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An Exploratory Study of Singaporean Student Teachers' Perception of Teacher Roles That Are Important in Fostering Creativity

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Following its aspiration to develop an excellent educational system, creativity appears gradually as a component of education in Singapore. In June 1997 the "Thinking Schools" concept was announced outlining teacher roles in fostering creative thinking. This paper investigated student teachers' perceptions of teacher roles in enhancing students' creativity in the classrooms. 140 student teachers participated in a paper-and-pencil survey rating teacher characteristics that were important for fostering creativity of primary school students and secondary school students on a 9-Likert scale. The student teachers perceived that primary school teachers who can help foster students' creativity are those who possess basic pedagogical skills, creative disposition, interpersonal disposition and classroom management skills. They regarded that secondary school teachers who can help foster students' creativity are those who possess creative disposition and skills, as well as know-how for fostering thinking skills, social skills and pedagogical skills. The student teachers' different perceptions of teacher roles in fostering creativity of primary and secondary school students were discussed.

Socio-Cultural Perspectives of Creativity Theories. Psychology of creativity education is a comprehensive concept, encompassing global factors such as cultural, social, technological, curricular, and economical environments, as well as personal factors such as cognitive, affective, emotional, and developmental process (see e.g., Hennessey, 1995). It is in line with

contemporary theories of creativity, which conceptualize creativity from the interaction of social, cultural, and personal milieu (see e.g., Csikszentmihalyi, 1988, 1990; Mellou, 1995, 1996; Simonton, 1988a, 1988b, 1994; Woodman & Schoenfeldt, 1990). Accordingly, creative endeavors depend on various factors such as role modeling, socio-cultural settings (Simonton, 1983), interpersonal relationships (Simonton, 1984), the presence of opportunities, leadership qualities (Simonton, 1988a, 1988b), and the existence of local and foreign cultural influences (Simonton, 1994, 1996, 1997). Acknowledging the significance of socio-cultural influences and interpersonal relations, Tan (1997) proposes a four-system model of creativity, which consists of the individual, contact persons (contemporaries, predecessors, successors, rivals, etc.), social institutions, and culture. The four systems are interdependent. For classroom learning the model emphasizes interactive effects between teachers and students — two intimate interdependent systems. Social institutional systems (e.g., the Ministry of Education and schools) and cultural systems (e.g., language, beliefs) are two interdependent systems that can exert indirect but significant influences on classroom cultures.

What Constitutes Creative Teaching? Recognizing the intimate interdependency between teachers and students and the effects of their interactions on classroom learning (Zelina, Bohonyova, & Alberty, 1996), Tan (1998a) suggests a six-component model of creative teaching. The first component is related to basic pedagogical skills such as lesson planning, classroom management, communication, and evaluation. The second component refers to the content knowledge, creative techniques, and knowledge of pupils' developmental processes. The third component concerns the teacher's competence in selecting appropriate assessment modes. The fourth component contains motivation of teachers and pupils. Intrinsic motivation is an indispensable component of fostering creativity (Amabile, 1983a, 1983b) as it can generate on-going task commitments. School cultures make up the fifth component and educational policies constitute the sixth component.

Components of a Creative Lesson: Teachers who aspire to conduct creative lessons are expected to co-ordinate the six components of creative teaching well. For discussion about the components of a creative lesson, we focus on the first four components and highlight the last two from the perspectives of how teachers prepare a pleasant and stimulating learning environment for creative thinking. Domain-specific knowledge and skills can only be translated into suitable communicative codes if teachers are

aware of the psychological development of various age groups. If teachers understand pupils' cognitive, behavioral, affective, and psychomotor development, they are likely to propose appropriate teaching materials and design suitable teaching aids. The student-centered approach to teaching and learning should be adopted for it emphasizes student participation and involvement. Pupils are likely to comprehend new concepts better if they are given the opportunities to explore and to experience. In addition, teachers should acquire various creative techniques (e.g., brainstorming) and understand conditions (e.g., non-threatening environment) that stimulate creativity (the second component). Teachers should have ample knowledge of various modes of assessments. In addition to recall and memorization, teachers should be able to design alternative assessments (see e.g., Campbell, 1997) that examine independent and interdependent learning competence (the third component). A creative lesson maintains learning interests, stimulates thinking, and encourages discovery of new knowledge. Motivation is one of the prerequisite conditions for continuous learning and self-education. Learning that brings pleasant experiences is likely to generate satisfaction. It is indispensable to arouse pupils' interests of learning as early as possible (Smith, 1996). A subject can be interesting if teachers can associate it with pupils' learning experiences and various types of intelligence (Gardner, 1993). Games and quizzes (see e.g., Baer, 1994) that invite pupils' active participation should be included into the list of classroom activities (the fourth component).

An activity that is interesting but ineffective is undesirable. Effective learning enriches an individual's experiences and can act as a stimulus for continuous learning and self-improvement (see e.g., Kyriacao, 1986). How can a teacher ensure that an enjoyable lesson is effective? Before pupils engage in an activity, teachers should deliver clear instructions and expectations in relation to the task, behaviors, and time management. After pupils complete the task, teachers should deliver immediate feedback with regard to the learning content, pupils' behavioral and time management. Immediate feedback is significant for it can alert pupils of their strengths and weaknesses whilst their experiences are still fresh. Teachers should encourage self- and peer-evaluations because such evaluations can foster pupils' critical thinking competence. Classroom activities become personal if teachers can integrate pupils' responses and evaluations into the learning of new content (the first component).

A supportive learning environment is indispensable to unfold pupils' creative potentials. In a creative lesson, teachers relate classroom learning

to real life and introduce strategies to solve everyday problems. Teachers who are aware of developing their creative competencies and introducing specific creative methods and techniques to their classes are more effective in enhancing pupils' creative abilities than those who use traditional methods (Esquivel, 1995). A good rapport forms the basis for teachers to manage students' behaviors. Teachers should develop classroom regulations together with pupils. They are likely to gain respect from their pupils if they are able to establish pleasant and firm interpersonal relationships with pupils (the fifth and sixth components).

Teacher Role: "What a teacher thinks teaching is ... determines the direction, tone, and styles of the teacher ... has a great influence on how teachers teach: their conceptions of what they would like students eventually to become." (Fernstermacher & Soltis, 1986, pp. 5–6). Teachers' beliefs, attitudes, and educational philosophy influence their instructional approach, classroom climate (e.g., Baer, 1997; Esquivel, 1995), and roles that they may adopt. The six-component model of creative teaching and its version for creative lessons can only be more comprehensive if we relate it to the discussion about teacher roles. A role is a person's function, the part taken by her/him in life or in any activity. It is the way in which s/he is involved in, and what influence s/he has on an activity or a situation. Teacher roles state the position that teachers have in a society, in schools, and classrooms, and the ways they are expected to behave in a relationship with students and other related persons.

According to the role-identity theory (McCall & Simmons, 1978), a person acts as occupants of particular social positions or roles based on how s/he likes to see her(him)self and how s/he likes to be seen by others. Role identities determine a person's interpretations of the people, situations, and event that s/he encounters in various social situations. If a person selects the role as a teacher and associates the role with the characteristic creative, s/he will possess the role-identity as a creative teacher. The individual whose role-identity is a creative teacher would like to be seen as someone who is creative. The positive affect associated with a role-identity constitutes the motivational power or strength to perform. A person with a "creative teacher" role-identity tends to engage in performances that are unconventional such as employing non-traditional texts and conducting innovative projects (Petkus, 1996). Role-identities of a person may change according to social situations. In order to maintain the consistency of a role-identity, a person needs role-support. Role-support manifesting in words and/or behaviors, intentionally or unintentionally,

confirms the contents of a role-identity. A person can have more than one identity associated with a given role, and can have more than one role associated with a given identity (Petkus, 1996). A teacher, for instance, can possess multiple characteristics such as creative, friendly, caring, flexible, strict, and serious. S/he can also have multiple roles attached to the creative identity. A teacher can be a creative classroom manager, a creative mentor, a creative administrator, and a creative disciplinary master. Multiple role-identities are structured according to the relative importance of various role-identities over the long-term or short-term situational contexts. In the process of nurturing and fostering creativity, teachers experience the transformation of their professional roles.

Creativity Education — A National Agenda: Fostering creativity becomes prevailing in Singapore after the Prime Minister (Goh, 1997) announced the "Thinking Schools" framework and outlined new teacher roles. The "Thinking Schools" concept highlights the importance to foster students' creative thinking, critical thinking, and problem solving skills. In line with the national aspiration, principals and teachers are urged to be resources seekers and developers. They are also expected to acquire knowledge and skills and propose strategies that can foster creative thinking in the classroom. The "Thinking Programs" (started in 1996), which aim at infusing thinking skills and strategies implemented in some secondary schools, will be expanded to all secondary schools by the year 2000. To allow pupils to have more time to think, the scopes of school curricula were reduced in January 1998 by the amount between 10% and 30% for each subject.

Primary Versus Secondary School Teachers: Fostering creativity means preparing and devoting time and thought to foster and cherish new ideas, products, and performances. It is a developmental process and should begin at children's early age (see e.g., Mellou, 1996). In an educational system that endorses early streaming examinations (10 years and 12 years), teachers are likely to differentiate their roles according to pupils' learning ages. Because the "Thinking Programs" focus on fostering thinking skills of secondary school students, it is likely that teachers regard secondary school students as more suitable than primary school students to be exposed to thinking activities. In addition, Singaporean secondary school teachers are specialists in two or three subjects whereas their counterparts in the primary schools are generalists (teaching all subjects). They may implicitly associate fundamental skills (e.g., classroom management, pedagogical skills) with roles of primary school teachers and

complex skills (e.g., creative skills, thinking skills) with those of secondary school teachers.

Research Questions: There are numerous aspects to consider in creativity education. In discussing the role of task motivation, researchers acknowledge components such as domain-relevant skills and creativity-relevant skills (Amabile 1983a, 1983b; Hill & Amabile, 1993). Whilst highlighting the teaching of creative skills, researchers emphasize ways to integrate the skills into the subject learning (Montgomery, 1997). Feldhusen (1995) examines creative thinking and production from three aspects: metacognitive processing, the knowledge base, and personality variables. Clark (1997) and Slabbert (1994) investigate creativity education from the perspectives of creative products, creative processes, creative personality, and the role of a facilitative environment. Rarely have researchers examined teacher roles across educational levels in the Singaporean context. This paper intends to find out Singaporean student teachers' perceptions of teacher roles that are important in fostering creativity in primary and secondary schools. Five research questions are formulated:

1. What are student teachers' perceptions of teacher roles that are important in fostering creativity in primary schools?
2. Are there gender differences and/or differences across disciplines (arts vs. science) between student teachers' perception of teacher roles that are important in fostering creativity in primary schools?
3. What are student teachers' perceptions of teacher roles that are important in fostering creativity in secondary schools?
4. Are there gender differences and/or differences across disciplines (arts vs. science) between student teachers' perception of teacher roles that are important in fostering creativity in secondary schools?
5. Are there differences between student teachers' perceptions of teacher roles that are important in fostering creativity in primary schools and secondary schools?

Method

A paper-and-pencil survey was conducted at the National Institute of Education (NIE) (February 24, 1998), aiming to uncover student teachers' perceptions of teacher characteristics or roles that are important in

fostering creativity of primary students (age 6–12 years) and secondary students (age 13–18 years).

Subjects

The subjects were 140 student teachers of the Bachelor Degree program (Year 1). There were 88 females (M = 20.1 years old and SD = 1.2 years), and 52 males (M = 22.0 years old and SD = 1.4 years). All of them were attached to one of the local schools for a five-week teaching practice (January 5 to February 6, 1998). There were 83 (59.3%, 48 females and 35 males) student teachers majoring in arts, 52 (37.1%, 36 females and 16 males) majoring in sciences, and 5 (3.6%) of them did not indicate their major. Four subjects did not respond to teacher roles in fostering creativity in primary schools. The others rated teacher roles that are important in fostering creativity in both primary and secondary schools.

Instrument

The instrument is a paper-and-pencil questionnaire comprising 51 teacher characteristics or roles. The six-component model of creative teaching (Tan, 1998a) and the role-identity theory (McCall & Simmons, 1978; Petkus, 1996) were referred to in order to highlight Singaporean classroom teaching and learning experiences. Specifically, the "Evaluation of Teaching Practice" (EPT) form designed by the NIE practicum office was consulted. The NIE supervisors and co-operating teachers in schools employ the EPT form to evaluate student teachers' performances during teaching practice. Examples of items extracted from the EPT form were managing behavior and time (#8), encouraging participation (#14), establishing rapport (#21), and stimulating thinking (e.g., #3, #5, #12). Besides, Singapore's current educational outcomes (Ministry of Education, 1998) were referred to such as being imaginative and creative (#49), infusing thinking strategies and skills into lessons (#2), acknowledging strengths of various cultures (#50), and organizing festivals and celebrations (#31). In addition, several common responsibilities of Singaporean teachers were included, for instance, ensuring high academic achievement and good grades (#17), as well as providing guidance and counseling (#22). The instrument also took into account various learning activities that Singaporean pupils desire to have (from a study conducted in January 1998, Tan, 1998b): Games, riddles, and role-play (e.g., #36, #51). It is

believed that dispositions of a person determine her/his role-identities. Hence, ten most frequently appeared items in a pilot study conducted in early 1997 on creative teachers' dispositions were included: Being fair (#40), dedicated (#34), firm (#30), patient (#15), artistic (#38), flexible (#20), resourceful (#28), kind and friendly (#32), and risk taking (#47).

Procedure

The instrument was distributed to the subjects in a lecture hall when they attended lectures on educational psychology and classroom management. The subjects were requested to rate the degree of importance of the items related to teacher characteristics or roles on a 9-Likert scale. The rating of 1 meant extremely unimportant, and the rating of 9 referred to extremely important. The subjects were told to judge the items from the perspective of fostering creative thinkers in Singaporean primary and secondary schools: What teacher characteristics or roles do you regard as important for fostering creative thinking of primary (secondary) school students? The average time taken to complete the survey was 20 minutes. The subjects answered the survey in English.

Data Analysis

Alpha reliabilities for the subjects' ratings on the teacher roles or characteristics that are important for fostering creativity of the primary students were 0.98, and for secondary students was 0.93, indicating that the instrument was highly reliable. In order to find out student teachers' perceptions of teacher characteristics that are important for fostering primary and secondary students' creativity, two additional computations were employed. First, responses with a rating 7 and above were selected. Then, the percentages of the number of student teachers who rated the items high (7 and above) were computed. Teacher characteristics that are important for fostering creativity referred to items that were rated highly by the majority of the subjects (80% and above).

Items that fulfilled the two additional computations were selected for factor analysis, which reduced the items into manageable portions. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA) for the perceived teacher characteristics that are important for fostering creativity was high: Primary (0.84) and secondary (0.83). The approximate Chi-squares from the Bartlett's test of sphericity were 1,184.75 (primary: df

253) and 1,946.34 (secondary: df 465) at the p less than 0.0001 significant level. The rotation method used was the oblimin with Kaiser normalization, and the extraction method was the principal component analysis. Items with a factor loading 0.30 and above were selected for interpretation.

A 2 (gender) × 2 (disciplines: arts vs. science) multivariate analysis of variance and the F-test were performed on the individual items to find out the differences in student teachers' perception of teacher characteristics that were important for fostering primary or secondary students' creativity. The non-parametric (Wilcoxon-Signed Rank) test for two related samples was computed to explore the differences in student teachers' perceptions of teacher characteristics that were important for fostering primary students' creativity and their corresponding perceptions regarding fostering secondary students' creativity.

Results

Four factors for student teachers' perception of teacher characteristics that are important for fostering primary students' creativity accounted for 51.5% variance. Alpha reliabilities of the individual factors were between 0.68 and 0.82. Co-relations among factors were between 0.16 and 0.34. Factor 1 (F1: variance, v = 31.8%; Alpha, A = 0.82; eigen-value, e = 7.3) is defined as teachers' pedagogical and interpersonal skills, which comprises ten items (#1, 6, 9, 15, 18, 21, 22, 23, 36, 51). Factor 2 (F2: v = 7.4%, A = 0.73, e = 1.7) refers to teachers' creative disposition, which consists of four items (#24, 28, 49, 50). Factor 3 (F3: v = 6.3%, A = 0.75, e = 1.5) illustrates teachers' interpersonal disposition (#34, 35, 40, 41), whereas Factor 4 (F4: v = 6.0%, A = 0.68, e = 1.4) comprises items related to teachers' classroom management skills (#2, 4, 8, 30). Table 1 displays factor loadings and percentages of high ratings (7, 8 or 9) of teacher characteristics that were important for fostering primary students' creativity (Research question 1).

Four factors for subjects' perception of teacher characteristics that are important for fostering secondary students' creativity accounted for 49.5% variance. Alpha reliabilities of the individual factors were between 0.70 and 0.85. Co-relations among factors were between 0.20 and 0.25. Factor 1 (F1: v = 30.1%, A = 0.85, e = 9.3) is defined as teachers' creative disposition and skills, which comprises ten items (#14, 24, 27, 28, 33, 41, 45, 48, 49, 50). Factor 2 (F2: v = 8.2%, A = 0.81, e = 1.6) illustrates teachers' social and interpersonal skills, which consists of six items (#21,

Table 1 Teacher Roles That Are Important in Fostering Primary School Students' Creativity

	Factor Loading	7+8+9 N (%)
Pedagogical skills		
Establishing a good rapport with students (#21)	0.77	119 (87.5%)
Recognizing individual needs, potentials (#18)	0.66	123 (90.4%)
Providing help, guidance, and counseling (#22)	0.62	117 (86.3%)
Being a role model (#9)	0.54	128 (94.1%)
Incorporating games, role play into lessons (#36)	0.50	123 (90.4%)
Stimulating interest, enhancing motivation (#6)	0.49	127 (93.4%)
Creating a non-threatening learning environment (#1)	0.48	121 (90.0%)
Selecting suitable materials, resources (#23)	0.47	126 (92.7%)
Incorporating quizzes, puzzles, riddles into lessons (#51)	0.44	112 (82.3%)
Being patient, repeat instructions, when needed (#15)	0.44	125 (91.9%)
Creative disposition		
Acknowledging strengths of various cultures (#50)	0.82	114 (83.8%)
Being imaginative, creative (#49)	0.79	116 (85.3%)
Being resourceful, knowledgeable (#28)	0.52	115 (84.6%)
Encouraging students to ask questions (#24)	0.36	117 (86.0%)
Interpersonal disposition		
Being fair, no favoritism (#40)	–0.81	132 (97.6%)
Allowing trial and error, mistakes (#41)	–0.74	119 (87.5%)
Relating learning to real life (#35)	–0.62	130 (95.6%)
Being dedicated, committed, hard working (#34)	–0.49	124 (91.2%)
Classroom management skills		
Managing behavior, time (#8)	–0.55	113 (83.1%)
Being firm and consistent (#30)	–0.51	130 (95.6%)
Establishing a disciplinary plan, rules, regulations (#2)	–0.49	125 (91.9%)
Communicating learning intent, expectations clearly (#4)	–0.45	112 (82.4%)

22, 30, 34, 34, 40). Factor 3 (F3: v = 6.1%, A = 0.70, e = 1.8) shows teachers' pedagogical skills (#9, 10, 13, 23, 29), whereas Factor 4 (F4: v = 5.1%, A = 0.75, e = 1.6) refers to skills in fostering thinking (#3, 5, 6, 11, 12, 20, 26) (Research question 2) (see Table 2).

A 2 (gender) × 2 (disciplines) multivariate analysis of variance on the 51 items did not show any main and interactive effects for student teachers' ratings on teacher characteristics that are important for fostering the creativity of primary and secondary students. For student teachers' ratings on teacher roles that are important in fostering primary students' creativity, results of the F-test showed that three items (managing behavior and time #8: $F_{1, 126} = 5.13$; being a role model #9: $F_{1, 126} = 4.32$; recognizing individuals' needs #18: $F_{1, 126} = 5.91$, $p < 0.05$) were significantly different

Table 2 Teacher roles that are important in fostering secondary school students' creativity

	Factor Loading	7+8+9 N (%)
Creative disposition and skills		
Acknowledging strengths of various cultures (#50)	0.73	128 (91.4)
Being imaginative, creative (#49)	0.65	131 (93.6)
Introducing debate, project and presentation (#45)	0.60	112 (80.0)
Encouraging independent learning and thinking (#48)	0.59	133 (95.0)
Facilitating immediate self- and peer-evaluation (#27)	0.53	121 (86.4)
Encouraging active student participation, discussion (#14)	0.51	131 (93.6)
Being resourceful, knowledgeable (#28)	0.50	133 (95.0)
Allowing trial and error, mistakes (#41)	0.49	124 (88.6)
Encouraging learning beyond syllabi, textbooks (#33)	0.46	128 (91.4)
Encouraging students to ask questions (#24)	0.43	129 (92.1)
Social skills		
Relating learning to real life (#35)	0.71	131 (93.6)
Being fair, no favoritism (#40)	0.65	134 (95.7)
Providing help, guidance, and counseling (#22)	0.62	127 (90.7)
Establishing a good rapport with students (#21)	0.57	122 (87.1)
Being dedicated, committed and hard working (#34)	0.54	127 (90.7)
Being firm and consistent (#30)	0.51	127 (90.7)
Pedagogical skills		
Being a role model (#9)	0.68	112 (80.0)
Setting learning standards, evaluating outcomes (#10)	0.66	119 (85.0)
Empowering responsibility, leadership (#13)	0.49	127 (90.7)
Exposing students to the use of IT (#29)	0.45	119 (85.0)
Selecting suitable materials, resources (#23)	0.40	125 (89.3)
Thinking skills		
Encouraging free association of thoughts (#5)	0.73	124 (88.6)
Encouraging brainstorming, problem solving (#12)	0.56	132 (95.0)
Stimulating interest, enhancing motivation (#6)	0.54	134 (95.7)
Infusing thinking strategies and skills (#3)	0.49	126 (90.0)
Posing challenging, open-ended questions (#11)	0.44	133 (95.0)
Being flexible and open (#20)	0.40	128 (91.4)
Encouraging logical, analytical thinking (#26)	0.38	133 (95.0)

across gender. Female subjects rated items 8 ($M = 7.86$, $SD = 1.14$), 9 ($M = 8.28$, $SD = 0.82$) and 18 ($M = 8.05$, $SD = 1.04$) significantly higher than their male counterparts did (#8: $M = 7.31$, $SD = 1.60$; #9: $M = 7.88$, $SD = 1.36$; #18: $M = 7.58$, $SD = 1.16$) (Research question 3). For student teachers' perception of teacher roles that are important in fostering secondary school students' creativity, there was one significantly different item (empowering responsibility #13: F1, $130 = 7.01$, $p < 0.01$) across gender and three significantly different items (encouraging student

participation #14: F1, 130 = 6.65; allowing trial and error #41: F1, 130 = 6.73; encouraging independent thinking #48: F1, 130 = 5.23, $p < 0.05$) across disciplines. The female subjects (M = 8.03, SD = 0.86) rated item 13 significantly higher than the male subjects (M = 7.67, SD = 1.28). Subjects whose major were sciences rated items 14 (M = 8.19, SD = 0.80), 41 (M = 8.15, SD = 1.19) and 48 (M = 8.37, SD = 0.84) significantly higher than their counterparts (#14: M = 7.94, SD = 0.76; #41: M = 7.76, SD = 1.14; #48: M = 7.89, SD = 0.94) who majored in arts (Research question 4). Except nine items (#4, 6, 21, 32, 34, 35, 40, 41, 44), results of the Wilcoxon-Signed Ranks test showed that student teachers rated significantly different in teacher characteristics that were important for fostering creativity of primary students and secondary students (Research question 5) (see Appendix).

Discussion

Primary School Teacher Roles (Research Question 1): Student teachers' perceptions of a phenomenon are information about what they experience, believe, and consider as important. Their perceptions of teacher roles that are important in fostering creativity are influenced by their implicit conceptions of creativity education, creative teaching, and/or creative lessons. Student teachers perceived a teacher who can help foster primary students' creativity as someone who possesses basic pedagogical skills (F1), creative disposition (F2), interpersonal disposition (F3) and classroom management skills (F4) (see Table 1). They assigned relatively conventional roles to primary school teachers. A primary school teacher who can foster students' creativity is a person who can perform basic pedagogical skills. S/he possesses interpersonal skills (#21), counseling skills (#18, 22), motivational skills (#6), intrapersonal skills (#9, 15), as well as skills for creating a psychologically safe learning environment (#1), preparing resources (#23) and selecting activities (#36, 51). A primary school teacher who has acquired these skills is likely to play the role of a mentor who has a close interpersonal relationship with her/his students. S/he can also act as a facilitator who organizes various instructional activities that invite student participation.

A primary school teacher who can help foster primary students' creativity is a creative and an imaginative person (#49). Living in a multiethnic and multilingual Singaporean society and teaching students of various backgrounds, a creative teacher acknowledges strengths of various

cultures (#50). S/he is a resourceful and knowledgeable person (#28) who encourages students to ask questions (#24). A teacher with such characteristics is likely to take the role of a creator. A teacher who intends to inculcate creativity into primary school students has an interpersonal disposition. S/he is fair and patient (#40), resembling the role of a caregiver. S/he is dedicated, committed and hard working (#34) in relating learning to real life (#35). Adopting the role of a caregiver, a teacher accepts the mistakes committed by primary students and their habit of trial and error (#41). A Singaporean primary classroom comprises 35 to 40 students. Teachers spend a great deal of effort in managing young children's behaviors and the level of noise generated by them. In order to create a supportive learning environment a teacher is likely to play the role of a classroom manager. S/he should acquire skills in managing students' behaviors and time (#8), establishing rules and regulations (#2), communicating learning intent clearly (#4), and being consistently firm (#30).

Secondary School Teacher Roles (Research Question 3): A secondary school teacher who can help foster students' creativity should acquire creative disposition and skills (F1), know how to foster thinking skills (F4), and possess social skills (F2) and pedagogical skills (F3). We can identify teacher roles of secondary school teachers that are important from the findings: Creator (F1), thinker (F4), counselor (F2) and mentor (F3). As a creator, the secondary school teachers should be creative (#49), resourceful (#28) and receptive to various cultures (#50). S/he encourages independent learning and thinking (#48), learning beyond syllabi (#33), active participation (#14), trial and error (#41), asking question (#24), self- and peer-evaluation (#27) and project work (#45). As a thinker teacher, the secondary school teacher is perceived as someone who is able to infuse various thinking skills (#3, 26) and use various thinking strategies (#5, 11, 12). S/he is flexible and open (#20) and can enhance students' motivation (#6).

As a counselor, secondary school teachers are fair (#40), firm (#30), dedicated (#34), helpful (#22) and realistic (#35). S/he is able to establish a good relationship with her/his students (#21). In the first year of secondary education, students in Singapore encounter several life events such as changing schools, adjusting themselves to new academic subjects and meeting new friends. In the higher secondary years, students experience a transitional period from student life to working life. They need career guidance and academic advice. Hence, the teacher role as a

counselor is essential. As a mentor, secondary school teachers are role models. They set standard of achievement and evaluate learning outcomes (#10). They empower leadership (#13), select suitable resources (#23), and explore students to information technology (#29).

Differences Across Gender and Courses (Research Questions 2 and 4): Female student teachers rated managing behavior and time (#8), being a role model (#9) and recognizing individual needs and potentials (#18) as qualities for fostering primary students' creativity significantly higher than male student teachers did. They also rated empowering responsibilities and leadership (#13) as an important quality for fostering secondary students' creativity significantly higher than their male counterparts did. We infer from the results that female student teachers may perceive the importance of guiding and disciplining young children, on the one hand, and empowering responsibility in older children, on the other hand. To confirm this interpretation future studies should look at female student teachers' conceptions of young and old children's competence. There were significant differences across disciplinary groups in student teachers' ratings on important roles or characteristics of secondary school teachers. Student teachers of the science major rated active participation and discussion (#14), encouraging trial and error or mistakes (#41), and independent learning and thinking (#48) as important secondary school teachers' qualities higher than did student teachers of the arts major. Science has been traditionally regarded as a subject that demands practical experience (e.g., experience, observation) and investigation. At the secondary level, students often conduct science experiment and observation. Science experiments at the primary level are likely to be conducted by the teachers. If primary school students are allowed to take part in the experiment, close guidance and clear instructions will be delivered. Student teachers may think that secondary school students are more ready than primary students to discover independently new knowledge and explore scientific methods that can enhance their understanding of science. Fostering creativity in science and arts may need different pedagogical skills, and hence different teacher roles. Future research should investigate this query.

Creativity for Young and Old Children (research question 5): Student teachers possessed different perception of teacher characteristics for fostering primary students' creativity and secondary students' creativity. The author interviewed several subjects. The subjects conveyed unanimously the message that young children are not likely to be ready for any abstract thinking activities. They believed that the young minds need

extensive guidance, and hence the teacher has to be patient (#15). The young minds can learn better from concrete objects (#25). Student teachers regarded secondary school students as a more appropriate group than primary school students for acquiring thinking skills and strategies (e.g., #12, 26) (see Appendix). Student teachers' conceptions of the development of the young children's mind should be examined. Do student teachers have a discrete or a continual conception of children's cognitive development? Do they perceive primary school students as less ready than secondary students to receive challenging thinking tasks? How can a person be creative at an older age when s/he is not given an opportunity to explore her/his creativity at an early age?

Critical Assessment: With the presence of the "Thinking Schools" and the "Learning Nation," Singaporean teachers experience a transformation of roles and an addition of various responsibilities. Structural and curricular changes are accompanied by newly defined educational outcomes for primary, secondary, and tertiary education of which creative characteristics and independence are highlighted. Creative pupils can think independently and find solutions to problems without referring to the textbooks and without following instructions from others. They are capable of taking initiative, can form their own judgements on matters, and can be entrusted with great responsibility (Goh, 1972; Ministry of Education, 1998). The new educational outcomes challenge teacher roles in the classroom, question their traditional roles as a caregiver and a knowledge disseminator, and encourage unconventional roles as partners and friends of pupils. Contemporary Singaporean teachers have to abandon the unidirectory role as a transmitter of knowledge and adopt multifaceted roles such as creators, leaders, managers, mentors, and counselors (Tan, 1998a).

Student teachers in this study seemed to understand the importance to adopt multiple teacher roles for fostering creativity in both primary and secondary school levels. They seemed to hold an implicit conception that secondary school teachers are in the better position than their counterparts in the primary schools to uncover pupils' creative potentials. Recognizing student teachers' views of teacher roles in fostering creativity across educational levels, the teacher education institute should try to design appropriate intervention programs that can implant the importance of nurturing young children's creativity.

Student teachers' perceptions of teacher roles across educational levels represent their beliefs in and experiences with the Singaporean educational systems. Fostering creativity challenges Singapore's school assessment

system especially the two early streaming examinations in primary schools, conventional learning cultures that focus on highly academic performances, as well as social values that emphasize respect for elderly people and teachers and maintain harmonious relations. It challenges teachers' implicit conceptions of learning in primary school classrooms structured by the two streaming examinations. During the past three years, there have been numerous curricular innovations in the teacher education programs such as the increase of the number of courses that enhance creative and critical thinking, and the use of multiple modes of learning and assessment that emphasize independent learning. Yet, some important innovations are still lacking, including the research and intervention programs that examine teachers' psychological needs in the process of coping with new roles. Some curricular and structural changes whose advantages, however, seem to be undermined by the conventional national school assessment systems for primary education. The newly established "Singapore Center for Teaching Thinking" (June 1998), and newly developed in-service and pre-service courses should address these urgent issues directly.

Limitations and Suggestions: According to the role-identity theory (McCall & Simmons, 1978; Petkus, 1996), the role-identity, role-performance, and role-support are in a cyclical relationship. A person with a given role (e.g., a creative teacher) undertakes role-performances (e.g., encouraging pupils to voice out their own viewpoint and share unconventional ideas) that are designed to elicit role-support (e.g., verbal recognition from pupils and colleagues), which reinforces the role-identity. A teacher needs supports from colleagues, principals, and parents, as well as co-operation from pupils in order to sustain his/her motivation in taking a role. While convincing themselves and students of the new initiatives, in-service teachers are likely to experience role-conflict, stress, and difficulty in coping with the new expectations.

The present study examined student teachers' perceptions of important roles of teachers (secondary and primary schools) for fostering creativity from the perspectives of role-performances and role-identities. Future studies should examine student teachers' perception of role-support that teachers need for conducting creative lessons. A research-design that captures actual classroom experiences is suitable for exploring difficulties in and advantages of adopting multiple roles in teaching, and subsequently the types of role-supports that teachers desire. The results of this study may be representative of initial teachers but may not represent the perceptions

of the in-service teachers. In-service teachers are likely to feel the overwhelming effects of the new educational initiative that challenges their conventional pedagogical approaches. A similar study that extracts in-service teachers' views on teacher roles for fostering creativity at various school levels should be conducted.

Initial and experienced teachers may be overwhelmed by the wide scope of factors, and may not get a concrete idea how creativity education should be carried out in the classroom. We admit the significance of all environmental and personal factors. We, however, think that, it is necessary for teachers to prioritize the factors that are important for fostering creativity of primary and/or secondary school students. It is believed that a good teacher who wishes to foster creativity should assume the role of a thinker, a mentor, a counselor and other roles. Future research should examine effective strategies that can help teachers realize these roles within the constraints of limited resources and insufficient time. Otherwise, teachers may lose in the "garden" of multiple roles without being able to generate appropriate instructional strategies.

The present study obtained student teachers' perceptions of characteristics that are important for fostering creative thinking with an instrument developed within the context of Singaporean teacher education. Similar instrument should be developed from students' and parental perspectives as well as from the perspectives of other adults in society. The effectiveness of the instrument can be enhanced if it is used together with other instruments that examine teachers' self-concept, self-esteem, and job satisfaction. It should also be used with other instruments that investigate teacher motivation (see Hennessey, 1995) in fostering various types of creativity.

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Appendix

Descriptive Statistics of Teacher Roles in Fostering Creativity

	Primary school		Secondary school	
	M (SD)	Rank	M (SD)	Rank
Be fair, no favoritism (#40)	8.46 (0.78)	1	8.39 (0.84)	1
Be firm and consistent (#30)	8.18 (0.96)*	2	8.01 (1.11)	14
Be a role model, set a good example (#9)	8.14 (1.06)****	3	7.73 (1.41)	25
Be patient, repeat instructions, when needed (#15)	8.13 (0.96)****	4	6.82 (1.45)	45
Relate learning to real life (#35)	8.07 (0.95)	5	8.02 (0.97)	12.5
Use concrete objects, hands-on experience (#25)	8.06 (1.01)****	6.5	6.66 (1.52)	47
Stimulate interest, and enhance motivation (#6)	8.06 (1.01)	6.5	8.09 (1.01)	6
Be dedicated, committed, and hard working (#34)	8.04 (0.98)	8	8.04 (1.02)	10
Establish a discipline plan, rules, and regulations (#2)	8.02 (1.00)****	9	7.55 (1.50)	30
Allow trials and errors, mistakes (#41)	7.95 (1.18)	10	7.90 (1.16)	20.5
Select suitable materials, resource, teaching aids (#23)	7.93 (1.02)****	11	7.76 (1.00)	24
Establish a good rapport with students, parents (#21)	7.90 (1.15)	12	7.98 (1.15)	15
Recognize individual needs, potentials, strengths (#18)	7.88 (1.10)*	13	8.04 (1.03)	10
Incorporate games, role play into lessons (#36)	7.87 (1.24)****	14	6.80 (1.42)	46
Create a non-threatening learning environment (#1)	7.78 (1.27)*	15	7.40 (1.42)	34.5
Be imaginative, creative (#49)	7.75 (1.11)****	16	8.08 (0.92)	8
Encourage students to ask questions (#24)	7.74 (1.18)*	17	7.94 (0.98)	18
Provide helps, guidance, and counseling (#22)	7.71 (1.27)****	18	7.96 (1.08)	16.5
Acknowledge strengths of various cultures (#50)	7.68 (1.34)****	19	7.91 (1.10)	19
Manage behavior, time (#8)	7.67 (1.34)****	20	7.37 (1.37)	36
Be resourceful, knowledgeable (#28)	7.63 (1.33)***	21	8.09 (0.94)	6
Incorporate quiz, puzzle, riddle into lessons (#51)	7.61 (1.19)****	22	7.13 (1.41)	41
Communicate learning intent, expectations clearly (#4)	7.51 (1.37)	23	7.69 (1.23)	27
Be flexible open (#20)	7.48 (1.36)****	24	8.04 (0.90)	10
Encourage learning beyond syllabi, textbooks (#33)	7.43 (1.28)****	25	7.96 (1.03)	16.5
Encourage active student participation, discussion (#14)	7.40 (1.26)****	26.5	8.09 (0.89)	6

	Primary school		Secondary school	
	M (SD)	Rank	M (SD)	Rank
Decide rewards and punishment (#7)	7.40 (1.54)****	26.5	6.03 (1.63)	51
Set learning standards, evaluate learning outcomes (#10)	7.36 (1.46)****	28	7.67 (1.17)	29
Infuse thinking strategies and skills into learning (#2)	7.35 (1.30)****	29	7.55 (1.50)	30
Be kind and friendly (#32)	7.23 (1.41)	30	7.29 (1.41)	39
Integrate students' responses into content learning (#19)	7.21 (1.32)***	31	7.45 (1.20)	33
Use a variety of assessment modes (#39)	7.18 (1.36)	32	7.29 (1.40)	39
Facilitate group work, cooperative learning (#16)	7.13 (1.37)*	33	7.40 (1.22)	34.5
Encourage independent learning and thinking (#48)	7.11 (1.62)****	34	8.11 (0.91)	3
Encourage brainstorming, problem solving (#12)	7.07 (1.43)****	35.5	8.10 (0.92)	4
Encourage non-academic activity, ECA (#43)	7.07 (1.52)****	35.5	7.51 (1.39)	31
Expose students to the use of IT (#29)	7.01 (1.51)****	37	7.71 (1.31)	26
Organize outdoor activities (e.g.,visit, excursion) (#31)	6.95(1.67)***	38	6.62(1.57)	50
Be artistic, appreciate art and music (#38)	6.90 (1.59)*	39	7.04 (1.56)	43
Allow unconventional, strange ideas (#37)	6.85 (1.64)****	40	7.29 (1.43)	39
Encourage free association of thoughts (#5)	6.83 (1.75)****	41	7.89 (1.05)	22
Be prepared to take risk (#47)	6.80 (1.75)****	42	7.34 (1.46)	37
Encourage logical, analytical thinking (#26)	6.76 (1.60)****	43	8.17 (0.87)	2
Organize exhibitions, competitions (#42)	6.75 (1.48)****	44	7.09 (1.37)	42
Empower responsibility and leadership to students (#13)	6.68 (1.48)****	45	7.90 (1.05)	20.5
Encourage festivals, celebrations (#44)	6.65 (1.75)	46	6.62 (1.66)	49
Facilitate immediate self- and peer-evaluation (#27)	6.52 (1.36)****	47	7.66 (1.10)	29
Pose challenging questions, open-ended questions (#11)	6.46 (1.64)****	48	8.02 (0.99)	12.5
Ensure high academic achievement, good grades (#17)	6.43 (1.62)***	49	6.65 (1.58)	48
Introduce debate, project, and presentation (#45)	6.19 (1.68)****	50	7.49 (1.39)	32
Convey current educational policies, aspirations (#46)	5.68 (1.92)****	51	7.02 (1.58)	44

Note: * $p < 0.05$; ** $p < 0.01$, *** $p < 0.005$, **** $p < 0.001$ (Wilcoxon-Signed Ranks Test)