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Improving the Preparation of Teachers:

Educating Pre-service Teachers for the Information Millennium

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The educational scene is evolving rapidly in response to societal developments over the last decade. Attempts to confront challenges of the 21st century have meant that ambitious goals are being set forth in current educational reform efforts. Singapore's Prime Minister, Mr. Goh Chok Tong, summed up the nation's vision for educational reform in these words – "Thinking Schools and Learning Nation". This vision of schooling however, poses great challenges for teachers and the schools in which they work. In order to meet these challenges, renewed forms of teacher preparation are an imperative. The purpose of the present paper is thus to discuss future directions for teacher education programs in light of current societal demands. A conceptual framework for developing teachers who are equipped to teach in the schools of tomorrow will be suggested. Particular emphasis is placed on ways to train pre-service teachers to teach thinking effectively. It is suggested that self-regulation be employed as a vehicle to support student teacher learning in this area.

The Pressure for Educational Reform

We are living in an age where the world's store of information is rapidly increasing. Almost a decade ago, Freeley (1990) stated in foresight that, "ninety-seven percent of everything known at the start of the twenty-first century will have been discovered since today's students were born" (p. viii), and pointed out that these students would be called upon to face problems unimaginable at this time and to reach decisions based on evidence that does not yet exist.

At the same time, advances in high-technology delivery systems have enhanced the accessibility of knowledge and rapid globalisation has diminished the significance of geographical boundaries. These international trends have placed growing and new demands on young people entering the labour market. In today's information age, intellectual capital will increasingly be the competitive advantage of nations and thinking skills are an essential prerequisite for employment.

In view of these new social and economic realities, education institutions are under pressure to develop students who are capable of thinking critically and creatively, and able to access, evaluate and use knowledge, rather than just knowing it. In an opening speech at the Seventh International Conference on Thinking in 1997, the nation's Prime Minister put forth the vision "Thinking Schools and Learning Nation". Central to this vision is that schools must develop future generations of thinking and committed citizens, capable of making good decisions to keep Singapore vibrant and successful in the future.

Yet, the visions of classrooms called for by current educational reform efforts pose great challenges for teachers and the schools in which they work. They represent a substantial departure from the classroom in which most of today's teachers were students, and they are based on fundamentally different assumptions about teaching and learning, and about students and schools.

The Increasing Complexity of Teaching in the Information Millennium

Teaching is a hard profession getting harder. Modern developments may have eased some teaching burdens, but they

certainly have not made life easier for teachers (Haddad, 2000). Efforts to restructure schools for the demands of a knowledge-based economy are redefining the job of teaching (INTASC, 1992). Teaching is no longer just about covering the curriculum by dispensing information, knowledge and skills. The objectives of education have become more complicated. In classrooms of the twenty-first century, teachers will need to employ a greater range of teaching approaches according to need (Day, 1999). Teachers are expected to help students acquire higher levels of cognitive skills, including the ability to think critically, synthesise information, and above all, the skills of applying acquired knowledge to new situations and judiciously learn new knowledge.

However, the implementation of any educational change can only be as good and successful as the teachers who execute these changes. Teachers serve as a critical intervening variable in the development of thinking skills in their pupils. If teacher performance is the most powerful link to effective thinking among students, teaching teachers to teach thinking must become one of the highest priorities of teacher education (Underbakke, et al., 1993).

Preparing Pre-service Teachers to Teach Thinking

In Singapore, the desired outcomes of teacher education are reflected in the Ministry of Education's ASK (Attitudes, Skills, and Knowledge) model (Tan & Gopinathan, 1999). While the acquisition of knowledge and skills is often taken for granted as an educational goal, dispositions are seldom included although they are often implied by the inclusion of attitudes (Katz, 1993). However, the acquisition of knowledge and skills does not guarantee that they will be used and applied. As Cantor (1990) puts it, "having" is not necessarily "doing".

This suggests that it is also important to cultivate dispositions or the tendency to exhibit frequently, consciously, and voluntarily a pattern of behaviour that is directed to a goal (Katz, 1993). Indeed, "it seems timely to include dispositions among important outcomes of education at every level" (Katz, 1993, p. 3).

Consequently, teacher training in the area of thinking skills instruction would necessarily have to address these components. It is clear that teachers need to be empowered in terms of the knowledge and strategies which are necessary for teaching thinking. Additionally, their own thinking faculties must be developed. In any process of teaching and learning, teachers are the mediators between the knowledge and skills to be taught and the students. Just as in driving, an instructor needs to be able to operate the car before teaching it to learner drivers, so it is with thinking skills. Therefore, teachers' ability to think must be developed prior to the teaching of these skills in the classroom context. Affective aspects such as favourable attitudes and dispositions towards the teaching of thinking are other critical elements to be fostered. From the perspective of pre-service teachers, thinking skills should be considered important in today's society. They should believe that thinking can be taught, and most importantly that students regardless of ability, can learn to think. Further, pre-service teachers would necessarily possess the positive dispositions that are the very push factors towards thinking critically (Kong, 2001).

But let us not become sanguine. Revising teaching approaches and curriculum to include thinking instruction exerts considerable demands on the teacher. Like most measures in instituting reform, efforts to embrace thinking skills would necessarily meet with a multitude of barriers. Amongst the oft-mentioned impediments are time constraints, the need to complete syllabi and the sometimes less than enthusiastic students. Teachers who have grown accustomed to a certain style will for a time experience the awkwardness that comes with any new approach. Unwilling to leave their comfort zones, teachers may be resistant to implementing what they have learnt in the classroom.

Given the rapid advances in information today, knowledge will need to be regularly updated; teaching methods and skills will need to be revisited. Initial training in thinking instruction that provides pre-service teachers with a solid foundation of knowledge, proficiency in pedagogical skills, a deep appreciation and willingness to partake in and contribute to the thinking movement is fundamental, but not sufficient. It is equally crucial that candidates are well-prepared to acquire new knowledge competencies according to future demands, to be open to new ideas and methods, to understand and accept the need to change. In order to take up this role, teachers need to know how to, as well as be willing to learn. This challenge corresponds closely with the concept of self-regulation.

The Role of Self-Regulation in Learning to Teach Thinking

Following the calls for lifelong learning, developing the capacity for self-regulation is quintessential (Pintrich, 1995). Typically defined as the process in which individuals are metacognitively, motivationally, and behaviourally active participants in their own learning (Zimmerman & Schunk, 1989), the ability to self-regulate has been understood to involve self-generated thoughts, feelings, and actions that are oriented toward the attainment of goals (Zimmerman, 1998, 2000).

At the descriptive level, self-regulated learners define meaningful learning goals, develop standards of excellence, and evaluate how well they have achieved their goals. They have alternative routes or strategies for attaining goals and strategies for correcting errors and redirecting themselves when their plans do not work. They know their own strengths and weaknesses and know how to deal with them productively and constructively. They are also able to shape and manage change. They demonstrate persistence and are able to deal with frustration. Self-regulated learners have both the "will" and "skill" to learn (cf., Jones, Valdez, Nowakowski, and Rasmussen, 1995; Manning & Payne, 1993; Paris & Winograd, 1998; Pintrich & DeGroot, 1990; Purdie & Hattie, 1996).

Current reform recommendations draw on the view that knowledge evolves at a rapidly accelerating pace and thus, learning fixed bodies of information and static skills is no longer a priority. Rather than focusing on helping teachers to acquire a fixed set of teaching skills (Franke, Carpenter, Fennema, Ansell, & Behrend, 1998), teachers need additionally to be enabled in terms of becoming self-regulated learners (e.g., Smith & Chang, 2000; Kremer-Hayon & Tillema, 1999).

In addition, teaching is considered stressful because of increasing teaching complexity and simultaneous demands (Manning & Payne, 1993). Self-regulated teachers are more apt to have internal coping and reinforcing skills that will lessen the impact of teaching complexity and accompanying stress (Manning & Payne, 1993). Given the importance of teachers' ability to self-regulate, opportunities must be provided in teacher training programs for its development.

Thus far, we have argued that preparing teachers to teach thinking involves equipping them with knowledge, skills, attitudes and dispositions. At the same time, teachers need to be given opportunities to develop self-regulatory capacities so that they are able to deal with the challenges and frustrations associated with the execution of thinking skills instruction and to continually update their skills in this area. To address these two intricately linked needs, the next section explores a conceptual framework, which proposes using self-regulation as a vehicle to support pre-service teachers who are learning to teach thinking.

Towards Thinking Schools and Learning Nation: A Preliminary Framework for Preparing Preservice Teachers to Teach Thinking

Based on the literature reviewed, a theoretical framework was constructed (See Figure 1 for a pictorial representation). This framework depicts two distinct levels involved in order to achieve the goal of 'Thinking Schools, Learning Nation'.

The first and most fundamental level is the preparation of teachers for teaching thinking in the classroom context. At this level, four aspects should be covered: (i) the **knowledge** about thinking and learning by exploring and acquiring the theoretical basis of human cognitive functioning and knowledge construction; (ii) the **skills** for teaching thinking by learning and trying out specific strategies and techniques; (iii) the appropriate **attitudes** towards the teaching of thinking; and (iv) the critical thinking **dispositions** by understanding the importance of critical thinking in a rapidly changing world.

Figure 1: Conceptual Framework for Preparing Pre-service Teachers to Teach Thinking

At the same time, there is a need to augment teachers' self-regulatory skills in order that they are adequately prepared to deal with the challenges and frustrations associated with teaching thinking. Further, the skills acquired now would need to be continually updated in the future. This calls for learning environments which are supportive and conducive to self-regulated learning so that teachers are able to embrace the demands of new teaching roles and see these as challenges rather than burdens to be borne.

The second level (Level II) in the conceptual framework is where teachers translate the knowledge and skills learnt into practice. Schools will become crucibles for thinking when teachers have been equipped with the necessary knowledge, skills, and affect as well as developed the will and skill to change and learn. Collectively, this brings us one step closer towards the ultimate vision of "Thinking Schools and Learning Nation".

Educational Implications

The conceptual framework proposed, suggests several implications for teacher educators. Firstly, it underscores the need to provide teachers with the theoretical foundations behind the teaching of thinking. Secondly, pre-service teachers' skills need to be developed through employing for instance, authentic activities that help translate theory into practice. Various thinking approaches and methods of instruction can also be modeled. Thirdly, it suggests that positive attitudes be fostered by situating theories of thinking in meaningful contexts. Real world examples can be

provided, and links between thinking and current needs of the society brought to the fore. Fourthly, teaching practices should take into account the ways that the dispositions associated with the skills can be strengthened. These considerations are important because the instructional processes by which some knowledge and skills are acquired may themselves damage or undermine the disposition to use them (Katz, 1993). Thus, teacher educators should foster the awareness of positive and negative dispositions, but support the manifestations of positive dispositions through role modeling and appropriate scaffolding.

Our conceptual framework further implies that teacher education programs must not be guided by an orientation of knowledge assimilation alone, although a sound knowledge base is critical for effective thinking instruction. It must also involve student teachers actively in their own learning. At present, most teacher training programs have always been based on providing research-based knowledge and on practicing necessary competencies prior to entering the profession. While such curricula target the application of theory in practice, little opportunity is provided for self-regulated learning (cf., Kremer-Hayon & Tillema, 1999). It is therefore pertinent that teacher training programs reconsider the 'learning routes' they provide for preparing prospective teachers in a knowledge society (Gilroy, 1993). As Hiemstra (1988, p. 6) has asserted, "the potential for learning can increase throughout life if we know how to stimulate that potential".

Accordingly, teacher education programs in thinking instruction, must provide a range of learning experiences which encourage self-regulated learning. Teaching goals in programs concerned with thinking instruction, should not focus on transmitting information but rather on preparing students to acquire the information on their own. There are several avenues to achieve this (cf., Hiemstra, 1988, 1993; Tillema, 1997). Instructional approaches conducive for self-regulated learning include the use of study teams, project work, problem-based learning approaches, small group activities, promoting discussion and the raising of questions.

The role of teacher educators would also have to change. They may provide direct information on certain topics, but serve as a resource on other portions of course content or build a varied collection of learning resources. Teacher educators are also essential in assisting student teachers to assess their needs and competencies, serving as a mentor and a validator or evaluator of student teacher accomplishment both throughout and at the end of a course. Teacher educators also play an important part in helping prospective teachers develop a positive attitude about and approach to learning that fosters independence. Continuous feedback should be provided, learner involvement fostered, and students should be encouraged to learn from experience, to think about learning, and to use libraries, information-technologies and human resources proactively.

Conclusions

The push for more complex and intellectually demanding approaches to teaching has meant that teachers today face problems that are complex and rarely straightforward. It is obvious that teachers cannot be prepared for these unfolding challenges once and for all. One shot of training, no matter how effective and successful, will not suffice. A new paradigm must emerge that fuses training for the teaching of thinking together with lifelong professional preparedness. The objective for prospective teachers, is to be able to apply newly acquired instructional skills for thinking in context, to be willing and able to change, to "learn to learn" for the rest of their life, and ultimately to challenge traditional school power structures.

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