Metacognitive Strategies and Expertise in Learning

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Abstract: Students should be trained to become expert learners so that they can learn efficiently in the classroom. Review of literatures supported the use of metacognitive strategies to help students become expert learners. The purpose of this qualitative study was to identify teachers' perceptions and suggestions on the use of metacognitive strategies in the classroom to help students become expert learners. Data from focus group interviews with teachers (N=36) were transcribed and coded using NVivo 7. The findings of the study supported the use of three key elements in the instructional strategies to help students become expert learners namely, (1) meta-attention, (2) meta-comprehension and (3) metacognitive reflection. The study concluded that most of the respondents support the move to encourage the use of metacognitive strategies in the classroom. A framework to infuse these metacognitive strategies in the teaching and learning activities in the classroom is presented.

Key words: Expert Learners · Competent Learners · Learning strategies · Learning to learn

INTRODUCTION

How do students learn in the classroom? Do students have the skills needed to become efficient learners? This question is related to the development of 'expert learners' which is being neglected in many classrooms today [1, 2]. Awareness about the learning process and ability to identify which strategy is suitable and effective are important to ensure the effectiveness of one's learning process. However, these skills are not automatically acquired without proper planning and deliberate effort.

Studies on study skills have shown that students acquire 'learning how to learn skills' through trial and error without formal training or guidance. As a result, not all students can learn effectively in the classroom. Some students are unable to identify the best way to approach a learning task; therefore they just follow whatever activities teachers have planned for them [3, 4] reported that low students lacked the 'how to learn' meta-cognitive knowledge and supported the use of explicit strategy instructions to close the gap between low and high learners.

Literature has suggested that students should be taught not only the content but also the learning strategies they need to understand the content [1, 3]. It is recommended that learners should be supported in order to get the most from their programme and to take responsibility for managing their own learning [5]. In other words, students should be trained to become expert learners so that they can learn efficiently in the learning process.

In the context of classroom learning, the adoption of a student centred approach by some teachers provided opportunities for students to learn effectively. However, these efforts are insufficient as the focus of learning activities is on the acquisition of content or knowledge and neglecting the element of 'learning process' involved in the activity. The literature has documented that 'learning how to learn' is not an agenda in the classroom [1, 3, 6]. This phenomenon indicates that many teachers tend to focus on the delivery of content and less effort was taken to make students aware of their learning process. Instead of enabling the students to learn effectively in the classroom, this practice failed in helping them become expert learners.

On the basis of a workshop conducted, it was found that low-achieving students who need help the most are least likely to attend any skills workshop [7]. This indicates the necessity of providing an opportunity for students to help them develop these important academic

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skills in the classroom. He further suggested that since the students have poor metacognition abilities, future research on strategies to promote students metacognition is greatly needed.

The essential part in developing expert learners lies in the use of an approach that enables students to be aware of elements that affect the effectiveness of their learning process. The use of a metacognitive approach is recommended by educational psychologists to provide opportunities for students to learn about their learning process [8-11]. It is also suggested that the development of general strategies to approach learning can be developed simultaneously as they learn the content of the subject matter [9]. Therefore, it is suggested that the intervention programme to promote the development of expert learner should be infused in the teaching of subject matters in the classroom setting. It was claimed that encouraging students to adopt meta-learning would result in learners becoming experts in learning [12]. This study aimed to examine how teachers can adopt metacognitive strategies in the classroom to help students become expert learners.

Expert Learners: Generally, expert learners refer to students who are able to learn effectively in their learning process. The term 'expert learners' refers to students who are skilful in solving problems and challenges faced in the learning process. An expert learner was described as someone who displays aspects of planning, control and reflection which help them to be aware of the knowledge and skills they possess, or are lacking and, consequently, use appropriate strategies to actively implement or acquire them [13]. They define the expert learner as a strategic, self-regulated and reflective learner. Three characteristics of expert learners that showed how far students are actively engaged with the materials they learn were as follows: (i) they focus their attention on materials learned, (ii) they put in effort to process the information and (iii) they take responsibility for their own learning [1].

There is a belief that the characteristics of expert learners are not built in automatically in all students. Many students need to be guided and supported to acquire the skills. Thus, deliberate effort should be planned and monitored to achieve the objectives of developing students as expert learners. [13] suggested a model of expert learning which illustrates how learners' metacognitive knowledge of cognitive, motivational and environmental strategies are translated into the regulatory control of the learning process through ongoing reflective

thinking. The power of reflective thinking can be traced from Dewey's 'How people think' to the extension of the notion of 'reflection in action' and 'reflection on action' as proposed by [14].

Metacognitive Strategies: Metacognition has been researched for more than three decades starting from Flavell, who first coined the term metacognition in the 1970s. Generally, metacognition is defined as 'thinking about thinking' or 'cognition about cognition'. Flavell defines metacognition as individuals' awareness about their own thinking processes which enables them to monitor and regulate their thinking activity [15]. As a whole, metacognition is usually related to learners' knowledge, awareness and control of their learning process [16, 17]. In a learning context, metacognition refers to students' knowledge about their own learning process. This knowledge is used to monitor and regulate their cognitive process during a learning or thinking activity.

The question is how do we help students to develop their metacognitive skills which makes them competent or expert learners in the classroom? Metacognitive strategies involve three processes that help students control their learning process. They are, (1) planning, (2) monitoring and (3) evaluating. These three processes are not necessarily in a sequential order but operate interactively depending on the objective of the activity at any given point. These processes can control the learning process through a series of questions that require students to make self assessments about the learning task they are trying to solve [2]. Students using metacognitive strategies will consciously control their own learning from the process of planning, choosing the right strategies, monitoring the progress and correcting errors, evaluating the effectiveness of the strategies used and changing between alternative strategies [18, 19].

Numerous studies have documented the benefit of metacognition to students' learning [6, 20, 21]. It is suggested that adopting metacognitive strategies will allow students to take charge of, organise and control their own learning However, it is unclear that how can it be implemented in the classroom. We hypothesised that use of three elements in metacognitive strategies would be able to help students becoming expert learners. The three elements are, (i) meta-attention, (ii) meta-comprehension and (iii) metacognitive reflection.

These metacognitive strategies were used to help students learn the 'content' as well as the 'learning how

to learn' skills. The meta-attention strategies are related to planning skills which focus on activities that guided the students to give attention to the goal of learning and stay focused to their learning process. Thus, teaching and learning processes should focus on the strategies that can direct students' attention to the objective of the instruction. Meanwhile, the meta-comprehension strategies are related to the monitoring and evaluating skills, which refer to students' ability to take charge of their own learning. In this context, students should be given opportunities to be involved in activities that encourage them to process information deeply and do the assessment in relation to the achievement of the objective of learning.

The study also proposed the use of metacognitive reflection strategies to assist students in building their study skills. Reflective thinking is one of the important elements in this approach that can be used to make students aware and help them learn about 'learning how to learn' process. [10] asserted that the use of metacognition reflection is potentially useful in a wide range of courses. He introduced what he called as the 'four step bridge for metacognition' which suggests the importance of teachers' scaffolding in helping students to learn how to reflect. The first step in his model is to help students to become aware of their thinking process starting with helping students recognise the operations of their minds.

The use of the metacognitive reflection technique was suggested to teach thinking explicitly [22]. This technique help to make the students thinking visible so that they can identify the strengths and weaknesses of their own thinking. This technique can be adopted to encourage students to reflect on the learning process, thus allowing them to learn the 'learning how to learn' aspects used in the learning activity. Upon the metacognitive reflection activity, students will be able to assess their own learning process and identify their weaknesses and strengths which would provide useful insights for improvement in future use.

In this study, meta-attention refers to the activities that are geared towards students' attention or focus on the learning process. It includes students' awareness of their learning objectives and deliberate efforts to plan an action to achieve the objectives. Meanwhile, meta-comprehension refers to activities that involve deep processing and students' efforts to monitor and evaluate their understanding. On the other hand, metacognitive reflection refers to activities that deal with the learning

how to learn aspects. It includes 'thinking about thinking' activities which involve discussions about the learning process and how it can be used to improve their learning process in the future. These elements were selected because they reflect the proposal from current studies that suggest the use of metacognitive strategies to improve students' learning.

The objective of this study was to examine teachers perception on the use of metacognitive strategies to support the development of expert learners in the classroom.

METHODS

Participants: This qualitative study involved 32 teachers from eight secondary schools in Malaysia. Four teachers were selected from each school, comprising science, mathematics, history and language teachers. All the participants chosen have more than five years' teaching experience.

Instruments: This study employs qualitative data collection namely, focus group interviews using a semi-structured interview protocol. The questions were constructed on the basis of the metacognitive framework, which includes three basic processes in metacognitive strategies, namely, planning, monitoring and evaluation aspects. The respondents were also asked for their opinion on the use of metacognitive strategies to promote the development of expert learners in the classroom. The interview consists of questions on, (1) teachers perception on the characteristics of expert learners and (2) teachers' perception on the use of metacognitive strategies to help students become expert learners.

Analysis: The interview data were transcribed right after each interview and then coded using NVivo 7. The responses to the focus group interview were analysed using a content analysis approach. Only data for the second question of the interview were analysed for this article. The verbatim was read many times to gauge the strategies and suitable categories of the strategies. The metacognitive framework namely the elements of meta-attention, meta-comprehension and metacognitive reflection, was used to gauge the category of the strategies. The objective of the analysis was to reduce the findings into thematic categories representing the metacognitive strategies that can be used by teachers to help students become expert learners.

RESULTS AND DISCUSSION

Meta-Attention: The study found that most of the respondents agreed that awareness about the objective of the learning activity is important to capture students' attention at the beginning of the lesson. They also agreed that this element is important in helping students deliberately plan an action to achieve the objective and stay focused to the learning process. Among the responses are the following:

'it's important for them to know the objectives'
'so they can focus on the objective of the lesson'
'it can help them plan what to do'

However they also admitted they seldom explicitly discuss the objective of the lesson with the students. Among the claims are the following:

'normally, I write the topic of the lesson but do not discuss explicitly the objective of the lesson with the students'
'yes but we don't spell it out explicitly'
'it is important but I was not aware about it'
' I guess I will discuss with the students about the objective of the lesson'

It is found that most of the respondents did not give attention on the importance of focusing students' attention on the importance of planning and monitoring their attention during the teaching and learning process. As suggested by the information processing theory, students' attention will determine if the information being processed will eventually transform into knowledge. Thus it is important that the aspects of meta-attention are emphasised in the teaching and learning process.

Meta-Comprehension: The study found that most of the respondents agreed that teachers need to guide students to monitor and evaluate their comprehension.

'we need to encourage them to evaluate their progress'
'we need to train them how to assess their own understanding'
'maybe we need to teach them the questions they need to ask themselves to assess their learning process'
'we can use prompts and cues to encourage students to monitor their comprehension'

The participants also agreed to the importance of deep processing activities to help increase students' comprehension.

'they need to process information'
'they will understand more'
'it will help them construct meaning'
'students need to be mentally active'

They also gave examples of activities that can be done with the students to encourage them to be involved in deep processing:

'get them to give examples'
'ask them to explain or teach their friend'
'use cooperative learning strategies'
'small group discussion will help students involve with the information processing activities'
It is believed that the emphasis on meta-comprehension using deep processing activities will facilitate students' learning.

Meta-Cognitive Reflection: The study found that most of the respondents are not aware of the importance of the activity and equate it with the evaluation process. They claimed that they do encourage students to reflect upon what they have learned, especially during the wrap-up session before the end of the lesson.

'yes, I asked them to reflect on what they have learned'
'we asked the students to conclude the lesson'

However most of the activities are focused on the content of the lesson. The respondents agreed that students should be encouraged to reflect on the activities that help them to understand the materials learned. These involve the information processing skills and information organisation skills employed in the learning activity.

Further discussion led to the conclusion that the students should also be encouraged to reflect on the process of learning in order to transfer the skills for future use.

'I guess this is a good idea to ask them to look back on how they solved the problem'
'so that they can use the procedure in the future'
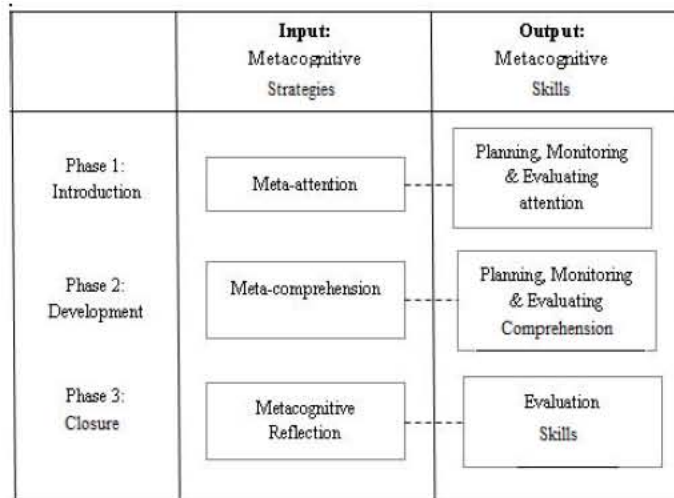'they learn how to do things in the future'

Fig. 1: Infusion model to develop expert learners in the classroom

Figure 1 shows the infusion model suggested for the development of the expert learners in the classroom. The implementation of the meta-attention aspect can be carried out at the beginning of the class, when teachers try to negotiate with students about the intended outcome of the learning. This negotiation process will help students plan strategies to achieve the objective thus helping them to stay focused on the learning activities that they themselves were involved in the planning phase. The outcome expected from these activities is the development of planning and monitoring skills. Teachers are encouraged to make the students aware of the planning process and how to monitor their learning process.

The meta-comprehension phase can be implemented in the second phase of learning, that is, the monitoring of the comprehension process. This process involves deep processing of materials and the evaluation of their understanding of the materials learned. It involves metacognitive prompts that eventually will train students on how to self-monitor and self-evaluate their learning process. These method should also be discussed explicitly to raise the students' awareness level, thus helping them to develop the skills of monitoring and evaluating and to use it during their own learning in the future.

The metacognitive reflection process is suggested to be implemented prior to the closure of the lesson. Teachers should encourage students to reflect upon the learning process involved during their learning activity. In this context, teachers should facilitate the process so that the students are able to do the reflection. Teaching techniques such as 'Think-Pair-Share' can be used to facilitate students learning. Devoting time for discussing

explicitly so as to make these thinking and learning processes visible to students will enhance the student's evaluation skills. The expected outcome from this activity is the student's opportunities to compare their own procedure with those of other students and evaluate their strengths and weaknesses that can be considered for future use.

CONCLUSION

The use of metacognitive strategies is suggested to help students develop the characteristics of expert learners. Three metacognitive strategies namely meta-attention, meta-comprehension and metacognitive reflection were identified as the key instructional elements that need to be infused in the teaching and learning activities in the classroom. As a whole, the teachers agreed on the need to explicitly teach learning strategies in the classroom. They agreed that they need to play an important role to help students become aware of the learning process, thus helping them become expert learners.

Results of the study indicate the importance of facilitating students to be involved in activities that can help them become expert learners. The study also supports the importance of teachers' role in helping students become expert learners. Generally, teachers are not aware of teaching strategies that can help students become expert learners. Therefore, there is a need to develop a module to help teachers in implementing strategies to support this proposition. It can also be suggested that the infusion of these three basic strategies should be adopted to promote the development of expert

learners in the classroom. Further studies should focus on the application of these three metacognitive strategies and its impact on students learning. Future research should also explore the use of metacognitive strategies to help students become expert learners in other setting such as bended learning and e-learning environments [23].

REFERENCES

1. Woolfolk, A., 2008. *Educational psychology*, 9th Edition, Boston: Allyn & Bacon.

2. Saemah Rahman, Zuria Mahmud, Siti Fatimah Mohd Yassin, Ruslin Amir and Khadijah Wan Ilias, Universiti Kebangsaan Malaysia. 2010. The Development Of Expert Learners In The Classroom. Contemporary Issues in Educational Research. 3(6): 1-8

3. Saemah Rahman and Najmi Hayati. 2009. Promoting metacognitive development in the classroom. Proceeding of "Seminar Pendidikan Serantau Ke 4". Seremban, Malaysia. 18-21Mei2009.

4. Chi, M. and K. VanLehn, 2010. Meta-Cognitive Strategy Instruction in Intelligent Tutoring Systems: How, When and Why. Educational Technology and Society, 13(1): 25-39.

5. The White Paper. 2006. Further Education: Raising Skills, Improving Life Chances, (www.official-documents.gov.uk/document/cm67/6768/6768.pdf)

6. Joseph, N., 2010. Metacognition Needed: Teaching Middle and High School Students to Develop Strategic Learning Skills. Preventing School Failure. 54(2): 99-103.

7. Nordell, S.E., 2009. Learning How to Learn: A Model for Teaching Students Learning Strategies. J. College Biology Teaching, 35(1): 34-42.

8. Brown, A.L., 1980. Metacognitive Development in Reading. In Spiro, R.J.; Bruce, B.C. and Brewer, W.F., (Eds) *Theoretical Issues in Reading Comprehension: Perspectives From Cognitive Psychology, Linguistics, Artificial Intelligence and Education,* (pp. 453-481). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

9. Borkowski, J.G. and A.J. Krause, 1985. Metacognition and Attributional Beliefs. In G. d?Ydewalle., (Eds.), *Cognition, Information Processing and Motivation.* (pp. 557-568) Amsterdam: North Holland.

10. Grossman, R., 2009. Structures For Facilitating Student Reflection. College Teaching, 57(1): 15-22.

11. Deed, C., 2009. Strategic Questions: A Means of Building Metacognitive Language. International Journal of Teaching and Learning in Higher Education. 20(3): 481-487.

12. Arnold, L. and K. Thompson, 2009. Learning to learn through real world inquiry in the virtual paradigm. NEXUS J. Learning and Teaching Res., 1: 6-33.

13. Ertmer, P.A. and T.J. Newby, 1996. The expert learner: Strategic, self-regulated and reflective, Instructional Sci., 24: 1-24.

14. Schon, D.A., 1987. *Educating the Reflective Practitioner: Towards a new design for teaching and learning in the professions.* San Francisco: Jossey-Bass Publishers.

15. Flavell, J.H., 1987. Speculations About The Nature and Development of Metacognition. In Weinert, F.E. and Kluwe, R.H., (Penyt.), *Metacognition, Motivation and Understanding* (h. 21-29). Hillsdale, New Jersey:Lawrence Erlbaum Associates.

16. Brown, A.L., 1987. Metacognition, executive control, self-regulation and other mysterious mechanisms. In F. E. Weinert and R. H. Kluwe (Eds) *Metacognition, Motivation and Understanding* (pp.65-116). Hillsdale, NJ: Lawrence Erlbaum.

17. Garner, R. And P.A. Alexander, 1989. Questions. Educational Psychologist, 24(2): 143-158.

18. Ridley, D.S., P.A. Schutz, R.S. Glanz and C.E. Weinstein, 1992. Self-regulated learning: the interactive influence of metacognitive awareness and goal-setting. J. Experimental Education, 60(4): 293-306.

19. Winn, W. and D. Snyder, 1996. Cognitive perspectives in pyschology. 1996. In D.H. Jonassen, ed. *Handbook of research for educational communications and technology,* (pp: 112-142). New York: Simon and Schuster Macmillan.

20. Fazal ur Rahman, Nabi Bux Jumani, Muhammad Ajmal Chaudry, Saeed ul Hasan Chisty and Fahim Abassi, 2010. Impact Of Metacognitive Awareness On Performance Of Students In Chemistry. Contemporary Issues in Education Res., 3(10): 39-44.

21. Yilmaz-Tuzun, O. and S.M. Topcu, 2010. Investigating the Relationships Among Elementary School Students' Epistemological Beliefs, Metacognition and Constructivist Science Learning Environment. J. Sci. Teacher Educ., 21: 255-273.

22. Beyer, B.K., 1997. *Improving student thinking: a comprehensive approach.* Boston: Allyn and Bacon.

23. Yardibi, U., 2008. New tendencies in Education: E-Learning. World Applied Sci. J., 4(3): 371-376.