INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 11, Issue 4, (2022) E-ISSN: 2226-6348

The Effectiveness of using Malay Literary Elements in Primary Education STEM

Ros Anita Kartini Mohamed, Abdul Halim Ali

Fakulti Bahasa dan Komunikasi Universiti Pendidikan Sultan Idris MALAYSIA

To Link this Article: http://dx.doi.org/10.6007/IJARPED/v11-i4/16086 DOI:10.6007/IJARPED/v11-i4/16086

Published Online: 26 December 2022

Abstract

This paper discusses the applied role of Malay literary elements in Science, Engineering and Mathematics Education (STEM) of the Primary School Standard Curriculum (KSSR). A study was conducted using qualitative document analysis. In this study, the cognitive domain of Anderson and Krathwohl (2001) is used as a solid platform to strengthen the existing knowledge and understanding of primary students' to understand basic scientific concepts in teaching and learning in the classroom to make STEM subjects more meaningful. The study found that the elements of Malay literature contained in Science, Mathematics and Technology Design textbooks in primary schools blend elements of poetry, verses, idioms, proverbs, metaphors, riddles, and poems in a relaxed manner but support the meaning of basic scientific concepts of STEM learning in among primary school students. This element of Malay literature is an aesthetic value that is familiar with the life and environment of students. The application of Malay literature elements in STEM teaching and learning in primary schools as a whole is rational to realize the potential of students while driving a generation that is highly competitive in decision making under the Value Added Skills Item which outlines seven skills, including Thinking Skills (KB). The focus of this paper is a discussion on the absorption of Malay literary elements in STEM learning through cognitive learning methods.

Keywords: Malay Literary Elements, Competitive, Cognitive, STEM, Primary School

Introduction

STEM education is education based on the integration of the four domains of science, technology, engineering and mathematics. In the context of Malaysia, STEM education is one of the agendas focused on in the implementation of the Malaysian Education Development Plan (PPPM) 2013-2025. The Malaysian Ministry of Education (KPM) is committed to increasing the number of qualified energy resources and experts in the field of research and industry. Therefore, one of the initiatives taken is to strengthen STEM education in our country. Some of the policies that support this noble desire are the 60% Science: 40% Literature Policy (60:40 Policy), Vision 2020, PPPM 2013-2025 and the National Science, Technology, and Innovation Policy (DSTIN), in addition to the operation of the National STEM Centre, which became operational in May 2018. STEM is an acronym for 'Science', 'Technology', 'Engineering' and 'Mathematics'. The subjects grouped under STEM include science, physics, mathematics, chemistry, biology, basic computer science (*Asas Sains Komputer*) and design and technology (*Reka Bentuk dan Teknologi*). STEM in the context of

teaching and learning (PdP) comprises three main aspects, namely learning domains (at school and tertiary levels), subject packages (based on a combination of STEM specialisation subjects) and PdP approaches (application of knowledge, skills and values to problem solving). STEM education was introduced in Malaysia in 2014 to meet the needs of this era where a leap in knowledge can occur very quickly. Becker and Park (2011) explained that STEM education is an exploration that takes place in the teaching and learning process and involves two or more STEM components. STEM can also be explored with other disciplines, such as elements of Malay literature. Malay literature is a very valuable Malay heritage. This is because Malay literature represents the language, history, culture, and cultural figures of the Malay community. One of the goals of education today is to develop creative thinking skills, especially in the fields of science, technology, business and management (Sternberg & Lubart, 1996; Cropley, 2001). According to some researchers, creativity is the ability to produce a work that is original, unexpected, and imaginative as well as appropriate (Guilford, 1967; Sternberg & Lubert, 1996; Simonton, 1988, 1997). Based on this broad definition of creativity, teachers face a major challenge in teaching creative thinking skills in a traditional educational structure. For this reason, the Ministry of Education has begun to emphasise the teaching of literature in Malay, in line with the aspirations of the national philosophy of education to produce people who are physically, emotionally, spiritually, intellectually, and socially balanced (JERIS). Not to mention the changes in education called for under the Malaysian Education Development Plan 2013-2025: Knowledge, Leadership, Bilingual Skills, Ethics and Spirituality, National Identity and Thinking Skills. These requirements must be mastered by students as early as primary school to prepare them for secondary school.

Integrating STEM education into the PdP is now the focus of the MoE through training and courses for teachers and collaboration with other universities. The PPPM 2013-2025 emphasises bridging the gap between subjects taught in school (Ayub, 2018). By incorporating literature in the classroom, students can not only enjoy the teaching and learning content, but also appreciate Malay literature presented in a beautiful language structure. Learning and teaching of science, mathematics and RBT subjects in school will be disturbed if various specific terms are used. Therefore, literary materials in class should not only enhance students' understanding of the curriculum content, but also train students to fully enjoy a literary work by making evaluations, judgements, and critiques.

Methodology

The method used in this study is a descriptive qualitative method of analysis. The basis of the analysis is the textual description of the text, i.e. the analysis of documents and textbooks for science, mathematics and technical design in primary schools to see how some science and mathematics concepts are explained with elements of Malay literature. The important features of qualitative research in literary studies include: The research is conducted descriptively, i.e. it is explained in words or pictures, as the case may be, rather than in numbers; the process is given priority over the outcome, as literary works are a phenomenon that contains much interpretation; inductive analysis; and meaning is the main assumption (Endraswara, 2011). The main sources in this study are the KSSR Science Textbook Level 1 and Level 2 of primary schools and the Curriculum Standard Document and Science Assessment, Curriculum Standard Document and Assessment of Malay Communicative Literature. Next, the study uses the library method. The library method can also be classified in the group of qualitative research because the data analysed requires detailed and comprehensive description (Ali, 2019). This bibliographic method is a method implemented through literature

review, that is, the collection of written data through KSSR Science textbooks in primary schools and the author also obtains data and information about the topic of the study through other academic books that support the research problems, such as Curriculum Standard Documents and KSSR Science Assessment and Curriculum Standard Document and High School Communicative Malay Literature Assessment printed by the Malaysian Ministry of Education 2017.

Literature Review

Since inheriting the primary education system from the British and the organisation of the Malaysian education system in 1963, Malaysia has made several improvements to its primary education system. One of the important improvements that has attracted the interest of this study was made in 1983 with the Integrated Primary School Curriculum (KBSR). The KBSR was developed to create a better educated and more diverse society. Through the KBSR, primary school students acquire knowledge from a variety of sources, in addition to textbooks such as current magazines and PowerPoint applications, while skills are acquired through extracurricular activities in school such as Girl Scouts, Boy Scouts and Red Crescent.

However, the KBSR was not enacted to provide students with the skills needed for the (digital) information age. The KBSR does not include electronic media such as Blogger, Youtube, Learning Management System (LMS) and so on. To promote the growth of Malaysian society in line with the demands of the information age, the KBSR was replaced by the Primary School Standard Curriculum (KSSR). The KBSR was implemented from 1983 to 2010 and then replaced by the Malaysian KSSR from 2011. Although there are many writings on the differences between the KBSR and the KSSR (Ali et al., 2014), the main difference between the two is the focus of the education system. The KSSR focuses on the ability to read, write, calculate, and think (4M). The independent thinking skills aspect is the backbone of the KSSR. From 2020, the Primary School Achievement Test (UPSR) has been abolished. Therefore, the excellence of primary school students is influenced by many external factors such as parents' actions, teachers' efforts, school programmes, availability of quality teaching materials and so on. In a situation where there is a balance among these factors, student excellence is also a concern so that the education system in Malaysia does not deviate from a student-centred learning environment as recommended by local researchers.

In general, the STEM information that the country's students need should be readily available in textbooks and digital resources. If the STEM information is not available in the appropriate sources, students need to learn to find information outside the usual sources, e.g. by using textbooks. Digital methods are practises and strategies that can help students understand concepts at a higher level without leading to a textbook-centric approach (Laplante, 1997). According to Francis and Abdullah (2017), while Malaysia has increased its efforts in science and technology and their application in the classroom, the number of students interested or excelling in these subjects is declining. These students have difficulty understanding scientific concepts. This issue is addressed in this study by using elements of Malay literature to enhance students' understanding of learning STEM in a fun atmosphere that has a brilliant impact.

Results and Discussion

On the way to 21st century education, Bloom's cognitive domain as revised by Anderson and Krathwohl (2001) is suitable for use in today's STEM -oriented teaching and learning. In this STEM -oriented teaching and learning, students are encouraged to find information under the

guidance of the teacher. This cognitive domain emphasises that teachers should know the extent of their students' existing knowledge in order to teach more effectively, and then teach based on this information (Hussin, 2013). This is because both emphasise the importance of students relating new knowledge, phenomena and facts to existing knowledge. Teachers should be able to develop students' cognitive potential through the process of thinking skills before students move further towards reality. Meaningful learning represents the knowledge and cognitive processes students need to solve problems (Ayub, 2013). Problem solving occurs when students think about ways to achieve a goal that was never reached, which is an attempt to change the situation to the desired situation (Anderson & Krathwohl, 2010). In this context, Bloom's Revised Taxonomy will make the learning process more meaningful. Bloom's Revised Taxonomy ensures that learning is not only focused on the teacher's delivery of facts to students in the classroom, but that students are encouraged to recall existing knowledge based on questions from the teacher that relate to previous experiences. This is appropriate in KSSR, which views students as customers in the hope that the education system will produce products that are competitive in the digital age through the teaching and learning process in the classroom (Mohamed et al., 2021).

This relationship can be illustrated with an example where students are asked to learn the basic concept of mathematics, which is to recognise numbers from textbooks. The student reads to understand and think and then decide. For example, in Figure 1 below, the students say verbally;

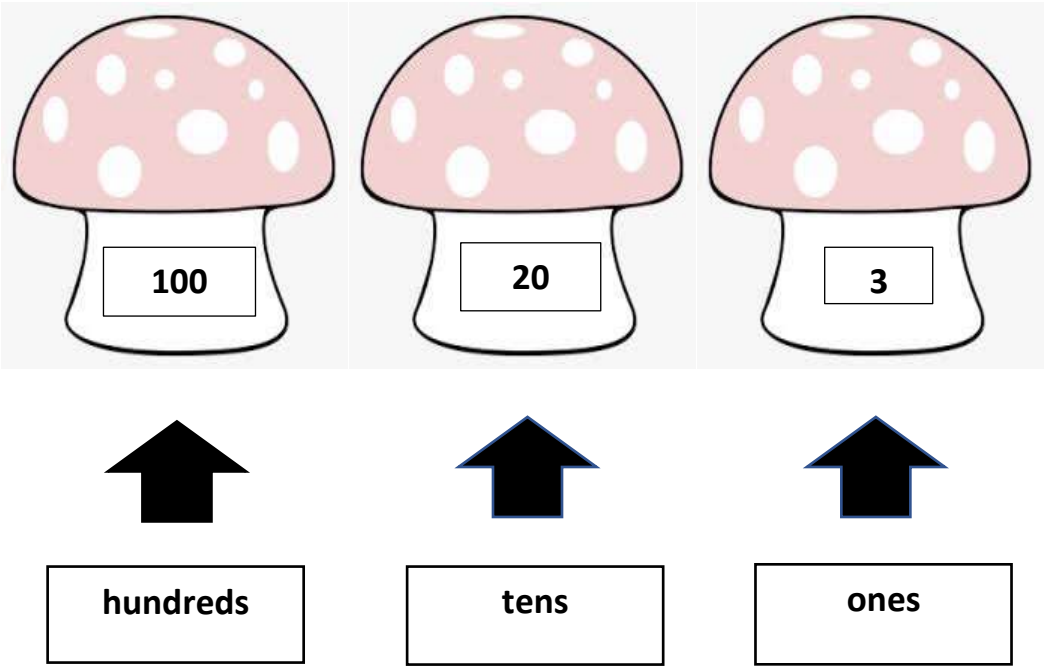

Figure 1: The Concept of Decimals

These are the dimensions of Bloom's Revised Taxonomy that students go through in this lesson. When the student is then asked to solve the problem, a meaningful learning process takes place (Ayub, 2013) because the student is not simply memorising the numbers, but a cognitive process takes place that involves the process of thinking and remembering the previous numbers. This indirectly stimulates the students' cognitive thinking to become active (Kartini & Ali, 2021). The application of this relationship is easier for students to understand

when it is presented in an entertaining form using literary material, namely writing poems in nursery rhymes as below

Lagu Nombor *(Number Song)*
Mari kawan kita belajar *(Let us learn, my friend)*
Kisah nombor punya cerita *(The story of numbers)*
Ada ratus, puluh dan sa *(There are hundreds, tens, and ones)*
Nombor ratus tiga digitnya *(Hundreds has three digits)*

Susun nombor dua caranya *(Arrange the numbers in two ways)*
Menaik semakin besar nombornya *(Ascending towards bigger number)*
Menurun semakin kecil nombornya *(Descending towards smaller number)*
Senang belajar kita ceria *(Easy to learn makes us happy)*

(DBP, 2017)

The use of the above Malay literary elements in teaching the basics of number sense in mathematics subjects strengthens the students' memory to retain the preparatory information in STEM -oriented teaching and learning. Children's songs, originally composed as poems and then sung, are elements of Malay literature that are simple and light in nature and are used as a medium in the STEM learning process. In line with the philosophy of Malay literature, education itself calls for the development of the mind, spirit and emotions, the strengthening of identity, the nurturing of the nation's culture and the promotion of a competitive attitude towards human education 2018. The nature of this simple and light Malay literature genre is compatible with the cognitive domain of Anderson & Krathwohl 2001, which emphasises the initial aspect of retrieving a student's existing knowledge in teaching and learning activities in the classroom. This process emphasises the need for students to recall the relationship between important and basic concepts in the introduction or beginning that cover the whole topic that students are following in the classroom that day (Jantan et al., 2004).

When teaching and learning in the classroom, teachers must therefore take into account the students' existing knowledge to ensure the appropriateness of the teaching materials and activities provided. Knowledge in this sense involves the process of 'remembering' specific and universal things, 'remembering' methods and processes, or remembering patterns, structures or attitudes (Gunawan, 2012). For example, students try to recite the position of the hundreds, tens and ones that the teacher shows them over and over again. 'Remembering' knowledge is important for students to remanifest past lessons, to retrieve and recall relevant knowledge from long-term memory (Kamaruzaman, 2012), whether formally or informally. For this reason, the construction of the second and third stanzas of the above poem will later produce a different pattern of results. The rationale of this study is to adapt to students' different cognitive developmental stages in knowledge acquisition based on Anderson and Krahthwohl's (2001) six cognitive domains. Meanwhile, the relationship only shows up when students are asked to respond;

If the tens digit is asked what is the digit at ones, less than five, becomes zero, the answer is….

The answer to this question applies cognitive domain at the level of 'understanding'.

The application of this cognitive domain in classroom teaching and learning clearly shows that Malay literary elements are suitable to be used as cross-curricular elements (CEC) to teach content in STEM subjects in a realistic way. Accordingly, using deductive techniques in

teaching and learning, it is able to make students enjoy learning and facilitate comprehension. For example, in teaching and learning to identify the basic concepts of science, storytelling techniques are used. The use of storytelling techniques improves students' recall of what they have heard from the teacher. For the area of "remembering", the technique of pictorial storytelling is presented by the author of the science textbook as follows

Figure 2: Storytelling Techniques

Figure 2 above is the most important material in the initial preparation of the lesson by the teacher to give an overview of the description required from the students. In science subjects, for example, the narrative technique is used to explain the animal world to first grade students. Narrative technique is important and refers to the general way in which the author sets up or handles the overall structure of the literature, including the arrangement of the plot, the maintenance of the characters, the use of setting and so on (Ahmad, 1986). The use of narrative techniques in STEM is important in teaching students the basic concepts of science. Students will retell what they see and hear in order to grasp the content of the science topic in the process of 'understanding'. In this process, the student's cognitive skills are reconnected with the student's learned concept or pre-existing knowledge that the teacher has provided in previous teaching and learning processes (Kartini et al., 2021). This relationship is called a comparative process.

Scientific terms should be used when presenting the basic concepts of science. The use of scientific terms is considered appropriate. The scientific term has a reference to previous simple concepts which are important for understanding new scientific concepts. However, scientific terms must be used carefully when understanding a concept. Careless use of terms may lead to neglecting earlier simple concepts to the point of misinterpretation (Francis & Abdullah, 2017). For example, this study published some scientific terms for teaching and learning science subjects based on primary science textbooks, such as hypothesis and fossil. The term hypothesis is an example of good term use. The term was introduced in the grade 4 science textbook, used again in grade 5 and recalled in the grade 6 science textbook. There is a good connection, but to maintain the memory of students of different levels, Malay literary elements such as pantun are significant so that students will read again and again.

In the next phase, students go through the process of 'applying'. Applying refers to the cognitive process of using or applying a procedure to implement or solve a problem (Anderson & Krathwohl, 2017). In this process, student-centred learning, students usually reapply the

basic knowledge they have learned in the process of 'remembering' and 'understanding' (Kartini & Ali, 2021).

In the process of "applying" described above, the student's cognition usually begins in a narrow and highly structured space, i.e. the student chooses the right procedure or approach and has become accustomed to solving the problem posed. The subsequent cognitive process is broader and increasingly unstructured (Anderson & Krathwohl, 2017) and moves into the process of implementation, i.e. the chosen approach is adapted to the new situation. The fourth cognitive domain is the "analysing" domain. "Analysing" is the process of problem solving, separating the parts of the problem and finding the connection between the parts and the cause of the problem that has arisen (Gunawan, 2016). "Analysing" refers to the cognitive process of structuring, comparing and ordering. In this phase, the students' thinking becomes more critical.

The fifth cognitive domain according to Anderson and Krahthwohl (2001) is "Evaluating" and "Creating". "Evaluate" refers to the cognitive process and gives an assessment based on the criteria set. Anderson and Krahthwohl (2001) place "evaluating" on the fifth level before "creating" because it is said that cognitive "creating" is higher than "evaluating". A person can "create" something after "evaluating" or going through the stages of "evaluating" the ideas presented until a new creation has emerged. The process of "creating" (creative) can be divided into three stages: The student describes the problem, the student orders the steps, and third, the student executes the steps (Anderson & Krathwohl, 2017). It can be said that the process of "creating" begins with the divergent level and ends with the convergent level of thinking. The final stage of the cognitive process of "creating" is the production of results. The process of 'creating' is evident in the construction of the stanza of this study when students plan the processes for rounding the number using a sung stanza, actively acting through role play, as in the following stanza;

Jika bundar ratus pula *(If it is a round of hundreds)*
Lihat apa digit puluhnya *(See what the tens is)*
Lebih 5 ataupun sama *(More than or equal to 5)*
Tambah 1 nilai ratusnya *(Add 1 to its hundreds)*
(DBP, 2017)

Ini pula cara membundar *(This is the way of rounding a number)*
Jika tempat puluh diminta *(If the tens is asked)*
Digit sa apa nilainya *(What is the value of ones)*
Kurang 5, sifar jadinya *(If less than 5, it becomes zero)*
(DBP, 2017)

This teachniques is used to solve the number rounding activities, as illustrated in Figure 3:

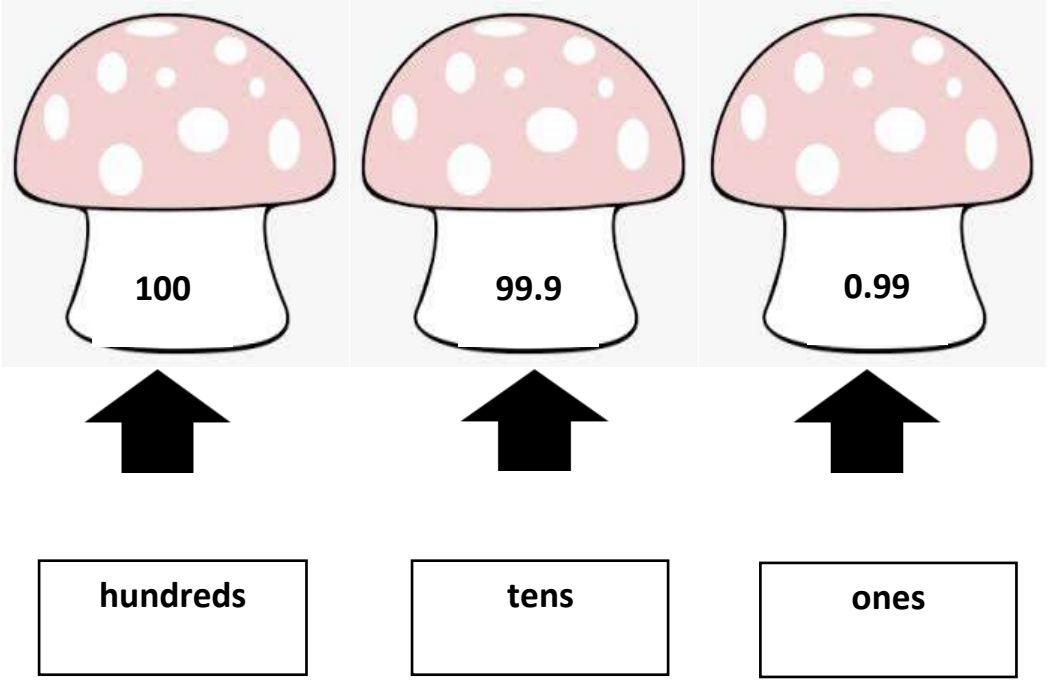

Figure 3: The Concept of Decimals

Through repeated reading in a fun and relaxed atmosphere, students will sharpen their memory of numbering basics. Online learning allows students to work together in a flexible time frame and not just limited to school hours (Razak, 2013). Not to mention that the educational material is provided online using a variety of mediums as delivery tools. The nature of this simple and light traditional literary genre is compatible with the cognitive domain of Anderson and Krathwohl (2001), which encourages students to continually recall existing knowledge (Mohamed & Ali, 2022) and compare it with current understanding in the teaching and learning activities that take place in the classroom.

Conclusion

Important Malay literature elements are used in STEM teaching and learning in primary school. This is because we want to produce students who are creative, innovative, and able to solve problems effectively, and we want to produce students with first-rate minds. Therefore, the cognitive theory of Bloom's revised taxonomy is used as the theoretical basis because this theory is systematic. The classification helps students easily understand the basic concepts of STEM from general to specific in a relaxed and fun atmosphere. At the same time, students can make choices ranging from easy to more difficult, interesting, and complex levels.

References

Abdullah, A., & Peters, R. F. (2015). Malaysia's post-PISA 2012 direction. *International Journal of Culture and History, 1*(1), 15-20.

Anderson, Lorin, W., & Krathwohl, D. R. (2010). *Kerangka landasan untuk pembelajaran, pengajaran, dan asesmen*. Pustaka Murid.

Becker, K., & Park, K. (2011). Effects of integrative approaches among science, technology, engineering and mathematics (STEM) subjects on students' learning: A preliminary metaanalysis. *Journal of STEM Education, 12*(5&6), 23-37

Buku teks Matematik. (2017). Dewan Bahasa dan Pustaka.

Buku teks Sains. (2017). Dewan Bahasa dan Pustaka.

Gunawan, I. (2012). *Taksonomi bloom-revisi ranah kognitif: kerangka landasan untuk pembelajaran, pengajaran, dan penilaian*. Universitas PGRI Madiun, *2* (2), 1-20

Dokumen standard kurikulum dan pentaksiran Kesusasteraan Melayu Komunikatif. (2018). Kementerian Pendidikan Malaysia.

Suwardi, E. (2011). *Metodologi penelitian sastera*: model, teori dan aplikasi. Kementerian Pendidikan Malaysia.

Satya, K., Anderson, Lorin, W., & Krathwohl, D. R. (2017). *Kerangka landasan untuk pembelajaran, pengajaran, dan asesmen.* Pustaka Pelajar.

Laplante, B. (1997). Teaching sceince to language minority students in elementary classroom. *NYSABE Journal*, (12), 62-83

Ahmad, M. T. (1986). *History of modern Malay literature*. Kuala Lumpur: Dewan Bahasa dan Pustaka.

Radzi, M. (2010). *Aplikasi kemahiran berfikir aras tinggi melalui pembelajaran berasaskan masalah*. Fakulti Pendidikan UTM.

Mohamed, R., Ali, A., & Kata, N. (2021). Unsur sastera Melayu dalam pengajaran dan pembelajaran di sekolah rendah melahirkan murid berfikiran kritis. *Jurnal Dunia Pendidikan*, 3(2), 540-550. https://myjms.mohe.gov.my/index.php/jdpd/article/view/14364

Mohamed, R. A. K., & Ali, A. H. (2022). Implications of enrichment and poetry learning on the cognitive development of primary school students. *Jurnal Pendidikan Bitara UPSI*, 15(1), 12- 18. https://doi.org/10.37134/bitara.

Moidunny. (2012). *Taksonomi Bloom: perubahan yang diperlukan*? Blogspot. http://kamaruzamanmoidunny.blogspot.com/2012/09/taksonomi-bloom-perubahanyang.html

Moidunny, K. (2012). *Artikel 5: Taksonomi Bloom: perubahan yang diperlukan?* Blogspot.http://kamaruzanmoidunny.blogspot.my/2012/09/taksonomi;-_bloom.html

Molenda, M., Reigeluth, C. M., & Nelson, L. M. (2003). *Instructional design.* http://mizanis.net/edu3105/artikel/ID_CogSci.pdf

Ayub, P. (2016). Revisi taksonomi pembelajaran Benyamin S. Bloom. *Jurnal Satya Widya*. Universitas FKIP

Ayub, P. (2013). *Revisi taksonomi pembelajaran Benyamin S. Bloom*. Universitas FKIP

Razak, R. A. (2013). Strategi pembelajaran aktif secara kolaboratif atas talian dalam analisis novel bahasa Melayu. *Jurnal Kurikulum dan Pengajaran Asia Pasifik*, *1*(3), 34-46.

Jantan, R., & Razali, M. (2004). *Psikologi pendidikan: pendekatan kontemporari edisi revisi*. Mc Graw Hill Education.

Hussin, R. (2013). Pendekatan teori pembelajaran kognitif dalam Pendidikan Seni Visual (PSV), *Jurnal Sains dan Pendidikan Seni*, (1), 59-66.

Francis, R., & Abdullah, A. (2017). Komunikasi dan kefahaman maklumat saintifik dalam buku teks Sains sekolah rendah: satu kajian kes tentang kaedah penyampaian. *Jurnal Pendidikan Malaysia, 42*(2), 79-86.