Singaporean Student Teachers' Perception of Teacher Behaviors Important for Fostering Creativity

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In an interview setting, 144 participants who completed two blocks of teaching practice (five and eight weeks) were invited to share their teaching experiences with respect to cultivating creativity. Specifically, they were requested to rate some adjectives (e.g., caring, creative) or short phrases (e.g., has interest in many areas) that described them, and their perception of teacher behaviors important for fostering creativity. The factor and cluster analyses showed that the majority of the student teachers wished to be seen as caring and/or assertive teachers. Significant results were found with regard to teachers' behaviors in stimulating thinking, asking questions, and facilitating evaluation. The majority of the student teachers (80% and above) associated high achievers with teacher competence in, and dispositions for fostering creativity. Implications of the findings of the study were elicited for fostering teachers' behaviors toward enhancing creativity within Singapore's teacher educational context.

Introduction

Teachers are "… the mentors, the transmitters of knowledge and values, the models for the students. … After parents, teachers are the most influential persons in the lives of the young. … Their characters, dedication and love for their students are … important." (C. T. Goh, 1996, pp. 10–11)

Teachers in Singapore's Education

Education is a key national priority in Singapore. Accordingly, teachers are

regarded as the key to students' success and nation building (School Excellence Model, 2003). Since its independence in 1965, like most East Asian countries, Singapore has invested highly in human resource development. For nearly forty years, education received substantial support from the government and local community. The roles of education and teachers have been addressed openly in ministerial speeches including those from the Prime Minister (see e.g., C. T. Goh, 1996, citation above). Indeed, teachers have a special position in Singapore. With the increased number of professional females, teachers are seen as "caregivers" and agents of socialization. To ensure students' holistic and high-quality development (Ministry of Education [MOE], 1998), Singaporean teachers of the twenty-first century are urged to adopt multiple roles that can help foster creative minds and innovative spirits.

Creativity in Singapore's Education

In Singapore's early development (1960s–1970s) after its independence in 1965, cultivating creative imagination was recognized as a core element of educational reform (K. S. Goh, 1972). In the 1980s, innovations in curricula (Ang & Yeoh, 1990), pedagogy (e.g., multimedia systems, see Chin, 1983), school management (J. E. T. Tan, 1996), and learning activities (e.g., games and team teaching) were observed. Toward the end of the 1980s, the intensity of the drive to foster creative minds increased. Thinking programs were initiated in several and later extended to all secondary schools (by the year 2000). The aspiration of enhancing creativity has become prevalent since the mid-1990s, after the launch of the Thinking Schools and Learning Nation (TSLN) framework (C. T. Goh, 1997). To maintain its competitiveness, fostering creativity has been recognized as a necessity for Singapore's socioeconomic, technological and educational advancement (C. T. Goh, 1996; Lee, 1996). The TSLN was launched around the same period as two other nationwide initiatives, the National Education (NE) program for implanting the sense of belonging among the young (Lee, 1997), and the Information Technology (IT) master plan for installing computer technology and imparting computer literacy (Teo, 1997). With the introduction of the TSLN, the National Institute of Education (NIE, the sole teacher educational institute in Singapore), the Ministry of Education, and all schools have initiated workshops, seminars and courses for teachers. Teachers and student teachers have been encouraged to infuse thinking skills and strategies into their lessons, and to help uncover and nurture students' creative potentials.

Teacher behaviors for fostering creative thinking are regularly assessed during teaching practice (since July 1999).

This recent reform has exerted a significant impact on Singaporean teachers' perception of their professional roles. In addition to the general responsibilities such as transmitting knowledge and modeling desirable behaviors, teachers are expected to adhere to specific responsibilities such as enhancing sense of belonging, continuous learning attitudes, IT competence and curiosity, to gain new and novel learning experiences (see MOE, 1998).

Large-scale Recruitment

Until recently, teaching, compared to other professions in a modernized society like Singapore, was not that attractive. Hence, qualified teachers in schools were lacking. As a result, schools recruited untrained teachers to fill the gap. The situation changed soon after the TSLN initiative, and was accelerated by the more competitive job market for new graduates.

Since 1999, Singapore's Ministry of Education has embarked on a large-scale recruitment of new teachers. Accompanying the new recruitment were revisions of teachers' salaries (higher revenue) and career paths (more leadership positions created), opportunities for upgrading through conferences, seminars, workshops or courses, and the establishment of a teachers' network for mutual support and individualized counseling, to name a few. As a result, the intakes for related diploma, postgraduate diploma and bachelor degree programs increased at least three-fold. On average, there are about 1,500 postgraduate diploma student teachers per annum who enrolled to the NIE to attend a one-year intensive program to prepare themselves for primary (30% of the cohort) or secondary (70% of the cohort) schools. The large number of application has resulted in the necessity of a special intake in January each year, in addition to the normal intake in July.

Likewise, the intake for the diploma program for the past three years has increased from 300 to 900 annually. The intake for the bachelor degree program remains at 200 annually. These two programs prepare teachers for the primary schools. Before graduation from the NIE, all student teachers must complete teaching practice (between two and three months). With the large-scale recruitment, the newly graduated teachers form a substantial pool of teaching force for Singapore's schools.

Singapore's Elementary Education

In a modernized and industrialized society, Singapore's elementary education has experienced a series of transformations. In the 1960s and 1970s, the focus of elementary education was on ensuring that every child would receive basic education. Toward the end of the 1970s, bilingual education (English and mother tongue) was introduced nationwide. All children (from age 6 onwards) were taught two languages: English, which served as the major medium of instruction, and the mother tongue (Mandarin, Malay or Tamil).

In the 1980s, the focus shifted to quality education, namely, education that should help to produce a reliable and efficient work force. School systems and educational structures evolved toward the enhancement of high-quality education.

Today, at the age of 10 (elementary 4), Singapore children sit for their first streaming examination (school-based), and at the age of 12 (elementary 6), their second streaming examination (nationwide). In many elementary schools, informal grouping based on students' academic performance is conducted at least one year prior to the first streaming examination. During these school years, teachers employ very frequently school-designed exercises and worksheets for subjects that are included in the streaming examinations. According to their linguistic and mathematical achievements in the two streaming examinations, students are grouped into EM1 (learning English and the mother tongue as the first language), EM2 (learning English as the first language and the mother tongue as the second language) and EM3 (learning English and the mother tongue for communication) classes.

Following the TSLN, NE and IT master plan initiatives, the *Desired Outcomes of Education* for elementary school children were delineated. Curiosity of children should be cultivated and maintained so that they will embark on discovery learning. Imaginative thinking is encouraged. The *Ability-driven Education Paradigm* (MOE, 1999) was announced before the turn of the century, focusing on the development of children's potential to their fullest.

Creativity in Teacher Education Programs

At the NIE, where all Singaporean teachers receive their professional education, creativity components and modules took independent form around 1997. Emerging from the thinking program introduced in the early 1990s, creativity was introduced through a compulsory educational studies module

into the Bachelor degree program (in 1996). At the diploma level, creativity was first introduced through a general elective module on critical and creative thinking (1998) and then through another general elective entitled "On becoming a creative teacher" (2000). Around the same period, elective modules on fostering creativity in primary or secondary schools were offered to postgraduate diploma students. At the Master's level, another elective of a similar kind was offered. Until recently, most educational and academic-related modules at the NIE consciously planned for the inclusion of a component of creativity. Embedded into the assessment are criteria for evaluating a student teacher's creativeness. This component of assessment has been included into the practical assessment form (since 1999).

For the past fifty years, educators and teachers have intensified their involvement in cultivating creativity but they have yet to propose conceptual frameworks that guide teachers' creative behaviors in the classroom (see A. G. Tan, 2000a). An analysis of the teacher educators' evaluation on classroom observations ($N = 147$, one hour lesson) showed that only one-fourth of the student teachers were competent in stimulating critical and creative thinking and posing questions. Less than one-third of them were skilful in using and giving student feedback (32.7%) and encouraging pupil evaluation (18.4%). The majority of them were proficient in content knowledge (83.7%) and encouraging participation (75.5%). Half of them were confident in delineating learning objectives (55.1%), selecting content (53.7%), establishing rapport (51%), managing behavior (57.1%), and monitoring understanding (51.7%) (A. G. Tan, 2000b).

Our findings are supported by Soh's (2000) results on teacher behaviors for fostering creativity. Referring to teacher behaviors for fostering creativity suggested by Cropley (1997), Soh developed a questionnaire comprising 45 items. On a 6-point Likert scale, 117 Singaporean teachers rated (1 = never, 6 = all the time) their teaching styles pertaining to fostering creativity. Teachers rated "having a socially integrative teaching style," "mastery of knowledge," "providing opportunities to work on a variety of materials under different conditions," "considering students' suggestions and questions," and "helping students to cope with frustrations" higher than (mean = 1–2) "encouraging independent learning," "delaying judgment," "encouraging flexible thinking," and "promoting self-evaluation among students."

In another study, A. G. Tan (1999) developed a questionnaire (51 items) to find out student teachers' ($N = 140$, age = 18–24 years, 5 weeks' teaching experience) perception of teacher behaviors (competence and dispositions) for fostering creativity. The questionnaire was developed with reference to

Singapore's *Desired Outcomes of Education* (MOE, 1998), the NIE teaching assessment form, and other preliminary studies (A. G. Tan, 1998a, 1998b, 1998c). Student teachers rated the degree of importance of these items on a 9-point Likert scale (1 = least important, 9 = most important). The findings showed that the student teachers did not have differentiated views with regard to common teacher dispositions (e.g., being fair, being kind) and pedagogical competence (e.g., relating learning to real life, stimulating interest, allowing trials and errors, establishing rapport, conveying learning intent). However, they possessed significantly different views in relation to specific teacher behaviors. For elementary school students, the majority of the student teachers (80% and above) regarded highly (ratings 7, 8, or 9) "teacher competence in classroom management" (e.g., time, discipline), "learning activities" (e.g., quiz, role-play), and "having dispositions of a mentor" (e.g., being patient, being a role model). For secondary school students, the majority of them (80% and above) rated highly (7, 8, or 9) "competence in encouraging brainstorming," "free association of thoughts," "logical and analytical thinking," "learning beyond syllabi," "debate, project, presentation," etc. They also rated highly creative dispositions such as "being flexible and open," "being resourceful," and "being imaginative and creative."

A General Framework for Fostering Creativity

We propose a general framework for fostering creativity to which we refer when we discuss the data of our study (see the Discussion section). Fostering creativity refers to teachers' efforts to uncover and develop the potential of every individual student. The general framework elicits four essential points.

First, teachers must believe that creativity is within every individual and happens in everyday life. Every individual has the potential to be creative in one or more domains (see Gardner, 1993). As such, creative thinking is defined with reference to particular kinds of cognitive structures that a person employs and in terms of the properties of those structures. Creative discoveries are largely a product of organized cognitive exploration. Sometimes creative processes entail surprises and unpredictability (Finke, Ward, & Smith, 1992). There is a continuum from the low levels of creativity observed in everyday life to historically significant advances in science, literature and the arts. This assumption implies that every individual is able to produce work that is creative to some degree and in some domain of endeavor (see Amabile, 1996).

Second, teachers must be convinced that creativity can be nurtured when the prerequisite components (e.g., motivation, intelligence, knowledge, skills; see Amabile, 1983) exist within an individual, and between the individual and his or her environment (Csikszentmihalyi, 1996). Specific cognitive processes and structures contribute to the creative acts and products (Finke et al., 1992). Social, cultural, and environmental factors can affect the kinds of cognitive processes employed in a particular situation or context.

Third, teachers must understand that creative processes are developmental and involve the intrapersonal (within the individual) and the interpersonal (between the individual and his or her community) domains (Simonton, 1988). All creative products are the results of a series of improvements and refinements. During the idea generation phase, the individual proposes numerous pre-inventive structures which may be ambiguous yet novel. These structures can be refined in the exploration phase (Finke et al., 1992). The individual can either evaluate the structures (intrapersonal) or invite other people to appreciate and judge them (interpersonal). For the latter, teachers can adopt the consensual technique of assessing creative products by inviting experts (i.e., colleagues, see Amabile, 1983) or novice (e.g., students, see Finke, 1990) to evaluate learning outcomes or products.

Fourth, the development of teachers' behaviors for fostering creativity is aligned with the development of the teachers' professional competence and dispositions. Teachers must acquire pedagogical competence (e.g., planning lessons, selecting suitable teaching models, and managing behaviors). They should possess sufficient content knowledge and skills, and are interested in teaching effectively and creatively. In addition, they should also acquire creative skills and techniques, as well as cultivate dispositions related to fostering creativity. To enhance their professionalism, it is indispensable for teachers to receive ample social support (e.g., colleagues, parents), and opportunities to display and develop multiple role-identities (e.g., caring, creative) (see McCall & Simmons, 1978; Petkus, 1996).

Focus of the study

In this article, we focus our discussion on Singaporean student teachers' perception of teacher behaviors important for fostering creativity of high and moderate achievers. Our target group comprised student teachers who completed their teaching practice in the elementary schools. During teaching

practice, student teachers were not recommended to teach EM3 classes. As such, our study included only teacher perception of the EM1 and EM2 students. Our participants were invited in an interview setting to share casually their experiences with respect to cultivating creativity in children. They were encouraged to cite some of their real-life experiences they gathered during teaching practice. Specifically, in relation to their perception of teacher behaviors for fostering creativity, their answers were guided by a survey instrument.

Pertaining to the discussion on Singapore's elementary education and the general framework for fostering creativity, we formulated three questions for our study: (1) What characteristics would student teachers regard as appropriate to describe their professional roles as teachers? (2) What teacher behaviors would student teachers consider important for fostering creativity of students of high and moderate ability levels? (3) Would student teachers' perceived characteristics influence their perception of teacher behaviors important for fostering creativity?

Method

Participants

The participants were 144 student teachers of the NIE who completed their 13-week teaching practice at Singaporean elementary schools. There were 114 females (79.2%) and 30 males (20.8%). Their average age was between 20–30 years. All student teachers are expected to acquire skills to teach English or the mother tongue, Mathematics, and one other curricular subject (e.g., science, social studies), and across all elementary levels (grade 1 to grade 6). The participants being interviewed reported that they had teaching experience with EM1 ($n = 40$, 27.8%) and EM2 ($n = 112$, 77.8%) classes. They taught English ($n = 119$, 82.6%), mathematics ($n = 116$, 80.6%), science ($n = 59$, 41%), the mother tongue ($n = 22$, 15.3%), social studies ($n = 49$, 34%), and other subjects (e.g., music, drawing; $n = 46$, 31.9%). A total of 37 (25.7%) participants attended thinking course(s), and 87 (60.4%) participants admitted to the use of thinking skills or strategies in their lessons.

Interview

A survey instrument for the interview was designed. It comprised two parts

related to the perception of teacher behaviors that foster creativity. In the first part, the interviewer recorded information related to the participants' teaching experiences (e.g., subject and level). Then the participants rated the degree of appropriateness of 17 adjectives or phrases describing them (I am a _____ teacher/I am a teacher who has _____). The interviewer would read out the 5-point Likert scale of appropriateness of which "5" indicated "extremely appropriate" and "1" indicated "extremely inappropriate." The participants would then select a number (1–5) that corresponded to their rating. The interviewer then circled the answer. The adjectives were selected based on results of our pilot studies on qualities of a good teacher versus a creative teacher (1997–2000), desired learning outcomes (e.g., being imaginative and creative, see MOE, 1998), expected school leaderships (e.g., being motivated, see Lee, 1996; being flexible, see K. Y. T. Tan, 2000), our initial findings on teacher characteristics important for fostering creativity (A. G. Tan, 1999), and qualities of a good individual (e.g., being caring, see Abdullah, 1997; being kind, see C. T. Goh, 1998) repeatedly elicited through public speeches.

In the second part, we employed a questionnaire developed for uncovering the participants' perception of teacher behaviors important for fostering creativity of elementary and secondary school students (A. G. Tan, 1999). We selected items with high frequency (80% and above of the participants rated 7, 8 or 9) and high mean (7 and above) and those included in the NIE evaluation form for teaching practice. In the interview, the participants were requested to rate the degree of importance of the items on a 9-point Likert scale. The rating of "1" meant "extremely unimportant," and "9" meant "extremely important." The participants were reminded to rate the items from the perspective of fostering creativity within the Singaporean elementary school contexts: What teacher behaviors (competence, dispositions) do you regard as important for fostering creative thinking of high-ability and moderate-ability students? Specifically, the interviewer referred to high-ability individuals as students who are in Singapore's EM1 stream (learning English and the mother tongue as the first languages) and moderate-ability students as in EM2 stream (learning English as the first language and the mother tongue as the second language). The interviewer recorded constraints that the participants encountered, and their suggestions for fostering creativity in the classroom. The interview was conducted between February and April 2000 at several time intervals. On average, each interview lasted for one hour. The appendix at the end of this article presents the interview instrument.

Results

The Cronbach's alpha for the 143 responses on the 17 adjectives or phrases was high (0.86). One participant did not indicate his or her response. Mean, standard deviation, skewness and kurtosis were computed. The values of skewness and kurtosis of the ratings were between –0.62 and 1.45. Factor analysis (principal component, and oblimin with Kaiser normalization) yielded four factors which accounted for 60.1% of the variance: F1 — characteristics of a creative teacher; F2 — characteristics of an assertive teacher; F3 — characteristics of a caring teacher; and F4 — characteristics of a motivated teacher. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA) for self-perceived teacher characteristics was high (0.83). The approximate Chi-square from the Bartlett's test of sphericity was 890.1 ($df = 136$) at the $p < 0.0001$ significant level. Table 1 summarizes mean, standard deviation and factor loading of each item.

Table 1   Mean, Standard Deviation and Factor Loading for Self-perceived Teacher Characteristics

		M	*SD*	Factor loading
F1	Imaginative (#4)	3.38	0.83	0.89
	Creative (#6)	3.24	0.80	0.83
	Has many ideas (#17)	3.27	0.76	0.75
	Different from others (#15)	3.12	0.83	0.60
F2	Disciplined, systematic (#25)	3.62	0.78	0.82
	Task-oriented (#7)	3.63	0.79	0.71
	Neat and tidy (#13)	3.65	0.94	0.71
	Hard working (#10)	3.58	0.77	0.64*
F3	Caring (#19)	3.94	0.68	–0.77
	Kind (#1)	3.89	0.73	–0.72
	Helpful (#24)	3.85	0.65	–0.71
	Patient (#9)	3.74	0.85	–0.69
	Friendly (#5)	4.04	0.69	–0.65
F4	Has interest in many areas (#21)	3.60	0.87	0.79
	Open-minded, receptive (#26)	3.85	0.69	0.74
	Adventurous (#8)	3.24	0.80	0.62
	Confident (#18)	3.66	0.72	0.51

* Except hardworking with a factor loading –0.41 for F3, all items displayed distinct factor loadings (0.5 and above) for the respective factors.

The Cronbach's alpha for the factors was high (between 0.72 and 0.81). Mean for each factor was computed by summing the total score of the items and dividing the sum by the number of items. The factors yielded three clusters (from cluster analysis). The distance between C1–C2 was 1.04; C1–C3, 1.69; and C2–C3, 1.38. Results of the discriminant analysis on the four factors showed that 93.7% of the participants were correctly classified to the three clusters. Table 2 displays correlation, percentage of variance, eigen-value, Cronbach's alpha, mean, standard deviation, and final cluster center of the factors. The two-sample independent *t*-test did not yield significant results between female and male participants, between the participants who attended and those who did not attend thinking courses, and between those who infused and who did not infuse thinking skills or strategies.

Table 2   Correlation, Percentage of Variance, Eigen-value, Cronbach's Alpha, Mean, Standard Deviation, and Final Cluster Center of the Factor

	Correlation			Var. %	Eigen v.	Alpha	*M*	*SD*	Final cluster center		
	F2	F3	F4						C1	C2	C3
F1	0.19	−0.31	0.33	32.0	5.4	0.81	3.26	0.64	2.88	3.51	3.97
F2	—	−0.27	0.15	11.3	1.9	0.74	3.62	0.62	3.60	3.11	4.32
F3	—	—	−0.27	9.1	1.6	0.78	3.89	0.56	3.68	3.95	4.40
F4				7.7	1.3	0.72	3.59	0.56	3.27	3.89	4.05

Note: Number of participants belonged to C1 = 77 (53.8%), C2 = 37 (25.9%), and C3 = 29 (20.3%).

Alpha reliabilities for the participants' ratings on the teacher behaviors important for fostering creativity were high (0.98 for high achievers and 0.99 for moderate achievers). We selected items that were rated highly (7, 8 or 9) by the majority of the participants (80% and above) (see A. G. Tan, 1999) for further analysis. Items which fulfilled the additional computation were factor analyzed. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA) for the perceived teacher behaviors important for fostering creativity was high (0.94 for high-ability and 0.96 for moderate-ability students). The approximate Chi-squares from the Bartlett's test of sphericity were 3490 (high ability: $df = 300$) and 3672 (moderate ability: $df = 190$) at the $p < 0.0001$ significant level. For each group of students, only one factor was extracted from the principal component analysis. Tables 3 and 4 summarizes the mean, standard deviation, factor loading and results of the paired test.

From the two-sample independent *t*-test computed for the two factors, there were no significant results across the two gender groups, between the

Table 3   Perception of Important Teacher Competence: Descriptive Statistics, Factor Loading and Paired t-Test

	High achievers				Moderate achievers				Paired t-test
	%	M	SD	Factor loading	%	M	SD	Factor loading	
Pose challenging questions, open-ended questions	93.8	8.16	1.43	0.88	76.6	6.81	1.69	—	11.0***
Encourage learning beyond syllabi, textbooks	93.7	8.15	1.50	0.80	82.7	7.36	1.85	0.83	6.06***
Encourage independent learning and thinking	91.7	8.08	1.43	0.88	83.6	7.28	1.76	0.88	6.26***
Encourage brainstorming, problem solving	91.7	8.07	1.40	0.90	67.9	7.15	1.75	—	7.81***
Relate learning to real life	88.9	7.97	1.58	0.80	85.5	7.75	1.86	0.88	1.74
Encourage logical, analytical thinking	86.8	7.87	1.73	0.76	73.6	7.08	1.93	—	6.37***
Encourage active participation, discussion	86.7	7.85	1.51	0.80	84.7	7.56	1.86	0.85	2.45
Introduce debate, project and presentation	86.1	7.76	1.61	0.73	61.1	6.65	1.80	—	9.69***
Select suitable materials, resources, teaching aids	85.4	7.78	1.56	0.85	87.6	7.72	1.76	0.87	0.70
Expose pupils to the use of IT	85.4	7.74	1.49	0.78	82.7	7.36	1.85	0.88	3.76***
Infuse thinking strategies and skills into learning	84.1	7.76	1.64	0.69	74.3	7.14	1.80	—	4.34****
Use a variety of assessment modes	84.0	7.62	1.66	0.65	80.6	7.28	1.92	0.81	2.80**
Encourage pupils to ask questions	83.4	7.61	1.73	0.78	87.8	7.62	1.72	0.90	−0.06
Empower responsibility and leadership to pupils	82.6	7.73	1.73	0.83	79.2	7.31	1.82	—	4.07*
Allow trials and errors, mistakes	81.9	7.63	1.72	0.60	82.6	7.52	1.91	0.84	0.88
Establish good rapport with pupils	81.2	7.73	1.72	0.77	81.7	7.66	1.83	0.89	0.65
Encourage free association of thoughts	81.2	7.54	1.73	0.69	68.1	6.98	1.86	—	3.81***
Facilitate immediate self- and peer evaluation	81.2	7.49	1.80	0.77	69.5	6.84	1.94	—	5.09***
Set learning standards, evaluate learning outcomes	79.1	7.47	1.88	—	79.8	7.40	1.92	0.75	0.64***
Recognize individual needs, potentials, strengths	75.1	7.56	1.72	—	81.2	7.60	1.80	0.88	−0.29
Stimulate interest and enhance motivation	73.7	7.43	1.82	—	85.4	7.67	1.71	0.89	−2.18*

Note: Correlation was significant at the $p < 0.001$ level. Significant difference: **** $p < 0.0001$, *** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$.

Italics are for cross-reference only.

Table 4   Perception of Important Teacher Dispositions: Descriptive Statistics, Factor Loading and Paired *t*-Test

	High achievers				Moderate achievers				Paired *t*-test
	%	M	SD	Factor loading	%	M	SD	Factor loading	
Be fair, no favoritism	90.3	8.08	1.62	0.73	92.0	7.97	1.89	0.89	0.94
Be imaginative, creative	90.3	8.02	1.52	0.72	84.7	7.55	1.87	0.86	4.20***
Be resourceful, knowledgeable	89.0	8.01	1.48	0.68	71.9	7.45	1.90	—	*4.46****
Be prepared to take risk	81.2	7.60	1.69	0.71	67.4	6.85	2.02	—	6.47***
Be firm and consistent	82.0	7.50	1.72	0.73	86.8	7.55	1.88	0.87	−0.49
Be flexible and open	83.4	7.82	1.50	0.76	79.8	7.45	1.86	0.85	3.57***
Be a role model, set a good example	81.9	7.72	1.67	0.80	81.9	7.71	1.82	0.89	0.15
Be kind and friendly	*76.8*	*7.30*	*1.79*	—	79.9	7.28	1.97	0.85	*0.13*
Be dedicated, committed and hard-working	*77.9*	*7.94*	*1.56*	—	85.5	7.73	2.00	0.88	*2.06**
Eigen-value				14.7				14.9	
% Variance				58.8				74.4	

Note: Correlation was significant at the *p* < 0.001 level. Significant difference: *** *p* < 0.001, ** *p* < 0.05, * *p* < 0.01.
Italics are for cross-reference only.

participants who attended and those who did not attend thinking courses, and between those who infused and who did not infuse thinking skills or strategies. To find out if self-perceived teacher characteristics would influence teacher perception of teacher behaviors important for fostering creativity, we computed the same test for the participants who belonged to the three clusters. Two significant differences were found between the participants of C1 and C2 or C2 and C3 for the EM1 students. Participants of C1 rated "selecting suitable materials, resources, and teaching aids" (#28: $M = 7.58$, $SD = 1.78$) and "using a variety of assessment modes" (#19: $M = 7.22$, $SD = 2.11$) significantly lower ($p < 0.05$) than their counterparts of the C2 cluster (#28: $M = 8.27$, $SD = 1.30$; #19: $M = 8.22$, $SD = 0.85$). Participants of C2 rated "stimulating interest and enhancing motivation" (#10: $M = 7.81$, $SD = 1.27$) and "using a variety of assessment modes" (#19: $M = 8.22$, $SD = 0.85$) significantly higher ($p < 0.05$) than their counterparts of the C3 cluster (#10: $M = 7.00$, $SD = 1.89$; #19: $M = 7.69$, $SD = 0.57$).

Discussion

General Versus Specific Teacher Characteristics

If we place the 17 adjectives or phrases on a continuum according to their societal connotations, we may regard adjectives such as "caring" and "friendly" as general teacher characteristics and adjectives such as "creative," "adventurous" and "imaginative" as specific teacher characteristics. Items describing a caring teacher (F3) were rated with the highest means (3.7 and above, see Table 1). The findings are consistent when we examined the mean (F3: $M = 3.89$) and the final cluster centers (F3: C1–C3 = 3.68–4.40) of the factor (see Table 2). A person can have more than one identity (e.g., creative, caring) associated with a given role (e.g., teacher), and can have more than one role (e.g., mentor, leader) associated with a given identity (e.g., creative) (Petkus, 1996). In general, the student teachers identified themselves with assertive (e.g., disciplined, task-oriented) and caring characteristics. After caring characteristics (F3), assertive teacher characteristics (F2) scored a moderately high mean for the individual items (3.58–3.65, see Table 1) and the factor (3.62, see Table 2). Half of the student teachers were grouped into C1, featured by these two characteristics (with a final cluster center: 3.60–3.68) (see Table 2).

Motivated characteristics are composed of three items ("having interests in many areas," "being open-minded," and "being confident") with a

moderately high mean (F4: 3.60–3.85) and one item (being adventurous) with a moderately low mean (F4: 3.24) (see Table 1). Consequently, these characteristics have a moderately high mean factor (F4: 3.59, see Table 2). The student teachers did not regard specific characteristics highly. Being in a new profession, the student teachers might not wish to be seen as adventurous teachers. The student teachers would attempt to work within the framework of cooperating teachers.

The creative characteristics are composed of items with a moderately low mean (see Table 1) and hence, have a factor with a moderately low mean (F1: 3.26, see Table 2). We may interpret our findings from the role-identity theory (McCall & Simmons, 1978). The student teachers would like to see themselves and to be seen by others as teachers with a caring role-identity. From the societal expectations transmitted through the leaders' speeches (Abdullah, 1997; C. T. Goh, 1996), we can infer that the student teachers were likely to be at ease with the role-identity of a caring teacher.

The general framework for fostering creativity alerts us of the importance to provide ample support and opportunities for student teachers to develop creativity-fostering behaviors within the school and classroom settings. The positive affect associated with a role-identity constitutes the motivational power or strength to perform (Petkus, 1996). The student teachers of our study nominated such factors that hindered the fostering of creativity in the classroom: large class size (38–44 students per class), limited physical space, lack of resources, insufficient time to complete the syllabi, and readiness of the students. They also admitted that they lacked sufficient knowledge of creativity and skills in carrying out creative activities. Being in a new profession, the student teachers were likely to undergo a role-transformation stage. To help student teachers enhance their confidence and competence in fostering creativity, systematic and structural innovations in the educational and social support systems are expected. For reference, we elicit some suggestions proposed by the participants: removal of school ranking and streaming systems, reduction of student number per class, opportunity for sharing of ideas, parental and community support, administrative support, flexibility in teacher guide, opportunities to take part in workshops and seminars, and improvement on school resources and physical environment.

Common Versus Differentiated Views of Fostering Creativity

If we place teacher behaviors (competence and dispositions) on a continuum, we can suggest common and differentiated views of fostering creativity

according to the societal connotations of a teacher's professional development. Accordingly, we can refer the following behavior to the domain of general professional development: relating learning to real life, selecting materials, asking questions, establishing rapport, and identifying individual needs. Included into this domain are dispositions such as being kind, being firm and fair, and being a role model. From our study, the student teachers did not hold a significantly different view for high and moderate achievers for some teacher competence and dispositions in the general professional domain.

We refer the following teacher behaviors to the domain of a teacher's specific professional development: stimulating thinking, asking open-ended questions, allowing free association of thoughts and dispositions, such as being imaginative, being flexible, and being a risk-taker. Within this domain, we observed a differentiated view. The majority of the student teachers (over 80%) of our study associated teacher competence in facilitating independent thinking, higher-order thinking (e.g., critical thinking, problem solving), brainstorming, open-ended questions, debate, project work and verbal presentation with fostering creativity of high achievers (10–25% higher than moderate-ability students). Similarly, they rated empowering leadership, the opportunity to conduct self- and peer evaluation, free association of thoughts and the use of assessment modes and thinking strategies significantly higher for the high-ability students. Dispositions that help foster creativity such as being resourceful, being creative and imaginative, being flexible, and being risk-taking were rated with a significantly higher mean for high-ability students than for moderate-ability students. A difference between 5% to 11% was observed (Table 4).

We attribute the above observations to the following two reasons. The first one is related to the teacher's pedagogical competence. We discover that common teacher behaviors fall into the general domain and within the student teachers' pedagogical strengths (e.g., encouraging participation, managing behavior, content knowledge; see A. G. Tan, 2000b). In contrast, differentiated teacher behaviors belong to the specific domain and within the student teachers' weak pedagogical skill areas (e.g., stimulating thinking, asking questions, and facilitating evaluation; see A. G. Tan, 2000b). The second reason is related to the lack of a general framework for fostering creativity within the initial teacher education programs. We hypothesize that when student teachers do not have a clear framework, their perception of fostering creativity is likely to be influenced by the contemporary educational practices. Elementary school learning and teaching culture both abide by

the streaming examinations (grades 4 and 6). It is thus common for teachers to complete the assigned syllabi and worksheets before introducing creative activities. Given the same amount of curricular time, student teachers would easily identify the high achievers as an appropriate group for challenging and creative activities. This possibly explains why some of the participants (those of the C2) held significantly different views with regard to teacher behaviors for EM1 students: using a variety of assessment (C2 > C1 and C3), selecting teaching aids (C2 > C1), and stimulating interest (C2 > C3).

A similar hypothesis can be used to explain the three significantly different items with a higher mean (mean difference: 0.5–1.5) for the EM2 students as compared to the EM1 students: stimulating interest, setting learning standards and evaluating learning outcomes, and being dedicated and committed (see Tables 3 and 4). After the first school-based streaming examination, the majority of the grade 5 students are grouped to the EM2 stream. The EM2 students are heterogeneous in their performances. Some of them are good at languages, while others are excellent in mathematics and science or are talented in arts and music. Accordingly, teachers have to be competent in motivating and assessing a variety of degrees of competence displayed by students of different ability levels. It is thus understood why the student teachers identified being committed and dedicated as significantly more important for fostering creativity of the moderate-ability students than it is for the high-ability students.

Implications for Educational Research and Policies

The study disclosed several issues of concern. First, it is indispensable to include a general framework for fostering creativity into teacher education programs. As a matter of fact, the general guidelines of education (e.g., the *Desired Outcomes of Education* and the *Ability-driven Education Paradigm*) were released two to three years after the launch of the three new initiatives (TSLN, NE and IT master plan). Hence, the schools and the teacher education institution were unclear about how to present their conceptions and frameworks of creativity for children and student teachers. In addition, creativity was first introduced via the arts (in the 1980s) and via thinking programs (as a thinking skill in the 1990s) to secondary school students; teachers and students alike were puzzled whether creativity is a form of a higher-order thinking skill, and whether this skill is suitable to be introduced to primary school children.

To have a comprehensive view of fostering creativity of all children

and adolescents, as beginning professionals, student teachers should understand that creative learning outcomes are developed from the mastery of knowledge and skills, and can be nurtured in ordinary but pleasant learning environments. Accordingly, they should be alert to the importance of learning environments that encourage combinational plays, joy of discovery, and trial and error. Supporting this view are some studies on the influence of positive affect on the unusualness of word association (Isen, Johnson, Mertz, & Robinson, 1985) and problem solving (Isen, Daubman, & Nowicki, 1987), which suggest that pleasant environments facilitate creative problem solving. In contrast, stress causes impaired performances on creativity tests. It is evident that the noradrenergic system (when test anxiety is blocked) exerts a modulatory effect on cognitive flexibility in problem solving (Beversdorf, Hughes, Steinberg, Lewis, & Heilman, 1999).

Student teachers should be reminded that creativity exists in all domains, ranging from humanity to science and engineering, and that academic achievement should not be used as a yardstick to qualify the students for taking part in creative activities. The habits and culture of ranking and labeling students according to their academic performances should be eliminated. As a matter of fact, students who fail to demonstrate their linguistic and mathematical competence (e.g., EM2 and EM3 students) in the standardized tests may be competent in other subject areas. Furthermore, among students, peer evaluation using the consensual techniques or other assessment modes should be encouraged.

Second, it is crucial for teacher educators, school leaders and policy-makers to recognize the significance of providing supportive and open environments for fostering teachers' creativity behaviors during teaching practice. To have a balance development, it is indispensable for student teachers to find congruence between their pre-existing ideas (e.g., social values, subject-related knowledge and skills) and professional knowledge (e.g., teaching, uncovering potential) (see e.g., Tillema, 1995), as well as their current and alternative beliefs (Bird, Anderson, Sullivan, & Swidler, 1993). Supervisor support (Sud & Malik, 1999), coping and other forms of social support (Griffith, Steptoe, & Cropley, 1999), and school leadership with clear vision and goals (Leithwood, Menzies, Jantzi, & Leithwood, 1996) are crucial as they can help reduce teacher burnout, role-identity conflict, role confusion, emotional exhaustion, and job dissatisfaction.

Third, student teachers are unique because they are new agents of socialization and societal changes. They are young professionals wanting to become effective and creative teachers. Within the new contexts of

education, student teachers along their journey of becoming creative teachers, experience roles formation and transformation. New roles are likely to be developed in supportive working environments. Teacher educators should recognize roles in which student teachers feel most comfortable. Based on their existing roles, student teachers should be encouraged to adopt other roles that can help furnish a high degree of flexibility of competence in the teaching profession.

Fourth, it is indispensable to conceptualize, revise and refine the general framework for fostering creativity that befits the student teachers' and students' needs. Cultivating teacher behaviors for fostering creativity should be regarded as one of the educational research themes. Accordingly, it is vital to establish consistent and interrelated educational research directions in several areas: national educational policies and aspirations, teacher educational curricula and assessment, school culture and curricula, and school and national assessment. As such, educational research frameworks should include related themes within the educational or teacher educational context. In the past several years, a few studies on students' perspectives on Singapore's computer (Teh & Fraser, 1994), chemistry (Wong & Fraser, 1996) and mathematics (S. C. Goh & Fraser, 1998) learning environments were reported. The studies validated useful instruments (e.g., My Classroom Inventory, Questionnaire on Teacher Interaction, What is Happening in the Class) for uncovering classroom learning climate in Singapore. These instruments can be employed with other instruments (e.g., A. G. Tan, 1999; Soh, 2000) to discover the influence of teacher behaviors on the classroom learning environments in general, and on ways to foster creativity of every student in particular. Using the interview technique with a survey instrument, we uncovered some shortcomings, further questions, and areas of concerns of fostering creativity within Singapore's contexts. The findings can be employed as exploratory information for further investigations.

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Appendix

The instrument comprises three parts: the backgrounds of the participants, self-perception of teacher characteristics, and teacher characteristics important for fostering creativity. Conduct the interview naturally, as if you are talking to a friend. Explain the rating scales to the participants. On a separate sheet of paper, note additional information related to constraints and ways to enhance creativity in the classroom.

The Participant

Age:
Gender:
Primary pupils he/she taught during teaching practice:
    (a)   Level
    (b)   Stream
    (c)   Subject
Has he/she attended any courses on thinking/creativity?
    Yes
    No
Has he/she infused thinking skills/strategies into his/her lesson?
    Yes
    No

Self-perception: I am a _____ teacher / I am a teacher who has
   _____.

The interviewer read the instructions: How do you describe yourself? Do the characteristics listed below describe you, a teacher, appropriately?

I am / I have
1.   Imaginative
2.   Disciplined, systematic
3.   Caring
4.   Interest in many areas
5.   Creative
6.   Task-oriented
7.   Kind
8.   Open-minded, receptive

9. Many ideas
10. Neat and tidy
11. Helpful
12. Adventurous
13. Different from others
14. Hardworking
15. Patient
16. Confident
17. Friendly

Note: On a separate answer sheet, a scale is prepared for each item:

Extremely Inappropriate		Moderately appropriate		Extremely appropriate
1	2	3	4	5
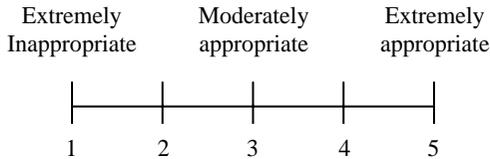
Teacher Behaviors Important for Fostering Creativity

The interviewer read the instructions: (a) What teacher behaviors (competence and disposition) are important for fostering creativity of the high academic achievers? Relate your ratings with reference to the students in the EM1 classes. (b) What teacher behaviors (competence and disposition) are important for fostering creativity of the moderate academic achievers? Relate your ratings with reference to the students in the EM2 classes.

1. Recognize individual needs, potentials, strengths
2. Pose challenging questions, open-ended questions
3. Be fair, no favoritism
4. Encourage free association of thoughts
5. Expose pupils to the use of IT
6. Be imaginative, creative
7. Allow trials and errors, mistakes
8. Encourage active participation, discussion
9. Be firm and consistent
10. Stimulate interest and enhance motivation
11. Encourage pupils to ask questions
12. Be prepared to take risk
13. Establish good rapport with pupils

14. Encourage learning beyond syllabi, textbooks
15. Be resourceful, knowledgeable
16. Facilitate immediate self- and peer evaluation
17. Encourage independent learning and thinking
18. Be a role model, set a good example
19. Use a variety of assessment modes
20. Encourage brainstorming, problem solving
21. Be kind and friendly
22. Relate learning to real life
23. Infuse thinking strategies and skills into learning
24. Be flexible and open
25. Introduce debate, project and presentation
26. Empower responsibility and leadership to pupils
27. Be dedicated, committed and hardworking
28. Select suitable materials, resources, teaching aids
29. Encourage logical, analytical thinking
30. Set learning standards, evaluate learning outcomes

Note: On a separate answer sheet, a scale is prepared for each item:

Extremely not important			Moderately important			Extremely important

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   |——|——|——|——|——|——|——|——|
   1    2    3    4    5    6    7    8    9
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