

## MONITORING STUDENTS' METACOGNITION IN KSSR CLASSROOM

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### ABSTRACT

The ability to think critically is essential for students to face the challenges of the 21st century. Students should be equipped with the skills as those skills will help them to solve problems, make wise decisions and analyse information. One of the approaches to cultivate critical thinking is by monitoring their metacognition. Thus, the purpose of the study is to explore the methods of monitoring students' metacognition used by teachers in KSSR (Primary School Standard Curriculum; Kurikulum Standard Sekolah Rendah) classroom. Six primary school teachers were purposely selected in the study. Qualitative design was utilised where they were interviewed separately and probing was done to elucidate or illuminate the issue of study. Observation was also done as a method for methodology triangulation. The data from both sources was recorded and transcribed. Data coding was used to analyse the data where the transcribed text was segmented and labelled to form descriptions, main ideas as well as themes. These emerging themes were analysed and interpreted. The findings suggest that the student-centred approach exercised in the curriculum has enabled students to share and discuss information among them. The teaching techniques which include questioning approach, asking students to predict outcome and provide reasons were also employed. Formative assessment such as indirect questioning with diverse assessments were also exercised in monitoring students' thinking about thinking or metacognition.

**Keywords:** *Metacognition, KSSR, Critical Thinking, Qualitative Design, Primary School Teachers*

### INTRODUCTION

Thinking, or cognition, (from Latin word means "to know") is defined as mental activities which often have images as well as words that enter in the brain when a person is processing information. Processing information can be elaborated by organising the information, understanding it, and communicating to others (Ciccarelli & White, 2015).

Thinking is used in everyday life; in making decisions, forecasting possibilities, making good judgment in practical manners, etc. However, according to Swartz and Perkins (1990), one should not only need to think, but to also think better, which simply means to think better in the common-sense terms. They suggested that when it comes to better thinking, people always focus on the outcome of thinking only, such as more reliable conclusions, deeper insights, sound decisions and keener critical assessments. Whereas better thinking outcomes should be paired with the process of better thinking, such as considering more possibilities, exploring further and wider, challenging assumptions and exercising keener judgement.

However, better thinking involves metacognition: the knowledge about and regulation of one's cognitive activities in learning processes (Flavell, 1979; Brown, 1978, as cited in Veenman, Van Hout-Wolters, & Afferback, 2006). In the simplest term, it means the thinking about thinking. Cognition and metacognition are inseparable as the former is regarded as (knowledge of) a set of self-instructions for regulating task performance whereas the latter is the means to self-instructions (Veenman, Van Hout-Wolters, & Afflerbach, 2006). Metacognition is inferred from certain cognitive activities and not always explicitly noticed during performing of tasks. In psychological literatures, there are two complementary elements of metacognition; a) knowledge about cognition, which means that cognition in general and some degree of awareness that involved and b) self-regulation, which is one's ability to plan, monitor and regulate his or her thinking that suits the demand of tasks and to evaluate his or her thinking outcomes (Flavell, 1979, as cited in Swartz & McGuinness, 2014).

Magno (2010) stated that metacognition has a significant path to critical thinking. He believes that metacognition has an influence on critical thinking skills. This view is supported by Gotoh (2016) who found that through metacognition regulation, students will be able to think critically in solving a problem. As critical thinking skill involved in students analysing and solving problems, metacognitive skill on the other hand helps students recognise the appropriate strategies in analysing and solving problems (Fang Huang, Ricci, & Mnatsakanian, 2016).

It is fundamental to be aware that thinking and critical thinking are two different terms. According to Alfaro-LeFevre (2013), thinking refers to any mental activity whereas critical thinking is controlled and purposeful, and using well-reasoned strategies to get the needed results. This is supported by Lai (2011) who stated that critical thinking is not just a mere mental activity but more than that. She also added that critical thinking is a deliberation of how people actually think and how they could or should think under varying circumstances.

Developing critical thinkers has become central to the education system. This necessity of change is supported by Darling-Hammond and McCloskey (2008) who suggested that in developing curriculum guidelines, the authorities, government and schools, should focus on what they called 21st century skills. They are "the ability to find and organise information to solve problems, frame and conduct investigation, analyse and synthesise data, apply learning to new situation, self-monitor and improve one's own learning and performance, communicate well in multiple forms, work in teams and learn independently". Saavendra and Opfer (2012) also stated in their research that 21st century skills include creativity and innovation, critical thinking, problem solving, decision making, and learning to learn (or metacognition). This implies that it is crucial for critical thinking skills (CTS) to be included in the school curriculum because it benefits students' academic achievement and also helps students to come to correct conclusions. Furthermore, it will also aid them to select the appropriate input from the internet and cope with such demands and challenges of the new world as critical thinking skills lead students to make wise decisions (Moore & Parker, 2012).

In Malaysia, the change from the New Primary School Curriculum (Kurikulum Baru Sekolah Rendah) or KBSR to the new Primary School Standard Curriculum (Kurikulum Standard Sekolah Rendah) or KSSR in 2011 beginning with the Year One students no longer emphasised the importance of knowledge only, but also in developing higher order thinking skills (Malaysia Education Blueprint 2013–2025 p. E-4). This seems to be a move in the right direction for teaching critical thinking skills. KSSR was introduced as an effort to restructure and improve the existing curriculum to ensure students are provided with the knowledge, skills and values that are relevant to meet current needs and challenges of the 21st century (KPM, 2012). The previous primary school curriculum, KBSR emphasised three skills; reading, writing and arithmetic, whereas with the current curriculum, KSSR, another skill is added to; that is reasoning (menaakul). Reasoning is thinking, specifically, critical thinking.

Moreover, the KSSR is developed to produce a balanced and holistic student who is able to think creatively, critically, and to be innovative through six strands; i) communication, ii) science and technology, iii) physical and esthetical development, iv) self-exposure, v) humanity, and vi) spirituality, attitudes and values (Malaysia Education Blueprint 2013–2025, 2013). One of the aspirations introduced in the KSSR is thinking skills, which emphasises that every student will be instilled with the love for inquiry and long life learning and to be able to connect different pieces of knowledge (p. E-4). Every student will need to master a range of cognitive skills that include critical thinking, reasoning, creative and innovation skills. Thus, this curriculum is expected to promote critical thinking skills among students and at the same time cultivating metacognitive skills.

## **STATEMENT OF PROBLEM**

A number of research regarding critical thinking skills and the need for students to be able to think critically has been performed (Rahil, Zaidatol Akmaliah, Habibah, & Mohd Majid, 2004; Sulaiman, 2013; Suzana, 2012; Salminah, Rahmah & Abdullah, 2013). Furthermore, a lot of exploration on current situation of primary school students' thinking ability was also done with regard to achievement and cognitive development (Bernardo, Zhang, & Callueng, 2002; Azar, 2010). However, there is no one found with regards to students' metacognitive skills. Therefore, the study is conducted to fill in the gap of knowledge.

## **RESEARCH OBJECTIVE & RESEARCH QUESTION**

The objective of the study is to investigate the method teachers employed in monitoring metacognition of students in KSSR classrooms.

Specifically, the study is to answer the following research question:

“How do teachers monitor student metacognition?”

## **RESEARCH METHODOLOGY**

The study used qualitative design where interview sessions were done with participating teachers separately. Classroom observations were also done to explore how teaching and learning process took place and as triangulation procedure.

Six teachers from different academic background were purposely selected for the study. The selection of informants was observed carefully to ensure the objective is met. Since the aim of the study was to explore the methods of monitoring metacognition of students in KSSR classrooms by focusing on teachers' teaching approaches and methods, teachers were selected based on their experience in handling KSSR classroom.

All the interview sessions were held in accordance to the informants' convenience. Each of the interview session took about 45 to 80 minutes depending on how much information was elaborated by teachers, and some even with detailed examples. Probing was done continuously until the saturation point was met. At the onset of the interview, all the informants had to sign a consent form to prove their willingness as informants to the study. The researcher also ensured them that the data collected will be strictly used for academic purposes and their identity will be kept private and confidential. The purpose of this study was conveyed before interview questions were asked. All interviews were audio taped and they were transcribed for analysis purpose.

Six classes were observed twice in the study. The classroom observation was scheduled after all interviews have been done with the teachers. Those observations were taking place in a week. Each of observation took place for an hour, that was using the time of the class were conducted. the researcher recorded field notes during the observation. A voice recorder was also used during that time as to make sure none of the incidences missed during interpretation and analysis stage.

Methodological triangulation was also exercised where semi-structured interview, and observation were put to use in the data collection procedure. The results of the inter-rater reliability data showed 82%, which is more than acceptable benchmark suggested by Ericsson and Simon (1993). The calculation of the inter-rater reliability is shown below:

$$\text{Reliability} = \frac{\text{Number of agreements}}{\text{Total number of agreement + disagreement}} \times 100$$

A reliability of 82% is quite high. This conformed to the rate suggests by Ericson and Simon (1993). They mention that a reliability of 80% reflects high reliability. The calculation for this study is shown in Table 1.

Table 1

<u>Co-rater 1</u>	<u>Co-rater 2</u>
$\text{Percentage of Agreement} = \frac{26}{26 + 4} \times 100$ $= 86.7\%$	$\text{Percentage of Agreement} = \frac{23}{23 + 7} \times 100$ $= 77.7\%$
So $86.7 + 77.7 / 2 = 82\%$	

Both interview data and field notes were transcribed and the transcriptions undergone the same analysis processes. The process of data analysis as shown in Figure 1.

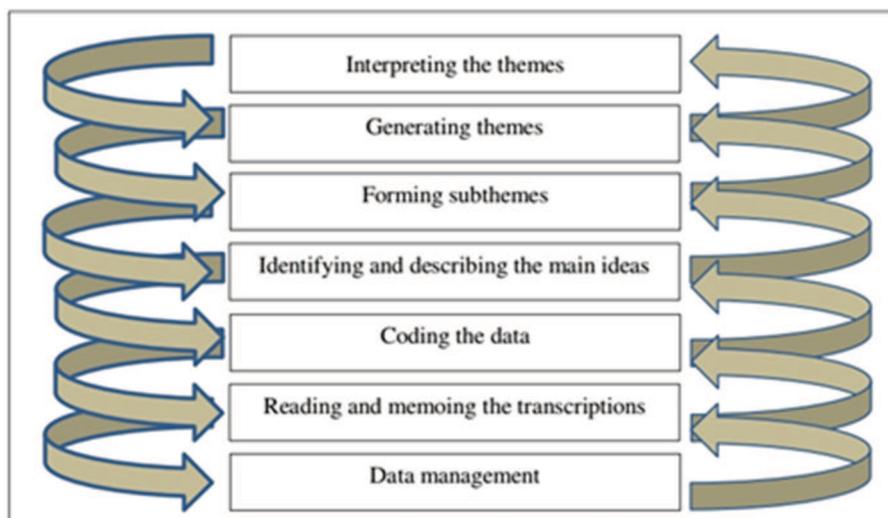


Figure 1: Data Analysis Framework, adopted from Creswell (2007)

## FINDINGS AND DISCUSSION

Data from the interview and observation were utilised to understand the situation to obtain a better insight. A number of themes and sub-themes emerged from the data and those themes were interpreted accordingly.

### (a) Student-Centred

The student-centred approach is used in KSSR classrooms where teachers are only facilitators and students have to construct their own learning. Before students were assigned to groups, teachers would conduct a brief whole class discussion for induction purposes where students needed to reflect on their previous knowledge as well as to predict what will be taught later. Then only students were assigned to groups and activities were done in groups. Usually when a teacher comes in he or she will introduce the topic of the day and give instruction to students to start working in groups. Since students were already seated in groups, it would be much easier to conduct group activities.

An example of a student-centred approach was during an English class where students were asked to perform a Reading Theatre activity. They were required to gather in front of the class and read the dialogue written in the textbook. According to Teacher 3, she conducted the activity to enhance students' self-confidence and reading skills and at the same time students were able to notice their level of reading proficiency which leads to self-reflection.

Group discussions allow students to monitor, assess and evaluate their learning. For example, in a mathematic class observed, the teacher gave information to students and they have to create a story based on the information provided. When the students asked to clarify, it indicates that the student was evaluating their learning whether what they understood was really what was being said by the teacher. On the other hand, through group discussions, students recognised different ideas from group members which signify that there were being self-corrective. Hence, group activities from student-centred approach permits teachers to monitor student awareness of their thinking.

In student-centred classrooms, many activities were done that involved students as doers. As mentioned by all the informants, they regularly conduct group discussions, group presentations and other class activities as their approach to teach the subject content. To exercise group activities, students were required to regulate their own thinking in order to achieve the goals or objectives of the activities or problem solving tasks. Indirectly, students were asked to think about thinking by regulating themselves. Self-regulation is a metacognitive skill that allows students to think about their own thinking process, to control their thinking process to achieve learning goals (Brown, 1987 as cited in Kayashima & Inaba, 1982)). Moreover, in group discussions, where usually students are required to solve problems, relate and apply to real life situations, they need to plan, monitor and evaluate their learning. For instance, they may ask themselves these questions 'What are all the things that I need to do to successfully accomplish this task?' 'What are the strategies, that I'm using, that is working well?' 'To what extent that did I successfully accomplish the goals of task?' These questions might not be seen explicitly from students but they are there to regulate student learning.

At the same time, through group activities in the student-centred approach, students were also monitoring and assessing their own learning, which are important characteristics of metacognitive skills. This is congruent with Brown (1987) and Kuhn (2000, as cited in Swartz & McGuinness, 2014) that self-regulation is a part of metacognitive where students have the ability to plan, to monitor and modify their thinking according to the needs of the task and to evaluate their thinking outcomes. Apart from that, group discussions allow student to reflect their learning as well, which is another metacognitive skill. This is because when students discuss ideas with each other and

their teachers, it makes thinking more concrete, and students learn what to ask, identify what they do not know and the also learn from other thoughts and ideas (Darling-Hammond et al., 2003).

In addition, during problem-solving activity, when students may be requested to relate or apply old knowledge to new situations, students will also observe and regulate their thinking. They need to ensure that whether the problem-solving process or the relationship or application made are going well or not, which essential for them to evaluate their progress on the activities. This indicates that they were thinking about thinking or metacognition. As a result, class activities or group discussions and group presentations, which are practised in student-centred approach, are ways or methods for teachers to monitor student metacognition.

## (b) Teaching Techniques

### (i) Questioning Technique

By applying various teaching techniques teachers were able to monitor student thinking. Teachers reported that they use questioning techniques as one of their teaching methods. This is also evident during observation. For example, in one of the classes observed, the teachers asked what the students have learnt previously,

To respond to the question mentioned by the teacher in the quote above, students must reflect on what they have learnt beforehand. Reflection allowed students to check whether they can remember or not what they have learnt.

Furthermore, in a mathematic class, the teacher gave different mathematical problems to different groups to solve. The teacher asked students on the steps to solve mathematical problems; from the story, what was given, what to search for, the mathematical operation and the solution.

The teacher kept on asking the steps to answer the question. Then the students needed to write the answers on the board. This required students' understanding of previous lessons and at the same time they need to reflect previous knowledge to apply to new problem solving process.

The findings indicated that the teachers were found to be selective in their teaching techniques, where they appropriately use questioning approach, and stimulated students to predict outcome and provide reasons to the answers. When teachers asked in classrooms, students needed to reflect on what they previously known in order to answer the question. Reflection requires what student know, care about, and able to do, that have them to develop awareness of themselves as well as providing pictures printable information on your learning (Darling-Hammond et al., 2003). On top of that, students may regulate their thinking prior to answering teacher's questions.

### (ii) Predict Outcome

Besides questioning techniques, teachers were also found to demand students to predict outcomes as a way to reflect their learning. For instance, in a science class, students were requested to provide hypothesis before conducting an experiment. When students made a hypothesis, there were assuming what would be the outcome of the experiment.

In the English class on the other hand, the teacher asked students to guess the end of the story that she read to the class. By predicting outcomes, students were indirectly being taught to be creative and to reflect their learning. Students also were able to be imaginative based on what they know.

To promote metacognitive skills among students, teachers were found to request them to predict outcomes by reflecting past knowledge and information. Self-reflection aims at “constructing metacognitive knowledge by making formerly unconscious, intangible, or reflective process or event explicit” (Desautel, 2009, p. 2001). This is aligned with Brown’s model (1987, p.15) of metacognition which states that “predicting outcomes is an activity of cognition regulation involved in metacognition”.

(iii) *Provide Reason*

In addition to that, students were encouraged to give reasons as to build a solid foundation of their answers or solutions. For example, in a science class observed, the teacher asked his students to reason why some plants have their sprouts facing certain ways, why the root facing downward, why it is certain plants react to touch stimulation, and students manage to answer because the plant is reacting to the sun, water or to protect itself.

To be able to respond to the question required student to evaluate prior knowledge and to be aware of their thoughts.

Teachers were found to request students to reasons as proof of their understanding of subject discussed. Yet again, the awareness of own thinking through reflection and evaluation of prior knowledge is the key to providing relevant reasons (Desautel, 2009). Hence, to insist upon metacognitive skills of evaluating own learning, and by asking students to offer reasons to situation, teachers were indirectly promoted metacognitive skills in student (Halpern, 2014).

**(c) Formative Assessment**

(i) *Indirect Assessment*

Teachers conducted continuous formative assessments to ensure students’ learning. The assessments were sometimes done indirectly. Teachers post open-ended questions in the classroom and ask students to answer the question. Some of the questions may be difficult that students really have to think of the answers. The students have to reflect what they have learnt and at the same time, they have to relate their prior knowledge to the new information grasped.

(ii) *Various Assessments*

Accordingly, the informants also admitted that KSSR permitted teachers to practise either formative or summative assessment. Thus, teachers may opt for formative assessment that can be done through group work where teachers observed student participation as well as the verbal responses from students. Besides, teachers would also benefit from the freedom that is imparted in KSSR to monitor student metacognitive skills through formative assessment.

Furthermore, a teacher also explained that she also asked WH questions to students. Some WH questions may be easy, for instance What, When and Where but certain questions might be difficult such as Why and How. Teachers may assess student learning using these questions as well as to monitor student metacognition by helping students to reflect prior knowledge or information.

Student learning is also assessed through homework. An informant admitted that KSSR benefited students as it empowered students to use the technology. Every now and then students were required to surf the Internet to look for information to complete their homework.

To be able to use that technology wisely, it requires self-regulation, which is also a metacognitive skill. Students need to be selective and self-monitored to ensure that they were able to use the internet appropriately.

(iii) *i-Think Tool*

The use of i-Think maps also helps students to build their metacognitive skills. Knowledge is transferred from textbook or own information and concepts to the mind maps, which make easier for student to understand using iconic materials. In all of the class of observed, teachers were found to utilise that i-Think maps in the teaching and learning process. Although it is not compulsory to use the i-Think maps for all lessons, teachers seemed to utilise the thinking tool quite frequently.

While students transferred the information into the maps, subtly, they were monitoring and evaluating their own learning. It was necessary for students to examine the information and their own knowledge to ensure that they included correct information in the maps. Self-corrective also applied in the process of transferring the knowledge in the maps as students needed to check frequently if they have done by mistake.

Teachers were found to utilise the i-Think maps as tools to assess student learning. Students were directed to transfer knowledge and information into the maps, which required them to regulate their behaviour and knowledge. i-Think maps as tools for formative assessment give immediate feedback on both teaching techniques as well as student learning. As a result, students will be able to evaluate and monitor their learning, to check whether they have understood the subject matter taught. Self-reflection was also involved in the process of evaluating one's learning and through formative assessment; students reviewed their work and determined their strengths and weaknesses on the thinking and learning (Darling-Hammond et al., 2003).

## CONCLUSION & RECOMMENDATION

The purpose of the study is to explore the methods teachers used in monitoring students' metacognitive skills. Semi-structured interview and observation were done as data collection method. The data was analysed through coding method. Findings suggest that teachers monitor students' metacognitive skills through group activities in student-centred approach, teaching techniques and formative assessment.

From the findings, the researcher infers that teachers monitored student metacognitive skills through student-centred approach, teaching techniques and formative assessment. However, the researcher should highlight an issue where teachers might not be aware that they were actually monitoring student metacognition. Most of the findings were gathered only from classroom observations and interpretation of the researcher. According to Prytula (2012), teachers were aware of the need to teach metacognition skills to students but they are not aware of their own thinking. The view is aligned with Curwen, Greitz, White-Smith and Calfee (2010) who suggest that teachers need to increase their metacognition in order to develop better student learning. Thus, it is essential for teachers to be aware of their metacognitive skills before they could indulge themselves into monitoring student metacognition.

It is believed that through interview and observation, the phenomenon can be understood. However, since the time was limited for data collection procedure, limited data collected. It is hoped that for future research, more time will be dedicated for observing students in classroom.

## REFERENCES

- Alfaro-LeFevre, R. (2013). *What Is Critical Thinking, Clinical Reasoning, and Clinical Judgment?* (5th ed.). United States: Elsevier Inc.
- Azar, A. (2010). The effect of critical thinking dispositions on students achievement in selection and placement exam for university in Turkey. *Journal of Turkish Science Education*, 7(1), 61–73.
- Bernardo, A. B. I., Zhang, L.-F., & Callueng, C. M. (2002). Thinking styles and academic achievement among Filipino students. *The Journal of Genetic Psychology*, 163(2), 149–163. <https://doi.org/10.1080/00221320209598674>
- Ciccarelli, S. K., & White, J. N. (2015). *Psychology*. (4th ed.) England: Pearson Education Limited.
- Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). New York: SAGE Publication Asia-Pacific Pte. Ltd.
- Curwen, M. S., Greitz, R., White-Smith, K. A., & Calfee, R. C. (2010). Increasing teachers' metacognition develops students' higher learning during content area literacy instruction: Findings from the Read-Write Cycle Project. *Issues in Teacher Education*.
- Darling-Hammond, L., & McCloskey, L. (2008). Assessment for learning around the world: What would it mean to be “Internationally Competitive?” *Phi Delta Kappan*, 90(4), 263–272.
- Darling-Hammond, L., Austin, K., Cheung, M., Martin, D., Barron, B., Palincsar, A., & Shulman, L. (2003). Thinking about thinking: Metacognition. *The Learning Classroom*, 157–172. Retrieved from [http://www.learner.org/courses/learningclassroom/support/about\\_guide.pdf](http://www.learner.org/courses/learningclassroom/support/about_guide.pdf)
- Ericson, K. A., & Simon, H. A. (1993). *Protocol analysis: Verbal reports as data* (revised edition). Cambridge, MA: Bradford book/MIT Press.
- Fang Huang, H., Ricci, F. A., & Mnatsakanian, M. (2016). Mathematical teaching strategies: Pathways to critical thinking and metacognition. *Journal of Research in Education and Science (IJRES) International Journal of Research in Education and Science*, 2(1), 190–200. Retrieved from <http://dergipark.gov.tr/download/article-file/231408>
- Gotoh, Y. (2016). Development of critical thinking with metacognitive regulation. In *13th International Conference on Cognition and Exploratory Learning Digital Age* (pp. 353–356). Retrieved from <https://files.eric.ed.gov/fulltext/ED571408.pdf>
- Kayashima, M., & Inaba, A. (1982). Cognitive Knowledge and Executive Control: Metacognition. *Animal Mind – Human Mind*, 21, 201–224. [https://doi.org/10.1007/978-3-642-68469-2\\_12](https://doi.org/10.1007/978-3-642-68469-2_12)
- KPM. (2012a). *Panduan Pengurusan Pentaksiran Berasaskan Sekolah*.
- Magno, C. (2010). The role of metacognitive skills in developing critical thinking. *Metacognition and Learning*, 5(2), 137–156. <https://doi.org/10.1007/s11409-010-9054-4>
- Moore, B. N., & Parker, R. (2012). *Critical thinking*. (10th ed.). New York: Mc Graw Hill.
- Prytula, M. P. (2012). Teacher metacognition within the professional learning community. *International Education Studies*, 5(4). <http://doi.org/10.5539/ies.v5n4p112>

- Rahil, M., Zaidatol Akmaliah, L. P., Habibah, E., & Mohd Majid, K. (2004). The Incorporation of thinking skills in the school curriculum. *Kajian Malaysia*, 22(2), 23–33. Retrieved from [http://www.usm.my/km/22-2-04/KM-ART\\_2\\_Thinking\\_Skills\\_In\\_The\\_School\\_Curriculum\\_\(41-51\).pdf](http://www.usm.my/km/22-2-04/KM-ART_2_Thinking_Skills_In_The_School_Curriculum_(41-51).pdf)
- Saavedra, A. R., & Opfer, V. D. (2012). Teaching and learning 21st century skills: Lessons from the learning sciences. Retrieved from <http://asiasociety.org/files/rand-0512report.pdf>
- Salmiah, J., Ramlah, H., & Abdullah, M. R. (2013). Acceptance towards school based assessment among agricultural integrated living skills teachers: Challenges in implementing a holistic assessment. *Journal of Technical Education and Training*, 5(1), 44–51.
- Sulaiman, A. (2013, June 28). Making our children world-class. *The Star*. Putrajaya. Retrieved from <http://www.nst.com.my/nation/general/making-our-children-world-class-1.309339#ixzz2XXoFjaPS>
- Suzana, A. M., & Jamil, A. (2012). Penggunaan teknik pentaksiran formatif dalam subjek bahasa melayu darjah satu: kajian kes. *Jurnal Pendidikan Bahasa Melayu*, 2(1), 17–30.
- Swartz, R. J., & Perkins, D. N. (1990). *Teaching thinking; Issues and approaches*. CA: Midwest Publications.
- Swartz, R., & McGuinness, C. (2014). *Developing and assessing thinking skills*. The International Baccalaureate Organisation. Boston.
- Veenman, M. V. J., Van Hout-Wolters, B. H. a M., & Afflerbach, P. (2006). Metacognition and learning: Conceptual and methodological considerations. *Metacognition and Learning*. <http://doi.org/10.1007/s11409-006-6893-0>