

Restructuring Teacher Education Programs  
To Teach Higher-Order Thinking Skills\*\*

(\*\* Paper presented at the Universiti Pendidikan Sultan Idris International Teacher Education Conference 2002, Kuala Lumpur, Malaysia).

N.S.Rajendran, Ph.D.  
Faculty of Cognitive Sciences and Human Development  
Universiti Pendidikan Sultan Idris  
E-mail: [nsrajendran@upsi.edu.my](mailto:nsrajendran@upsi.edu.my)

Abstract:

The fact that preservice and inservice teacher education programs, with some exceptions, have not systematically incorporated the teaching of thinking into the professional curriculum is disturbing in view of the growing interest in teaching thinking skills explicitly in schools. Even in the case of teacher education programs which have incorporated the teaching of thinking, there seems to be an urgent need to improve the conceptualization and implementation of these skills to prospective and serving teachers to enable them to teach those skills effectively. Data available suggest that teachers, even those who have been trained, in general, find it problematic to effectively infuse thinking skills into content instruction. This calls for a need to reexamine the ways in which prospective and serving teachers are taught. The reexamination of teacher education programs need to pay attention, among others, to recent findings from works on teacher learning. There seems to be a need for teacher education programs to find systematic efforts to both improve the thinking of prospective and serving teachers and to prepare them to become successful teachers of thinking. This is because there are numerous recent works on specific teacher behaviors that promote student thinking. This paper will attempt to propose guidelines for restructuring teacher education programs for higher-order thinking skills. This paper will be prepared on data obtained for a research on teaching higher-order thinking skills and current efforts in Malaysia to incorporate thinking into teacher education programs.

Introduction

Helping students become effective thinkers is increasingly recognized as a primary goal of education. Rapid expansion of knowledge points to the importance of curriculum and instruction that empower students to locate and process knowledge rather than simply memorize facts. As Langer (1991:12) suggests, “the current era requires that students acquire the kinds of critical thinking skills that are needed to use the communication devices and technologies we meet on a daily basis in our everyday living and in entry-level jobs”. What this calls for is that students are prepared to

interpret, analyze or manipulate information, critically think about information, ideas and opinions, and draw conclusions, inferences or generalizations. They also need to be able to produce original communications, make predictions, propose solutions, create, solve life-like problems, judge ideas, express opinions and make choices and decisions.

The real question, however, is whether the education system on the whole has been receptive and make the necessary changes to prepare students who are capable of performing the various tasks mentioned above. In this respect, it seems interesting to note, as Nickerson (1988) suggests, in spite of numerous vigorous attempts by various reformers to make thinking a primary focus of education and to effect whatever changes in educational practice would be in the interest of doing so, the educational system, as a whole, has been remarkably resistant to these efforts.

For the past half dozen years, school reformers have admonished us that K-12 students must learn more at higher levels of understanding. They urge that students acquire concepts and routines that lead to deeper understanding of content. Attention has turned to ways of promoting thinking and reasoning with the goal of creating schools where students are deeply engaged in problematic situations that matter to them. Those admonitions prompt many questions and concerns about teacher education. The basic question is, of course, how preservice teacher education programs can or ought to respond to these expectations.

(David, G. Imig, in Foreword, Richardson, Virginia. (1997)

It is needless to say that for the teaching of thinking to be successful, curriculum planning, teacher education, preparing resource materials, assessment tools for teachers, continuous professional development of teachers, and taxonomy for teaching thinking are some of the important areas which need to be addressed. This paper will specifically address the issue of restructuring teacher education to facilitate the teaching of thinking skills. Main focus of the paper will be on various studies conducted on teacher behaviours that promote student thinking, the on-going Malaysian experiment to make modifications to the teacher education curriculum to prepare teachers to teach thinking and proposing guidelines for restructuring teacher education to prepare teachers to teach higher-order thinking skills.

### The Need To Teach Students To Think

It is absolutely necessary to achieve the most basic goal of education: preparing students for further learning and more effective functioning in their lives (Perkins, 1993). Today the expectation is that students need to understand what they are learning, not just knowing about it. What this entails is that connections are sought between students' lives and the subject matter, between principles and practice, between the past and present. Students are asked to think through concepts and situations, rather than memorize and give back on the quiz.

In fact, there are strong relationships between teaching a traditional school subject and the teaching of thinking. Some would argue that the proper teaching of a

subject, is equivalent to, or sufficient for, promoting higher-order thinking (Prawat, 1991). For example, there are a number of definitions for literacy which is taught in schools, which include, “the ability to read and write”, “the capacity to employ language as a tool for thinking and communicating” and “a way of thinking, acting, speaking defined in terms of differential power relationships and structures within society”. It can be seen that thinking underlies language skills taught, both implicitly and explicitly.

Whatever the case may be, students today need thinking skills. In relation to this, Hiebert and Raphael (1996) reviewing different definitions of literacy suggest that it is the first step in the empowerment of the mind, albeit a crucial one. Langer(1991) also argues that literacy can be viewed in a broader and educationally more productive way, as the ability to think and reason like a literate person. In this respect, she proposes that, the schools need to understand the ways of thinking that are involved in a particular society’s uses of literacy and to use approaches to literacy instruction that will ensure that these ways of thinking become an intrinsic part of the school’s context. As such, the listening, speaking, reading, and writing components of language instruction, for example, should aim to improve the higher-order thinking abilities of the students.

### Teaching Higher-Order Thinking Skills and Teacher Education

There are findings that suggest that certain teacher behaviours support the acquisition of higher-order thinking skills by students. Many of these behaviours have been identified as highly appropriate for conducting sophisticated discourse among students. For example, Costa (1985) discusses the importance of “open response” behaviours in discussions, accepting tone, probing questions, clarifying statements, teacher modeling of rational behaviour, and appropriate use of silence during discussions.

There are also other teacher behaviours that promote student thinking (Martin, 1989; Rajendran, 1998a):

1. Using problem solving and decision making strategies in the teaching and learning processes.
2. Asking questions that demand “why” and “how” responses”.
3. Identifying the specific strategies used in solving a problem and labeling those strategies (metacognition).
4. Reminding students of the cognitive strategies that can be applied in the context of regular subject matter.
5. Reflecting with students explicitly on the cognitive processes used to solve a problem.
6. Setting an appropriate “disposition” for thinking in the classroom by establishing an accepting tone during discussions.
7. Providing students with sufficient time for response.
8. Seeking multiple answers to questions asked, both in discussions and on paper.

9. Promoting inductive reasoning in moving from specific data to general principles.
10. Providing summaries for students after a classroom discussion.
11. Requiring students to elaborate on ideas expressed.
12. Encouraging refinement of ideas once they are expressed and pressing students to give greater precision.
13. Setting expectations that all students can and will improve their cognitive functioning.

This is certainly not an exhaustive list of teacher behaviours that are associated with higher levels of student thinking. Numerous other recent works are now available on the specific teacher behaviours that promote thinking. The challenge, however, is that teaching practices in majority classrooms on the whole are antithetical to the kind of teaching practices which strongly support the acquisition of thinking skills by students.

Taking off from the contention that a major source of failure in teaching thinking could be the teaching style, Sternberg and Martin (1988) considered three different styles in which teaching of thinking can take place in classrooms and concluded that, "Relatively little of the teaching that goes on in the classroom directly encourages higher-order thinking (p.560)". Teachers who taught these classes, however, felt that they were actually teaching for thinking. This was also true with other audience in their research. This was also the case in an investigation involving teachers teaching higher-order thinking skills in language classrooms (Rajendran, 1998a).

There are various factors that attribute to this situation in classrooms, where generally teachers play dominant roles in conducting the teaching and learning processes (Rajendran, 1998a). First, the kind of orientation teachers receive before they become teachers, which Lortie (1975) terms as the apprentice of observation. This factor seems to encourage the usage of transmission approach of delivering lessons as opposed to a more constructive approach. The second reason is, that formal teacher preparation is not powerful enough to overcome the impact of early experiences, which are often contrary to the qualities expected of teachers today (Feiman-Nemser, 1983). The third reason is that teachers tend to think that they lose control of the classes they teach if students ask questions, challenge ideas, and propose their ideas.

The fourth reason is that there seems to be a clear cognitive dissonance between what teachers believe about teaching thinking and what they are actually doing in their classrooms. The cognitive dissonance found among teachers may be the result of assuming that 'good' thinking is the by-product of effective teaching and learning (Rajendran, 1998a). The fifth reason is that education on the whole has suffered the virtually undisputed domination of a mindless behaviourism (von Glasersfeld, 1995). All learning was reduced to a model that had been derived from experiments with captive pigeons and rats. The sixth reason is, education on the whole gives so much emphasis to testing and examinations. When students are taught with the main aim of obtaining grades, education very often is reduced to testing observable behaviours, but missing out on the cognitive processes and intellectual development.

This being the case, there needs to be a transformation of teaching practices in classrooms that support the acquisition of higher-order thinking skills by students. While the dominant transmission approach in most classrooms is still considered relevant, there seems to be an urgent need to have more and more practices which

provide opportunities to students to understand, analyze, synthesize, make conclusions, propose solutions, solve problems, and make decisions in the teaching and learning processes. There is certainly an urgent need to prepare teachers to carry out this difficult task.

The fact that preservice teacher education programs, with some exceptions, have not systematically incorporated the teaching of thinking into professional curriculum is disturbing in view of the growing interest in this topic in elementary and secondary schools (Martin, 1989). While some individual teacher education institutions have developed programs to train teachers to teach thinking skills, the involvement in the thinking skills movement by preservice teacher education institutions on a general level is lacking.

A growing body of research examines the area of teaching as a cognitive activity which brings implications on teacher learning and teacher education. For example, Herrick (1962) underscored the need for teachers to use critical thinking in identifying important understandings and processes when preparing instructional objectives. Johnson (1972) focused on teacher judgment in cognitive terms; Marland (1982) developed three models of teacher thinking; and Gage (1978) and Shulman and Elstein (1975) called for studying the mental processes of teachers at work. Recent scholarship about teacher learning and teacher education leads to emerging images of successful teacher education experiences, among others, teachers should be treated as active learners who construct their own understandings; and teachers should be empowered and treated as professionals (Putnam & Borko, 1997).

### Restructuring Teacher Education Program To Teach Higher-Order Thinking Skills: The Malaysian Experience

The Teacher Education Division of the Ministry of Education made changes to its Five Semester Basic Teacher Education Program and the Two Semester Post-Degree Education Programs to accommodate the necessary changes to teach higher-order thinking skills explicitly in 1993. These changes were implemented in the teacher education colleges in June 1994. The Teacher Education Division basically adopted the 'Boston Model' to train teacher educators to teach prospective teachers. Almost all adjustments to the existing curricula for various subjects were based on this model. Special guidelines and resource books for teacher educators in the teacher education colleges were developed in late 1993 and in early 1994 (Teacher Education Division, 1994a; 1994b).

The 'Boston Model', or the infusion model, advocates integrating teaching critical and creative thinking in all content areas and at all grade levels rather than using a pre-packaged program or curriculum. This program provides examples for a variety of grade levels and content areas, as well as life situations. The main contention of the authors of this program is that the same skill can be taught, reinforced, and elaborated in many other contexts, subject areas, and at other grade levels (Swartz & Parks, 1994). This program proposes the 'Infusion Approach' to teach thinking skills. Infusing critical and creative thinking into content instruction blends features of two contrasting instructional approaches that educators have taken to teach thinking: (1) direct instruction of thinking in noncurricular texts and (2) the use of methods which promote

thinking in the content lessons (Swartz & Parks, 1994). Infusion lessons are similar to, but contrast with, both of these types of instruction.

Teacher Education College lecturers were exposed to the 'Boston Model', CoRT Thinking Tools, the ways to incorporate the teaching of thinking skills using the 'infusion approach' in the various content areas, and teaching and learning strategies during four-day workshops in their respective colleges in early 1994. Various materials on the program, strategies and techniques, and model lesson plans were distributed to the lecturers in these workshops. Specifically, model lessons showing how thinking skills could be taught using the infusion approach on various subjects like Malay, English, Math, Science and History were prepared by the Teacher Education Division and were used as important resource materials in these workshops.

It has to be noted that the Teacher Education Division made modifications to the 'Boston Model' before implementing it in the colleges to suit the local needs. One significant change is the components of the infusion lesson itself. The 'infusion' lesson proposed by the 'Boston Model' has four components: introduction to content and process; thinking actively; thinking about thinking; and applying thinking (Swartz & Parks, 1994). The Teacher Education Division adopted a model which has five components in the infusion lessons: introduction to content and process; thinking actively; thinking about thinking; consolidation or enrichment activities; and applying thinking (Teacher Education Division, 1994a; 1994b). One extra component of consolidation and enrichment was included to provide more opportunities for teachers and students in the classrooms to reinforce their knowledge and skills about one or more of the thinking skills being learned.

Initially thinking skills were taught using the stand-alone approach together with study skills. These skills were taught during the first week when students reported for admissions in the respective teacher education colleges. These skills were later allocated 30 hours of instruction or 2 credits in the preservice (certificate or diploma level) teacher education program. Creative and Critical Thinking Skills were taught under the Teacher Dynamics category of the preservice teacher education program. The teaching of creative and critical thinking skills gained more and more attention over the years. Besides being taught using the stand-alone approach, thinking skills were also encouraged to be taught using the infusion approach in the content instruction. This was to cater for the teaching of thinking skills using subject-specific pedagogy.

There are a number of things one could learn from such an initiative taken by the Teacher Education Division to formally include the teaching of thinking skills in the preservice teacher education. A major study was conducted to investigate the teaching of higher-order thinking skills in Malay and English Language classrooms (Rajendran, 1998a). The Malay and English Language teachers in this study perceived that they were better prepared in terms of their knowledge, pedagogical skills, and attitude to teach Malay or English Language as compared to teaching higher-order thinking skills. Their perceptions are significantly different for the teaching of Malay or English Language as compared to the teaching of higher-order thinking skills. Yet, they are expected to teach both the content and higher-order thinking skills in their classrooms. More importantly, they are expected to teach both the content and higher-order thinking skills using the infusion approach.

It was found that teachers in the study perceive that they lack in at least two of the four categories (Grossman, 1990) required to construct the pedagogical content

knowledge, the overarching conception of teaching a subject, and in the knowledge of instructional strategies and representations for teaching particular topics, especially in higher-order thinking skills. The other two categories, knowledge of students' understandings and potential misunderstandings, and knowledge of curriculum and curriculum materials were not adequately investigated in that study. There were sufficient data, however, to suggest that teachers lack in the first two categories. Given this situation, it is no surprise that they find it difficult to construct the pedagogical content knowledge to teach higher-order thinking skills. Numerous writers have argued that teaching that emphasizes student understanding, reasoning, and problem solving requires richer and more flexible understandings of subject matter (Cohen, 1988).

As a result, as has been indicated by these teachers who are required to teach higher-order thinking skills in their content instruction, 26 percent of them did not allocate any class time to do this, and 77.7 percent of the teachers allocate 10 percent or less of their class time to do this in their classrooms. Even if they do attempt to teach, one could see the complex problems they face in their own classrooms, like in the case of teachers in this study reported elsewhere (Rajendran, 1998a: 1998b).

The basic problem seems to be that they are not adequately prepared to make this innovation in their classrooms. It seems that there has to be a comprehensive approach in preparing teachers to carry out such innovations in their classrooms. Providing the 'sit and get' type of courses certainly do not seem to make a difference. Although 59 percent of the teachers have received some form of training to teach higher-order thinking skills, and the rest of 41 percent of the teachers did not receive any training to teach higher-order thinking skills, this did not seem to have significantly influenced their perceptions of their knowledge, pedagogical skills, and attitude to teach Malay or English Language and higher-order thinking skills. It seems that the 60 percent of the teachers who received their training may not even think that they are better prepared than those who did not receive any training to teach higher-order thinking skills. A close analysis of practices of teachers in this study reported elsewhere (Rajendran, 1998a: 1998b) seems to provide much more information to understand how teachers grapple with this and many other issues. There also seems to be a real need to help all teachers learn, more so for those who have taught for more than ten years, about this new reform and ultimately make changes in their practices in their classrooms.

Besides this, the study also found that teachers still perceived the teaching of thinking skills and content instruction as two separate entities, probably because thinking skills were taught using the stand-alone approach in the teacher dynamics category of the preservice teacher education program and also were taught using the infusion approach in the content instruction. As a result, the Teacher Education Division of the Ministry of Education made an important decision to drop the teaching of thinking skills using the stand-alone approach and only teach thinking skills through content instruction. Modifications were made to the preservice teacher education curriculum and implemented in teacher education colleges from January 2001 (Teacher Education Division, 2001).

#### Restructuring Teacher Education Program To Teach Higher-Order Thinking Skills: A Proposal

Any attempt to review and restructure teacher education programs to teach higher-order thinking skills need to incorporate the following. This proposal is based on the findings and experiences gained from a number of studies and initiatives (Martin, 1989; Putnam and Borko, 1997; and Rajendran, 1998) cited in this paper. The guidelines given below are both generic to educating teachers and specific to preparing teachers to teach thinking skills. However, any attempt to review and restructure preservice teaching education to teach higher-order thinking skills should not compromise on the core components of teacher education and certainly should not bring negative impact on the business of training teachers (Walters, 1989). Prospective teachers need to be exposed to:

1. Courses on teaching thinking skills using the stand-alone approach and also using the subject-specific pedagogy with the aim of providing strong foundation in knowledge and pedagogical skills both in the content area and thinking skills.
2. The connection between education courses and subject-specific methods courses emphasize and exemplify the specific teaching strategies that will promote higher level student thinking.
3. A general conceptualization of teaching as fundamentally a thinking and reflective activity.
4. Practicum experiences that provide the student teacher with a variety of models for the teaching of thinking, as well as opportunities to practice them and receive productive feedback from both a supervisor and a cooperating teacher who are committed to the improvement of children's thinking.
5. To prepare and use various resource materials which enhance the teaching and learning of higher-order thinking skills, both through the stand-alone approach and content instruction.
6. Various kinds of assessment tools to evaluate the acquisition of higher-order thinking skills by students. Teachers also need to be equipped with the skills to build test items, assessment tools and administer those tools.
7. Teachers should be treated as active learners who construct their own understandings. Teachers learn new teaching practices and understandings to the extent that they can make sense of them through the lenses of their existing knowledge and beliefs.
8. Teachers should be empowered and treated as professionals.
9. Teacher education must be situated in classroom practice.
10. Teacher educators should treat teachers as they expect teachers to treat students.

## Conclusion

There is certainly a need to teach thinking explicitly to students so that they are capable of performing various tasks for which thinking becomes the basis. Teachers need to be prepared to carry-out this important task. For this to happen, there has to be serious and systemic initiatives to make significant changes to the existing preservice



curriculum to equip teachers to teach thinking. It has to be noted that irrespective of the kind of initiatives taken, there should be a mechanism to sustain the enthusiasm amongst teachers who teaching thinking. Otherwise, they would resort to the teaching of content at the expense of teaching of thinking skills.

For the initiatives to bring long-lasting effects, there are other related factors such as continuous professional development of teachers (Rajendran, 2001), alternate taxonomy for the teaching of thinking (Rajendran, 2001), and incentives for teachers who teach thinking need to be addressed. It is the hope that such a systemic effort will bring the desired outcomes and bring about significant changes to teaching in general, and the teaching of thinking skills in particular.

#### Bibliography:

- Cohen, D. K. (1988). *Teaching Practice: Plus Ca Change .....*, (Issue Paper 88-3), East Lansing: Michigan State University, National Center for Research on Teacher Education.
- Costa, A. (1985). Teacher behaviours that promote student thinking in developing minds. Alexandria, VA: Association for Supervision and Curriculum Development.
- Feiman-Nemser, S. (1983). Learning to teach. In L. Shulman and G. Sykes (Eds.). *Handbook on teaching and policy*, New York: Longman, pp. 150-170.
- Gage, N.L. (1978). *The scientific basis of the art of teaching*. New York: Teachers College Press.
- Grossman, P. (1990). *The making of a teacher: Teacher knowledge and teacher education*. New York: Teachers College Press.
- Herrick, V.E. (1962). Curriculum decisions and provision for individual differences. *The Elementary School Journal*, 62(6), 313-320.
- Hiebert, E. & Raphael, T. (1996). Perspectives from educational psychology on literacy and literacy learning. In D. C. Berliner & R. C. Calfee (Eds.) *Handbook of Educational Psychology*, New York: Macmillan.
- Johnson, D. M. (1972). *Systematic introduction to the psychology of thinking*. New York: Harper and Row.
- Langer, Judith, A. (1991). Literacy and schooling: A sociocognitive perspective, In Hiebert Elfrieda, (Ed.), *Literacy for a diverse society: Perspectives, practices and policies*, New York: Teachers College Press.
- Lortie, D. (1975). *Schoolteacher*. Chicago: University of Chicago Press.
- Maritn, David. (1989). Restructuring Teacher Education Programs for Higher-Order Thinking Skills. *Journal of Teacher Education*. Vol. XXXX, No.3.
- Marland, P.W. (1982, January) Models of teacher thinking. Paper presented at the conference of Thinking. University of South Pacific.
- Nickerson, R. S. (1988). On improving thinking through instruction. *Review of Research in Education*, 15, 3-57.
- Perkins, D. N. (1993). Teaching for understanding. *American Educator*, Fall, pp.28 - 35
- Prawat, R. (1991). The value of ideas: The immersion approach to the development of thinking. *Educational Researcher*, 20:2, 3-10.

- Putnam, R. & Borko, H. (1997). Teacher learning: Implications of new views of cognition, In B. J. Biddle, T. L. Good, & I. F. Goodson (Eds.) *The international handbook of teachers and teaching*. Dordrecht, The Netherlands: Kluwer.
- Rajendran, Nagappan. (2001). Language teaching and the enhancement of higher-order thinking skills. In Renandya, W. & Sunga, N. R. (Eds.). *Language curriculum and instruction in multicultural societies*. Singapore: SEAMEO Regional Language Centre.
- Rajendran, Nagappan. (2000) *Teaching higher-order thinking skills in classrooms: Learning from the experiences of Malaysia*. Paper presented at the Thinking Qualities Initiative Conference Hong Kong 2000, Hong Kong.
- Rajendran, Nagappan. (1998a) *Teaching higher-order thinking skills in language classrooms: The need for transformation of teaching practice*. Unpublished doctoral dissertation, Michigan State University, East Lansing, MI: Michigan State University.
- Rajendran, Nagappan. (1998b) *Teaching higher-order thinking skills in language classrooms in Malaysia: The teachers' dilemmas*. Inaugural Conference of the Malaysian Educational Research Association, Penang, Malaysia.
- Rajendran, Nagappan. (1996) *How are higher-order thinking skills taught?: The case of an eighth grade English Language Arts classroom*, Unpublished Research Practicum Report, East Lansing, MI: Michigan State University.
- Richardson, Virginia. (1997). *Constructivist teacher education: Building new understandings*. London: The Palmer Press.
- Shulman, L. S. & Elstein, A. S. (1975). Studies of problem solving, judgment, and decision making: Implications for educational research. In F. Kerlinger (Ed.) *Review of Research in Education*, (Vol. 3). Itasca, IL: Peacock.
- Sternberg, R. & Martin, M. (1988). When teaching thinking does not work, what goes wrong?, *Teachers College Record*, Vol.89., N.4.
- Swartz, R., & Parks, S. (1994). *Infusing critical and creative thinking into content instruction*, California: Critical Thinking Press
- Teacher Education Division. (2001). *Sukatan Pelajaran Ilmu Pendidikan: Kursus Diploma Perguruan Malaysia*. Kuala Lumpur, Malaysia: Ministry of Education.
- Teacher Education Division. (1994a). *Kemahiran berfikir secara kritis dan kreatif dan kemahiran belajar (Sukatan Pelajaran KPA Lima Semester)*. Kuala Lumpur, Malaysia: Ministry of Education.
- Teacher Education Division. (1994b). *Model pengajaran dan pembelajaran kemahiran berfikir*. Kuala Lumpur, Malaysia: Ministry of Education. Division.
- von Glasersfeld, Ernst. (1995). A constructivist approach to teaching. In. Steffe, Leslie. & Gale, Jerry. (Eds.). *Constructivism in education*. New Jersey: Lawrence Erlbaum Asso.
- Walters, Kerry, S. (1989). Critical thinking in teacher education: Towards a demythologization. *Journal of Teacher Education*. Vol.XXXX, No.3.