for paraphrasing, visualizing, and computation accuracy. The paraphrasing and visualizing graphs depicted the probe assessment data as part of the multiple baseline design. Visual analysis was used to examine the data for changes in level, trend, and variability in order to determine if the behaviors changed in a meaningful way, as well as to measure the extent to which the changes could be attributed to the cumulative effect of the intervention. During visual analysis, a decision protocol (Keohane & Greer, 2005) was also used to make moment-to-moment decisions about student progress. Refer to Keohane and Greer (2005) for a full description. The computation graphs depicted the probe assessment data combined within each of the four sections of baseline, paraphrasing intervention, visualizing intervention, and follow-up. Since each assessment was scored out of two for computation accuracy, visual analysis after each probe was not possible (therefore, the visual analysis protocol was only used for the paraphrasing and visualizing data). Additionally, presenting the data cumulatively better enabled an assessment of the overall effect of the intervention within each phase.

In addition to visual analysis, percentages of non-overlapping data (PND; Cohen, 1988) scores were calculated for each student for each main target (paraphrasing and visualizing). PND is a non-parametric approach, which incorporates statistical tests that do not make parametric or distributional assumptions. It is the most widely used effect size measure in single-subject research (Parker & Hagan-Burke, 2007). The PND scores were calculated by counting the number of data points in the intervention phase that did not overlap with the highest data points in the baseline phase, dividing by the total number of data points in the treatment phase, and then multiplying by 100.

5. Results

Overall, the majority of students demonstrated increases in the target behaviors. Individual student graphs and discussion of individual student progress is presented below. PND scores are presented for all students in Table 2. PND scores are interpreted in accordance with the guidelines for interpretation outlined by Scruggs and Mastropieri (1998); PND scores less than 50% reflect an unreliable treatment, PND scores between 50 and 70% reflect a treatment with questionable effectiveness, PND scores between 70 and 90% reflect a fairly effective treatment, and PND scores greater than 90% reflect a highly effective treatment.

5.1. Student Z (At-risk status)

Student Z's performance on the target behaviors of paraphrasing and visualizing is presented in Figure 3. For paraphrasing, hi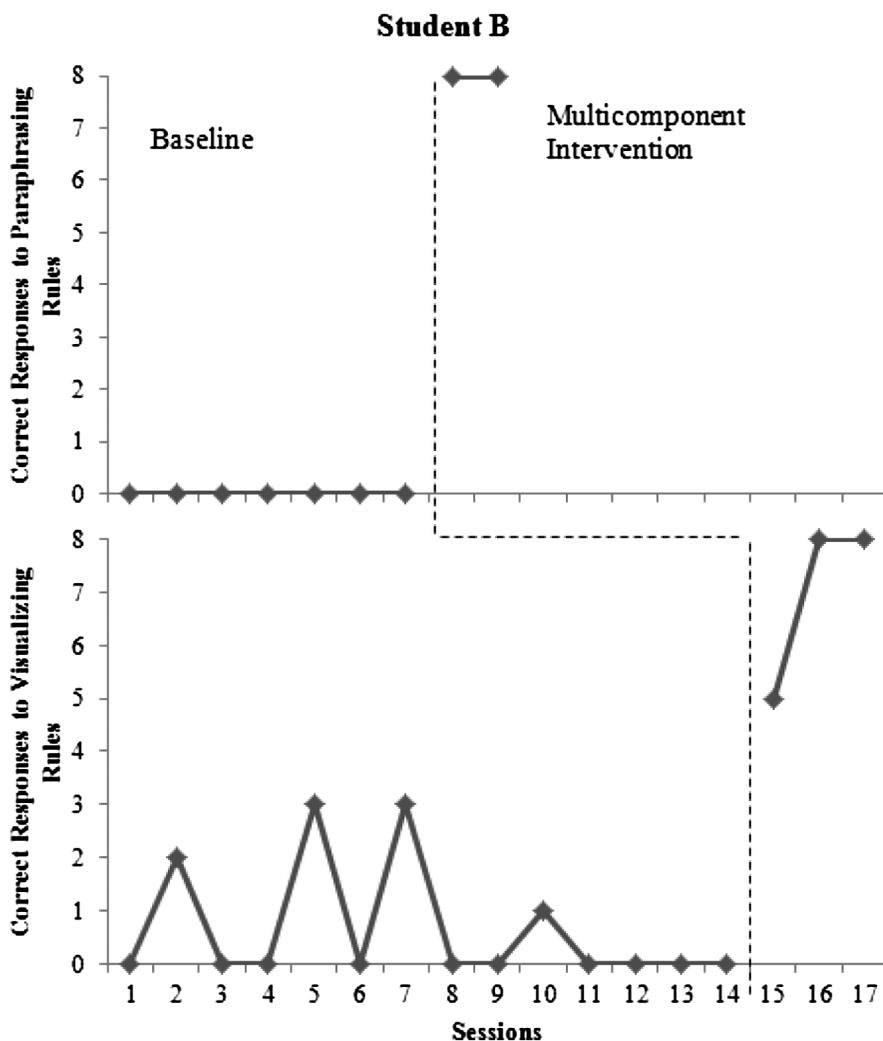s baseline scores were stable at 0 across all seven sessions. Substantial improvements in performance occurred after the introduction of the intervention, with two scores at criterion level (8/8 two consecutive times). His visualizing data were more variable in baseline, but still overall stable, with a mean of 0.85 and a range of 0–2. Again, substantial improvements in performance occurred after the introduction of the intervention, with two scores at criterion level (8/8 two consecutive times). Overall, visual analysis revealed that the intervention proved efficacious for increasing both his paraphrasing and visualizing responses. Furthermore, the overall stable trend in his visualizing data, which demonstrated a lack of improvement in visualizing despite the introduction of the intervention for the paraphrasing behavior, provided evidence of a functional relationship

Table 2. PND scores for each student and target		
	Paraphrasing (%)	**Visualizing (%)**
Student G	86	100
Student D	56	50
Student H	100	38
Student Z	100	100
Student J	89	50
Student P	100	67
Student B	100	100
Student M	100	100
Student L	100	100
Student S	100	100
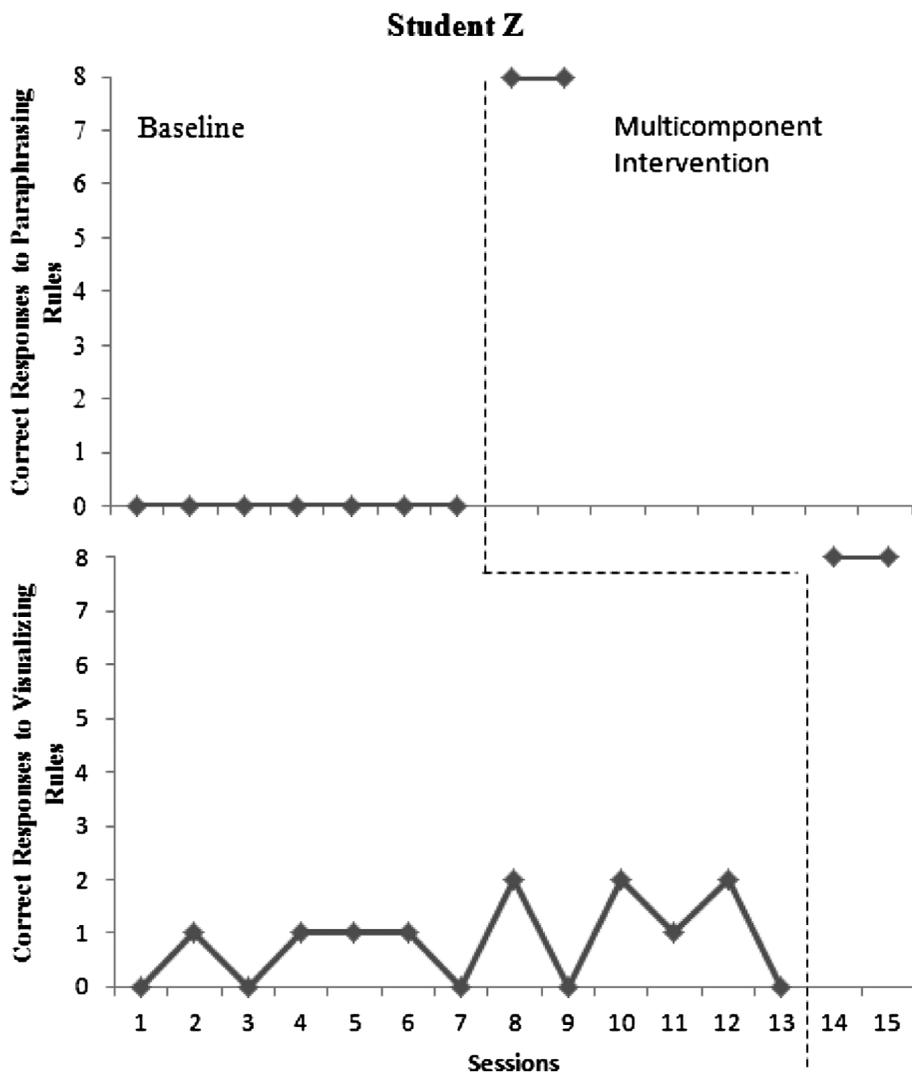
Figure 3. Student Z's correct responses to paraphrasing and visualizing rules.

between the intervention and the changes in the target behaviors. As an additional measure of his paraphrasing and visualizing progress, his PND scores are presented in Table 2. His PND scores for both responses were 100%, which represents a highly effective treatment.

Figure 3. Student Z's correct responses to paraphrasing and visualizing rules.

5.2. Student B (At-risk status)

Student B's performance on the target behaviors of paraphrasing and visualizing is presented in Figure 4. For paraphrasing, her baseline scores were stable at 0 ac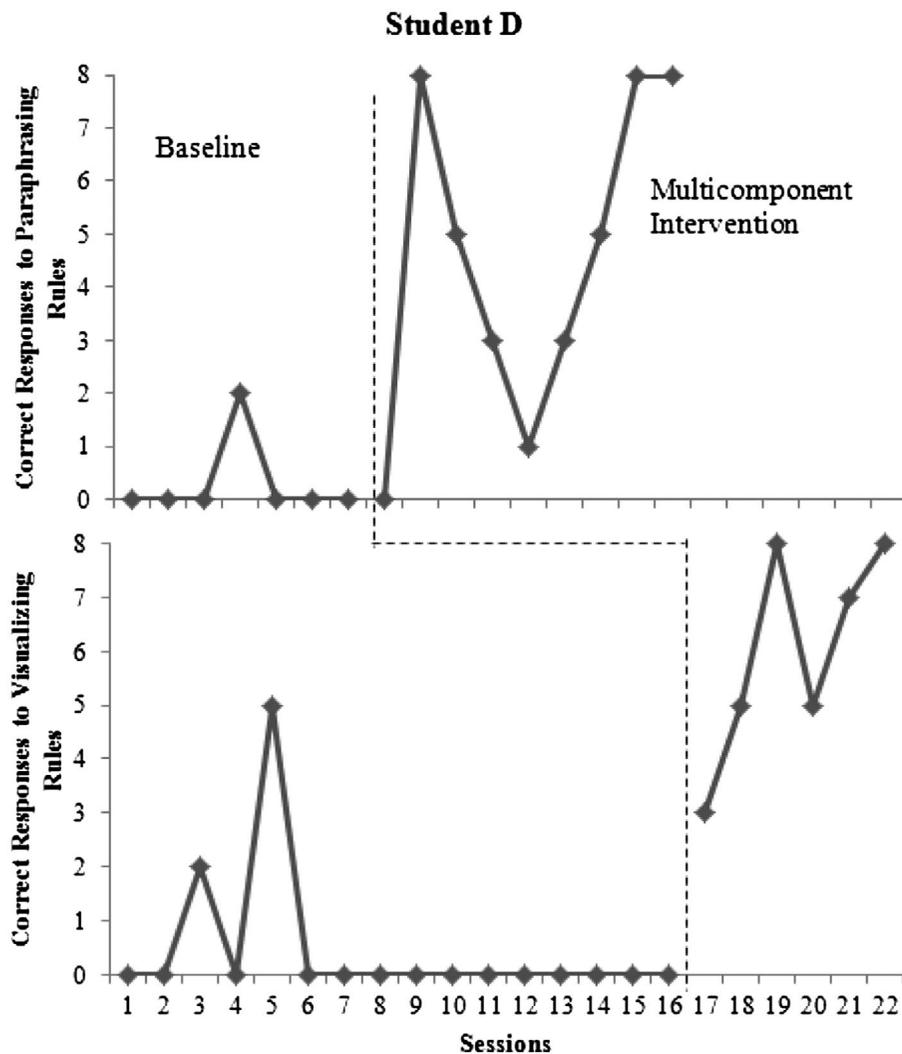ross all seven sessions. Substantial improvements in performance occurred after the introduction of the intervention, with two scores at criterion level (8/8 two consecutive times). Her visualizing data were more variable in baseline, but eventually reached a stable 0 trend, with a mean of 0.64 and a range of 0–3. Again, substantial improvements in performance occurred after the introduction of the intervention, reaching criterion level on the second data point with a mean of 7 and a range of 5–8. Overall, visual analysis revealed that the intervention proved efficacious for increasing both her paraphrasing and visualizing responses. Furthermore, the overall stable trend in her visualizing data, which demonstrated a lack of improvement in visualizing despite the introduction of the intervention for the paraphrasing behavior, provided evidence of a functional relationship between the intervention and the changes in the target behaviors. As an additional measure of her paraphrasing and visualizing progress, her PND scores are presented in Table 2. Her PND scores for both responses were 100%, representing a highly effective treatment.

5.3. Student D (At-risk status)

Student D's performance on the target behaviors of paraphrasing and visualizing is presented in Figure 5. For paraphrasing, his baseline scores were stable at mostly 0 across the seven sessions,

Figure 4. Student B's correct responses to paraphrasing and visualizing rules.

with one outlying score of 2. This resulted in a mean of 0.29 and a range of 0–2. After the introduction of the intervention, Student D's scores were still quite variable; this variability coincided with the state testing practice. Over the course of nine sessions, his mean score was 4.56, with a range of 0–8. His visualizing data were also variable in baseline, but stabilized at an overall 0 trend, with a mean of 0.44 and a range of 0–5. In comparison to his established 0 trend in baseline for sessions 6–16, substantial improvements in performance occurred after the introduction of the visualizing intervention, with a mean of 6 and a range of 3–8. Overall, visual analysis revealed variable intervention effects. The changes in the behaviors do seem to be attributable to the intervention though, with the overall stable trend in his baseline visualizing data demonstrating a lack of improvement in visualizing despite the introduction of the intervention for the paraphrasing behavior. As an additional measure of his paraphrasing and visualizing progress, his PND scores are presented in Table 2. His PND scores for paraphrasing and visualizing were 56 and 50%, respectively. These scores represent only a questionably effective intervention for Student D.

5.4. Student L (at-risk and ESOL level 5 statuses)
Student L's performance on the target behaviors of paraphrasing and visualizing is presented in Figure 6. For paraphrasing, her baseline scores were variable across seven sessions, with a mean of

Figure 5. Student D's correct responses to paraphrasing and visualizing rules.

1.29 and a range of 0–2. Substantial improvements in performance occurred after the introduction of the intervention, with two scores of 4, followed by two scores at criterion level (8/8 two consecutive times). Her visualizing data were also variable in baseline, but eventually reached a stable 0 trend, with a mean of 0.79 and a range of 0–2. Again, substantial improvements in performance occurred after the introduction of the intervention, with a mean of 5.89 and a range of 3–8. Overall, visual analysis revealed that the intervention proved efficacious for increasing both her paraphrasing and visualizing responses. Furthermore, the overall stable trend in her visualizing data, which demonstrated a lack of improvement in visualizing despite the introduction of the intervention for the paraphrasing behavior, provided evidence of a functional relationship between the intervention and the changes in the target behaviors. As an additional measure of her paraphrasing and visualizing progress, her PND scores are presented in Table 2. Her PND scores for both responses were 100%, representing a highly effective treatment.

5.5. Student M (at-risk status)
Student M's performance on the target behaviors of paraphrasing and visualizing is presented in Figure 7. For paraphrasing, her baseline scores were stable at mostly 0 across the seven sessions with one outlying score of 2, resulting in a mean of 0.29 and a range of 0–2. After the introduction of the intervention, Student M's scores were variable before reaching criterion level. Over the course of seven sessions, her mean score was 6 with a range of 4–8. Her visualizing data were somewhat
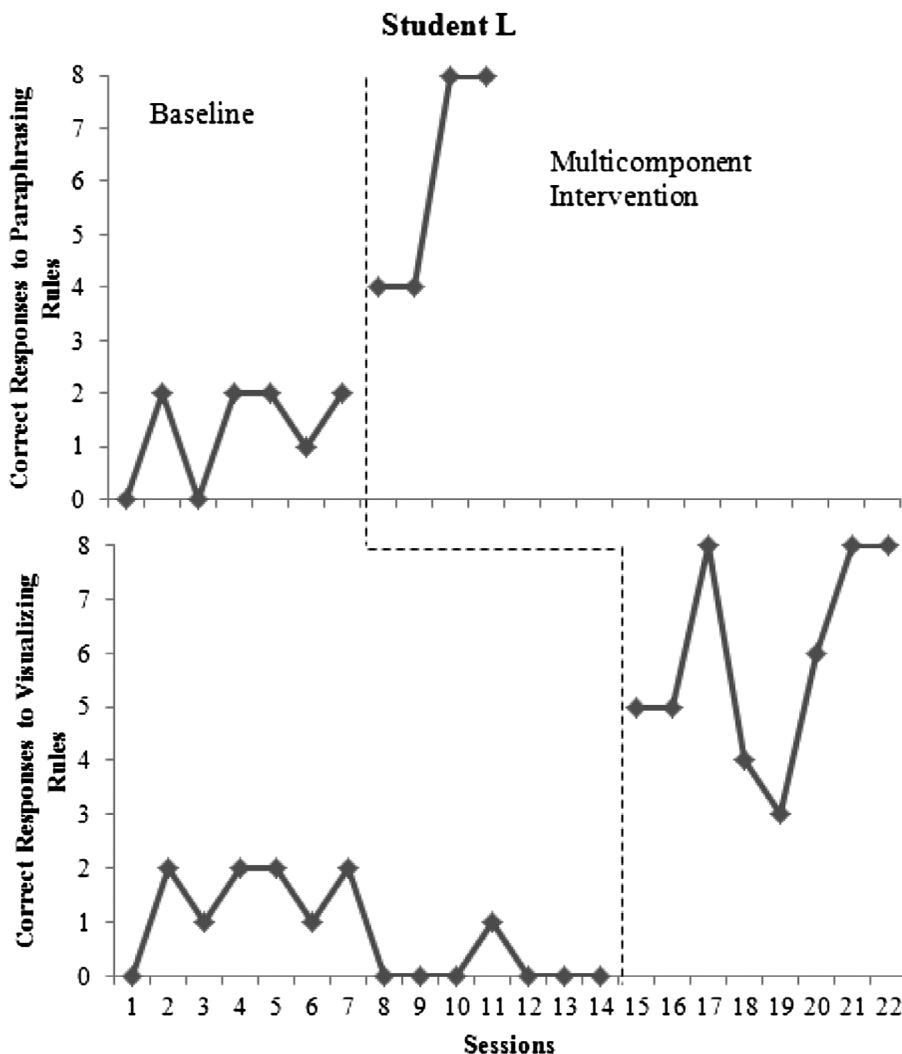
Figure 6. Student L's correct responses to paraphrasing and visualizing rules.
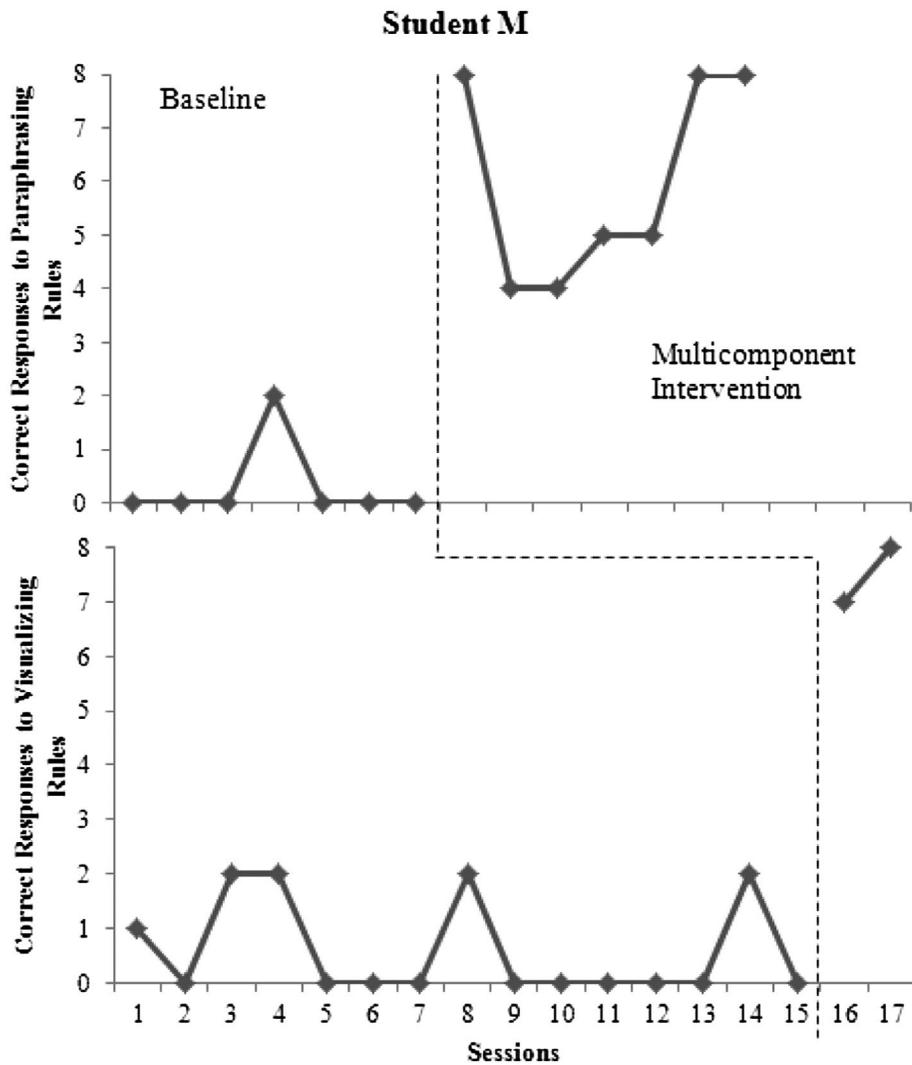
Figure 7. Student M's correct responses to paraphrasing and visualizing rules.

variable in baseline, but hovered around the 0 level most consistently, with a mean of 0.60 and a range of 0–2. Substantial improvements in performance occurred after the introduction of the intervention, with the first two scores reaching criterion level. Overall, visual analysis revealed that the intervention proved efficacious for increasing both her paraphrasing and visualizing responses. Furthermore, the overall stable trend in her visualizing data, which demonstrated a lack of improvement in visualizing despite the introduction of the intervention for the paraphrasing behavior, provided evidence of a functional relationship between the intervention and the changes in the target behaviors. As an additional measure of her paraphrasing and visualizing progress, her PND scores are presented in Table 2. Her PND scores for both responses were 100%, representing a highly effective treatment.

5.6. Student G (LD and ESOL level 5 statuses)
Student G's performance on the target behaviors of paraphrasing and visualizing is presented in Figure 8. For paraphrasing, his baseline scores were stable at 0 across all seven sessions. After the introduction of the intervention, Student G did not score at criterion level until his 6th session; his mean score was 3.43 with a range of 0–8. His visualizing data were initially variable in baseline, but stabilized at an overall 0 trend, with a mean of 0.36 and a range of 0–2. He made substantial improvements after the introduction of the visualizing portion of the intervention, scoring at criterion level immediately. Overall, visual analysis revealed variable intervention effects for the paraphrasing
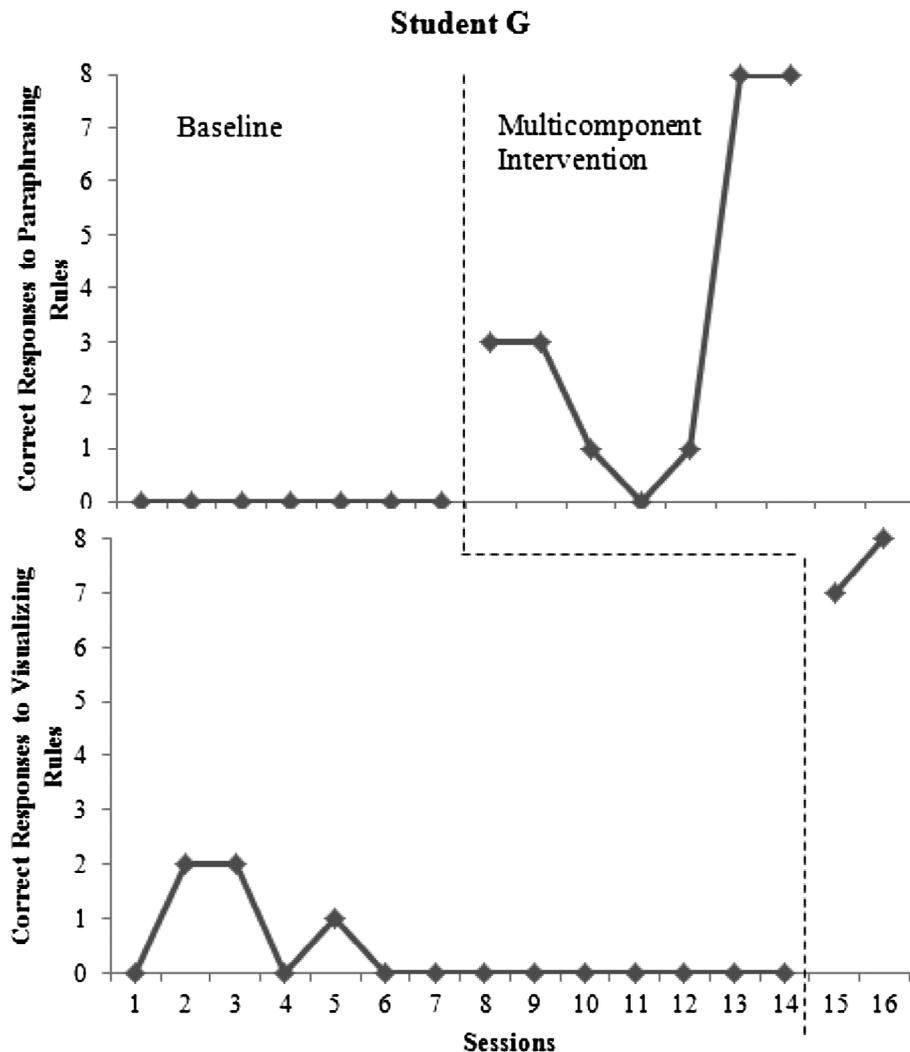
Figure 8. Student G's correct responses to paraphrasing and visualizing rules.

portion of the intervention but strong effects for visualizing. The changes in the behaviors do seem to be attributable to the intervention though, with the overall stable trend in his baseline visualizing data demonstrating a lack of improvement in visualizing despite the introduction of the intervention for the paraphrasing behavior. As an additional measure of his paraphrasing and visualizing progress, his PND scores are presented in Table 2. His PND scores for paraphrasing and visualizing were 86 and 100%, respectively. These scores represent a fairly effective intervention for paraphrasing and a highly effective intervention for visualizing.

5.7. Student H (LD and ESOL level 2 statuses)

Student H's performance on the target behaviors of paraphrasing and visualizing is presented in Figure 9. For paraphrasing, her baseline scores were stable at 0 across all seven sessions. After the introduction of the intervention, Student H's scores reached criterion level immediately. Her visualizing data were somewhat variable in baseline, but hovered around the 0 level most consistently, with a mean of 0.57 and a range of 0–4. After the introduction of the visualizing portion of the intervention, her data, while variable, represented an overall ascending trend. While she did not reach the mastery criterion of two consecutive scores of 7/8 or higher, at the conclusion of the intervention her score was 8/8. The mean and range of her visualizing data in that phase were 3.63 and 0–8, respectively. Overall, visual analysis revealed that the intervention proved efficacious for increasing her paraphrasing responses, with more questionable results for her visualizing responses.
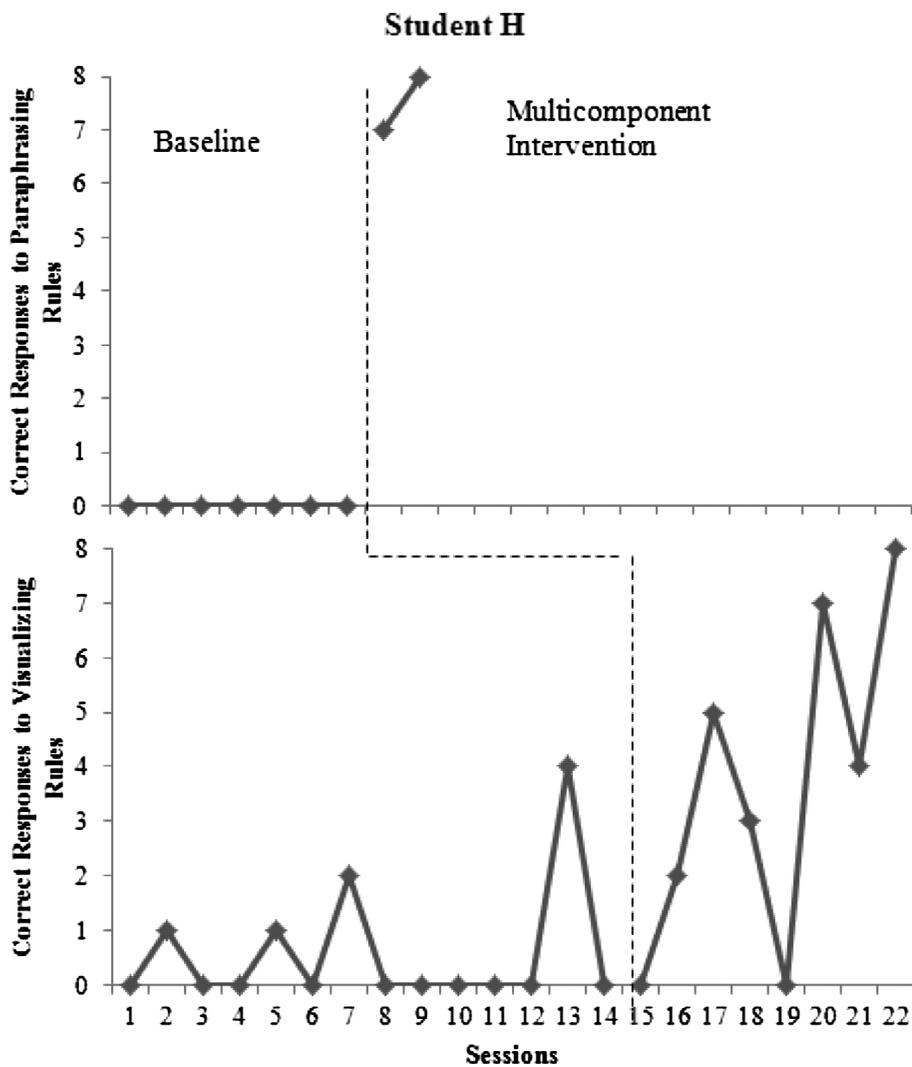
Student H

Figure 9. Student H's correct responses to paraphrasing and visualizing rules.

Additionally, the variability in her visualizing data does not provide clear evidence of a strong functional relationship between the intervention and the changes in her behaviors. As an additional measure of her paraphrasing and visualizing progress, her PND scores are presented in Table 2. Her PND scores for paraphrasing and visualizing were 100 and 38%, respectively. This low visualizing PND score was mostly due to an outlying data point in baseline. Considering all data, these scores represent an effective intervention for the paraphrasing response and an unreliable intervention for the visualizing response.

5.8. Student P (at-risk and ESOL level 5 statuses)

Student P's performance on the target behaviors of paraphrasing and visualizing is presented in Figure 10. For paraphrasing, her baseline scores were stable at 0 across all seven sessions. After the introduction of the intervention, Student P's scores were variable, with an overall ascending trend. She reached criterion level at the 7th session, with an overall mean of 5.38 and a range of 3–8. Her visualizing data were variable in baseline, with a mean of 0.93 and a range of 0–4. After the introduction of the visualizing portion of the intervention, she scored at criterion level quickly (on the second session). Overall, visual analysis revealed that the intervention proved efficacious for increasing her paraphrasing and visualizing responses. However, a functional relationship was only weakly demonstrated due to the variability in her visualizing data. As an additional measure of her paraphrasing
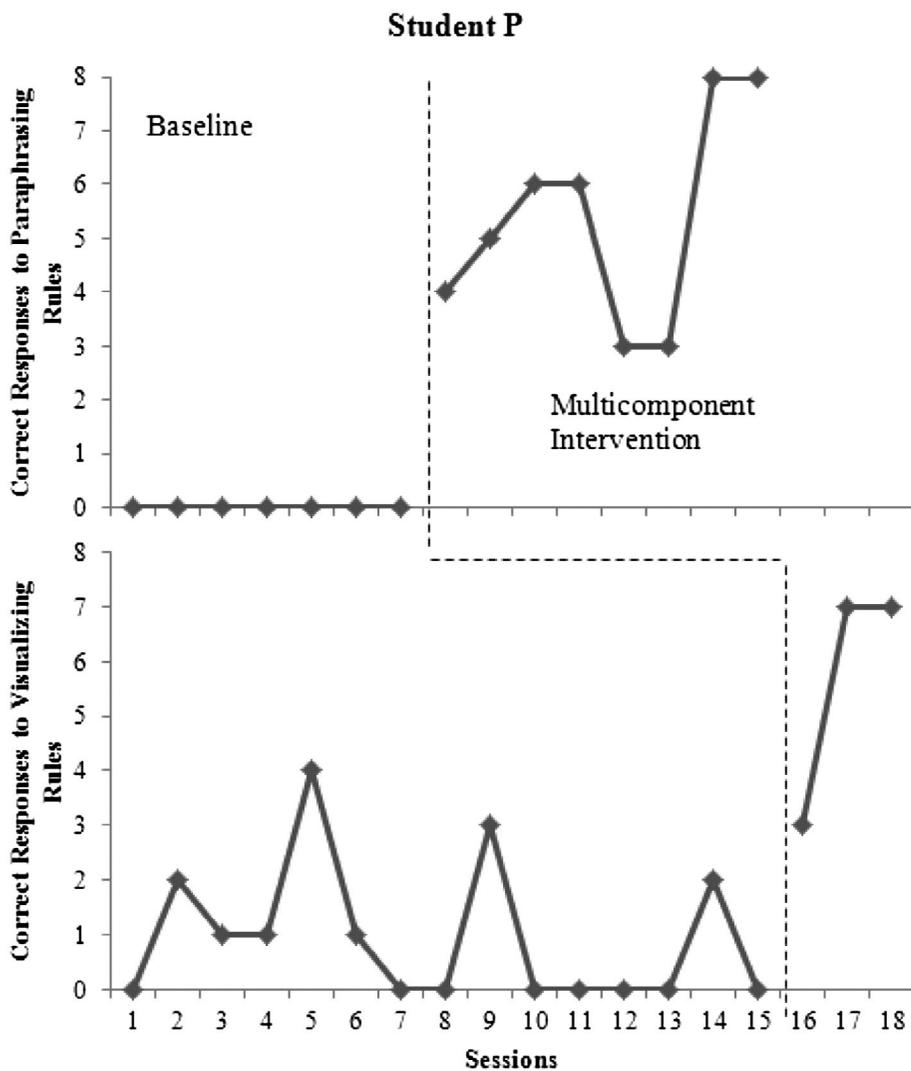
Figure 10. Student P's correct responses to paraphrasing and visualizing rules.

and visualizing progress, her PND scores are presented in Table 2. Her PND scores for paraphrasing and visualizing were 100 and 67%, respectively. These scores represent an effective intervention for the paraphrasing response and a questionable intervention for the visualizing response.

5.9. Student S (ESOL level 2 status)

Student S's performance on the target behaviors of paraphrasing and visualizing is presented in Figure 11. For paraphrasing, her baseline scores were stable at 0 across all five sessions. After the introduction of the intervention, Student S's scores were variable before meeting criterion. Over the course of seven sessions, her mean score was 6.57, with a range of 2–8. Her visualizing data were mostly stable in baseline, hovering around the 0 level most consistently, with a mean of 0.46 and a range of 0–2. Substantial improvements in performance occurred after the introduction of the intervention, with the second score reaching criterion level. Overall, visual analysis revealed that the intervention proved efficacious for increasing both her paraphrasing and visualizing responses. Furthermore, the overall stable trend in her visualizing data, which demonstrated a lack of improvement in visualizing despite the introduction of the intervention for the paraphrasing behavior, provided evidence of a functional relationship between the intervention and the changes in the target behaviors. As an additional measure of her paraphrasing and visualizing progress, her PND scores are presented in Table 2. Her PND scores for both responses were 100%, representing a highly effective treatment.
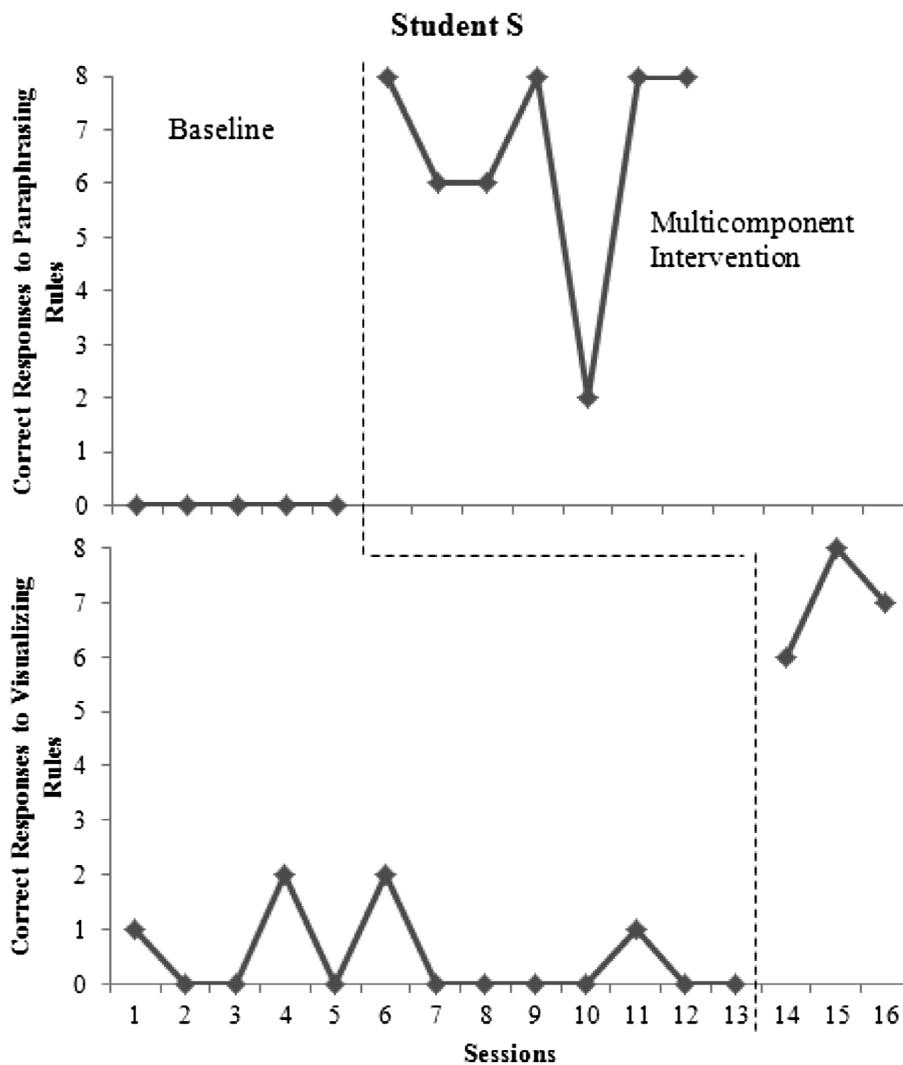
Student S

Figure 11. Student S's correct responses to paraphrasing and visualizing rules.

5.10. Cumulative computation performance

The cumulative computation performance of all students is presented in Table 3. For Students D, Z, M, and S computation accuracy improved throughout the duration of the intervention, and further increased at follow-up. For Students G, H, J, and P, computation accuracy at follow-up was an overall improvement, in comparison to baseline. Students B and L already had high computation accuracy skills in baseline.

5.11. Social validity

The students' responses to the intervention were mostly positive. Question 1 addressed problem solving in general, with the majority of students feeling that problem solving is important (70%). Questions 2 and 6 focused on the skill of paraphrasing, and questions 3 and 7 focused on the skill of visualizing. Overall, the students appeared to value the intervention's visualizing component more than the paraphrasing component, with a 100% favorable response to both visualizing questions and more variable responses for the paraphrasing questions. Questions 4, 5, and 8 inquired about the overall intervention. The responses were somewhat variable, but overall students felt that the intervention strategies were now automatic (70%), will continue to be used (80%), and enhanced problem-solving ability (80%). However, these social validity results should be interpreted with caution. Having the teacher interview the students about what is essentially her teaching effectiveness is likely to impact the validity of their responses, as young students in particular are susceptible to

Table 3. Cumulative percentage correct computation points				
	Baseline (%)	IV targeting paraphrasing (%)	IV targeting visualizing (%)	Follow-up (%)
Student G	36	0	67	50
Student D	43	44	71	79
Student H	14	21	44	38
Student Z	21	58	63	75
Student J	50	39	56	69
Student P	36	19	44	50
Student B	86	14	93	75
Student M	43	25	93	94
Student L	86	7	38	69
Student S	40	44	79	81

social desirability bias; that is, their relationship with the teacher may hinder their ability to truthfully express an opinion about the intervention's value.

The teacher's responses were also positive. She strongly agreed or agreed with all 16 questions assessing the value of the intervention, 69 and 31%, respectively.

6. Discussion

Overall, the multi-component intervention proved effective in increasing the paraphrasing, visualizing, and computation responses for all students. The main intervention components were the use of explicit instruction, a self-monitoring checklist, and multiple exemplars in instruction and assessment practices. However, due to the treatment package nature of the study, determining the most valuable pieces of the intervention is difficult.

The explicit instruction component of the intervention was present in all 19 instructional sessions. It provided the overall structure of the intervention format (i.e. guiding the teacher's lesson structure, use of modeling, and opportunities for student practice and feedback). In the work of Fuchs and colleagues (e.g. Fuchs, Fuchs, et al., 2008; Fuchs, Fuchs, Prentice, Burch, Hamlett, Owen, Hosp, et al., 2003; Fuchs, Fuchs, Prentice, Burch, Hamlett, Owen, & Schroeter, 2003; Fuchs, Seethaler, et al., 2008), an explicit instruction lesson format was found to be superior to a general instruction format when delivering an intervention which increased the correct problem-solving responses of third graders. Jitendra and colleagues (e.g. Jitendra, Griffin, et al., 2007; Jitendra et al., 1998; Jitendra & Hoff, 1996) also found that using an explicit instruction format was most beneficial when implementing a visualization intervention with a similar population. Both researchers utilized interventions that included multiple components but identified explicit instruction as a necessary piece. Therefore, that this intervention was delivered in an explicit instruction format and resulted in favorable student outcomes aligns with the previous research on the critical characteristics of effective math problem-solving interventions for third graders.

Separating the explicit instruction component and the instructional guidance provided with the self-monitoring checklist is impossible, as the teacher consistently modeled use of the self-monitoring checklist during the lessons, intertwining it with the explicit instruction strategy. The teacher used the checklist to drive her explicit instruction, and that was where the checklist played the most critical role—during instruction. During student assessments, the students were rarely observed using the self-monitoring checklists during solving. However, although the students were not observed reading and checking off the items on the checklist on a regular basis, inspection of student work after assessment revealed that the behaviors outlined on the checklist were being completed (e.g.

underlining the important information). The work of Marsico (1998) on increasing the independent math performance of students diagnosed with various learning difficulties found that increases in their correct responses were the observable result of students' self-monitoring (self-editing) behavior when using a checklist. Harris and colleagues (e.g. Harris, Danoff Friedlander, Saddler, Frizzelle, & Graham, 2005) discussed similar results when investigating the effects of self-monitoring on the academic performance of students with ADHD and finding that the intervention controlled independent on-task spelling behaviors. Like results were found here, with the behaviors on the checklist becoming automatic and happening covertly, but the checklist still playing a role in increasing independent student responding. As in the work by Marsico (1998) and Harris and colleagues (e.g. Harris et al., 2005), the role of the checklist became one of a discriminative stimulus (SD) for independent problem solving, rather than a tool needed to facilitate each step in a problem-solving algorithm. That is, the response of solving in the presence of the checklist during the instructional sessions resulted in praise (an established reinforcer for the students), so during assessments the students responded to its presence by again solving. The checklist therefore became the cue to solve the problem, regardless of the need to read and follow the individual steps on the checklist. This role of the checklist aligned with the students' social validity data.

Only 70% of the students reported no longer needing the self-monitoring checklist. The checklist did serve a function for the students, even if they were not observed reading and checking it off.

Using multiple exemplars is good practice and has proved effective in increasing the generalization responses in problem-solving intervention studies by Fuchs and colleagues (Fuchs, Fuchs, et al., 2008; Fuchs, Fuchs, Prentice, Burch, Hamlet, Owen, Hosp, et al., 2003; Fuchs, Fuchs, Prentice, Burch, Hamlet, Owen, & Schroeter, 2003; Fuchs, Seethaler, et al., 2008; Owen & Fuchs, 2002). Problem-solving work by Hughes (1992) also supported this, finding that the use of multiple exemplars in an instructional package resulted in not only response generalization, but also response maintenance behaviors. All assessments in this study were presented in a similar context; explicit tests for generalization did not occur. However, the teacher did report that the students were using the paraphrasing and visualizing strategies during their other assignments. This generalization may be due to the use of multiple exemplars in the teaching practices. Additionally, while tests were not conducted for response generalization across settings, in the follow-up procedures, probes were conducted for response generalization across time. As in Hughes (1992) data, the follow-up data here support the use of the multiple exemplars in maintaining the computation skills of the students.

6.1. Limitations

While the intervention proved valuable, three main limitations exist. First, because most students belonged to multiple groups, trying to draw conclusions of intervention effectiveness based on student classification status was difficult. This may limit the generalizability of the intervention for specific student groups. However, it provides support for the single-subject design and analysis used in this study that focused on individual student data.

Second, although the design and analysis used within this study were the most beneficial for exploring the results in relation to unique student characteristics, certain environmental constraints limited the use of best design practices. While each student did serve as his or her own control within the study, further measures would have been beneficial to increase the validity of the design. For example, putting the students into two groups where the intervention phases were counterbalanced would have provided more information about the role of paraphrasing and visualizing skills within the problem-solving process, and also would have addressed the potential confounds of sequence effects. This was not possible though, since all students were part of the same class, and the intervention was delivered in a group lesson format. Furthermore, the theory behind mathematical problem solving places the process of paraphrasing before visualization. Therefore, while counterbalancing processes would have strengthened the methodology of the study, it may have done so at the expense of the intervention. Additionally, two of the students, Student B and Student L, had high computation scores at baseline that decreased after intervention. The decision to include these

students in the study could be seen as a limitation. However, a few things are worth noting. First, although decreases in computation scores occurred for both students, their scores were still relatively high. Student B's scores increased in the visualization phase to 93% before decreasing in the follow-up phase to 75%. Student L's score was 69% at follow-up. These decreases were attributable to discrete issues for both students. Student B had limited opportunities for assessment because of excessive absences. Student L routinely ran out of time during assessment before she was able to complete computation. Second, although both students were proficient in computation, their visualization scores were very low at baseline. The intervention improved visualization abilities in both students that may not be needed with the more simple third grade problems presented here, but will likely help them as problems increase in complexity. As related to this, both students were observed using these visualization skills outside of the intervention context with more complex problems. Although the link between their visualization and computation abilities was not represented in the data here, more practice in fluency for Student L and more opportunities for assessment with more complex problems for Student B may reveal otherwise.

Third, although the intervention was teacher-delivered, the researcher was present during the majority of the lessons. It is likely that reactivity occurred; that is, the researcher's presence may have had an impact on the behavior of the teacher and the students. It would be valuable to further assess the ecological validity of the intervention by having it delivered in a more natural context by the teacher without the presence or support of the researcher.

A few other limitations that were out of the control of the researcher are also worth noting. One area of difficulty was that interim testing (i.e. testing used to prepare for the upcoming standardized state assessment) occurred during the first week of the paraphrasing intervention. This resulted in an interruption in the intervention schedule and a significant disruption to the daily schedule. This disruption may have been reflected in the paraphrasing score drop seen in the data for some students (e.g. Student J, Student S, Student G, Student M, and Student D) after the first paraphrasing assessment within the intervention phase. Second, the transient nature of the school's population resulted in numerous changes to the classroom during the study. Students withdrawing from the school resulted in attrition of three participants. There were also several students who either became part of the class or were moved to a different classroom during the course of the study. This disrupted the general flow of classroom operations, like the structure of the teacher's lessons (e.g. having one student translate her instruction into Russian for a new Russian-only speaking student) and the classroom seating arrangement.

6.2. Educational significance

Despite these limitations, the results of this study offer valuable contributions to the field. Previous research with this age group (e.g. Fuchs, Fuchs, et al., 2008; Fuchs, Fuchs, Prentice, Burch, Hamlett, Owen, Hosp, et al., 2003; Fuchs, Fuchs, Prentice, Burch, Hamlett, Owen, & Schroeter, 2003; Fuchs, Seethaler, et. al., 2008) has focused on the mainly cognitive aspects of the mathematical problem-solving process. Within this study a cognitive and behavioral model of mathematical problem solving was developed to better understand the observable skills that may demonstrate student understanding in this complicated process. Looking at the discrete skills associated with paraphrasing and visualizing and investigating their impact on computation were areas not previously explored; in doing this, this study generated some conclusions as well as important questions for future investigation. It also provided teachers with a different way of teaching and assessing problem solving in the general education curriculum. Teachers are likely to feel more comfortable teaching and assessing skills of the problem-solving process which are observable (e.g. underlinining important information, schematically representing parts of the problem) to make determinations about student areas of need, their own teaching effectiveness, and student problem-solving ability, as opposed to trying to draw conclusions based on unobservable cognitive processes or student answers alone. Such a process of student learning and teaching evaluation aligns with the current RTI framework being implemented in many schools across the nation. A basic RTI framework includes ongoing tracking of student progress through stages of prevention and intervention, which

includes: (a) student screening, (b) implementing evidence-based intervention, (c) monitoring student progress, and (d) analyzing student progress to determine special education eligibility (Fuchs, Mock, Morgan, & Young, 2003). The intervention applied here began with a baseline assessment of problem-solving skills (stage a), implemented evidence-based practices of using explicit instruction, multiple exemplars, and self-strategies (stage b), monitored student progress through ongoing assessment of problem-solving skills (stage c), and examined student learning through the graphing and analysis of individual student problem-solving data (stage d). Students identified in stage d as struggling with problem solving despite the application of high-quality instruction at stage b, may then benefit from more intensive, individualized, one-on-one problem-solving practice using the stratgies applied here (e.g. working with a special educator who systematically teaches the student each step of creating a schematic representation to mastery criterion). This model could seamlessly be applied by educators committed to using evidence-based mathematical teaching practices in the classroom to make determinations about student classification and remediate learning difficulties. This practice appeared to resonate with the teacher in this study, based on her very favorable feedback on the social validity scale and request to apply these teaching procedures and assessments with her future classes.

Furthermore, previous research on math problem-solving interventions at the third grade level failed to address critical issues such as incorporating curriculum which aligned with the Common Core State Standards, targeting all four operations, targeting practice and assessment with a broad set of word problems, and teaching visualization strategies which were not problem-type specific. These concerns, addressed through this intervention, make the intervention practices applied here more aligned with the regular education curriculum and resultantly more valuable in the general education inclusive classroom and for the general education teacher. Also, the overall format of the intervention employed a very natural and simple framework. The teacher required very little training to learn the teaching strategies used here and felt flexible to make the intervention her own (i.e. was not required to use a script or a set of contrived practice and assessment materials). These aspects increase the likelihood of intervention use outside of the intervention context; in fact, the teacher in this study reported that she used the intervention strategies in her teaching practices outside of the intervention sessions, and will continue to incorporate the strategies in upcoming years.

Lastly, the majority of previous research that investigated related intervention strategies presented in a group inclusive setting did not sufficiently disaggregate and discuss individual student data. As a result, the effects of the interventions on students with special education needs were often masked. In cases where student data were broadly categorized by disability status, as in the study by Owen and Fuchs (2002), the accuracy of post-test scores for students with disabilities only reached 45%, a still failing level. In this study, 7 of the 10 students reached a computation accuracy level at follow-up of about 70% or higher. Overall, this study was able to show that students with LD, ESOL classification, and at-risk status were all able to benefit from the intervention in a practical way by increasing their problem-solving skill set. This is useful when considering the current service delivery model of special education services and the variety of student needs that a teacher in this context strives to meet.

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Appendix A

Sample student checklist

Paraphrase

SAY: Underline the important information.

ASK: Have I underlined the important information?

SAY: Put the problem in your own words and write the important information.

CHECK: That the information goes with the problem.

Paraphrasing prompt
I'm trying to figure out _____. I know that _____ and that _____. Again, I'm looking for _____.

Student teaching from the perspectives of cooperating teachers and pupils

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Abstract: To facilitate student-teachers' transition from internship to permanent positions, they are advised to meticulously learn from real experiences of practicum process as it might form their future teaching practices. To help promote the effectiveness of this process, investigating student-teaching from stakeholder perspectives could be enriching. Research on the cooperating teacher has mainly dealt with the perspective of student-teachers; however, this study focuses on student teaching process from the perspective of both cooperating teachers and the pupils in student-teacher's classes of EFL in a Turkish teaching context. We administered open-ended questionnaires to 21 teachers and 114 pupils and carried out inductive qualitative content analysis to analyze the data. The study elaborates on the cooperating teachers' and pupils' perceptions of the student-teachers as well as the impact of their teaching. Results reveal that the arrival of student-teachers was highly welcomed by most of the students and some of the cooperating teachers even though some expectations from student-teachers were not met.

Subjects: Educational Research; Initial Teacher Training; Language Teaching & Learning

Keywords: teacher education; student teaching; perceptions of pupils; perceptions of cooperating teachers; student-teachers

1. Introduction

Traditionally there has been a long standing conflict between teacher education programs with their theoretical orientation and the public schools with their practical and real world hands-on orientation. Therefore, to solve the possible conflicts, effective early field experiences are necessary and require closer ties between schools and teacher education programs. Such partnerships are not new;

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PUBLIC INTEREST STATEMENT

Exploring the perspectives of pupils and cooperating teachers who are affected by student teaching helps better conceptualize the practicum process and provide insights into achieving more transparent, consistent, and sustainable training standards. This study argues that for a high-caliber student teaching process to occur, cooperating teachers', and pupils' perceptions should evolve in a positive direction. However, the data reveal that cooperating teachers and pupils exhibited various attitudes toward the student-teachers' initial experiences for several reasons.

precedents exist for other professions and occupations, such as for engineering, business, medicine and law. Early field experiences in teacher education are in a sense like the experiences provided to medical students in the active participatory roles of internships and residencies. Through field experiences, teacher candidates observe and work with real students, teachers, and curriculum in natural settings (Gebhard, 2009; Ewing & Le Cornu, 2010).

In the teaching profession, the student-teachers typically engage in early field experiences, such as seminars, workshops, career days, field observations, field orientations, explorations and inquiry into workplace to experience the job and finally in student-teaching prior to certification (Darling-Hammond, Hammerness, Grossman, Rust, & Shulman, 2005; Huling, 1998). Student teaching experiences are usually accepted as the most influential components of a teacher education program, and have the power to shape student-teachers' development as novice teachers (Glenn, 2006; Leshem, 2012).

Any process to strengthen teacher education programs must include a careful study of student teaching because it is usually the final education course students take and the most influential field experience in a teacher education program. Therefore, many teacher education programs use student teaching as the primary evaluation of student competencies (Kirk, Macdonald, & O'Sullivan, 2006). Student-teaching serves as the culmination of the teacher education programs and provides student-teachers the opportunity to put all previous field experience and pedagogical instructions into practice (Huling, 1998). Providing student-teachers with a series of experiences such as student teaching, classroom observation, lesson planning, classroom management, student guidance, etc. would make them better prepared agents geared toward in-the-field practice, thereby making them potentially advantageous in becoming teaching professionals. Findings from studies reveal that teacher identities are constructed (Gu & Benson, 2015), teachers face a transition from the course content to real conditions (Tarone & Allwright, 2005), and they get a feel of classroom management (Wright, 2012).

Weighing multiple perspectives in terms of student teaching practices will help us capture the richness and complexity of the process student-teachers go through more precisely. Focusing on student-teachers' beliefs will be instrumental with respect to understanding the underlying decisions which shape student-teachers' classroom actions. This helps us go beyond the traditional notion of language teaching simply reduced to classroom behavior and have a broader understanding of cognitive, affective and behavioral dimensions. This study incorporates the main premise of reflective practice (Schön, 1987) and the idea here is that what teachers do in the classroom is a representation of their beliefs. In Richards and Lockhart's (1996, p. 29) words, "It [The view of teaching that involves cognitive, affective and behavioral dimension] is based on the assumption that what teachers do is a reflection of what they know and believe, and that teacher knowledge and 'teacher thinking' provide the underlying framework or schema which guides the teacher's classroom actions". Understanding teacher cognition from different perspectives could be enriching because, in accordance with the premise of sociocultural tradition (see Vygotsky, 1978), learners need to negotiate or mediate the information they process for learning to take place. When the mediation in question is applied to the zone of proximal development, cognitive development of learners in the presence of more capable peers might be facilitated when they are provided scaffolding assistance (Vygotsky, 1978).

Exploring the perspectives of pupils and cooperating teachers who are affected by student-teaching would help us better conceptualize the practicum process and provide insights into achieving more transparent, consistent and sustainable training standards. The cooperating teachers' perspectives could prove to be instrumental to help teachers make the transition between the work in faculty classrooms and work as a full-fledged, independent teacher. Student-teaching is a highly regarded activity in teacher education, and there exists today considerable support for the assertion that the quality of the student-teaching experience depends largely on the professional abilities and attitudes of the cooperating teacher[1] who has a day to day working relationship with the student-teacher (Lane, Lacefield-Parachini, & Isken, 2003; Mulholland & Wallace, 2001). To put it differently,

cooperating teachers have great influence, positive or negative, on student-teachers' attitudes, teaching and growth. Moreover, an analysis of pupils' aspirations will enable us to define their expectations better and enhance the likelihood of more informed decisions by going beyond the sheer reliance on student-teachers' perspectives.

1.1. Cooperating teachers

Cooperating teachers may influence student-teachers' profession-related socialization, career satisfaction, perceptions of the professional role, philosophies of teaching, instructional practices, and perhaps even their decision to stay in the profession (Britzman, 2000; Brouwer & Korthagen, 2005). Despite the strength of such views and supporting evidence of the power of cooperating teachers, there has been a strong debate about the selection of cooperating teachers. Previous studies point to the arbitrary selection of cooperating teachers as well as their inadequate preparation for their work as supervisors (Knowles & Cole, 1996; Yavuz, 2011). For example, Yavuz's study (2011) revealed that the selection of cooperating teachers should be carried out through the cooperation of faculties and schools and a selection and evaluation criteria could be instrumental so as to minimize, if not totally eliminate, the problematic aspects of mentoring. Therefore, it appears that the selection of cooperating teachers is not duly systematic.

Research results also demonstrates that many student-teachers believe cooperating teachers disapprove of ideas and methods advocated by the teacher education programs or unable or unwilling to support the needs of a student-teacher in the context of learning to teach (Borko & Mayfield, 1995; Guyton & McIntyre, 1990). These results confirm our informal communications with student-teachers throughout the years. Payant and Murphy (2012) studied 11 cooperating teachers' perceptions of their roles in guiding the student-teachers of English and their study showed that the communication between the cooperating teachers and practicum course instructors was poor. Despite the potential outcome of mediation and negotiation which Vygotsky (1978) referred to his concept of zone of proximal development, the poor collaboration between the student-teacher and cooperating teachers, and cooperating teachers' lack of precision in terms of their roles and responsibilities were noted.

As a result, nearly every year, quality-focused teacher education programs invest considerable time and energy in selecting and supporting cooperating teachers who will serve their student-teachers (Sinclair, Dowson, & Thistleton-Martin, 2006). The professional qualities of a cooperating teacher include the ability to give constructive feedback and having effective communication skills (Birrell & Bullough, 2005; Glenn, 2006; Killian & Wilkins, 2009), accept differences (Glenn, 2006), teach both technical and managerial skills of teaching (Graham, 2006), nurture student-teachers' professional development and think about teaching (Beck & Kosnik, 2002; Wang & Odell, 2002; Zeichner & Liston, 1996), and provide student-teachers the freedom to explore new teaching styles or instructional approaches (Koerner, Rust, & Baumgartner, 2002). Moreover, being accountable for the instructional outcomes in the classroom and placing more pressure on the student-teacher to teach in the same manner and style in order to ensure similar outcomes (Cochran-Smith, 2005), and including the student-teacher in all aspects of the professional life of a teacher (meetings, professional development, extracurricular involvements, etc.) (Sayeski & Paulsen, 2012) are some other concerns.

Since the role of the cooperating teacher is complex and highly important, many different roles have been found in different studies. The cooperating teacher is assigned the role of coach and feedback provider (Broad & Tessaro, 2010; Calderhead & Robson, 1991; Clarke, 2006); observer, recorder and reporter (Borko & Mayfield, 1995); teacher educator (Book, 1996; Knowles & Cole, 1996); coaching (Russell, 1997); evaluator (Crookes, 2003); reflector (Crasborn, Hennissen, Brouwer, Korthagen, & Bergen, 2011; Schön, 1987); facilitator (Crasborn et al., 2011; White, Deegan, & Allexsaht-Snider, 1997); socializer (Anderson, 2007; Zeichner & Gore, 1990); mentor (Coulter et al., 2007; Edwards &

Protheroe, 2004); relation-setter (Glenn, 2006; Latour, 2005); knowledge seeker (Clarke, 2006); regular classroom teacher (Goodfellow, 2000; Kent, 2001; Rajuan, Beijaard, & Verloop, 2007); and tolerator of difficulties (Phelan et al., 2006; Smith, 2007).

1.2. Student-teachers

Student teaching is for student-teachers. The problems experienced during student teaching may influence the development and professional qualifications of student-teachers and as a result the overall success of student teaching. Therefore, it is not surprising to notice that research related to student teaching focus largely on the possible problems student-teachers encounter and perceptions of student-teachers on the process (Al-magableh, 2010; Almikhalafi, 2005; Coşkun, 2013; Hamaidi, Al-Shara, Arouri, & Abu Awwad, 2014; Izadinia, 2013; Perry, 2004; Pinder, 2008; Richardson-Koehler, 1988; Smith, 1990).

Despite this quantitative advantage, still more research is needed to explore the ideas, values, expectations, and understanding shaping the relationship between cooperating teachers and student-teachers since available research suggests that dispute on role expectations or lack of clarity of such roles might cause unsuccessful supervising relationships (Beck & Kosnik, 2000; Martin, Snow, & Franklin Torrez, 2011; Patrick, 2013; Rajuan et al., 2007).

1.3. Pupils' perceptions of student teaching

As far as we were able to discern from the available literature, not much, except from Arnold (2002), has been available on the perceptions of pupils related to student teaching. In fact, this reality was one of the reasons of including pupils' perceptions related to student teaching in this study. More research is needed to explore the process of student teaching from the perspectives of pupils in the classrooms and we hope that our study can initiate this awareness.

2. Methodology

Research about the cooperating teacher has much been investigated from the perspective of the student-teacher (Smith, 1990). However, it is important that research should move to more detailed and different perspectives on how the work of cooperating teachers is carried out (Rakicioglu-Soylemez & Eroz-Tuga, 2014). Therefore, this study focuses on student teaching process from the perspective of both cooperating teachers and the pupils in student-teacher's classes of EFL teaching in Turkey.

The study aims to determine how cooperating teachers and student-teachers perceived the process of student teaching and changes if occurred as a result of the student-teachers' presence in their classrooms. Interview questions used for cooperating teachers and pupils are provided below.

Two types of open-ended questionnaires were distributed to cooperating teachers and pupils, respectively, in order to gather the data during the spring semester of 2013 academic year. Both the cooperating teachers and pupils were chosen from Kayseri, a province in central Anatolia, Turkey, where student-teachers were undertaking teacher education program, including student teaching. Due to both high number of pre-service teachers and limited budget allocation made by the offices of revolving funds at universities, it is impossible to place each student-teacher to a classroom to work with a cooperating teacher. Therefore, groups of student-teachers, usually three to five, were put together, and they were assigned to a practice teaching class under the supervision of a cooperating teacher.

In Turkey, as part of the curriculum, student-teachers have two tasks as their practicum component in the senior year. The first one is school experience which takes place in the fall semester for 14 weeks where student-teachers are required to observe the teaching practices of the cooperative teacher, learn school policies and procedures at a cooperating primary and/or secondary school. The student-teachers also expected to meet with their university supervisors for two contact hours to reflect on their observations and turn in their field notes and assignments.

In the spring semester of the senior year, the student-teachers are assigned for their practice teaching, where each student-teacher is engaged in full-time teaching responsibilities under the supervision of a cooperating teacher for 14 weeks attending at least 6 class hours for a week. Again, each week for two contact hours, student-teachers meet with their university supervisor to reflect on their experiences. Student-teachers practice a couple of sample teaching sessions under the guidance of a cooperating teacher before they perform a final teaching under the observation of the university supervisor. Cooperating teachers' assessment is used as the student-teacher's mid-term grade where university supervisor's assessment is used for the final grade. The passing grade is 50.

Twenty-one cooperating teachers of English language in six different state schools completed the questionnaire. The teachers were those serving as cooperating teachers for the student-teachers who took the Practicum Course the same semester. All of the teachers were paid by the Faculty of Education and each cooperating teacher had a minimum of three years of teaching experience. Inductive qualitative content analysis has been carried out to determine how 21 cooperating teachers and their pupils perceived changes in teaching practice as a result of the student-teachers' presence. The questionnaire used for cooperating teachers was adapted from Arnold (2002), and it consists of six open-ended questions:

- What is your understanding of the role of the cooperating teacher?
- What is your understanding of the role of the student-teacher?
- How has your class been affected by the presence of a student-teacher?
- What effect, if any, has the experience of being a cooperating teacher had on your own practice?
- What do you like about having the student-teacher?
- What do you dislike about having the student-teacher?

As for the reason of using Arnold's (2002) study, we found the study and the format very useful and unique in nature as it focuses on student teaching process from the perspective of cooperating teachers and the pupils in student-teacher's classes. It also helped us to compare a study from the USA with one from our context.

The following steps were taken to ensure consistency and trustworthiness. In order to increase the credibility, we reviewed the related literature and this helped us better conceptualize the research and interview questions. The respondents were assured that the findings would be used for research purposes only and their names would be kept confidential. Therefore, no names were assigned for the respondents and each respondent is indicated with a number sign (#). To avoid the use of gender-biased pronouns, we provided the pronouns for both genders together, such as s/he, and his/her. So as to increase the internal consistency, we asked another faculty experienced in qualitative inquiry to develop codes from the transcripts. When compared with that of the researchers, the consistency was calculated to be 90%, which meant that a considerable number of the codes developed were consistent.

3. Findings and discussions

3.1. The perceived role of the cooperating teachers

All of the cooperating teachers shared their feelings of responsibility to support, help, and guide their student-teachers. When asked about their perceived role of the cooperating teachers, they used the words guide, role model, mentor, facilitator, planner, teacher educator, resource developer, knowledge transmitter, and master. These affirmed roles by the participants are in line with the aforementioned literature results.

The teachers' accounts indicate that even if they perform the role of a "guide", or "role model", a one-way flow of transmission of knowledge or experiences was evident in some teachers' speech:

I think we [cooperating teachers] should be good role models as the cooperating teachers to our student-teachers. We must encourage them and create a positive atmosphere in the classroom for them. (#4)

I think our [cooperating teachers'] role is to show student-teachers how things are going on in real practice in every side of school atmosphere. (#1)

"Giving" (9), "sharing" (9), "showing" (5), and "providing" (5) were the most frequently used verbs followed by "cooperating" (4) to indicate their roles as cooperating teachers.

3.2. Cooperating teachers' perceptions of the role of the student-teachers

The cooperating teachers in general seem to view the practicum process as a warm-up or transition to something "real". This orientation is explicitly stated by several cooperating teachers (see Table 1).

The data reveal that a transition from "learning teaching" to "doing teaching" might test the student-teachers' preparedness. Moreover, considering the implied discrepancy of school and professional life which is frequently referred to as a transformation to "real", it would be reasonable to argue that cooperating teachers perceive their teaching contexts somehow detached from university community. This implication is made explicit in #11, who called for the need to expose student-teachers to "authentic classroom atmosphere". Moreover, the practicum process is also considered as a move from the "theoretical knowledge" to practical applications. The underlying assumption behind all these concerns seem to be rooted to the image of university which is usually associated with a place helping learners gain sheer theoretical knowledge.

Table 1. Perceptions of changes in teaching			
	Technical practice	**Teachers' affect**	**Impact on pupils**
Teachers' positive responses	Preparation for "real" contexts (8) New activities, ideas, approaches (2) Time management (1) Observation (6) Exchange of ideas (10) Acting unusually carefully (1) Reflective practice (2)	Collaboration (4) Promotion of risk-taking (1) Motivation (8) Satisfaction of helping-out (1) More reflective (2)	Exposure to new teaching styles (3) Opportunity to observe pupils (7) Communication (1) Increased comprehension (2)
Teachers' negative responses	Poor classroom management (3)	Avoidance of role taking (1) Increased nervousness of pupils (2)	Naughty classes (3)
Teachers' neutral responses	The same practices (2)	Not affected much (3)	No difference (2)
Pupils' positive responses	Help (7) New words (3) Teaching style (8) Discipline (4) Reduced noise (10) Increased productivity (4) Activity variety (11) Group work (1) Classroom management (3)	Motivation (7) Increased self-esteem (1)	Enjoyable lessons (38) Increased participation (13) Better comprehension (11)
Pupils' negative responses	Turn-giving (4) Not active enough (4) Curriculum mismatch (1) Poor classroom management (4) Poor technical practice (4)	Change of atmosphere (3) Undue responsibilities (2) Student-teachers' anxiety (7) Boring classes (3) Slow pace (2)	Increased noise (4) Concentration problems (2)
Pupils' neutral responses	The same practices (9)	—	No difference (9)

Note: Teachers' and pupils' responses are categorized in positive, negative, and neutral terms. These changes are further categorized into practical and affective aspects and the impact on pupils both from the teachers' and pupils' perspectives is provided.

Besides, several other roles such as observation, collaboration, time management, and communication were also mentioned. The cooperating teachers used the words "observation", "observe", and "observer" (#5; #10; #13; #16; #20) repeatedly to point to the implied role of the student-teachers. Here, the implication is that student-teachers are given a detached role and they are not participatory enough to contribute to the existing situation. This takes us to consider that the role assigned to student-teachers is to "imitate" rather than expand on the existing practices.

3.3. Cooperating teachers' perceptions of student-teachers' impact on student teaching classrooms

A considerable number of teachers, 13 out of 21, agreed that the student-teachers had a positive impact on students. The reasons they provided ranged from activity variety to motivation and from classroom management to resourcefulness. However, in line with the cooperating teachers' accounts, this positive impact on students seems to change according to the grades. The cooperating teacher #13 aptly points this out when s/he wrote:

> The student-teachers, whom I was responsible for, attended different levels of classes. These classes were 4th, 5th, 6th and 8th grades. As a result of their ages, the reaction of my students showed variance. The 4th and 5th graders were the most impressed ones as they are enthusiastic about learning a foreign language and putting other teachers up in their classes. 6th graders also took benefit of their guest teachers. However, the 8th grade students didn't show a noteworthy reaction to the student-teachers.

Cooperating teacher #6 and #21 argued that student-teachers' impact on the pupils were negative as pupils became noisier and behaved badly more than usual in the presence of the student-teachers. Three teachers indicated that there was not much difference (#5, #9, and #12) while some cooperating teachers (#2, #4, #14) reported that the pupils were not comfortable when they met the student-teachers. Some teacher accounts could be given to validate this assertion:

> At the beginning they were shy and tried to understand the reason why a student-teacher was there. Presence of a student-teacher makes the environment positive and funny. (#4)

> Firstly, they [pupils] haven't taken them [student-teachers] into consideration. They have neglected them but after a while they have learnt to be with them, to spend time with them. (#14)

3.4. The impact of being a cooperating teacher on one's own practice

The question "What effect, if any, has the experience of being a cooperating teacher had on your own practice?" was asked to gather information about cooperating teachers' opinions on the impact of student teaching process on their own practice.

Seventeen out of twenty were positive, three were neutral and one was negative in their reflections, which suggests that there was a two way exchange of information with cooperating teachers despite the way they describe the relationship (see Table 2).

3.4.1. Positive changes

From the cooperating teachers' accounts, it is logical to deduce that they extend a welcoming hand to student-teachers as they helped the cooperating teachers increase their motivation in the classroom, develop empathy, engage in reflective practice, brush up on the methodological aspects, and advance professionally.

Table 2. Cooperating teachers' perceived changes after the arrival of student-teachers

Positive reactions	Negative reactions	Neutral reactions	Total
17 (85%)	1 (5%)	3 (15%)	20 (100%)

3.4.1.1. Increased motivation. Teachers' accounts reveal that they are moved or pushed by the student-teachers' presence. The following accounts are taken as examples:

> We [cooperating teachers] co-operated together with them [student-teachers] and that caused an extra motivation on me [cooperating teacher]. (#4)

> They had a great effect on me. I [cooperating teacher] felt younger and more energetic when they [student-teachers] were in class (#9)

The transcriptions above seem to create a favorable image of the student teaching on the grounds that an energizing power is supplied to cooperating teachers. That the cooperating teacher felt younger is a sentence which is open to various interpretations, but we took it as the dynamism the student-teachers bring into the classes.

3.4.1.2. Nurturing empathy. With reference to empathy, #2 and #9 said that the student-teachers reminded them of their student days and, reported that they were able to understand how the student-teachers felt:

> I remember my old days, how I was feeling at that time. I think it is a beneficial experience for both the cooperating teacher and the student-teacher. I am an old [a former] student of you. I think it is very effective having the experience of being a student-teacher. I can remember lots of things you talked about in the class. I compare what I learnt from you and what I did in the class. (#2)

> ... they reminded me of the old university days. As a confession, they made me think again the approaches and techniques. (#9)

3.4.1.3. Opportunity for reflective practice. When teaching, developing a deeper understanding of the issues or events happening in the classroom is essential to feel the pulse of emerging situations or respond to the immediate needs of the students. As Richards and Lockhart (1996) point out, failure to attend to events happening in a timely manner may mean teachers lose touch with what is actually going on in the classroom. Thus, there is a need to enable teachers to keep track of their development. To this end, one of the cooperating teachers' explanations in favor of the impact of the student-teachers sounds as an opportunity for reflective practice:

> All my student-teachers were a mirror for me. I could see myself in this mirror. (#7)

3.4.1.4. Brushing up language teaching methods and techniques. The following excerpts indicate impact on methods and techniques. They suggest that the introduction of student-teachers leads to a corresponding awareness of the language teaching methods and techniques because student-teachers triggered the coordinating teachers to become familiar with new ways.

> I have tried to improve the methods, activities and skills in language teaching and process more than I have done before. (#9)

> As a graduate of English literature, I think I have a chance to get some new language teaching techniques during their teaching process in class. (#14)

As illustrated above, the cooperating teachers benefitted from the student teaching practice, particularly in terms of language teaching methods and techniques. Judging from the participant #14's words, this situation is attributable to discrepancy of the curriculum offered in education faculties and faculties of letters. In Turkey, the graduates of the faculties of letters or some other faculties can also get a teaching job on condition that they get pedagogic formation. This makes those graduates who graduated from a department which is not particularly geared to language teaching disadvantaged due to the limited number of courses on language learning and teaching.

3.4.2. Neutral (no change)

Several cooperating teachers stated that arrival of the student-teachers was not influential in their teaching practices. The cooperating teachers' (#6; #12; #20) argument for their neutral stance in general, as the following accounts suggest, was that their actions did not differ because of the student-teachers' presence.

> My practice didn't change drastically. I was teaching as I did normally so that student-teachers could see a natural setting of education. (#6)

3.4.3. Negative change (Behavioral change)

The student-teachers' arrival was not always welcomed. One teacher indicated the negative impact of a student-teacher's presence. Teaching, even if properly managed, sometimes turns out to be a child-raising experience for teachers as student misbehavior might be disruptive. This might, as (#21) maintains, make it difficult for teachers to cope with:

> The pupils became naughty due to their [student-teachers] presence in the classroom.

3.5. Cooperating teachers' perceptions of the student-teachers' strengths and weaknesses

Exchange of ideas and experiences, increase in motivation, satisfaction of helping out and fostering reflective practice were cited to be the influential factors by the cooperating teachers. Exchange of ideas and experiences were the most recurring theme (10) followed by motivation. However, even though the word "exchange" refers to reciprocal acts or benefits, this did not seem to be in several cases-although the cooperating teachers reported that they benefitted from the exchange of ideas and experiences, some of the explanations they gave point to a one-way flow. The following excerpts could reasonably be interpreted in this light:

> I told my pupils that the student-teacher will be a teacher in the future so please help them and study harder. I try to share my experiences about classroom management, the activities which can be used in the 7th and 8th grades. (#2)

> I was happy that I got to share my experience with young people who were willing to work hard for their profession. (#6)

As for the student-teachers' reported weaknesses, pupils' classroom misbehavior, student-teachers' classroom management, personal problems, fear of falling behind the curriculum requirements were mentioned to be the undesirable outcomes. Pupils' noise or the class size usually matter and these problems might become more evident, if not severe, when student-teachers take responsibility. This could also result in classroom management problems. Moreover, letting student-teachers take control of the lessons, as one of the cooperating teachers argues, could jeopardize the teachers' chances of catching up with the curriculum:

> I like having student-teachers in my classes, but to be honest I have had some questions in my mind before. Such as, will it be possible to finish the chapters in my schedule on time or not? Sometimes, activities take much more time than we expect. Luckily I have had no problems about what I have thought before. (#14)

3.6. Pupil questionnaires

In addition to the cooperating teacher questionnaire, a questionnaire was distributed to the pupils in 21 classes where there had been a cooperating and a student-teacher. One hundred and fourteen pupils fully completed and returned the questionnaires fully. Again, the questionnaire used for pupils was adapted from Arnold (2002). Considering the English language proficiency of the pupils, the questions were in Turkish language and included two open-ended questions, namely:

(1) Have you noticed any changes/differences after the arrival of student-teachers?

(2) What did you like/dislike about having a student-teacher in your classroom?

Table 3. Pupils' perceived changes after the student-teachers' arrival				
Positive reactions	Negative reactions	Positive and negative reactions	Neutral reactions	Total
91 (80%)	4 (0.03%)	10 (0.83%)	9 (0.78%)	114

We categorized the respondents' answers to the differences after the arrival of the student-teacher into three broad themes, namely *positive changes*, *negative changes*, and *no change*. First of all, all the students' responses were written verbatim. Then the preliminary jottings were made. Next, the codes were developed and then the recurring ideas were grouped into categories/themes. Of one hundred and fourteen respondents, ninety-one pupils indicated a positive change whereas nine pupils took a neutral stance suggesting that there was not much difference after the arrival of student-teachers. Four pupils indicated a negative attitude whereas six respondents reported both negative and positive perceptions (see Table 3).

3.6.1. Positive changes
With respect to the positive changes, "enjoyable lessons" were the most recurring theme (see Table 1). One third (38) of the participants used the word enjoyable lessons to indicate the positive change after the student-teachers' arrival. The following pupil comments illustrate this:

We liked the games. The classes got more enjoyable. (#37)

Lessons got more enjoyable; they are good at teaching; they make some applications without making us bored. (#51)

Lessons got more enjoyable; the trainee had a nice voice. (#105)

What made the lessons enjoyable was the activities such as games or other techniques used in the classroom, particular characteristics and teaching style of the new trainees (e.g. voice, use of songs, videos), the pace of the lesson, entertaining nature of the lessons, and student-teachers' facilitative communication with the pupils. Moreover, the turn-soliciting behavior of the student-teachers was reported to aid class participation. The technical practices of student-teachers received the most varied comments from both cooperating teachers' and pupils' perspectives. The pupils mentioned activity variety as the greatest form of change (10%) whereas the exchange of ideas was the most noted issue valued by the cooperating teachers (50%).

Enjoyable lessons were followed by increased participation (11%) and better comprehension (10%). The following comment is an example of the increased eagerness to participate:

Everyone watches their behavior when the term "discipline" is pronounced. Participation increased and the classes got better. (#6)

In a similar vein, 11 pupils reported an improved comprehension in the student-teachers' presence. Here is an example:

I began to understand the lessons better because the trainees are the teachers specialized in their field. (#31)

The pupils wrote down what they liked about the student-teachers in particular and we developed several themes from their answers—student-teachers' help, class management that resulted in discipline and reduced noise, teaching style, activity variety, group work and productivity, motivation, increased self-esteem were deemed to be the desirable aspects of pupils' encounter with student-teachers.

3.6.2. Neutral (no change)

The pupils who appeared to take a neutral position were usually of the opinion that there was not any change after the arrival of the student-teachers.

> Nothing has changed. The same class ... (#57)

3.6.3. Negative changes

The pupils whose reaction toward the changes was negative complained about the uneven turn-giving behavior through which only some pupils are advantaged while others are victimized, passive role of the student-teachers, teachers', and their curriculum mismatch, teachers' poor classroom management and applications regarding technical practice. These negative aspects are grouped in students' negative responses with reference to technical practice. Change of atmosphere, undue responsibilities, student-teachers' anxiety, boring classes, and slow pace were found to be the negative aspects regarding the student-teachers' affect. Moreover, mismatch with the curriculum, classroom management problems due to the pace of the lessons, increased noise, and concentration problems were reportedly prevalent. For instance, one of the pupils (#90) claimed that change of the instructor affected them negatively: *Some people, not everyone, got interested in the lesson. A lot of people complained about "skipping" the lesson because the lessons were always taught by different people.* Another pupil pointed to the classroom management failure after the student-teachers' arrival: *The lessons were slower. Because of the new teachers, some of my friends became naughty* (#92).

> Another pupil comment provided evidence of the anxiety-provoking nature of the change of voice:

> We were anxious as we feared that they would not like us at first but we established rapport soon. My classmates studied more. (#114)

According to the pupils and the cooperating teachers, the least contributors of change were related to the student-teachers' communication with pupils. However, this does not necessarily mean that pupils were not affected by the feelings or emotions of the teachers. A considerable number of pupils did not hesitate to write their student-teacher's name as the main reason for the change which could be indicative the effect of student-teachers. The following a pupil's comments in which the name of the student-teacher was highlighted:

> With the arrival of xxx teacher, we began to like English. Some of my classmates got naughty. We sang songs together and we really loved her. I think she will be a sweet teacher. (#17)

Even though almost all students (95) had a high opinion of the prospective teachers, some held a neutral (9) or negative (10) view of them. Anxiety, which we categorized under teachers' affect in this study, was found to be the most provoking factor for their negative orientations. Although the student-teachers' affect was not considered to be particularly influential in students' reasoning for a change, anxiety as an affective factor played a significant role in creating a negative or distorted perception.

4. Discussion

The data suggest that student teaching can provide a meaningful opportunity for growth and learning both for cooperating teachers and for pupils. It is clear from the responses to the questionnaires that both cooperating teachers and pupils are aware of some growth as a result of student teaching process. The growth becomes clearer with some cooperating teachers' and pupils' reflections. Even though a great number state that they have benefitted from the exchange of ideas and experience of sharing, some of the arguments provided are usually categorized as a one-way flow of exchange. That is to say, the flow of exchange is usually cooperating teacher-based, giving little room for reciprocity. This finding is similar to findings from Kızıldağ (2011) in that the student-teachers failed to provide the required competences due partly to teacher-centered flow of classes. This might be

enriching for the student-teachers as they are subject to this flow; however, ensuring the integration of student-teachers' ideas would be more desirable as new perspectives could widen the horizon. One of the conventional notions of mentoring implies a hierarchy of power relations where the mentee, usually the less-experienced person, is positioned in a "subservient status" (Kochan & Trimble, 2000). In accordance with this view of student teaching, it is not surprising that a one-way relationship could prevail in situations where the traditional wisdom still holds true.

The results also indicate that cooperating teachers' focus is more on their pupils rather than student-teachers and this focus sometimes may reduce their mentoring possibilities. When judging the impact of the student-teachers, cooperating teachers constantly refer to the pupils and they fail to provide an account of their own mentoring responsibility.

When specifying the merits of the practicum process, a considerable number of cooperating teachers refer to either getting familiar with or recollecting some teaching methods and techniques. However, they are not clear about how they benefitted from the methods and techniques in question or whether they exercise the same methods or techniques. Thus, the impressions of method or technique familiarization are superficial in nature.

The data reveal that cooperating teachers lack specific preparation to give quality and professionally appropriate support for student-teachers as emphasized in the literature. For instance, provision of constructive feedback is considered to be a significant characteristic of the cooperating teachers (e.g. Anderson, 2007; Russell & Russell, 2011; Sayeski & Paulsen, 2012; Yavuz, 2011). However, the cooperating teachers in the study did not reveal anything specific about the feedback they provided and the word "feedback" was uttered by only one teacher, which suggests that feedback provision does not gain the emphasis it deserves. For this study, the support does not go beyond the exchange of ideas, as many comments indicate a one-way flow. In addition, the roles assigned to cooperating teachers appear to support the one-way flow in question.

The data also point out that pupils usually credited the student-teachers' impact on themselves whereas the cooperating teachers usually credited technical practice of the trainees as the source of change. It is worth noting that there were teachers who provided reference to the two-way nature of the practice teaching arguing that the process was mutually fruitful. Cooperating teachers' inspiration, especially by the techniques used by the student-teachers takes us to consider the benefits of the process on the part of the cooperating teachers. When these benefits are compared with pupils' accounts, similarities become more visible (see Table 4). This could partly be attributed to the

Table 4. Similarities between the perceptions of pupils and cooperating teachers about the student-teachers' activities	
Pupils' accounts	**Teachers' accounts**
After the arrival of trainees we were exposed to new teaching styles and this improved our productivity. Through various activities we made a lot of practice. (#109)	I like learning new techniques and methods from student-teachers. (#3)
I like it in this way. We like all games. (#39)	I have eight years of experience on being an English teacher and this is the first time that I have worked as a cooperating teacher. This year was such a year that I felt as I burnout on my occupation. Working with university students brought me new blood and I summoned up my energy as I learned some new and valuable ideas from them. (#13)
Lessons got more enjoyable after meeting new trainees; there were many activities and we understood the lessons better. (#87)	That's a useful experience for me. I got the chance of learning their ideas about teaching and learning profession. (#17)

achievement of the desired outcomes of "Teaching English to Young Learners" course recently introduced in English language teaching programs in Turkey. Through the course, student-teachers are given further opportunities to feel the pulse of the students and make their lessons more engaging.

5. Conclusion

Wide range support in the community and its popularity with student-teachers puts some important burdens and emphasis on the process of practice teaching. Therefore, practice teaching is a high impact experience and a period of intense learning and growth if it is done professionally. However, if it is done at a superficial level and it is imprecise, student teaching becomes a real source of deep dissatisfaction for many parties included in the process (e.g. student-teachers, cooperative teachers, teacher educators).

When student-teachers face the realities of classroom life, they need immediate help. And at this highly critical period, the person or the source of information ready to provide the necessary help and guidance is the cooperating teacher. Therefore, the effective availability of the cooperating teacher in the transformation process of the student-teacher into the teaching profession is pivotal.

The unavailability of cooperating teachers to help the student-teachers in time of need is an important concern of the student teaching process. The data reveal that, though not questioned directly, many of the cooperating teachers have no proper training to guide student-teachers. This tendency becomes evident when the cooperating teachers preferred to jump into the teaching methods and techniques when judging the student-teachers' efforts rather than provide something specific regarding the fulfillment of their own and student-teachers' responsibilities. Sometimes teachers accept the supervision of student-teachers not because they are committed to the practicum task, but basically for the additional payment. The task of a cooperating teacher is not as simple as it looks since "mentoring is not a straightforward extension of being a school teacher" (Arnold, 2006, p. 117).

The selection of cooperating teachers must meet two important criteria; effective classroom teaching skills and effective supervision skills. Teachers should have positive attitudes toward guiding and helping students in order to establish a sound supervisory contact. It should be noted that having effective classroom teaching skills does not always result in having effective supervisory skills.

Although much has been written about student teaching, we really have very little systematic or empirical knowledge about it. On the one hand, by examining the data of both the cooperating teachers and the pupils in student teaching classrooms, this study contributes to our understanding of what cooperating teachers and pupils feel about this important process. On the other hand, the findings from the study should be interpreted with caution as this is a qualitative research which relied heavily on individual's perspectives; the quest for generalizability is not applicable to this study.

An investigation of the nature and effectiveness of cooperating teachers' supervision, as perceived by both student-teachers and cooperating teachers themselves could be very useful to find out some interesting results about their perceptions and expectations in order to complete the whole picture of student teaching. Although the selection of the cooperating teachers was not subject to a methodological treatment in this study, the selection of cooperative teachers should be carried out with caution in order to guarantee the quality of the supervision given to the student-teachers. Further studies could be carried out to specify and find out the selection process and the criteria of cooperating teachers. Although there are a lot of number of student-teachers and rather limited budget for cooperative teachers which make it difficult to assign one student-teacher to one cooperative teacher. Still faculties of education should be more selective of both the schools and the cooperative teachers they send their students to. There should be certain criteria for both choices in order to ensure that students who undergo their practice teaching process will be able to make the most out of this very important part of their professional life (Duquette, 1994; Sayeski & Paulsen, 2012).

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Note
1. Although different terms have been used for the
   role of cooperating teacher, such as, school advisor,
   school-based teacher educator, mentor, etc. the most
   commonly used term in the literature is cooperating
   teacher and therefore this term will be used throughout
   the article.

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Measuring classroom management expertise (CME) of teachers: A video-based assessment approach and statistical results

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Abstract: The study aims at developing and exploring a novel video-based assessment that captures classroom management expertise (CME) of teachers and for which statistical results are provided. CME measurement is conceptualized by using four video clips that refer to typical classroom management situations in which teachers are heavily challenged (involving the challenges to manage transitions, instructional time, student behavior, and instructional feedback) and by applying three cognitive demands posed on respondents when responding to test items related to the video clips (accuracy of perception, holistic perception, and justification of action). Research questions are raised regarding reliability, testlet effects (related to the four video clips applied for measurement), intercorrelations of cognitive demands, and criterion-related validity of the instrument. Evidence is provided that (1) using a video-based assessment CME can be measured in a reliable way, (2) the CME total score represents a general ability that is only slightly influenced by testlet effects related to the four video clips, (3) the three cognitive demands conceptualized for the measurement of CME are highly intercorrelated, and (4) the CME measure is positively correlated with declarative-conceptual general pedagogical knowledge (medium effect size), whereas it shows only small size correlations with non-cognitive teacher variables.

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PUBLIC INTEREST STATEMENT

Classroom management is one of the most important tasks teachers have to master. Adequate mastery is clearly related to student achievement, whereas insufficient mastery may lead to teacher stress and burnout. From previous research on teacher expertise, we know specific teacher knowledge of the learning environment and their knowledge of procedures for adequate classroom management are highly relevant. This study aims at developing and exploring a novel video-based assessment that captures teachers' classroom management expertise (CME) and for which statistical results are provided. Thus, the article and its research orientation as well as empirical findings point toward a new form of assessment regarding a central issue of teachers' daily work. This form of discourse can serve as a powerful context and as an important channel for improving challenges of teaching. It supports the debates and efforts about the clarification of what teachers should learn, know, and be able to do.

Subjects: Classroom Management & Organisation; Education; Educational Research; Teaching & Learning

Keywords: classroom management; general pedagogical knowledge; teacher expertise; video clips; test; assessment

For the past decades, the interest in doing research on the measurement of cognitive elements of teacher competence has been growing, as systematic literature reviews demonstrate [e.g. Blömeke and Delaney (2012), for the knowledge of mathematics teachers and König (2014), for teachers' general pedagogical knowledge (GPK)]. One major reason for this is the understanding that knowledge is required for effective teaching, as the research on teacher expertise shows (e.g. Berliner, 1986, 1992; Bromme, 1992, 2001; Carter, Cushing, Sabers, Stein, & Berliner, 1988; Hogan, Rabinotwitz, & Craven, 2003; Klein & Hoffman, 1993; Sabers, Cushing, & Berliner, 1991). For the majority of relevant studies, however, the classical paper-and-pencil assessment represents the dominating paradigm (e.g. Baumert et al., 2010; Hill et al., 2008; König & Seifert, 2012; Tatto et al., 2012) not least because it enables an efficient and reliable way to measure declarative-conceptual knowledge in large samples. For example, in 2008, the *Teacher Education and Development Study – Learning to Teach Mathematics* (TEDS-M) was carried out under the supervision of the *International Association for the Evaluation of Educational Achievement* (IEA). TEDS-M was a comparative study of teacher education and the first IEA study on tertiary education as well as the first international large-scale assessment of future teachers that worked with representative samples (Tatto et al., 2012). The TEDS-M target population were mathematics teachers for elementary and middle schools in their final year of teacher education. More than 20,000 future teachers from 17 countries worldwide were tested using paper–pencil instruments measuring their mathematical content knowledge (MCK), mathematical pedagogical content knowledge (MPCK), and GPK. In TEDS-M, MCK covers the main mathematical areas relevant for future teachers, MPCK refers to curricular knowledge, knowledge of lesson planning, and interactive knowledge applied to teaching situations, and finally GPK is structured in a task-based way, i.e. referring to knowledge teachers need to prepare, structure, and evaluate lessons ("structure"), to motivate and support students as well as manage the classroom ("motivation/classroom management"), to deal with heterogeneous learning groups in the classroom ("adaptivity"), and to assess students ("assessment") (for more details, see König, Blömeke, Paine, Schmidt, & Hsieh, 2011; Tatto et al., 2012).

However, the measurement of context-dependent, procedural teacher knowledge goes beyond the limited scope of classical paper-and-pencil assessments (Blömeke, Gustafsson, & Shavelson, in press; Shavelson, 2010). This is especially true when looking at an action-orientated teacher skill such as effective classroom management. To account for such methodological concerns, a major current focus in the measurement of teacher knowledge and skills is the shift from paper-and-pencil tests to the implementation of instruments using video clips of classroom instruction as item prompts: such studies use videos as a stimulus in the item stem, an assessment format which is frequently referred to as "video-vignette" or "video-cued testing". Video-based assessment instruments are used to address the contextual nature and the complexity of the classroom situation. They are considered to improve the measurement of teacher knowledge when compared with the classical paper-and-pencil test (König, 2014).

Several studies (e.g. Kersting, 2008; König, Blömeke, Klein, Suhl, Busse, & Kaiser, 2014; Seidel, Blomberg, & Stürmer, 2010) have already adopted this approach to provide a more ecologically valid measurement of teacher knowledge and to intend to measure knowledge that is more of a situated nature (Putnam & Borko, 2000). The study by Kersting (2008) examines a video-analysis instrument to measure teacher knowledge of teaching mathematics. Among other findings, evidence is provided the instrument is reliable and a variety of video clips can be used to measure a homogeneous construct. The study by König et al. (2014) examined the relationship of mathematics teachers' general pedagogical skills to notice and interpret typical classroom situations from a pedagogical perspective. As expected, the skill to notice and the skill to interpret are of different quality. This shows that what a teacher knows and is able to do is of multidimensional nature, a finding that

should be accounted for by any assessment instrument measuring teacher knowledge. In the study by Seidel et al. (2010), a video-based assessment instrument was evaluated by student teachers and in-service teachers regarding its usability. Overall acceptance was good. Pre-service teachers as well as in-service teachers evaluated the classrooms situations shown in the video clips as being a helpful tool to analyze lessons, and to discuss teaching and learning. Video clips were regarded as being meaningful authentic, and interesting.

With the growing popularity of video-based measurements in the field of teacher knowledge research, it is essential to establish a convincing empirical rationale for their implementation. However, the theoretical and methodological advantage delivered by using video clips remains to be specified. To expand previous research, our study aims to address the measurement of situational knowledge in teachers by proposing a video-based approach for testing pedagogical knowledge and skill required for successfully meeting the specific requirements involved in effective classroom management.

As for example TEDS-M shows teacher knowledge about classroom management can be assigned to the broader understanding of GPK, whereas in turn GPK has been defined as one of the central cognitive components of professional teacher competence (Blömeke et al., in press; Tatto et al., 2012). Since such a conceptualization of teacher competence is based on research on teacher expertise, in the following we consider that classroom management expertise (CME) belongs to the area of GPK thus contributing to an essential component of professional teacher competence. Research on classroom management in general has triggered broad interest, as for example the corresponding handbook by Evertson and Weinstein (2006) demonstrates. Meta-analyses of empirical studies have repeatedly shown adequate mastery of classroom management is clearly related to student achievement (e.g. Hattie, 2012; Wang, Haertel, & Walberg, 1993). By contrast, insufficient mastery may lead to teacher stress and burnout (e.g. López et al., 2008). Successful classroom management depends on the teachers' ability to identify and interpret the critical aspects of the teaching learning process (Kounin, 1970). Knowledge in relation to classroom management refers to an "intellectual framework" (Doyle, 1985, p. 33), consisting of knowledge of the learning environment and procedures for adequate classroom management, which teachers have to acquire rather than an accumulation of isolated scripts and facts such as "don't smile before Christmas". The importance of CME as being part of a teacher's professional competence has been addressed by some studies on teacher competence measurement (König et al., 2011; Voss, Kunter, & Baumert, 2011). Although these studies seize classroom management as an important aspect of teachers' GPK, none of them have started to conceptualize teachers' situational knowledge of classroom management extensively. As a consequence, the measurement of classroom management has not only been limited to the paper-and-pencil approach predominantly, but it has also been kept a subordinated construct of GPK. This becomes critical when a measure of CME conceptualized as a self-contained construct is needed, for instance, for doing specific research on the effectiveness of professional development of teachers in the field of classroom management.

To establish the theoretical rationale for our study, a specification of pedagogical knowledge and skills required for successful classroom management was developed (cf. König & Lebens, 2012). Building on previous research showing expert teachers systematically perceive and interpret classroom events and sequences differently from novices, three cognitive demands that will be outlined in the following were distinguished: "accuracy of perception", "holistic perception", and "justification of action".

First, from the research on teacher expertise which has proven to be valid across different subjects and countries, it is well known that expert teachers outperform novice teachers in recalling meaningful instructional details (Klein & Hoffman, 1993; König & Lebens, 2012). Expert teachers' categorical perception with which phenomena, events, or sequences are cognitively divided into relevant units for perception (e.g. Bromme, 1992) supports them to focus on the *relation* between knowledge elements rather than on discrete elements. Repeated activation of schemata strengthens connections between elements within a schema and support enhanced activation of knowledge for categorizing new information when salient cues are present. Since connectivity and complexity of schemata

required for identifying and categorizing information evolve with practice (e.g. Dehoney, 1995), "accuracy of perception" is an indicator of expertise. Consequently, it can be reasonably assumed that expert teachers identify relevant instructional situations seen in a video-vignette assessment more precisely and correctly than do novices (Sabers et al., 1991).

Second, expert teachers can be characterized by a more "holistic perception" compared to novices (Bromme, 2001; König & Lebens, 2012): they reconstruct and anticipate the context of instruction and engage in reflecting alternative problem-solving strategies. Whereas novice teachers observe classroom situations step by step due to the fragmented structure of their knowledge, experts have an intuitive grasp of the situation since their knowledge is highly interlinked (Bromme, 1992). More specifically, prior knowledge of experts organized in schemata is employed during perception to form a cognitive representation of the situation (Putnam, 1987). By contrast, novices, whose knowledge structures for constructing a mental framework have not yet been developed, are likely to experience difficulties in reconstructing the context of instruction.

The third dimension of cognitive demands ("justification of action") refers to the functional interpretation of instructional events and sequences that depends on reasoning about the instructional intention and rationale amidst the context of classroom teacher–student interaction (Berliner, 1992). Although the functional interpretation of actions is rarely explicated in everyday teaching situations, it can be accessed from long-term memory (Bromme, 1992). In contrast to teachers' holistic perception, the interpretation of events goes beyond generating mental representations, since it strongly depends on reframing and transforming knowledge (König et al., 2014). Whereas the holistic perception can be described as a perceptive-representational process, the interpretation of events refers to transformative processes.

Besides these three cognitive demands relevant for measuring CME, a variety of typical classroom management situations are needed to assure content-related breadth of the assessment. So the video clips used for the assessment in our study refer to typical classroom management situations in which teachers are heavily challenged [following classifications provided by Hawk and Schmidt (1989), Swartz, White, Stuck, and Patterson (1990), and Doyle (2006)], involving to manage transitions, instructional time, student behavior, and instructional feedback. Although each video can be assigned to one of these situations, they also include aspects of the other situations. For example, one video clip focuses on the transition of instructional phases, a central dimension of classroom management supposed to run smoothly and effortless provided that classroom management is effective (Kounin, 1970). It first displays a class working on different group tables. Then, introduced by an acoustic signal, the teacher is displayed. She instructs the students to finish group work, to carry out a relaxation task, and announces the presentation phase of the lesson. Although the clip is very short (about 1 min), besides managing transitions, the teacher also has to manage instructional time and student behavior in that specific situation.

This study aims at developing and exploring a novel video-based assessment that captures teachers' CME conceptualized via a matrix of cognitive demands and classroom management situations. We examine the following questions:

(1) Does the assessment instrument measure the CME construct in a reliable way?
(2) When using four video clips as item prompts, do any testlet effects related to the four video clips occur?
(3) To what extent are the three cognitive demands intercorrelated?
(4) Can evidence be provided for criterion-related validity of the measurement instrument?

Examining these issues, we use the following assumptions: (1) CME can be measured using a video-based assessment in a reliable way. (2) The CME total score represents a general ability that is not or almost not biased by testlet effects related to the four video clips. (3) Due to the connectivity

of teacher knowledge and skills, the three cognitive demands conceptualized for the measurement of CME are highly intercorrelated. (4) Considering convergent validity (Campbell & Fiske, 1959), an examination of the correlation between CME and general pedagogical is of great interest. Since GPK involves "broad principles and strategies of classroom management and organization that appear to transcend subject matter" as well as knowledge about learners and learning, assessment, and educational contexts and purposes (Shulman, 1987, p. 8), CME can be regarded as a construct that is located in the field of GPK, but due to its specific definition it covers a segment of that knowledge only. Thus, we assume the CME measure is positively correlated but not identical with declarative-conceptual GPK. Moreover, CME should be positively correlated with teacher self-efficacy. Self-efficacy is used since it can be regarded as a protective factor for mental health and resilience (Schwarzer & Hallum, 2008). Following the state-of-the-art literature, it can be assumed that ineffective classroom management strategies are linked to poor self-efficacy beliefs leading to a vicious cycle of motivational and professional deficits. Therefore, besides teacher self-efficacy, also teacher burnout scales are used as a non-cognitive criterion measure. Teacher burnout has already been investigated with the challenge of classroom management, e.g. regarding the question of how to deal with disruptive behavior of students (López et al., 2008). Following this research, we also assume CME is negatively correlated with teacher burnout scales taking into account that, besides self-efficacy, it may represent another protective factor for teacher burnout. However, accounting for discriminant validity (Campbell & Fiske, 1959), we assume only small effect size correlations between our CME measure and non-cognitive teacher variables such as self-efficacy and burnout scales.

1. Method

1.1. Sample

In 2013, one elementary and two secondary schools in the greater area of Cologne, Germany, agreed to participate in our study. The whole teaching staff of each of the three schools was tested. The schools varied with respect to size from 15 teachers and 19 teachers to 85 teachers. The sample consists of 119 teachers. 90 of them (77%) are female. By average, they are 44.1 years old (SE = 1.1, SD = 11.9, min = 25.0, max = 64.0) and have taught for 16.7 years at school (SD = 12.0, min = 1.0, max = 41.0).

1.2. Data collection and procedures

The three schools that agreed to participate were asked to assembly their teaching staff for one hour. One test session per school was conducted. The survey was administered by a research assistant who was a member of the project team. Teachers first had to complete a background questionnaire containing variables such as age, sex, and teaching experience. Second, the CME instrument was administered with a total duration of 20 min allowing 5 min for watching one video clip and responding to the corresponding test items. The four video clips are very short (they vary between 1 and 2 min in length). Each video clip was presented only once, and respondents were only allowed to read test items related to a video clip when they had already watched that clip. This procedure assured that video clips were used as item prompts in a standardized way and teachers had to respond to test items immediately after having watched the correspondent clip. Test time of 20 min was appropriate since none of the teachers got bored or had to rush. Third, teachers had to complete a paper-and-pencil instrument measuring their GPK, which took another 20 min. Finally, they had to complete a questionnaire containing non-cognitive teacher variables such as teacher self-efficacy and burnout.

1.3. Measures

In this study, we investigate a new measurement instrument that captures the CME of teachers using video clips of classroom instruction as item prompts followed by paper-and-pencil test items to be responded to. As criterion measures we use a cognitive measure and non-cognitive teacher variables. As a cognitive measure, a test measuring teachers' GPK for teaching is applied, consisting of paper-and-pencil test items only. Teacher efficacy and burnout scales are used as non-cognitive teacher variables.

1.3.1. CME video-based assessment instrument

The CME measurement instrument consists of four video clips of classroom instruction that refer to typical classroom management situations in which teachers are heavily challenged. These video clips were carefully selected from a pool of video clips available to the research team. For conceptual reasons, the selection procedure applied mainly intended to follow classifications of typical classroom management situations found in the literature (Doyle, 2006; Hawk & Schmidt, 1989; Swartz et al., 1990): the video clips had to represent authentic and comprehensive situational information of classroom instruction in which a teacher is challenged (1) to manage transitions, (2) to manage instructional time, (3) to manage student behavior, and (4) to manage instructional feedback. Whole-class interaction teaching situations were preferred, as in terms of effective classroom management they are more complex and thus more challenging for teachers than private work-time situations during which a teacher assists a single student or a group of students (Kounin, 1970). The video clips had to represent a variety of classroom contexts (regarding school grade, school subject, composition of the learning group, and age of teacher), not least in order to detain respondents from getting used to one specific situational context during assessment. Besides conceptual issues, technical criteria had to be met, too. The video clips had to be of good quality both visually and acoustically, they had to represent usual events somehow familiar to every experienced school teacher, they had to be short and self-contained for research-related economic reasons. In a pilot study (König & Lebens, 2012), these criteria were issued by conducting an expert review before the procedure of selecting appropriate video clips was started. The video clips do not come along with complementary information about the teacher, the learning group or the lesson, since our idea to measure CME was to stick as closely as possible to the situation presented via video and to not distract respondents from perceiving the concrete classroom instruction.

Test items were developed for each video clip covering the three cognitive demands outlined above (accuracy of perception, holistic perception, and justification of action). In total, 27 test items were developed. Seven are multiple-choice response (MCR) and 20 are open-response (OR) items. Accuracy of perception is measured by 15, holistic perception by 8, and justification of action by 4 test items.

Coding rubrics were developed for the OR items in a complex and extensive interplay of deductive (from our theoretical framework) and inductive approaches (from empirical teacher responses). In a pilot phase, codes from several independent raters were discussed in detail and coding rubrics were carefully revised and expanded. Thus, the coding manual is theoretically based as well as data-based. The codes were intended to be low-inferent thus allowing to code every response with the least possible amount of inferences by the raters.

Coding rubrics for OR items consist of one criterion, two criteria or more than two criteria. If the single criterion is met by the response provided by the respondent, then the rater has to code this criterion with 1. If it is not met, a 0 will be given. Six test items were coded by one criterion, six test items by two criteria, and seven by more than two criteria (another two OR test items later turned out to be inappropriate for scaling analysis). Coding criteria of test items with two or more than two criteria were summed up thus having partial-credit items. For example, a test item with two coding criteria was transformed to a test item with full credit (coded with 2) and partial-credit (coded with 1). Therefore, in this case, if a response fulfilled the two criteria, a 2 was given; if a response fulfilled only one of the two criteria, a 1 was given no matter which of the two criteria was met; and if none of the two criteria were met, a 0 was given. Test items with more than two criteria to be coded received sum scores ranging from 0 to the number of criteria summed up. Theoretically, three items range from 0 to 3, one item ranges from 0 to 4, two items range from 0 to 5, and one item ranges from 0 to 7.

However, when doing frequency analysis and exploratory scaling analysis, it turned out that these differentiations were not needed, i.e. they did not substantially contribute to the improvement of item fit statistics. For example, in case of the item with a theoretical range from 0 to 7, it turned out

the empirical range was 0 to 4 only. As a consequence, partial-credit items were recoded to dichotomous items, i.e. additional categories were collapsed. For this, two different strategies were applied depending on the frequency distribution of each item: either full credit (1) was given for all responses fulfilling at least one criterion or, in case this led to a better discrimination index and frequency distribution full credit (1) was given for all responses that met two or more criteria.

All OR items measuring CME were coded on the basis of the coding manual. For the coding of the 19 OR items, we finally use in the analysis of this article (see Section 1.3.2), in total, 48 coding categories were applied. First, two raters were trained with example responses from a previously conducted small pilot study and thus learned about the principles of how to use the coding manual. When they were familiar with the coding procedure, they coded teachers' responses provided to OR test items of this study. Thirty questionnaires (25% of all questionnaires) were randomly selected and coded by the two raters who then coded the responses independently of one another. As a measure of consensus and internal consistency, Cohen's κ was estimated. For the 48 coding categories, it ranges from .29 to 1.0 with an average of $M_{\kappa} = .80$ (SD$_{\kappa} = .21$). There were only four coding categories that felt below a κ value of .5, whereas 33 of the 48 coding categories had a κ value of .7 or higher. This can be regarded as a good result (cf. Fleiss & Cohen, 1973; Landis & Koch, 1977) and thus confirms the quality of the coding rubrics. If conformity of raters was lacking, an agreement between the raters was obtained in collective discussion, calling on an expert if necessary. The four coding categories with a κ value below .5 were flagged and thus very carefully applied when all other questionnaires were processed. However, there were no subsequent coding problems with these categories.

1.3.2. Cognitive criterion measure

To account for a cognitive criterion measure in the domain of general pedagogy which includes the issue of classroom management (Grossman & Richert, 1988; Shulman, 1987), we applied the paper-and-pencil test measuring GPK of teachers that was developed in the context of TEDS-M (König et al., 2011).

The theoretical framework of GPK is structured in a task-based way and related to generic dimensions of teaching quality. Thus, four content-related dimensions of GPK are considered highly relevant allowing teachers to prepare, structure, and evaluate lessons ("structure"), to motivate and support students as well as manage the classroom ("motivation/classroom management"), to deal with heterogeneous learning groups in the classroom ("adaptivity"), and to assess students ("assessment"). Additionally, three dimensions of cognitive processes describing the cognitive demands on teachers when dealing with such generic classroom situations were defined following Anderson and Krathwohl (2001): to retrieve information from long-term memory in order to describe the classroom situation; to understand or analyze a concept, a specific term or a phenomenon outlined; and to generate strategies for how they would solve the problem posed (for more details, see König et al., 2011). Generic dimensions of teaching quality and cognitive demands made up a 4×3 matrix which served as a heuristic for the development of the GPK paper-and-pencil test items.

In this study, a short form of the TEDS-M GPK test as described in König et al. (2011) was applied. For this, a selection of test items was used to reduce the test length to 20 min due to data collection constraints. On the basis of TEDS-M data, test items were carefully selected according to several criteria (such as range of item difficulty, variety of item format, differentiation into content-related dimensions and cognitive processes) in order to leave the GPK overall test construct unchanged. After having selected test items, this short form of GPK test was examined using TEDS-M data. Since findings showed it was possible to create a reliable overall test score and item fit statistics computed in a one-dimensional item response theory (IRT) scaling analysis using the software *ConQuest* were good, we assume the short form of the GPK test to be a valid cognitive criterion measure for our study. When applied to the teacher sample of our study, classical item analysis was conducted over the 31 items. Internal consistency was estimated at .758, which is a good result taking into account that only about half the test items of the original instrument were included into this short form.

1.3.3. Non-cognitive criterion measures

To examine relationships between CME and non-cognitive teacher variables, two constructs that had already been subject to research in the area of teachers' challenge to manage the classroom were focused on: teacher burnout and teacher self-efficacy. Teacher self-efficacy was measured using the scale developed by Schwarzer, Schmitz and Daytner (1999) consisting of 10 items (e.g. "Even if I am disrupted while teaching, I am confident that I can maintain my composure and continue to teach well." α = .777). The Maslach burnout inventory (MBI; Maslach, Jackson, & Leiter, 1996) was used to assess the three burnout dimensions depersonalization (five items; e.g. "I feel I treat some students as if they were impersonal objects", α = .777), reduced personal accomplishment (eight items; e.g. "I have not attained important goals with my work", α = .688), and emotional exhaustion (nine items; e.g. "I feel emotionally drained from my work", α = .878). All scales were administered using a four categories response format ("not at all true", "barely true", "moderately true", and "exactly true").

2. Results

2.1. IRT analysis

IRT analyses were done with the scaling software *ConQuest* in order to carefully investigate item characteristics. Three out of 27 test items did not show satisfying psychometric statistics and thus were excluded. The final scaling model using a one-dimensional Rasch model includes 24 dichotomous test items, 19 OR items, and 5 MCR items.

The one-dimensional model and its results show it is possible to create an overall CME test score. The reliability is acceptable (EAP-reliability .699, WLE-reliability .706, Cronbach α .700) and the variance of the latent variable is sufficiently large (θ-Variance .601). Taking into account this measurement instrument is a kind of performance assessment mainly using OR items rather than a declarative knowledge test, such reliability and variance values can be regarded as good results. Besides, item fit statistics (Table 1) show that item estimation parameters spread over a range of more than four logits (from −1.778 to 3.163), which is a good result (cf. Bond & Fox, 2007), and item discrimination is .36 by average. The four items with a discrimination index below the value of .3 were kept in the scaling model for theoretical reasons, but also because they are clearly above the value of .2, which is still acceptable. Fit statistics of all 24 items are good, since the weighted mean square (MNSQ) of each item falls into the acceptable range between .94 and 1.07, and there is no statistically significant *t*-value (−1.96 < *t* < 1.96). Item estimate parameters were examined with regard to mean and median differences in item assignment to one of the four video clips, item format (OR vs. MCR), and item assignment to one of the three dimensions of cognitive demands (accuracy of perception, holistic perception, and justification of action). As significance tests showed, there were no statistical significant differences related to these differentiations.

2.2. Testlet effect analysis

Video-based assessments capturing situated teacher knowledge are challenged by the question whether there is a homogeneous ability across the items related to the various situations of classroom instruction presented by the video clips. Thus, the question arises whether any testlet effects may exist in our assessment approach (Sireci, Thissen, & Wainer, 1991). In our study, a testlet is defined as a cluster of items that share one video clip as a common context. If there are testlet effects, then items might measure something in common beyond the trait measured by the test as a whole.

Our hypothesis is that since CME as measured with our approach is a teacher skill widely independent from the specific subject or age group, there should be no or almost no effects evolved with the individual video clip of the assessment, because the selected situations have many aspects in common. That is, although each of the video clips brings to the front one of the typical classroom management situations in which teachers are heavily challenged (managing transitions, instructional time, student behavior, and instructional feedback), the other challenges are also involved.

Table 1. Item fit statistics from one-dimensional IRT scaling analysis

Item	Clip	Format	Cognitive demand	Estimate	SE	Weighted MNSQ	t-value	Discrimination Index	Facility (%)
12	3	OR	A	−1.778	.206	.99	.0	.36	89.08
24	4	OR	J	−1.527	.853	1.01	.1	.31	86.55
2	1	OR	A	−1.446	.195	1.04	.3	.24	85.59
4	1	OR	A	−1.308	.191	1.01	.1	.34	84.03
19	4	OR	A	−1.308	.191	.98	−.1	.36	84.03
16	3	OR	A	−1.239	.189	.94	−.3	.45	83.19
7	2	MCR	H	−.939	.180	1.02	.2	.35	78.99
1	1	OR	A	−.879	.179	.95	−.4	.47	77.97
9	2	OR	A	−.830	.178	1.01	.1	.35	77.31
5	1	OR	J	−.779	.176	.99	−.1	.39	76.47
6	2	OR	A	−.628	.173	1.08	.8	.26	73.95
10	3	MCR	A	−.628	.173	1.07	.7	.30	73.95
21	4	MCR	H	−.140	.164	1.00	.0	.38	64.71
8	2	OR	A	.063	.162	1.03	.4	.35	60.50
20	4	OR	H	.141	.161	.98	−.3	.39	58.82
13	3	OR	A	.374	.160	1.07	1.1	.32	53.78
23	4	MCR	H	.563	.160	.97	−.5	.43	49.58
18	4	OR	A	.986	.162	.96	−.6	.45	40.34
3	1	OR	J	1.206	.165	1.04	.5	.28	35.59
11	3	OR	H	1.228	.164	1.02	.2	.36	35.29
14	3	OR	A	1.484	.168	.96	−.5	.47	30.25
22	4	MCR	H	2.022	.180	1.02	.2	.30	21.01
15	3	OR	J	2.198	.185	.98	−.1	.36	18.49
17	4	OR	A	3.163	.215	1.00	.1	.26	8.40

Notes: OR is the open response item and MCR is the multiple-choice item.
A is the accuracy of perception, H is the holistic perception, and J is the justification of action.

Therefore, we assume that a multidimensional model specifying each video clip as a latent variable should not necessarily fit better to the data than a model that specifies only one general latent variable. To analyze this in depth, we will also specify a third model with a second-order factor reflecting CME as a general factor.

In order to analyze possible testlet effects, confirmatory factor analysis with categorical factor indicators was carried out using the software *Mplus* which in contrast to *ConQuest* provides several fit indices to compare models with different factor solutions. Analysis showed that the testlet factor model, i.e. a four-factor model in which test items of one video clip were assigned to one factor specifically, did turn out to be slightly better than a single-factor model (single factor model (model 1): $\chi^2/df = 1.119$, $p = .094$, RMSEA = .032, WRMR = .930; testlet factor model (model 2): $\chi^2/df = 1.085$, $p = .172$, RMSEA = .027, WRMR = .894). However, the testlet factor model with an additionally specified second-order factor (model 3) also fitted well to the data ($\chi^2/df = 1.084$, $p = .173$, RMSEA = .027, WRMR = .899). Intercorrelations between the four testlet factors in model 2 are relatively high (.542/.569/.649/.731/.848/.899) and every testlet is highly (>.73) correlated at least with one other testlet factor. In model 3, CME is measured as second-order factor with factor loadings that are all greater than .7 (.706/.786/.911/.971). So the latent second-order factor can explain 83.0% of testlet 1, 94.3% of testlet 2, 61.7% of testlet 3, and 49.9% of testlet 4. To conclude, although slight testlet effects occur, we predominantly see evidence from these confirmatory factor analyses to justify modeling the CME test as a one-dimensional construct.

2.3. Intercorrelations of cognitive demands

To investigate possible intercorrelations of cognitive demands, another model specifying three latent variables, one for each cognitive demand, was analyzed (model 4). The fit of this model (χ^2/df = 1.104, p = .125, RMSEA = .030, WRMR = .915) is only slightly better than that of model 1 reported in the previous section (χ^2/df = 1.119, p = .094, RMSEA = .032, WRMR = .930). The holistic perception is more highly correlated with the accuracy of perception (.743) than with the justification of action (.447). The difference of the two correlations is statistically significant (z = 6.256, $p \leq .05$). By contrast, there are no statistically significant differences between the correlation of accuracy of perception with holistic perception (.743) and the correlation of accuracy of perception with justification of action (.775). To compare differences in height of correlations, the significance test proposed by Meng, Rosenthal, and Rubin (1992) was applied.

Again, this model 4 was analyzed with a second-order factor specified (model 5). The overall model fit remains almost the same (χ^2/df = 1.104, p = .124, RMSEA = .030, WRMR = .933). Interestingly, the three latent variables are measured with similar factor loadings for the precision of perception (.949), the holistic perception (.862), and the justification of action (.805). Since they are all greater than .8, this allows the interpretation that all three cognitive demands are significant constituents of the overall construct of CME. However, the variance explained differs from 90.1% (precision of perception) to 74.3% (holistic perception) to 64.8% (justification of action). So obviously, much of CME is related to the skill of perception.

2.4. Criterion-related validity

Criterion-related validity was examined first by correlational analysis with the TEDS-M GPK paper-and-pencil test, then by an intercorrelation analysis with the non-cognitive teacher variables teacher self-efficacy and burnout. Teachers' score in the video-based assessment of their CME was compared with their scores in the GPK paper-and-pencil test (using CME and GPK as manifest variables due to limited capacity of sample size). There is a positive, statistically significant correlation of medium size between CME and GPK (r = .470; $p \leq .001$) leading to the assumption our video-based assessment approach to measure CME is not independent from teachers' declarative-conceptual knowledge in the domain of general pedagogy as measured by the TEDS-M test. Such a correlation shows that the two constructs have something in common but are not identical. Their covariance is about 22%, but about 78% of their variance does not change together.

In another analysis, the relationship between CME and non-cognitive teacher variables was investigated. As expected, CME is positively correlated with teacher self-efficacy and negatively correlated with the three burnout scales (again all scales were used as manifest variables). However, these correlations were only of small effect size (.1 ≤ |r| < .3) and only correlations with two of the burnout scales were statistically significant (−.232 for reduced personal accomplishment and −.283 for depersonalization, each $p \leq .01$), whereas the third burnout scale measuring emotional exhaustion (−.139, p = .122) and teacher self-efficacy (.132, p = .143) were not statistically significant. However, since the direction of these correlations support our assumption of CME as a valid construct, these correlations seem to be an important finding nevertheless.

Moreover, regarding the concept of convergent and discriminant validity (Campbell & Fiske, 1959), we see CME substantially closer correlated with GPK (medium effect size of correlation and convergent validity) than with non-cognitive teacher variables (small effect size of correlations and discriminant validity). This makes CME a valid construct being relatively close to adjacent cognitive teacher measures and being relatively distant (though not completely independently) from non-cognitive teacher measures.

3. Discussion

Classroom management constitutes a central dimension of instructional quality, whereas teachers' knowledge of classroom management is part of their professional competence. Managing the classroom exposes teachers to a range of demands requiring considerable expertise. This study

forwarded methodological consideration regarding the measurement of teachers' CME, supporting the implementation of a novel video-based assessment approach. From a theoretical perspective and in relation to the requirements of classroom management, typical situations of classroom management (managing transitions, instructional time, student behavior, and instructional feedback) and the knowledge-based processing of perceiving and interpreting classroom instruction (accuracy of perception, holistic perception, and justification of action) were conceptualized. CME was empirically investigated by administering a test instrument that consists of four video clips used as item prompts and followed by test items related to these video clips. With our research questions we asked for (1) the reliability of the instrument, (2) possible testlet effects resulting from the four video clips and their corresponding items, (3) the intercorrelations of cognitive demands, and (4) the criterion-related validity of the instrument.

Regarding our first question, findings from IRT scaling analyses show CME of teachers can be measured in a reliable way. Test items are located across a substantial ability range and generally show good item fit statistics. To investigate our second question, testlet effect analysis was done by comparing differently specified latent variable models. A testlet model specifying each video clip as a latent variable using its test items as indicators had a slightly better model fit than a model with only one latent variable using all test items as indicators. However, adding a second-order factor to the testlet model led to a nearly identical model fit which provided further evidence for the assumption of a general factor being behind the measurement of CME. This assumption is also strengthened by the finding that mean and median differences in item parameter estimates of each video clip were not statistically significant, by relatively high intercorrelations between the latent variables specifying each video clip in the testlet model, and the relatively high coefficients of the indicators of the second-order factor. With regards to our third question, cognitive demands were analyzed by comparing latent variable models, too. Accuracy of perception somehow seems to be the basis for the two other cognitive demands, since it is highly correlated with both the holistic perception and the justification of action, whereas holistic perception and justification of action show a medium size intercorrelation only (<.5). So we see our assumption confirmed that teacher knowledge and skills related to classroom management is highly interwoven, but it is also obviously necessary to differentiate teachers' holistic perception (perceptive-representational process) from their functional interpretation of classroom events (referring to processes of reframing and transforming knowledge). This further confirms our theoretical framework. Finally, when examining our fourth question, we found evidence our video-based assessment approach to measure CME correlates with teachers' declarative-conceptual knowledge in the domain of general pedagogy. This is what research in other domains has also shown. Kersting (2008, p. 857), for example, reports a statistically significant correlation of $r = .53$ between a paper-and-pencil test measuring MCK for teaching and a video-analysis instrument to measure teacher knowledge of teaching mathematics. The height of the correlation we found ($r = .47$) was very similar to that reported by Kersting (2008) for the domain of mathematics. So, there seems to be a kind of analogy between the two very different assessments, confirming the construct validity of our approach.

Besides, in TEDS-M, GPK of German future teachers at the end of their initial teacher education was associated with their MPCK [manifest correlation of $r = .30/.30$ (SE = .05/.07) for elementary/middle school teachers, respectively; cf. Blömeke and König (2010) and König and Blömeke (2010)]. Although the correlation reported here between GPK and CME ($r = .47$; SE = .07) was found for a sample of in-service teachers, comparing these correlations leads us to the assumption that GPK and CME have more in common (covariance about 22%) than GPK and PCK (9% covariance). This corresponds well to basic conceptions of how teacher knowledge is differentiated today (cf. Baumert et al., 2010; Shulman, 1987; Tatto et al., 2012): Since our GPK and CME measures are related to one of the three cognitive components of teacher knowledge researchers have identified (namely GPK vs. PCK and CK), they are more strongly interwoven compared with their correlation to one of the other cognitive components of teacher knowledge such as PCK. Accounting for this, we see our initially described consideration supported that CME belongs to the area of GPK thus contributing to an essential component of professional teacher competence.

To conclude, we consider our CME measure not only a research tool capturing a cognitive variable of teachers. Regarding the discussion in which teachers are considered to be the key professionals in the school system, especially when looking at the challenge to provide high-quality opportunities to learn for students (Hattie, 2012; Schleicher, 2011), establishing a specific CME measure may support the debates and efforts about the clarification of what teachers should learn, know, and be able to do (Darling-Hammond & Bransford, 2007). Against this background, our research instrument could be applied in various research contexts. As an educational outcome, for example, it could be used as a measure of teacher education effectiveness research and research on the effectiveness of teacher professional development. As a determinant of instructional quality and student attainment, its predictive validity could be examined. Taking into account adequate mastery of classroom management is clearly related to student achievement (e.g. Hattie, 2012; Wang et al., 1993), the hypothesis of teachers' CME measure predicting what actually happens in the classroom (e.g. captured by student ratings, video analysis of lessons, and indicators for student achievement) should be tested. That kind of research may have significant practical implications, at least for the situation in Germany, where classroom management is not only an important facet of instructional quality, but the challenges for teachers to deal with classroom management issues such as disruptive behavior of students has increased during the last decade as, for example, the PISA cycles have shown (OECD, 2013).

However, limitations of our study should be mentioned, too. First, we applied our novel approach to a sample of 119 teachers only (due to data collection constraints, since in Germany, it is very difficult to test teachers at all). Replication studies using larger samples would be necessary to strengthen our work. Second, although our instrument shows CME can be measured in a reliable way, the slight testlet effects show there is room for improvement of psychometric properties. Presumably, this could be resolved by increasing the number of video clips and test items. For example, when the number of video clips was doubled, the meaning of testlet effects, even if they slightly occur, may decrease because of the larger number of situations and aspects of classroom management involved thus leveling possible effects that come from one or the other testlet.

In future research, our instrument should be applied to samples with different expertise level as well. Close inspection of the test items in Table 1 show that there are 11 items that are relatively easy, since their correct response frequency is 70% or higher. Teachers therefore did not have so much difficulty with about half of the test items. This lets us assume it will be possible to apply the test to pre-service teachers, since it differentiates CME in the lower ability range quite well. Especially, comparisons between in-service teachers denominated as experts (e.g. by school principals) and pre-service teachers who could be regarded as novices have the potential to provide further insights into the quality of our measurement instrument. Currently, such a study is being conducted and first findings are promising, so in the near future we will be able to report further findings on measuring the CME of teachers.

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Creativity fostering teacher behaviour around the world: Annotations of studies using the CFTIndex

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Abstract: Teachers play a critical role in the development of student creativity. How well they play this role depends on whether they demonstrate creativity fostering behaviour when interacting with their students. There is, however, a dearth of suitable instruments for measuring this type of teacher behaviour, although there are many instruments for measuring student creativity. Based on Arthur J. Cropley's nine principles, the *Creativity Fostering Teacher Behaviour Index* (CFTIndex) was developed and trialled with a group of teachers (N = 117) in Singapore. There are evidence showing its internal consistency reliability and concurrent validity. The need for an instrument such as the CFTIndex is witnessed by many studies based using it subsequent to its first publication. The scale has since been used by researchers in America, Canada, Chile, Hong Kong, Korea, Mexico, Nigeria, Turkey and Singapore since its first appearance in the *Journal of Creativity Behavior* in 2000. Creativity researchers have used the CFTIndex for varied purposes, including several Ph.D. theses. This article highlights information directly related to CFTIndex to provide an integrated database and to facilitate future research. Possible further research studies using the CFTIndex are suggested and discussed.

Subjects: Classroom Practice; Research Methods in Education; Teachers & Teacher Education

Keywords: creativity; fostering creativity; measurement; teacher

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This annotation provides a bird's-eye view of studies using the CFTIndex conducted in many countries and languages, with a wide range of students, school teachers and university professors. It helps interested researchers to put their own studies in an international context. The CFTIndex can also be used by teachers and professors to evaluate their own teaching styles for self-reflection.

PUBLIC INTEREST STATEMENT

When teachers behave in a manner that foster creativity, students are likely to respond in a creative manner and thus develop their own creativity. The availability of the CFTIndex by the present author in 2000 has spawned many relevant studies over the decade. However, there is yet a comprehensive review of these studies and the present article is an effort to fill this vacuum. This article is of interest not only to creativity researchers but perhaps more to educators in general who are concerned with developing creativity in the students.

1. Introduction

It is a truism that teachers play a critical role in the development of student creativity. How teachers respond to their students' ideas, views and suggestions during lessons can be expected to have an influence on the students' subsequent effort and inclination in coming up with new ideas, views and suggestions. Well-timed positive teacher responses will naturally encourage students' further efforts while, in contrast, premature and especially negative teacher responses will discourage students from further creative exploration. In short, teachers are in a strategic position to foster creativity of their students, if the teachers are able to and in a habit of demonstrating creativity fostering behaviour in the day-to-day interaction with their students. However, it is also a truism that not all teachers are equipped with such capacity-building behaviour. They may and may not be conscious of the impact of their own behaviour on that of their students where creativity is concerned. They therefore need be aware of their possible influence on student creativity and be trained to demonstrate creativity fostering behaviour in the classroom.

There are many data collection instruments for measuring student creativity but there is a dearth of instruments to measure creativity fostering behaviours of teachers. For instance, *Creativity Based Information Resources: Assessment of Creativity (1994-)* lists 162 items published in the decade from 1994 to 2004. Among these only four (2.5%) references pertain to teachers and CFTIndex is one of the four (The International Center for Studies in Creativity, n.d.). A measure of teachers' creativity fostering behaviours is therefore needed if research in this subfield of student creativity development is to be conducted with rigour and vigour. This entails the need to define and describe creative fostering teacher behaviours first and then develop an instrument based on them.

After an extensive review of the pertinent literature, Cropley (1997) in a paper *Fostering Creativity in the Classroom: General Principles* listed nine conditions necessary for teachers to foster student creativity as follows:

(1) *Independence*: Encouraging students to learn independently;

(2) *Integration*: Having a co-operative, socially integrative style of teaching;

(3) *Motivation*: Motivating students to master factual knowledge, so that they have a solid base for divergent thinking;

(4) *Judgement*: Delaying judging students' ideas until they have been thoroughly worked out and clearly formulated;

(5) *Flexibility*: Encouraging flexible thinking;

(6) *Evaluation*: Promoting self-evaluation in students;

(7) *Question*: Taking students' suggestions and questions seriously;

(8) *Opportunities*: Offering students opportunities to work with a wide variety of materials and under many different conditions; and

(9) *Frustration*: Helping students to learn to cope with frustration and failure, so that they have the courage to try the new and unusual.

Based on these as the conceptual framework, Soh (2000) developed the *Creativity Fostering Teacher Behaviour Index* (CFTIndex) as an effort to fill the vacuum of suitable instruments for measuring teacher behaviour relevant to the above principles. The need for such an interment was thus argued for,

> Where creativity fostering behaviour of teachers is concerned, the lack of suitable measuring instruments will limit the relevant discourse to the philosophical and conceptual levels (which are, of course, important in their own right as a subdomain of creativity research). But, there is also the need to empirically test out the theory, an activity that calls for adequate measurement. (Soh, 2000, p. 119)

Almost one-and-a-half decades have passed since the publication of CFTIndex on 2000. It has been cited and used by many researchers for various purposes who investigated different aspects of creativity development: evaluating the effectiveness of creativity development projects, checking its cross-cultural validity of its translated versions and even as the main instrument for Ph.D. theses. The studies were conducted in various countries in the past few years as listed below:

- America (Edinger, 2008; Lee & Kemple, 2014)
- Canada (Hondzel, 2013).
- Chile (Manriquez & Reivera, 2005).
- Hong Kong (Forrester & Hui, 2007).
- Mexico (Belio & Urtuzuastegul, 2013).
- Nigeria (Olanisimi, Adeniyi, & Olawale, 2011; Olawale, Adeniyi, & Olubela, 2010).
- Singapore (Soh & Quek, 2007).
- Turkey (Dikici, 2013).

The CFTIndex has fulfilled its predicted role in meeting the need of creativity researchers by providing them with a much needed data collection instrument. The articles are scattering here and there in the forms of journal papers, research monographs and doctoral theses, appearing in different sources. The present article is an effort to summarize and highlight information pertaining to the CFTIndex and put them in a form for ready referencing by future researchers.

The highlights are presented in chronological order of the studies. Admittedly, in the process of highlighting and extracting only information directly relevant to the CFTIndex, many of the valuable and interesting information (e.g. the extensive literature review) in the cited publications are inevitably (and reluctantly) excluded. Excluded from this annotation are other articles citing the CFTIndex but not using it as a tool for data collection. Hopeful, this is not misunderstood as doing injustice to the original documents, some of which are full-length Ph.D. theses. Moreover, new studies are likely to appear in time to come (for instance, at the time of writing, there was a request to use it for research purpose from Hong Kong) and an update is necessary in the future. More details can of course be found in the original articles and interested creativity researchers are certainly encouraged to read them in their original forms.

2. Annotations

In developing the Soh's (2000) CFTIndex, the nine principles for creativity fostering teacher behaviour propounded by Cropley (1997) were operationalized in terms of teacher–student transactions. For each of the nine principles, five statements of teacher behaviour in the classroom context were written to depict those teacher behaviours consistent with each principle. Each item was presented with a six-point scale, with 6 for *All the time* and 1 for *Never*. The choice of six points was to discourage the probable tendency of respondents to endorse the neutral mid-point and this, hopefully, would maximize the variance in the scores.

The 45 items formed the 9 subscales, and the CFTIndex as a whole were tested on a group of 117 teachers in Singapore. In this group, there were 26% male and 75% female, with 54% teaching in primary schools and 46% in secondary schools. Of the teachers, 62% had a university degree and a majority (62%) of them taught language while the rest taught science, mathematics and humanities. In terms of age, 40% aged between 20 and 35, and the remaining 60% aged 36 or above. In the multicultural context of Singapore, there were 56% Chinese, 21% Malay, 18% Indian, and 5% Eurasian and others.

Admittedly, the composition of this group of teachers may not be consistent with the composition of Singapore teachers as a whole. Nonetheless, the study did not begin with the intention to *generalize to the population* of Singapore teachers but to *generalize to the theory* of teacher behaviour that fosters student creativity.

Table 1. Reliabilities, means and SDs of CFTIndex (*N* = 117)					
	Total variance explained	**Reliability**	**CFTIndex (Soh, 2000)**		
			Mean	**SD**	**Correlation with *Creative Person***
Independence	51.77	.75	21.80	3.46	.39
Integration	63.54	.85	24.23	3.98	.45
Motivation	51.73	.74	24.21	3.25	.35
Judgement	59.99	.83	22.34	3.93	.44
Flexibility	56.60	.78	22.52	3.95	.40
Evaluation	47.19	.69	22.50	3.58	.25
Question	59.49	.82	23.69	3.42	.33
Opportunities	59.75	.83	23.69	3.50	.36
Frustration	65.00	.86	23.64	3.67	.40
CFTIndex	–	.82	208.62	27.27	.45

The CFTIndex was administered to the respondents with the results shown in Table 1. Factor analysis with Varimax rotation was run on the set of five items for each subscale *separately* with the intention that each set of items forms a subscale to measure the construct (i.e. Cropley's principle) relatively independent of the other subscales. As shown in Table 1, the total variances (of five items) of the subscales vary from 47% (Evaluation) to 65% (Frustration), with most of them explaining near 60% of the total variance that is normally found for factor analysis.

The reliabilities of the subscales in terms of Cronbach's α coefficients vary from α = .69 (Evaluation) to α = .86 (Frustration) and the reliability for the scale as a whole is indicated by a median of α = .82. Although five items per subscale may be on the low side in terms of scale length for which eight or more would be desirable, the reliability coefficients are sufficiently high for the subscales and the CFTIndex as a whole to be used with confidence for research purposes.

Table 1 also shows the means (and SDs) for the subscales and the CFTIndex as a whole. These were recalculated from the original article which presents the descriptive statistics separately for the females and males. For the content of actual items, see Appendix in the original article. Inter-subscale correlations vary from a moderate r = .49 (between Independence and Motivation) to a high r = .82 (between Flexibility and Opportunities), with a median of r = .67. These correlations indicate that while the subscales are relatively independent, they are also correlated and may form a higher order general factor.

To establish the concurrent validity of the CFTIndex, 16 adjectives were selected from Domino's (1970) 59-item *Creative Adjective Scale* through several rounds of factor analysis. The 16 adjectives formed a scale for self-evaluation by the respondent as a Creative Person. The scale has a Cronbach's α coefficient of .96 indicating a very high degree of internal consistency. As shown in Table 1, the correlations between CFTIndex subscales and *Creative Person* scores varied from r = .25 (Evaluation) to r = .45 (Integration), with r = .45 for the CFTIndex as a whole. These are substantial evidence of concurrent validity in that respondents who saw themselves as being more creative also scored higher on CFTIndex and its subscales.

Further evidence of validity was procured by the differences between Chinese and non-Chinese teachers, in view of the popular stereotype that Chinese teachers, at least in the context of Singapore, tend to be more restrictive and hence less creative than non-Chinese teachers. The inter-ethnic differences have standardized mean differences (effect size; Cohen, 1988) varying from small d = .26 (Independence) to medium d = .45 (Opportunities), with d = .43 for the CFTIndex as a whole.

Soh (2000) acknowledged that this is a preliminary study and further work needs be done to further evaluate the validity of the scale. He suggested several specific approaches such as checking teachers' self-ratings for CFTIndex against (a) students' ratings of teachers, (b) independent observers' ratings, (c) student creativity, (d) effect of training in creativity techniques and (e) correspondence between changes in teacher creativity and student creativity. These are possible studies which can be taken as ways of further verifying the validity of the CFTIndex or as research in its own rights.

Manriquez and Reivera's (2005) study aims to find out the pedagogical practices of faculty members of the University of Antofagasta, Chile, in connection with creativity fostering, with the conviction that creative behaviour is a highly valuable goal for modern professional training in higher education.

The study involved 233 Assistant Professors and Associate Professors of the University. With 164 respondents completed the CFTIndex with a response rate was 70%. Of the respondents, 14% aged 31–40 years, 27% aged 41–50 years and 59% aged 51 or more years. In terms of teaching experience, 20% had less than 10 years, 39% had between 11 and 20 years, and 41% had 21 or more years. There were 70% males and 30% females. Where academic qualification is concerned, 36% held a Bachelor' degree, 46% a Master's degree and 18% a Ph.D. degree. Thus, generally, this sample consisted mainly of senior, highly qualified and experience faculty members.

The CFTIndex was translated into Spanish and renamed as *Learning Style Self-Assessment Scale,* but the structure of the nine subscales and eight of the nine subscale names were retained, with Question renamed as Consultation. Also, the original six-point scale was used. Methodologically, the study followed very closely the original study when the CFTIndex was first developed, although reliabilities are not reported.

Inter-subscale correlations vary from $r = .28$ (between Independence and Flexibility) to $r = .62$ (between Independence and Integration), with a median of $r = .47$. However, 12 of the possible 36 correlations are at or greater than $r = .50$ and 16 are between $r = .40$ and $r = .50$. This shows the subscales to have moderately correlated with one another. With the given sample size, all correlations are statistically significant ($p < .05$).

When all the items were submitted as one lot for a factor analysis, a general factor was obtained with factor loadings varying from $\lambda = .788$ (Independence) to $\lambda = .616$ (Flexibility). However, the authors also followed the original approach by factor-analysing the sets of five items of each subscale. This time, the total variances explained for the subscales are shown in Table 2 together with the

Table 2. Means, SDs and reliabilities for CFTIndex (*N* = 31)			
		CFTIndex (Manríquez, Carrasco, Navarro, Rivera, & Pizarro, 2005)	
	Total variance	Mean	SD
Independence	62.1	25.75	3.04
Integration	57.4	25.27	3.83
Motivation	48.2	26.06	2.83
Judgement	51.6	23.55	3.64
Flexibility	37.9	25.70	2.96
Evaluation	61.7	23.41	4.38
Consultation (Question)	43.1	27.56	2.70
Opportunities	54.9	26.46	2.69
Frustration	56.4	25.44	4.08
CFTIndex	52.6	229.26	21.87

means and SDs for the CFTIndex and its nine subscales. Moreover, mean comparisons for each of the three demographic variables (i.e. age, academic qualification and teaching experience) showed no significant differences.

The authors concluded that although the study does not contribute greatly to making theoretical progress, their results do show that creativity behaviour does exist in their university. They further argued that there was a "relevant desirability that acquires a substantive priority, taking into account how important it is for developing professional competencies, the transfer value it has for meaningful learning, and the pertinence it gives to a sensible curriculum" (p. 28).

Comparisons with the original CFTIndex (Soh, 2000) shows that for all subscales the Chile groups had greater means, especially for Independence, Flexibility, Consultation (Question) and Opportunities where the Cohen's *d*'s indicate large effects. These differences could well reflect the differences in culture, professional status, and age of the Singapore and Chile groups. Since the two studies used the same methodology, these differences are unlikely a methodological effect.

The purpose of Soh and Quek's (2007) study was to explore further the validity of the CFTIndex using fresh data from another group of Singaporean teachers. Involved in the study were 31 second-ary school teachers 97% of whom were university degree holders teaching language. Most of these teachers attended a workshop on creativity techniques (e.g. SCAMPER) a year prior to this study conducted by the first author.

Table 3 below shows the means, SD's and Cronbach's α coefficients for the CFTIndex as a whole and its nine subscales. The reliabilities are generally high, varying from α = .62 (Motivation) to α = .85, with a median of α = .77. However, the reliability for the whole scale of 45 items is α = .95, which is very high for research instrument.

Following the same approach of the original study (Soh, 2000) by factor-analysing the subscales separately, it was observed that Independence, Integration, Flexibility, Evaluation and Frustration retained the original structures, with total variances explained varying from 53% (Evaluation) and 75% (Judgement). The other four subscales each split into two orthogonal factors. Such deviation from the original study was attributed to the smaller sample size and homogeneity of the group in view of their training in creativity techniques prior to the study.

When subscale scores were factor-analysed, comparisons with factor loadings of the original study show high similarity of the two sets of loadings, with a correlation of *r* = .82. The original factor loadings vary from λ = .70 (Motivation) to λ = .91 (Opportunity), the new set of factor loading vary from λ = .43 (Motivation) to λ = .89 (Flexibility).

Table 3. Means, SDs and reliabilities for CFTIndex (*N* = 31)			
	Reliability	**CFTIndex (Soh & Quek, 2007)**	
		Mean	**SD**
Independence	.81	22.87	3.45
Integration	.80	23.77	2.88
Motivation	.62	23.81	2.93
Judgement	.76	22.52	3.61
Flexibility	.83	24.42	3.01
Evaluation	.77	21.58	3.53
Question	.70	25.16	2.53
Opportunities	.71	24.52	2.74
Frustration	.85	25.10	3.33
Overall	.95	213.75	21.6

The structure of the CFTIndex appears to be relatively stable in spite of the differences between the original group and the one of this replication. There is also the possible training effect influencing the structure somehow. However, the authors concluded that "the CFTIndex has the potential to provide practical information to a classroom teachers keen on developing students' creativity" (p. 68).

Comparisons with the original version, the subscale and whole scale means show little difference, perhaps with the exception of Independence, Flexibility, Question and Frustration for which the replication groups scored slightly higher. Cronbach's α coefficients are slightly greater for the replication groups for Motivation, Question, Opportunities and CFTIndex as a whole. These differences in the means and reliabilities might be attributable to the fact that the replication groups were more homogeneous, mostly university graduates teaching language in the main. In other words, the findings of the original study have been replicated by and large.

Forrester and Hui's (2007) study was premised by the hypothesis that "if teachers saw value in creativity as integral to their effective teaching, observed teachers' classroom behavioural choices would reflect a significant array of creativity-enhancing techniques".

The study involved 27 primary school teachers (11 males and 16 females) 17 of whom had eight or less years of teaching and 10 had more. Of the teachers, five held a university degree and the rest certificates. They taught Chinese, mathematics and General Studies. The CFTIndex was used as the main data collection instrument, in addition to Gough's Creativity Personality Scale which has 30 adjectives; a shorter version based on Domino (1970) was used in Soh (2000) and a Chinese Creativity Test. The teachers were observed for their classroom teaching.

Some interesting correlations were observed between teachers' creativity fostering behaviour and students' verbal and figural creativity measures. Table 4 was reconstructed by using the data from the article. The correlations lend support to the concurrent validity of the CFTIndex.

The article also reports inter-subscale correlations for the CFTIndex. Of the 36 possible correlations paring two scales, five are $r > .80$, 14 are $.79 > r > .70$, four are $.69 > r > .60$ and five are $.59 > r > .40$. Of these, the lowest is $r = .43$ (Integration and Opportunity), the highest is $r = .89$ (Independence and Judgement), with a median of the correlations is $r = .74$. These inter-subscale correlations are comparable in range with those found in Soh's (2000) original study, although the Hong Kong study has a lower median (as compared with $r = .82$).

Moreover, significance differences were found for creative fostering behaviours among subject groups of teachers. Specifically, Chinese Language teachers scored higher than did Mathematics and General Studies teachers for Independence, Integration, Flexibility and Evaluation. However,

Table 4. Correlations between teacher behaviour and student creativity			
	Student creativity		Creative personality
	Verbal	**Figural**	
Independence			.40
Integration			–
Motivation	.39	.39	.43
Judgement			.48
Flexibility			.51
Evaluation		.46	–
Question			.52
Opportunities			.38
Frustration			.34

Note: All correlation coefficients are statistically significant ($p < .05$).

gender, teaching experience and qualification did not influence the teachers' scores for the CFTIndex subscales. Furthermore, multiple regression shows Motivation and Evaluation to predict significantly students verbal creativity.

In their conclusion, the authors noted that there is a need to use instruments for data collection grounded in the classroom context so as to inform in-depth study. They also pointed out that their research question remains unanswered but the study point to possible pathway to its eventual answering.

Although the study does not report as a routine the reliabilities of the CFTIndex and its subscales, it provides interesting new information in the correlations between subscale scores and student creativity; these lead evidence to the validity of the CFTIndex in a different way. It is of note that the correlations with *Creative Person* scores are comparable between the two studies, although that for Integration, Evaluation and CFTIndex are regrettably unavailable from the Hong Kong study.

Within the context of *No Child Left Behind,* Edinger's (2008) study investigated creativity fostering teacher behaviours in a high-stakes standardized testing environment. Twenty 9th and 10th grade teachers from a high school in a large, mid-Atlantic suburban school district were involved in the study. The teachers taught mainly English and Social Studies, with one quarter taught Science or Mathematics. Of these teachers, 45% had five or less years of teaching experience, 25% had 6–10 years and 30% had 16 or more years. At the same time, 35% of the teachers held a Bachelor's degree and 65% a Master's degree.

For data collection, self-report was gathered by using the original CFTIndex; six-point scale was used. However, noting the limitation of such data, a scale relevant to the CFTIndex was used to gather observational data. Classroom observation and face-to-face interviews were conducted with teachers who scored above the 50th percentile of CFTIndex. Table 5 below shows the means and SDs for the subscales and CFTIndex as a whole. As the author reported the mean (and SD) for the average of five items of each subscale, these were rescaled for the original five items. Correlations among the subscales were found to vary from $r = .67$ (Evaluation and Opportunities) to $r = .94$ (Opportunities and Frustration). Reliabilities are not reported.

The author was of the view that behavioural strategies appear to be utilized with a high degree of effectiveness. Participants' ability to foster creativity in the classroom was improved by supportive administration and instructional peers but was constrained by a lack of time and the constricting standardized testing environment. Thus, teachers' creativity fostering behaviours and abilities were influenced by both personal and environmental factors.

Table 5. Means and SDs for CFTIndex (*N* = 20)				
	CFTIndex (Edinger, 2008)		Rescaled	
	Mean	SD	Mean	SD
Independence	5.08	.60	25.40	3.00
Integration	5.06	.55	25.30	2.75
Motivation	4.97	.68	24.85	3.40
Judgement	4.93	.61	24.65	3.05
Flexibility	4.87	.61	24.35	3.05
Evaluation	4.75	.66	23.75	3.30
Question	4.55	.61	22.75	3.05
Opportunities	4.36	.70	21.80	3.50
Frustration	4.08	.73	20.40	3.65
Overall	4.71	.64	211.95	28.8

Note: The rescaled means and SD's are for five items per subscale using six-point scale as in the original CFTIndex.

The author conclude by suggesting that "Administration can positively influence the teachers' ability to be creative in the classroom by being open to ideas, by making teachers aware of professional opportunities, and planning meaningful staff development" (p. xi). He further suggested that the CFTIndex could be used for in-depth qualitative research and to explore the relationship between creativity abilities and experience of administration.

A difficulty in the direct use of the information of this study lies with the use of five-point instead of the original six-point scale and the reporting of average score for each subscale instead of the total of item score. The author might have some good reasons to change the format and reporting, but doing so prevent direct comparisons to be made across studies. However, this difficulty is easily overcome by rescaling the scores. Of course, it remains to be seen how the changes affect the interpretation of the results.

Comparisons between the two studies show that the Atlantic group score higher than the original Singapore group on Independent and Judgement but lower on Opportunities and Frustration; the Cohen's *d*'s indicate medium or large effect. These could be due to cultural difference and, possibly, age of the teachers (the Atlantic group being younger).

In a context of productivity and capacity building, Olawale, Adeniyi, and Olubela's (2010) study aims to ascertain the creativity fostering behaviour of university lecturers. The study involves forty university lecturers from four universities in Oyo and Ogun States selected randomly, with five males and five females from two faculties of each institution. The age range was between 32 and 64 years with a mean of 44.3 (SD = 2.36). Used for data collection was the CFTindex which has 45 items forming 9 subscales. Instead of the original six-point scale, a five-point scale was used. Reason for this change is not explicated. However, to facilitate comparisons with the original scale, the means and SD's were rescaled for six-point scale.

Table 6 below shows the means and SD's for the 40 lecturers worked out from Tables 1–4 of Olawale et al. (2010) paper. First, it is of note that the Cronbach's α coefficients are high, varying from α = .74 (Motivation) to α = .86 and for the CFTIndex as a whole α = .74. These show that the CFTIndex as a whole is very highly reliable or internally consistent and its nine subscales also have reasonably high reliabilities. In short, the scores yielded by the scale and subscales can be trusted in terms of reliability.

Table 6. Means, SDs and reliabilities for CFTIndex (*N* = 40)

	Reliability	CFTIndex (Olawale et al., 2010)		Rescaled	
		Mean	SD	Mean	SD
Independence	.76	18.3	3.30	21.96	3.96
Integration	.85	21.5	2.17	25.80	2.60
Motivation	.74	20.7	2.76	24.84	3.31
Judgement	.83	18.9	2.87	22.68	3.44
Flexibility	.78	20.5	2.13	24.60	2.56
Evaluation	.69	18.9	3.35	22.68	4.02
Question	.82	21.4	2.67	25.68	3.20
Opportunities	.83	21.2	2.50	25.44	3.00
Frustration	.86	21.8	2.66	26.16	3.19
Overall	.96	182.70	24.39	219.24	29.25

Note: The rescaled means and SD's are for five items per subscale using six-point scale as in the original CFTIndex.

The authors concluded that "the university lecturers in Ogun and Oyo States exhibited a good amount of productivity and capacity building based on their creativity fostering behaviours" (p. 259). They were convinced that "the university lecturers were resourceful and creative enough thereby contributing meaningfully to the system" (p. 259) and further stressed that "if undergraduates and graduate students are not trained in creativity thinking or behaviour by the lecturers, they would remain passive, potentially vibrant and inactive as before they were admitted to the university" (p. 231). Finally, they called for attention of policy-makers and decision-makers to organize periodic training for university lecturers in creativity fostering behaviour.

In a context of productivity and capacity building, Olanisimi, Adeniyi, and Olawale's (2011) study aims to ascertain the creativity fostering behaviour of primary school teachers. The study involves 36 special primary school teachers from the Oyo state. The average age of the teachers was 36.8 (SD = 3.7). Data were collected by using the CFTIndex. Five-point scale was used instead of the original six-point scale with 1 indicating *Never* and 5 *Always*. However, the need to change the scale-point was not explained. Table 7 below shows the results, worked from Table 4 of the paper for the three schools.

It was concluded that "Results from the study showed that there was variation across subject, subscales and schools in the capacity building and productivity of teachers" (p. 25). The authors suggest that the special teachers should be creative, resourceful and innovative to adequately meet the needs of the students who have special needs or disabilities, because the absence of such creative teachers could make children with special needs waste away, half-baked and remain dependent for survival. For this reason, the authors further argue, teachers and professionals handling children with special needs should possess adequate amount of creativity fostering behaviours, depicting their productivity and capacity building.

In Hondzel's (2013) Ph.D. thesis, Hondzel intended to find out the creativity fostering behaviours of primary school teachers. The study involved 22 Grade 5 to 7 teachers from across Southern Ontario. The schools were located in city, town, village and remote rural community. There were 4 male and 18 female teachers in the sample. The average years of teaching experience is 12.5 (SD = 8.7), with 2 teachers aged below 29, 13 aged 29–41, and 7 aged 42–55.

In the first stage of the study, teachers completed online the CFTIndex and, in the second stage, they were observed in the classroom as well as interviewed. The original six-point scales were used but reported as the averages of five items for each subscale. To facilitate comparisons, the means

Table 7. Means and SDs for CFTIndex (*N* = 36)				
	CFTIndex (Olanisimi et al., 2011)		Rescaled	
	Mean	SD	Mean	SD
Independence	19.14	2.33	22.95	2.80
Integration	20.83	2.68	25.00	3.20
Motivation	20.64	2.14	24.75	2.55
Judgement	19.39	2.39	23.25	2.85
Flexibility	20.14	3.41	24.15	4.10
Evaluation	18.36	3.36	22.05	4.05
Question	20.03	2.51	24.05	3.00
Opportunities	20.97	2.88	25.15	3.45
Frustration	20.16	2.71	24.20	3.25
Overall	179.64	24.39	215.55	29.25

Note: The rescaled means and SD's are for five items per subscale using six-point scale as in the original CFTIndex.

and SD's were rescaled for five items per subscale. As shown in Table 8, the Cronbach's α coefficients for the nine subscales are generally high and the median of the α coefficients is α = .83 which is greater than the conventionally expected α = .7 for research instrument, though somewhat lower for the expected α = .9 for making decisions on individuals.

Independent *t*-test shows no differences between male and female teachers as well as between teachers teaching in urban and rural locations. There is a moderate correlation between years of teaching experience with overall CFTI (*r* = .51), Motivation (*r* = .59), Opportunities (*r* = .44) and Flexibility (*r* = .51).

The author concludes that "the strategies teachers use to foster creativity in students should then emphasise the well-rounded and imaginative development of children while tolerating behaviours associated with creative production…. These strategies tended to fall into one or more of four categories: differentiated instruction, emotional variables, collaboration, and experiential learning" (p. 123).

The purpose of Dikici's (2013) study was to evaluate the language equivalence, validity and reliability of the CFTIndex when used with Turkish teachers. The translation of the original English version into the Turkish version involved 30 lecturers from the Nigde University School of Foreign Languages. There were 20 female and 10 male respondents. There were 6 respondents aged 25 or younger, 12 aged 26–35, and another 12 aged 36 or older. Twelve of the lecturers had five or less years of teaching experience, 15 had between 6 and 15 years of teaching experience, and 3 had more than 16 years.

The Turkish version of the CFTIndex was then completed by 288 teachers from 13 primary schools in the Nigde city centre. Instead of the original six-point scale, a five-point scale was used and there is no explanation for this change. Of these teachers, 148 (51.4%) were females and 140 (48.6%) were males. The majority of the teachers were between 20 and 30 years old, and 104 (36.1%) of the teachers have between one and five years of teaching experience, with another 86 (29.9%) worked as novice teachers. Moreover, 125 (55%) of the teachers taught mainly elementary classes. Back-translation was conducted to check translation equivalence and it was decided to use a five-point scale instead of the original six-point scale after a discussion. Reason for changing the scale length is not given.

The 30 lecturers completed the original English version first and then the Turkish version one week later. In both cases, the original six-point scale was used. Scores for the two versions were calculated and the correlations varied from a low *r* = .32 (item 2) to a very high *r* = .89 (item 38). Seven of the forty-five correlations are significant at the .05 level and the remaining 38 items have correlations significant at the .01 level.

Table 8. Means and SDs for CFTIndex (*N* = 22)					
	Cronbach's α	**CFTIndex (Hondzel, 2013)**		**Rescaled**	
		Mean	**SD**	**Mean**	**SD**
Independence	.76	4.28	.72	21.40	3.60
Integration	.85	5.45	.38	27.25	1.90
Motivation	.74	4.78	.58	23.90	2.90
Judgement	.83	4.45	.57	22.25	2.85
Flexibility	.78	4.78	.56	23.90	2.80
Evaluation	.69	4.82	.61	24.10	3.05
Question	.82	4.78	.60	23.90	3.00
Opportunities	.83	5.18	.48	25.90	2.40
Frustration	.86	4.93	.67	24.65	3.35
Overall	.83	4.82	.40	216.90	18.00

Note: The rescaled means and SD's are for five items per subscale as in the original CFTIndex.

Factor analysis of the primary school teachers' responses yielded nine factors explaining 59.12% of the total variance. Varimax rotation was employed to obtain orthogonal factors. The Kaiser-Meyer-Olkin MSA of .925 indicates a perfect sampling adequacy. There is however a difference in the approach of data analysis when compared with the original study: in this study, all 45 items were factor-analysed together at one run, whereas the nine subscales were factor-analysed separately in the original development of the CFTIndex. Table 9 below was reconstructed from the text which reports that "These results were similar to the construct validity results of the original scale developed by Soh (2000)" (p. 321). For this reason, the author retained the original names of the subscales.

In Table 9, however, 12 items which did not satisfy the criterion for item retention were excluded. For the retained 33 items as a whole, the Cronbach's α coefficient is α = .94. For the subscales, the lowest is α = .57 for subscale 6 (Evaluation) and the highest if α = .77 for subscale 3× (Motivation). For these, the author asserts that "It is nearly impossible in the areas of education and psychology to develop a scale with a reliability coefficient of + 1. For this reason, it can be said that Cronbach's Alpha coefficients obtained from the scale and subscales is sufficient" (p. 321). Moreover, item-total correlations of the subscales were estimated and these vary from r = .29 to r = .66. Correlations among the nine subscales were also estimated and the lowest is r = .26 between Independence (subscale 1) and Question (subscale 7) and the highest is r = .74 between Integration (subscale 2) and Flexibility (subscale 5).

Following the exploratory factor analysis which yielded the above results, a confirmatory factor analysis was run to verify the obtained structure. This was confirmed by the goodness-of-fit statistics such as x^2/df = 1.409 and root mean square error of approximation RMSEA = .038, both falling within the desired limits. The author then concluded that "These values, which take account of sample size and complexity of model, demonstrate good fit" (p. 321).

With the results above, the author concluded that "The behaviours and practices of teachers in class are important to foster student creativity… . As a result of the language equivalence analysis, high correlation was observed between the Turkish and English forms of the CFTIS, developed by Soh (2000) … . It can be recommended to the researchers who will used the scale to make their interpretation according to 33 items and nine subscales" (p. 321).

The purpose of Belio and Urtuzuastegul's (2013) study was to determine the opinion of the faculty members regarding their creativity fostering behaviour. This study involved 34 faculty members and 202 students. Data were collected by using the 45-item six-point scales of the CFTIndex, translated from English into Spanish, with some modification of the items to suit the students. The original six-point scale was used.

Table 9. Factor analysis results		
Factor	**Item**	**Loading**
Independence	1, 37	.392, .609
Integration	2, 11, 20	.431 – .705
Motivation	3, 12, 21	.476 – .551
Judgement	13, 22, 31, 40	.362 – .656
Flexibility	5, 14, 23, 32	.405 – .482
Evaluation	15, 33, 42	.476 – .779
Question	7, 16, 34, 43	.606 – .775
Opportunities	8, 17, 26, 35	.604 – .725
Frustration	9, 18, 27, 36, 45	.442 – .683

Note: For item content, see Appendix.

Table 10. Means and SDs for CFTIndex					
	CFTIndex (Belio & Urtuzuastegul, 2013)		Rescaled		
	Faculty	Students	Faculty	Students	Difference
Independence	5.1	4.3	25.5	21.5	4.0
Integration	5.3	4.2	26.5	21.0	5.5
Motivation	5.0	4.2	25.0	21.0	4.0
Judgement	4.7	4.1	23.5	20.5	3.0
Flexibility	4.8	4.0	24.0	20.0	4.0
Evaluation	4.8	4.0	24.0	20.0	4.0
Consultation	5.5	4.2	27.5	21.0	6.5
Opportunities	5.2	4.3	26.0	21.5	4.5
Frustration	5.4	4.0	27.0	20.0	7.0
Overall	5.1	4.1	228.60	186.3	42.3

Note: The rescaled means and SD's are for five items per subscale using six-point scale as in the original CFTIndex.

Demographic data includes gender, age, academic qualification and teaching experience. These, however, were found to be unrelated to the CFTIndex scores. Table 10 shows the scores of the faculty members and students for the CFTIndex and its nine subscales. In the original article, average scores for the five items of each subscale were reported. These were rescaled for five items. However, SD's and reliabilities are not available from the article, except that for the CFTIndex as a whole has an α = .98 which is much greater than the α = .70 expected of research instrument.

An interesting aspect of this study is the comparisons of faculty's scores with students' scores. As shown in Table 10, there are generally differences between the faculty's and students' scores, in favour of the former group. Such differences show either over-reporting by the faculty on their own creativity fostering behaviour or under-reporting by the students on their teachers, or both. The three largest differences are for Frustration, Consultation (originally, Question) and Integration. In a sense, these are the aspects worthy of more attention if student creativity is to be fostered.

The authors also classified the faculty members into five groups in terms of teaching experience. Table 11 shows the overall CFTIndex scores for the groups. It is interesting to note that the greater faculty-student discrepancies are found for the faculty members with less than six years of teaching experience and also for those with more than 20 years, while the three groups in-between have much smaller discrepancies. In other words, the least and the most experienced faculty members tended to over-reporting their creativity fostering behaviour or, alternatively, their students under-reported.

The authors concluded effective teaching depends on many factors, some of which are unalterable such as age and gender while others can be acquired through experience. The students, on average, feel that their teachers are moderately creative in their teaching while the teachers themselves believe that they are highly creative.

The purpose of Lee and Kemple's (2014) study (a PhD thesis) was to examine the pre-service teachers' personality traits, engagement in creative activities and beliefs about the teaching practices that have been shown to support children's creativity. The study involved a total of 302 early

Table 11. CFTIndex scores for groups of teaching experience					
	Under 6 years	6–10 years	11–15 years	16–20 years	Above 20 years
Faulty	26.4	25.6	25.4	24.3	25.9
Students	16.4	23.1	23.8	21.8	17.7
Difference	10.0	2.5	1.7	2.4	8.2

childhood and elementary pre-service teachers from a university in the southern part of the USA. Personality traits were measured with a 10-item inventory for the Big Five Factors (i.e. Openness, Conscientiousness, Agreeableness, Extraversion and Emotional Stability). Engagement in creative activities was measured with a 28-item Creative Behaviors Inventory which had four components for visual art, literary arts, drama and receiving arts awards. Support for children's creativity was measured by using the CFTIndex. However, through a confirmatory factors analysis, the CFTIndex was modified to have only three items each for the nine subscales instead of the original five items.

A mediation model was hypothesized with engagement as the mediator between personality and creativity fostering behaviour. Multiple regression analysis results supported the hypothesized model.

The findings indicate that pre-service teachers with higher scores on Openness had more engagement in creativity-related experiences. Those with higher scores on Openness *and* who creativity-related experiences were more likely to espouse creativity fostering teaching styles. Moreover, pre-service teachers' own creativity-related experiences fully/partially mediated the relationship between Openness and CFTIndex scores.

This study introduces personality traits as a set of predictors of creativity fostering behaviour, with engagement in creative activities as the moderator. This is a welcome feature that brings about a better understanding of teacher behaviour and this is does not found in the other studies using the CFTIndex. However, the reduction of items down to three for each subscale needs be cautious; a (sub-)scale normally needs 8–12 to be stable and the five items per subscale in the original CFTIndex is already on the low side. The Cronbach's α coefficients for the modified three-item subscales vary from α = .71 (Flexibility) to α = .80 (Independence) although it is α = .91. These are somewhat lower than the average reliabilities (Table 12 below).

3. Integration and prospect

Although not all studies annotated here present reliabilities of the data, it is interesting to have the available reliabilities integrated for an overview of the CFTIndex and its subscale to evaluate how much trust they deserve. Table 12 shows the sample-size weighted average of the Cronbach's α coefficients available in some of the cited studies. As shown therein, the five subscales which have reliabilities α > .80 are Frustration, Integration, Judgement Opportunities and Question. Those with lower reliabilities (α < .80) are Flexibility, Independence, Motivation and Evaluation. The CFTIndex as a whole has reliability of α = .85. Thus, generally, the CFTIndex and its subscales yielded reliable scores and can be confidently used for further research.

Table 12. Reliabilities for CFTIndex (*N* = 210)		
	Average α	**Rank**
Independence	.75	7
Integration	.85	2
Motivation	.74	8
Judgement	.83	3.5
Flexibility	.78	6
Evaluation	.69	9
Question	.82	5
Opportunities	.83	3.5
Frustration	.86	1
Overall	.85	–

The information from the various studies was combined for a broader view of the nine subscales and the CFTIndex as a whole. For those studies which have reported *both* the means and SDs, sample-size weighted means and SD's were calculated. As shown in Table 13, Integration, Motivation and Opportunities have the highest means. They indicate that teachers of the studies displayed these three creativity fostering behaviours more visibly. In the middle range are Question, Frustration and Flexibility. The lowest means go to Judgement, Evaluation and Independence. This suggests that teachers found it more difficult to withhold their judgement on students' ideas and suggestions, to refrain from premature evaluation these, and to encourage students' independent learning. Thus, if training is to be offered to foster teachers' creativity fostering behaviours, these three will need more attention and effort.

The SD's are also interesting. The three widest spread of scores go to Evaluation, Judgement and Flexibility, indicating that teachers had less agreement for these. On the other hand, the three narrowest spread of scores go to Opportunities, Question and Motivation, suggesting that teachers were more agreeing in these. In-between are Frustration, Independence and Integration.

Integrating the two sets of rankings for the means and SD's, it is obvious that Evaluation and Judgement both have low means and high SD's. This implies that if training are to be given, trainers are likely to find it more difficult to raise the level and, at the same time, to attain greater consensus.

Having had the studies thus annotated and their information integrated, a logical question is, *Where do we go from here?*

Whether creativity is born or bred is a nature–nurture question beyond the scope of this article. Nevertheless, the current mood and belief is that creativity can be fostering, as evidenced by many writings posted on the Internet and more formal publications (e.g. Cropley & Cropley, 2013). In this context, CFTIndex seems to have proven that it is a data collection tool much needed by creativity researchers, especially those who are concerned with the development of student creativity. An extension to this is the development of child creativity by parents and hence the CFTIndex can be adapted to measure creativity fostering parental behaviour. Moreover, since the school and the family are partners in developing the child, researchers could well include both teachers and parents in their studies of child creativity. Besides, parenting educators could benefit by including creativity fostering parental behaviour as part of their programmes by following the nine principles propounded by Cropley (1997) and modify the CFTIndex as both research tool and instructional material.

As gathered from the experience of this annotation, for research purposes, there is an obvious need to have a standard procedure to enable comparisons among studies.

Table 13. Integration of means and SDs for CFTIndex				
Subscale	**CFTIndex**		**Ranking**	
	Mean	**SD**	**Mean**	**SD**
Independence	22.34	3.44	9	5
Integration	24.85	3.35	1	6
Motivation	24.35	3.12	2	9
Judgement	22.70	3.54	7	2
Flexibility	23.53	3.54	6	3
Evaluation	22.59	3.65	8	1
Question	24.16	3.18	4	8
Opportunities	24.29	3.26	3	7
Frustration	24.10	3.48	5	4
Overall	212.67	26.82	–	–

Firstly, keep close to the original six-point scale with five items for each subscale and report the total score accordingly. Researchers may have different research environments which require them to modify; for instance, they may use a five-point scale or report average item score as subscale score as has been done in some studies annotated above. This makes their studies not directly comparable with others'. If it is imperative to modify, also reported rescaled scores as have been demonstrated above. A study standing alone, however well done, has little usefulness; ensuring or facilitating comparisons with other like studies enhances its value in a wider context. Moreover, on a technical note, using six instead of five points for the scale is to minimize the respondent's tendency of choosing the neutral category and, at the same time, to maximize variance which is important for correlation analysis and related statistical technique, e.g. factor analysis.

Secondly, make it a good habit to report the SD when reporting the mean. This serves two useful purposes. The mean shows the averaged performance level of a group but does not show the spread of its scores which has implication for its precision and hence trustworthiness. Next, for comparison by either the statistical significance test or the effect size, or both, the SD is needed for calculation. As alluded to above, comparison with other studies enhance the value of an otherwise isolated study. This requires the SD.

Thirdly, also make it a good habit to report reliabilities of the CFTIndex and its nine subscales. This information enables other researchers to decide how much they can trust what has been reported in a study. Since CFTIndex is a social measure and social measures tend to be more fallible, reporting reliabilities also serve the purpose of cautioning other researchers not to over-trust a set of research outcomes but to take due caution against over-interpretation which may lead to misinformation and wrong decision.

In conclusion, the CFTIndex has made its contribution to one aspect, and an important one at that, of creativity research. In view of the recent Ph.D. dissertations and other studies which used it for data collection, and in view of the prevalent mood about creativity fostering, more studies like those annotated here can be expected. Thus, this annotation may serve a pivotal function in summing up what has taken place hitherto and bridge over to new researcher. Hopeful, this annotation helps in bringing to future researchers' awareness of what has been done by their predecessors and what they themselves can add to the field, with more informed methodology.

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Appendix

Items of the Creativity Fostering Teacher Behaviour Index (CFTIndex)

Subscale	Item	Item content
1. Independence	1	I encourage students to show me what they have learned on their own
	10	I teacher my students the basics and leave them to find out more for themselves
	19	I leave questions for my students to find out for themselves
	28	I teach students the basics and leave room for individual learning
	37	I leave open-ended questions for my students to find the answers for themselves
2. Integration	2	In my class, students have opportunities to share ideas and views
	11	Students in my class have opportunities to do group work regularly
	20	Students in my class are encouraged to contribute to the lesson with their ideas and suggestions
	29	I encourage students to ask questions and make suggestions in my class
	38	Students in my class are expected to work in group cooperatively
3. Motivation	3	Learning the basic knowledge/skills well is emphasized in my class
	12	I emphasize the importance of mastering the essential knowledge and skills
	21	My students know that I expect them to learn the basic knowledge and skills well
	30	Moving from one topic to the next quickly is *not* my main concern in class
	39	Covering the syllabus is *not* more important to me than making sure the students learn the basics well
4. Judgement	4	When my students have some ideas, I get them to explore further before I take a stand
	13	When my students suggest something, I follow it up with questions to make them think further
	22	I do not give my view immediately on students' ideas, whether I agree or disagree with them
	31	I comments on student's ideas only after they have been more thoroughly explored
	40	I encourage students to do things differently although doing this takes up more time

(Continued)

Appendix (*Continued*)

Subscale	Item	Item content
5. Flexibility	5	In my class, I probe students' idea to encourage thinking
	14	I encourage my students to ask questions freely even if they appear irrelevant
	23	I encourage my students to think in different directions even if some of the ideas may not work
	32	I like my students to take time to think in different ways
	41	I allow my students to deviate from what they are told to do
6. Evaluation	6	I expect my students to check their own work instead of waiting for me to correct them
	15	I provide opportunities for my students to share their strong and weak points with the class
	24	My students know that I expect them to check their own work before I do
	33	In my class, students have opportunities to judge for themselves whether they are right or wrong
	42	I allow my students to show one another their own work before submission
7. Question	7	I follow up on my students' suggestions so that they know I take them seriously
	16	When My students have questions to ask, I listen to them carefully
	25	My students know I do not dismiss their suggestions lightly
	34	I listen to my students' suggestions even if they are not practical or useful
	43	I listen patiently when my students ask questions that may sound silly
8. Opportunities	8	I encourage my students to try out what they have learned from me in different situations
	17	When my students put what they have learned into different uses, I appreciate them
	26	My students are encouraged to do different things with what they have learned in class
	35	I don't mind my students trying out their own ideas and deviating from what I have shown them
	44	Students are allowed to go beyond what I teach them within my subject
9. Frustration	9	My students who are frustrated can come to me for emotional support
	18	I help students who experience failure to cope with it so that they regain their confidence
	27	I help my students to draw lessons from their failure
	36	I encourage students who have frustration to take it as part of the learning process
	45	I encourage students who experience failure to find other possible solutions

Note: The items were presented with "*All the time 6__5__4__3__2__1 Never*".

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The contributors of this book come from diverse backgrounds, making this book a truly international effort. This book will bring forth new frontiers with its revolutionizing research information and detailed analysis of the nascent developments around the world.

We would like to thank all the contributing authors for lending their expertise to make the book truly unique. They have played a crucial role in the development of this book. Without their invaluable contributions this book wouldn't have been possible. They have made vital efforts to compile up to date information on the varied aspects of this subject to make this book a valuable addition to the collection of many professionals and students.

This book was conceptualized with the vision of imparting up-to-date information and advanced data in this field. To ensure the same, a matchless editorial board was set up. Every individual on the board went through rigorous rounds of assessment to prove their worth. After which they invested a large part of their time researching and compiling the most relevant data for our readers.

The editorial board has been involved in producing this book since its inception. They have spent rigorous hours researching and exploring the diverse topics which have resulted in the successful publishing of this book. They have passed on their knowledge of decades through this book. To expedite this challenging task, the publisher supported the team at every step. A small team of assistant editors was also appointed to further simplify the editing procedure and attain best results for the readers.

Apart from the editorial board, the designing team has also invested a significant amount of their time in understanding the subject and creating the most relevant covers. They scrutinized every image to scout for the most suitable representation of the subject and create an appropriate cover for the book.

The publishing team has been an ardent support to the editorial, designing and production team. Their endless efforts to recruit the best for this project, has resulted in the accomplishment of this book. They are a veteran in the field of academics and their pool of knowledge is as vast as their experience in printing. Their expertise and guidance has proved useful at every step. Their uncompromising quality standards have made this book an exceptional effort. Their encouragement from time to time has been an inspiration for everyone.

The publisher and the editorial board hope that this book will prove to be a valuable piece of knowledge for researchers, students, practitioners and scholars across the globe.

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