
| | |
|--------------|---|
| Title | Blending two thinking programs together for trainee teachers in Singapore |
| Author(s) | Kong Siew Lang and Seng Seok Hoon |
| Source | <i>ERA-AME-AMIC Joint Conference, Singapore, 4-6 September 2000</i> |
| Organised by | Educational Research Association of Singapore (ERAS) |

This document may be used for private study or research purpose only. This document or any part of it may not be duplicated and/or distributed without permission of the copyright owner.

The Singapore Copyright Act applies to the use of this document.

BLENDING TWO THINKING PROGRAMS TOGETHER FOR TRAINEE TEACHERS IN SINGAPORE

Kong Siew Lang & Seng Seok Hoon
National Institute of Education
Nanyang Technological University
Singapore

Abstract. In the era of massive information and technology explosion, there is an urgent need for students to learn in “thinking school”, where teachers emphasise critical and creative thinking besides the well-established curriculum content. In Singapore, the concept of “thinking schools, learning nation” recognises that lifelong learning is essential for the individual and the society as a whole. With such realisation, the Singapore Thinking Program has won itself to a higher degree of recognition and attention, especially among the teacher educators as well as the trainee teachers. This paper attempts to give a review on the attitudinal change of the trainee teachers who has gone through a course that focuses mainly on two thinking programs, namely the “Infusion Program” by Robert Swartz and the “Dimension of Learning” by Robert Marzano. Finding from this preliminary study seems to support the notion that teachers’ attitude is a crucial element in predicting the success of any thinking program.

Introduction

As the world is changing rapidly, educators in today’s society are not spared from the challenges of this new millennium. One of the significant challenges we are facing is the information and knowledge explosion. Reading through any newspapers and magazines, one will doubtlessly be offered with a host of new ‘dot com’ companies and Websites. All these are sources of information that one can have access. We no longer need to walk down the street to buy newspapers and magazines from a vendor, or drown in an ocean of books in the library in order to find a certain piece of information or news. With the advances in technology and the affordable prices nowadays for personal computers, and competing telecommunication companies offering affordable Internet services, obtaining information is made much easier. One only needs to click a few buttons on the computer at home and everything required will be displayed on the screen. On top of that, advances in the field of multimedia information system have contributed to packaging otherwise simple and boring information into a much more attractive layout and presentation.

As technology advances, much of the ‘old’ information has undergone a ‘face-lift’, making it more interesting and seemingly new, at least in its appearance. So there seems to be myriad of ‘new’ knowledge available in the world today. The amount of information is so tremendous that we are no longer certain which is reliable and acceptable. To be able to compete and stay ahead in this new millennium, we need to have relevant information at hand, and apply it at the opportune time. In our everyday

life, decision and problem solution need to be swift and immediately available when needed.

In Singapore, we recognise that lifelong learning is essential for the individual and the society as a whole - thus the concept of “thinking schools, learning nation” (Goh, 1998). With this realisation, the Singapore Thinking Program has won itself to a higher degree of recognition and attention, especially among the teacher educators as well as the trainee teachers. This is especially so because teachers are the individuals that serve as mediators between knowledge and the students. In other words, teachers are the facilitators in the students’ process of learning in the classroom environment. The challenge for teachers today, therefore, is to prepare the young to be competent in such uncertain and ever-changing world. We need to decide what specific knowledge and skills will be critical to our students in the future.

Ever since the thinking movement in 1980s, educational scientists and the general public alike have come to agreement that critical and creative thinking abilities should not be just another educational option; rather it should be an indispensable part of education (e.g., Norris, 1985). This has stimulated the creation of a variety of special programmes to bring the explicit teaching of thinking into the classroom. However, not much has been said, least researched, about programme to prepare trainee teachers for carrying out the thinking programmes into the classrooms. The usual practice is that the teachers will go through a particular thinking programme and are later expected to perform miracles in the classroom. It is not uncommon to have comment from the teachers that they do not understand “what’s the fuss about all these thinking stuff, have we not already been doing that?” To the teachers, they have been teaching with a certain method and it serve them well throughout, producing excellent results. Therefore, the authors decided to study a group of trainee teachers if there is any effect on their attitudes after they go through a module in NIE that aims to improve their strategy for effective thinking and learning.

The Importance of Thinking Skills in Learning

Thinking is generally assumed to be a cognitive process, a mental act by which knowledge is acquired. Edward de Bono (1997) defines thinking as ‘... the operating skill through which intelligence acts upon experience.’ In order for ‘intelligence to act upon experience’, much effort is required on the part of the thinker. The thinker needs to sort and organise whatever experience he has in order to act intelligently. In other words, when confronted with a problem, one cannot simply accept all the information that comes to his mind and arrive at a conclusion or a decision. Thinking processes require *active involvement* on the part of the thinker. Up to this point we can assume that thinking is a complex and reflective endeavour as well as a creative experience.

The traditional belief is that as long as we equip students with as much information and facts as possible, they are adequately equipped to face various challenges in life. But as the amount of information is increasing, students must be equipped with more than knowledge. As educators, we are faced with the responsibility and challenge to develop in our students, both the acumen to decide for themselves, what else they need to know and the abilities to acquire that information accurately and efficiently (Adams, 1991). The

ability to decide and acquire information selectively can only be done when students tap into their thinking faculty. In short, we must equip students with the appropriate thinking skills so that they can think and learn more effectively. As one anonymous writer puts it rightly:

We must return to basic, but the “basic” of the 21st century are not only reading, writing and arithmetic. They include communication and higher problem-solving skills, and scientific and technological literacy – the thinking tools that allow us to understand the technological world around us.

Educating Americans for the 21st century

As educators, we are responsible for our students’ learning. Learning is generally assumed to be the mechanism by which organisms can adapt to a changing and non-predictable environment. According to Anderson (1994), “learning is the process by which relatively permanent changes occur in behavioural potential as a result of experience.” From the definitions of thinking and learning, it seems to suggest that ‘thinking’ is a powerful tool for ‘learning’. Cognitive scientists are realising that memory itself is not enough (or not good enough) for effective learning. Thinking and higher order thinking is an imperative component to effective learning, and thus, effective transfer of learning.

What can ‘thinking’ contribute to learning and transfer of learning then? When we discuss about the process of learning in a classroom setting, we are actually referring to the process of dispensing knowledge and content to our students; in the hope that they (students) will be able to utilise the ‘generic’ knowledge to solve problems and make good decisions in real life. In the most general sense, the process of problem solving will require the students to, first of all, analyse and focus on the problem itself. Upon understanding the problem, they will need to gather relevant information and synthesise them in order to generate possible alternatives for the solution. Before settling on the most suitable solution, the students will need to utilise other thinking skills such as integrating the relevant knowledge, organising the information, and evaluating various alternatives along the way. All these activities or strategies will require the students to think either creatively (e.g., generating alternatives), or critically (e.g. eliminating irrelevant information and deciding on the best alternative).

A student can still learn without thinking much about what she is learning; but learning that takes place in this manner will not be long lasting, i.e., will not have much room for transfer. In order for transfer to happen, a person needs to construct the knowledge in a meaningful way. What one is learning has to be of relevance in order to be meaningful. And in order to be meaningful, one has to put in more effort in the information processing and that involves the element of thinking.

Dimension of Learning

According to Robert Marzano (1992), learning involves the interaction of five types of thinking, of which he refers to as the Five Dimensions of Learning (DOL). The DOL is an instructional programme that grew out of the comprehensive research and theory-based framework on cognition and learning (Dimension of Thinking). Implicit in the DOL model are six basic assumptions:

1. Instruction must reflect the best of what we know about how learning occurs.
2. Learning involves a complex system of interactive processes that includes five types of thinking – the five dimensions of learning.
3. What we know about learning indicates that instruction focusing on large, interdisciplinary curricular themes is the most effective way to promote learning.
4. The curriculum should include explicit teaching of higher-level attitudes and perceptions and mental habits that facilitate learning.
5. A comprehensive approach to instruction includes at least two distinct types of instruction: one that is more teacher-directed and another that is more student-directed.
6. Assessment should focus on students' use of knowledge and complex reasoning rather than on their recall of low-level information.

Through DOL, Marzano attempts to articulate a theory of learning based on the best available research on learning and then translates that theory into a model of classroom instruction that directly affects how teachers plan for instruction, design curriculum, and assess student performance. The five DOL are as follows:

1. Positive attitudes and perceptions about learning;
2. Thinking involved in acquiring and integrating knowledge;
3. Thinking involved in extending and refining knowledge;
4. Thinking involved in using knowledge meaningfully; and
5. Productive habits of the mind.

Marzano argues that the five DOL do not function in isolation or in a linear order. To illustrate this point further, let us take a look at a tangible learning task of 'how to cook a chicken curry dish'. As the first dimension states, all learning occurs within a set of attitudes and perceptions that either promote or inhibit learning. In this case, whether or not one succeeds in learning how to cook this dish will depend on, first of all, his attitude towards cooking itself. If he dislikes cooking in the first place, chances are he will not learn. Coupled with the right attitude and perception, he has to be willing to put in some active thoughts into what to include in that dish, e.g., what ingredients will go well with chicken curry, and so on. This, according to the DOL model, will be the productive habit of the mind. These two dimensions of learning will serve as a background in determining the motivation of the students towards learning a particular subject matter, before they can proceed to acquire, extend, and apply the knowledge meaningfully.

The five DOL form a framework that can be used to organise curriculum, instruction, and assessment, so that the learning process can bring maximum benefit. From this framework, trainee teachers are made aware of the affective aspect of learning. They will

also realise that after activating the students' interests towards the subject at hand, teachers need to sustain that interest by conducting an active lesson, which requires students to think deeply and carefully. This also brings us to the next point, that 'knowledge and thinking go hand-in-hand'. This will later explain why our discussion places heavy emphasis on the infusion approach to teaching thinking skills.

Importance of Infusion, Combining Knowledge and Thinking Skills

One cannot think without information, yet too much information may make a person confused and uncertain of what is exactly true. Therefore, we need as much information as we can get, and at the same time, we need the element of thinking to decide what information we should seek and where to look for it. Upon finding the information, we need thinking to decide on the validity and reliability of the basic information (Swartz et al., 1998). In other words, we need thinking to analyse and make the best use of the information we have. We need thinking to set up possible ways of putting the information together. According to Swartz (1998), infusion, as an approach in teaching thinking, is based on the natural fusion of information that is taught in the content areas with forms of skilful thinking that we should use every day to live productively. The school curriculum contains a multitude of natural contexts to teach skilful thinking. Utilising such contexts, teachers can design well-crafted infusion lessons that dramatically enhance student content learning.

For example, in a topic studying the human digestive system, instead of providing the students with all the relevant facts and information, the teacher may create a discussion session for the students to share their experiences relating to their stomach discomfort. From those experiences, the teacher could then encourage students to brainstorm on what are the possible causes of those stomach discomforts. At the same time, the teacher will put up some facts about the human digestive system. With their own experience, coupled with the new information presented by the teacher, the students will be able to connect the new knowledge about the human digestive system more meaningfully, and thus, assuring at least some meaningful transfer. Such an activity forces the students to explore and later construct knowledge about the topic. Infusing the teaching of thinking skills into curriculum content as described above will be able to address both the acquisition of the curriculum content as well as the utilisation of the appropriate thinking skills (Swartz et al., 1998). In short, apart from thinking deeply about the content, students are also made aware of their thinking processes (i.e. metacognition = 'thinking about thinking').

The structure and component of an Infusion Lessons being adopted here is based on those suggested by Swartz (1998). They essentially consist of four components as follows:

1. *Introduction to content and process*

In this component, the teachers introduce the content objectives as well as the thinking processes involved. This aims to activate the students' prior knowledge of the content and establish its relevance and importance.

2. *Thinking actively*

By thinking actively, students will be prompted by teacher's questioning and graphic maps to think and explore the lesson content actively.

3. *Thinking about thinking (or metacognition)*

This component aims at teaching and guiding students towards thinking about their own thinking. Students will be asked direct questions about their thinking, e.g., what kind of thinking they did?

4. *Applying the thinking*

At this stage, students will be given transfer activities that involve student-prompted use of the skill in other examples.

On a more practical note, infusion will be the best approach for teachers today due to: (1) there are a lot of curriculum content to be covered, (2) as it is now, schools already have enough activities to keep students busy, (3) as teachers, they already have enough workload to keep them occupied. By adopting infusion lesson, teachers can 'kill two birds with one stone'. Not only will incorporating thinking skills in the lessons reduce the extra curricular activities that students have to attend, but learning thinking skill concurrently with lesson content will also help the students to understand subsequent lessons more easily and readily. In other words, the infusion lesson will not only provide a deeper understanding of the lesson at hand, but it also contributes to the understanding of the subsequent lessons as a result of mastering the basic concepts of the content. Ultimately, infusion lesson will also contribute to the lifelong learning of the students; thus helping to achieve the goal of producing a 'learning nation'. To be a lifelong learner, the students need to have appropriate attitude, perception, and skills, of which can be achieved through a well-planned infusion lesson. Whether an infusion lesson is successful or not will greatly depend on the person who carries out the lesson, i.e., the teacher.

Training 'Thinking Teachers'

Imbedded in the notion of the 'thinking school' and the 'learning nation' is the implicit assumption that we already have well-equipped teachers to transform the 'non-thinking school' into the desired 'thinking school' and thus learning nation. However, there appears to be at least one missing element here (i.e., between the 'thinking programme' and the 'thinking school'). Since all teachers will be involved in the teaching of thinking in school, they are but mediators between the thinking programme and the students. Perhaps the most crucial element that will complete the whole picture of the 'thinking school, learning nation' mission are the '*thinking teachers*'!

Taking on the DOL model by Marzano that has been discussed previously, the first important factor determining the success of any thinking and learning process will be the attitude and perception of the person. The second important element (if not the most) will be the teacher herself. Whether a student learns anything in school will depend a lot on the teacher. It is the teacher's job to make content interesting and meaningful to the students, rather than just presenting the dry facts about a certain topic. In the same way, it is up to the teacher to direct and guide the students into a certain path of learning. If the teacher's aim is just to equip the students to pass their examinations, providing plenty of notes and making students to memorise them will be sufficient. But on the other hand, if the teacher's goal is to instil in the students the acumen to fare better in life, our old strategies need to be improved.

However, having gone through the same system themselves, it might not be easy for the teachers (in this case, teacher-to-be) to see the importance of incorporating or infusing thinking skills into the curriculum content. As the famous saying goes, 'what works for me in the past should also work now'. Cliché it may sound, but the natural tendency of human being is to hold fast to their experiences (especially those that work well), and insist the same techniques on the younger generation. That is probably why the generation gap exists between a father and his son. The same actually applies to teachers. Therefore not having experience the 'thinking schools' themselves might serve as an invisible barrier towards materialising the thinking school, and later the learning nation. In this preliminary observation, we attempt to find out whether the trainee teachers that have attended an 'effective thinking' module as part of their elective course requirement during their teachers' training program, will show any attitude changes towards the thinking program in Singapore.

Preliminary Observation

25 trainee teachers were registered in this elective module. As part of the course assessment, students were required to reflect on their own past learning experiences. Upon reflection, they were to give an account on the construction of meaningful and transferable knowledge. In other words, based on their own experience and the knowledge they have learnt from this module (some underlining theories about thinking and learning and transfer), they were to describe the factors that make learning effective and at the same time applicable to real world tasks.

There are a few interesting responses that are worth sharing here. We believe that these responses are reflective of what students in schools are facing, and yet at their stage, the students may not be able to pinpoint the exact root of their learning difficulties. Fortunately, as trainee teachers, they are able to determine these difficulties. The following are some of the responses by this group of trainee teachers.

- S1: *"...what I think is still paramount in this whole exercise is how we ourselves devise and be aware of our own ways of organising those schemas, making sense of them and ultimately transferring them to another situation or individual."*
- S2: *"After attending this elective, I began to uncover for myself the various thinking skills that were involved or needed to complete project (a marketing plan task)".*
- S3: *"Perhaps the successful construction of meaningful knowledge boils down to my attitudes, perceptions and habits of mind. It is important to realise that one would only pursue (some knowledge) when one is interested in (it)".*
- S4: *"(Based on my experience,) ... the most important dimension of learning in my opinion is the first – positive attitudes and perceptions about learning."*
- S5: *"I really hope that I was taught on metacognitive strategies and thinking skills earlier so that I was aware of them and could have learnt and performed better.... Knowledge that I could remember best are those which are meaningful and applicable."*

As they reflect on their past learning experiences, almost every trainee teacher mentioned that attitude and perception is an important element in learning. Their learning experiences range from skills based learning such as driving a car and playing chess, to content based learning such as a particular topic in their favourite subject, to learning a new language.

Another observation is the interest they show after attending the course. When the trainee teachers were undertaking their teaching practicum in school, a few have been sending back e-mails asking how they could acquire more examples of the infusion lessons. At least one has given feedback that he is trying out the infusion strategy in his lessons. Some of the trainee teachers, during an informal interview, also expressed that they understand better now “*why is there a big hu-ha about thinking programme*” because they can see the link between thinking skills and knowledge/content. These are some encouraging feedback that we, who are interested in the thinking program, can always fall back on. It is exciting to see trainee teachers actually trying out the strategies without being forced and having their effort graded.

Discussion and Conclusion

A few points can be drawn from this preliminary observation. Firstly, teachers will only be interested in any thinking program if the program is meaningful to them. In order to achieve this, theories about thinking, learning, and memory have to be made meaningful to the teacher trainees. Making them reflect on their learning experiences pertaining to the relevant theories will enable them to reflect on how their learning could have been a more effective one.

Often time, we ‘relate’ (if at all) to the trainees by stating and promoting how effective it would be for their students in the classroom if thinking skills are incorporated. Rationally speaking, this approach is excellent because without doubt our main goal in education is for our students to learn something. However for the teacher trainees, their main concern at the initial teaching period will be on the classroom management more than anything else. In other words, what troubles the trainee teachers now, are finding effective ways to control their class and deliver their well-planned lessons. Asking them to take into account the thinking skills and infuse them in their lesson will be too overwhelming for them, and they would rather wait until later years to do so. However when the subsequent years come, they have become complacent because methods that they were using (and what their teachers had been using) are seemingly effective, i.e., serve well to achieve A’s in formal examinations.

However, the approach that we have adopted here is to take a step back, and inviting the teacher trainees to reflect on their own learning experiences. Asking them to think about both successful as well as unsuccessful learning experiences seems to really open their eyes to the relevance and importance of thinking skills in the process of learning. Of course in addition, the trainee teachers are equipped with some relevant background theories about learning and transfer of learning. This is just a simple concept about learning that has been overlooked in our excitement to bring across thinking skills into the classroom environment.

Our attempt to teach thinking skills to our classroom students must not overlook the importance in staff development. We can have a very well-planned staff development seminar for such thinking program, but without being carefully carried out; it will just be another seminar that will be forgotten once they leave the venue. Just as any content can only be effective when it is meaningful to learners, so are thinking skills. They have to be

meaningful to the teachers in order to ensure transfer, i.e., for teachers to really infuse the thinking skills meaningfully in the classroom environment.

References

- Adams, M. J. (1991). Balancing Process and Content. In A.L. Costa (ed.) *Developing Minds: Programs for Teaching Thinking* (Revised edition, Vol. 2, pp. 1-2). Alexandria, Virginia: ASCD
- Anderson, John R, (1994). *Learning and Memory: An Integrated Approach*. USA: John Wiley & Sons, Inc.
- Costa, Arthur L. (1991). The school as a home for the mind. In Arthur L. Costa (Ed.), *Developing Minds: A Resource Book for Teaching Thinking* (Revised Edition, Vol. 1). Alexandria, Virginia: Association for Supervision and Curriculum Development.
- De Bono, Edward (1997). *De Bono's Thinking Course* (Revised & updated). Trowbridge, Great Britain: Redwood Books.
- Goh Chok Tong (1998). Shaping our future: thinking schools, learning nation. In Quah M.L., & Ho W.K. (Eds.), *Thinking Processes: Going Beyond the Surface Curriculum*. Singapore: Prentice Hall.
- Marzano, Robert J. (1992). *A different Kind of Classroom: Teaching With Dimension of Learning*. Alexandria, Virginia: Association for Supervision and Curriculum Development.
- Norris, S.P. (1985). Synthesis of research on critical thinking. *Educational Leadership*, 42, 40-45.
- Presseisen, Barbara Z. (1991). Thinking skills: meaning and models revisited. In Arthur L. Costa (Ed.), *Developing Minds: A Resource Book for Teaching Thinking* (Revised Edition, Vol. 1). Alexandria, Virginia: Association for Supervision and Curriculum Development.
- Swartz, R. et al. (1996) *Infusing the Teaching of Critical Thinking into Content Instruction*. Critical Thinking Books and Software, USA