

The Development of the KARA Module Based on Experiential Learning Approaches in the Three-Dimensional Geometry Blocks Topic for Lower Secondary School Students

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The global transition of mathematics teaching from focusing on cognitive algorithmic skills to higher order thinking skills (HOTs) has given rise to the challenge and effect of mathematics teaching and learning in Indonesia. Moreover, teachers in Indonesia have not yet used instructional instruments and various methods, especially in mathematics teaching. This study aims to develop a KARA module that is based on Kolb's experiential learning approach in a Three-Dimensional Geometry topic in the subtopics:- cube, cuboid, prism and pyramid. The module adapted the Research and Development design by using a modified ADDIE model and involved 42 purposively-selected students. The findings show that the KARA module developed can be used by mathematics teachers at SMP. The development of KARA teaching and learning module based on Kolb's experiential learning approach can foster and enhance various abilities and achievements of students. The development of this module can bring implications to the application of learning approaches integration, mathematics teaching and learning (PdP) and mathematics curriculum drafter. Therefore, further studies are suggested to test the effectiveness of the module on students' mathematics achievement.

Key words: *KARA Module, Three-Dimensional Geometry Block, ADDIE Model.*

Introduction

Indonesia places mathematics as a subject that must be mastered by students ranging from preschool level to higher education level to boost Indonesia's status as a developed country in the 21st century. However, the mathematics' achievements of Indonesian students, especially the Lower Secondary School (SMP) students at the international level is somewhat worrying. The level of mathematics achievement of Indonesian SMP students (aged 15) in the PISA international assessment is less satisfactory (Stacey 2010). In addition, at the national level, the results of the National Examination (UN) for mathematics subject of the SMP level in 2014/2015 academic year is also low (Balitbang Kemendikbud 2015). A study is needed that can help solve the problem.

The learning approach used by teachers is one of the factors influencing students' understanding of mathematics subjects (Bhai & Horoi 2019; Gess-Newsome 2019; Siregar, Roslinda & Siti Mistima 2018; Siti Mistima & Adila 2018). Previous studies found that students' achievement is still low, especially in the Three-Dimensional Geometry Blocks topic, because this topic is the most difficult topic according to many students (Adolphus 2011; Hua et al. 2019). One of the problems experienced by students is in the aspect of solving mathematical problems that are in the form of sentences instead of mathematical symbols. Students experience many difficulties in interpreting the meaning of the sentences in the Three-Dimensional Blocks questions into the form of mathematical symbols (Karnasih 2015). This is in line with the opinion of Hendriana (2014), who found that students' mathematical strategy competency is still low. Students find it difficult to express the problems found in daily life into mathematical models and determine the right method to solve the problems.

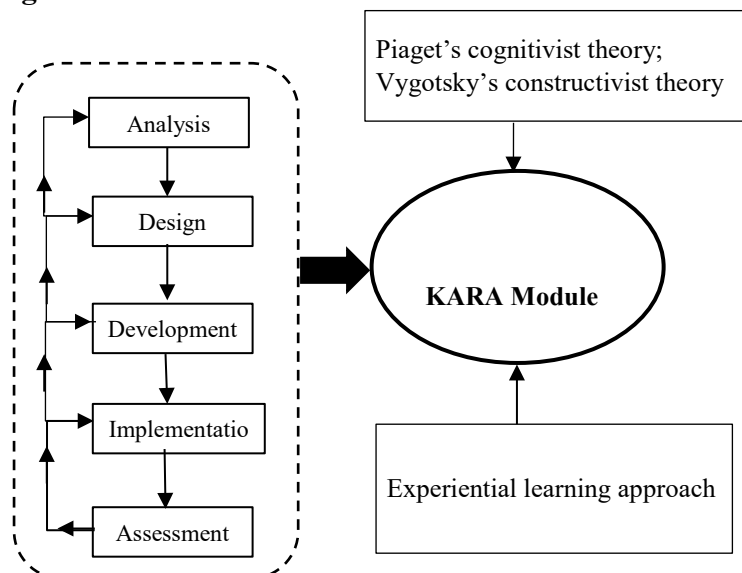
The low achievement in Three-Dimensional Geometry Blocks topic among students needs to be used as an initial motivation to make changes in the teaching and learning process (Nik Azis 2008). There are four common mistakes made by students in the process of solving questions in the Three-Dimensional Geometry Blocks topics; namely, (1) errors and inappropriate usage of theorems, (2) data errors, (3) technical errors, (4) errors in making conclusions and (5) students not answering the questions. The causes of these errors include not remembering the formula well, misreading the questions, wrong calculations, being in a hurry in the process of completing questions, lack of understanding of the topic, and less accustomed to completing questions in the form of sentences (Agustina 2019). To overcome these problems, teachers need learning methods that actively involve the students in the teaching and learning process (PdP). One of the methods meant in this study is the experiential learning approach. In this study, the researchers build a teaching and learning module based on Kolb's (1984) experiential learning approach, which is called the KARA module.

Experiential teaching and learning approach in the Three-Dimensional Geometry Blocks topic

Kolb's experiential learning approach is one of the teaching and learning methods that are based on the constructivist's approach which is in line with the demands of the 2013 Curriculum in Indonesia. This experiential learning approach comprises of four activity phases; namely concrete experience, reflective observation, abstract conceptualisation, and active experimentation (Kolb 1984). Kolb's experience-based learning approach is a learning process that revolves around the transformation of experience. It is an integration process that is in a cycle, beginning with experience followed by data collection and observation of the experience. Data analysed and conclusions obtained will be used to change the behaviour in dealing with a new situation in a new experience. Experiential learning includes action and thinking (Kolb 1984).

Experience-based learning manifests when students (i) participate in an activity, (ii) critically investigate the experience activity to be clarified, and (iii) use the experience gained to work in a new situation (Fathurrohman 2017). Kolb's experiential learning approach is appropriate and may be used in mathematics teaching and learning (Evans, Forney & Guido-DiBrito, 2009). The KARA module for the topic of Three-Dimensional Geometry Blocks was developed following Piaget's cognitivist theory, Vygotsky's constructivist theory, and Kolb's experiential learning approach. Figure 1 refers to the experiential learning module development method.

Figure 1. Theoretical Framework of the KARA Module Development



Piaget's cognitive theory relates mainly to the formation of knowledge of an individual, which involves complex cognitive tasks and requires several action processes based on the knowledge available. In the human cognitive structure, there is a framework which is a scheme that acts

to administer and interpret new information (Santrock 2014). Meanwhile, the Vygotsky's constructivist theory explains how knowledge is organised within the cognition (Glaserfeld 1989). Generally, constructivist theory emphasises that students do not directly receive the knowledge that they get, but they actively build the knowledge (Rusman 2018).

Kolb's (1984) experiential learning approach for the topic of Three-Dimensional Geometry Blocks (cube, cuboid, prism and pyramid) is a teaching approach in the form of a cycle, where the learning process occurs through four phases, which are: (1) concrete experience, (2) reflective observation, (3) abstract conceptualisation, (4) active experimentation.

a. Concrete Experience Phase

This phase encourages students to be involved in various activities so that they can do, see, and feel the activity as it is. Students cannot yet understand about these activities. This experience is what occurs in the initial learning phase of the Three-Dimensional Geometry Blocks topic.

b. Reflective Observation Phase

In this phase, students paid active attention to the activities they have experienced. Students tried to search for answers and think about the activities which they have done. Students reflected on the events experienced by asking questions about how and why the experience happen.

c. Abstract Conceptualisation Phase

In this phase, students have started to make an abstraction, develop a concept or procedure about the topic of Three-Dimensional Geometry Blocks that is the object of attention. Inductive thinking process is often done by students to formulate a concept or theory based on various activities they experience.

d. Active Experimentation Phase

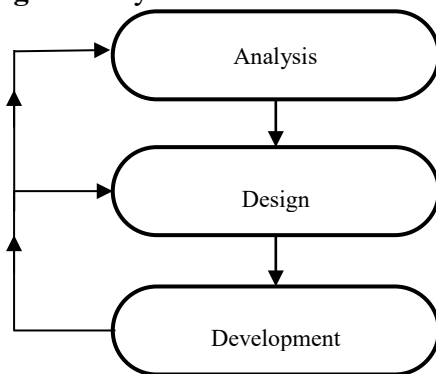
The final phase of the experience-based learning process according to Kolb is conducting active experiments. In this phase, students have applied the concepts, theories or rules of the cubes, cuboid, prism and pyramid that have been developed from the questions given. In this phase, deductive thinking was widely used by students to practice and test existing theories or concepts which can be found in the solving mathematical problem process (Zainun, Zanaton & Norziah 2013).

Methodology

The design of this study is research and development (Richey & Klien 2007). In this study, the module was developed according to the ADDIE model, which is widely used by education experts (Morrison 2010) in developing learning frameworks of effective learning to be implemented in the PdP process (Aldoobie 2015 ; Saidatuna Miftahul & Rosseni 2016). The ADDIE model is the most basic design model consisting of five phases, namely Analysis, Design, Development, Implementation, and Evaluation (Branch 2009; Moradmand, Datta & Oakley 2014). The ADDIE instruction model was chosen because it is a systematic model that can provide a flexible and structured framework for developing effective educational products or sources of learning materials, and the process is easy to follow (Branch 2009). Aside from that, each phase in the ADDIE model is easy to understand and apply throughout the KARA module development process.

The development process of the KARA module in this study used the adapted ADDIE model from Branch (2009).

Figure 2. Systematic ADDIE Model



Based on the stages in Figure 2, the changes made in the module development process are shown as in Table 1 below.

Table 1: Modification of module development process based on ADDIE model

Phase	Modification
Analysis	Determine the problems in teaching and learning (PdP). Determine the needs of module development by carrying out (1) student analysis, (2) topic analysis, (3) assignment analysis and (4) learning objective specifications.
Design	Design the teaching and learning module based on experiential learning (KARA Module), content, media and format.
Development	Assessing the validity of the module by experts and pilot study to assess its usability.

Findings and Discussion

Findings from the process of module development is described according to the following phases.

a. Analysis Phase

The analysis phase was carried out to identify the exact problems in the teaching and learning (PdP) of mathematics for Form Two SMP students in the Pekanbaru district. In addition, this phase also aims to predict the restraints that may occur during the application of the module (Branch 2009). The analysis carried out in this phase is student analysis, topic analysis, assignment analysis and learning objective specification analysis (Branch 2009).

i) Student analysis

Determining the ability and condition of students is one of the important factors that influences the academic performance of students (Betts & Tang 2019; Lazarides & Buchholz 2019; Nooriza & Effandi 2015). Student analysis was carried out by means of reading and analysis of students' mathematics test result. A total of 80 Form Two SMP students became the subjects in this analysis to get to know their exact level of mathematical knowledge. The finding of the analysis shows that the mathematical knowledge of the students was quite diverse, indicated by the range of the test scores (between 60-93). Although the Two-Dimensional Geometry Blocks topic and an introduction of the Three-Dimensional Geometry Blocks topic have been learned by the students during Primary School, the analysis shows that only 20 (25%) out of the 80 students achieved above the minimum standard criteria (KKM) of 75. The results of this analysis also has become a reference for the researchers in developing the contents as well as the form and format of the module.

ii) Topic analysis

Topic analysis aims to get to know the main topics to be learned by students and its schematic arrangement in the form of figures (Branch 2009). Topic analysis was carried out by administering questionnaires to students. The results of the topic analysis show that the topic of the Three-Dimensional Geometry Blocks is the most difficult topic for students. The topic of the Three-Dimensional Geometry Blocks is a teaching and learning topic that must be given to Form Two students in SMP. The Three-Dimensional Geometry Blocks topic was studied to understand the surface area and volume of the Three-Dimensional Geometry Blocks which encompasses the surface areas and volumes of cube, cuboid, prism, and pyramid.

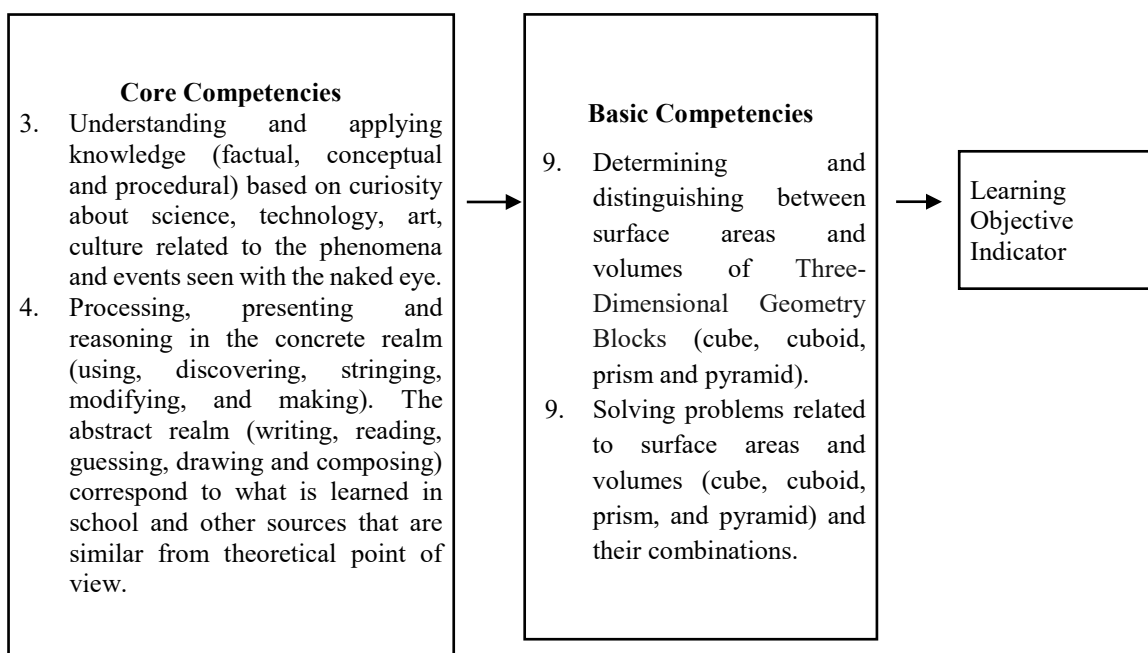
iii) Assignment analysis

The purpose of the assignment analysis is to identify the main tasks or skills that students must have after learning, based on topic analysis (Branch 2009). This analysis was carried out by means of reading the syllabus used by the teacher in the teaching and learning process of mathematics in SMP. The task analysis includes description of the subtopics from the available topics. Assignments were given in the module that contains contextual problems.

iv) Learning objective specification

The specification of learning objective is done to formulate the specified learning objective based on the student analysis, task analysis and topic analysis (Branch 2009). The analysis of the specification of the learning objective was carried out by using the method of reading the syllabus used by the teacher during the PdP process in the classroom. Before describing the learning objective, the core competencies (KI) and basic competencies (KD) of each topic to be studied must be understood first. In this study, the KI and KD are in accordance with the 2013 curriculum, as shown in Figure 3.

Figure 3. KI and KD of Three-Dimensional Geometry topic



Based on KI and KD in Figure 3, the learning objective indicators of Three-Dimensional Geometry Blocks topics, in the subtopics Cube, Cuboid, Prism and Pyramid are arranged as shown in Table 3.

Table 3: Description of learning objective indicators of the Three-Dimensional Geometry Blocks topic

Subtopic	Indicator
Cube	<ol style="list-style-type: none"> 1. Explain the meaning of cube. 2. Find the formula for the surface area of cube. 3. Solve problems related to the surface area of cube. 4. Find the formula for the volume of cube. 5. Solve problems related to the volume of cube.
Cuboid	<ol style="list-style-type: none"> 1. Explain the meaning of cuboid. 2. Find the formula for the surface area of cuboid. 3. Solve problems related to the surface area of cuboid. 4. Find the formula for the volume of cuboid. 5. Solve problems related to the volume of cuboid.
Prism	<ol style="list-style-type: none"> 1. Explain the meaning of prism. 2. Find the formula for the surface area of prism. 3. Solve problems related to the surface area of prism. 4. Find the formula for the volume of prism. 5. Solve problems related to the volume of prism.
Pyramid	<ol style="list-style-type: none"> 1. Explain the meaning of pyramid. 2. Find the formula for the surface area of pyramid. 3. Solve problems related to the surface area of pyramid. 4. Find the formula for the volume of pyramid. 5. Solve problems related to the volume of pyramid.

b. Design Phase

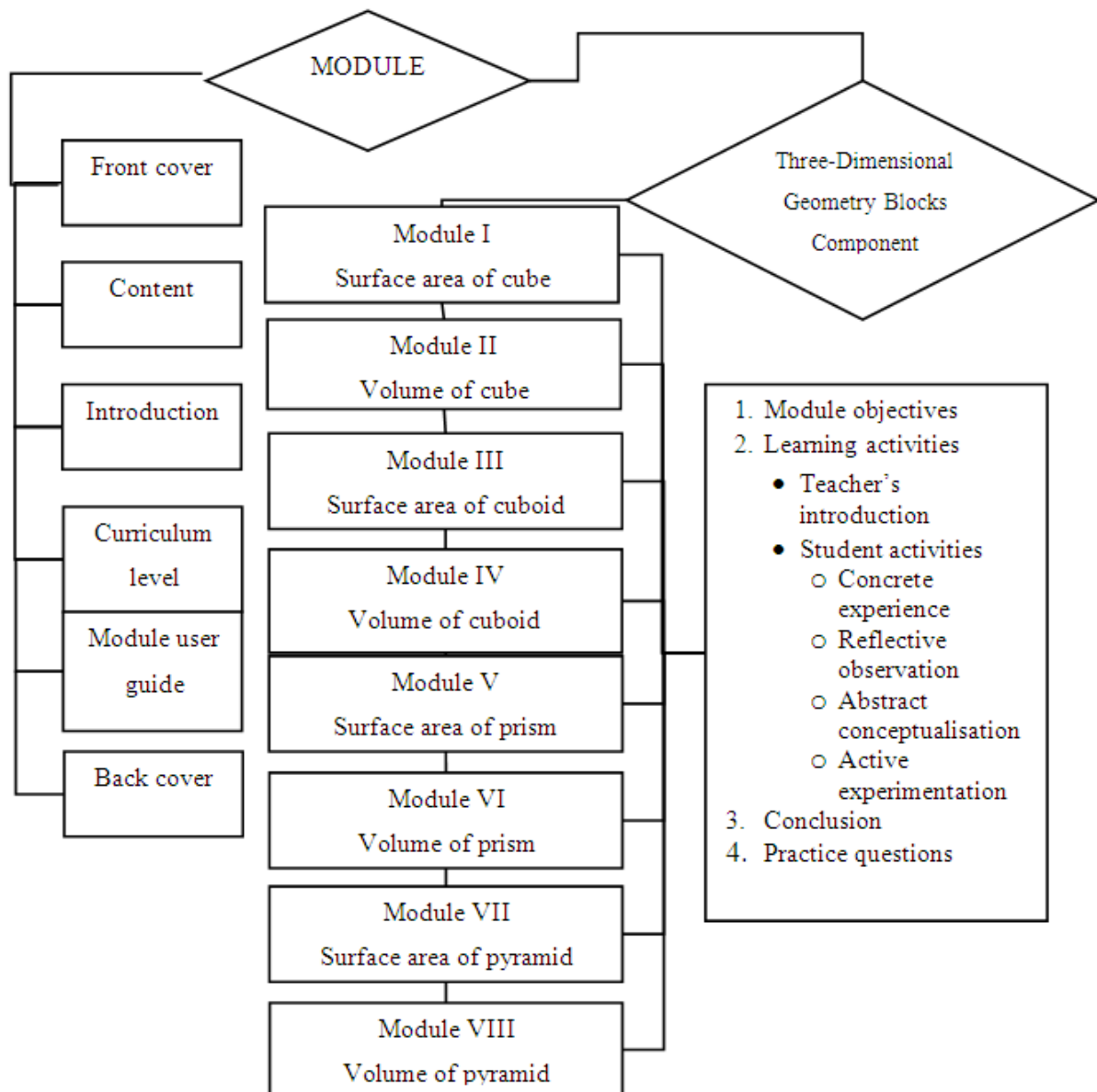
The design phase aims to design the learning module needed (Dick, Carey & Carey 2015). The selection of media and props that might be adapted to the needs based on the contents of the Three-Dimensional Geometry Blocks topic in PdP activity. It also aims to select the formats including the planning for the module contents.

The learning media needed in the implementation of Kolb's experiential learning approach for the Three-Dimensional Geometry Blocks topic for Form Two SMP students is a module which will be assisted by a daily lesson plan (RPH) and several teaching and learning aids (props). The choice of the format for the module is adjusted to the principles, characteristics and steps of teaching and learning based on Kolb's experiential learning approach. The lesson plan contains basic competencies, indicators, indicator description, prerequisite topics, teaching

approaches and methods, tools/equipment, and learning activities. Learning activities contain the introduction, main activities and closing activities. This is in accordance with what is stated in 2016 Permendikbud no. 22 concerning the standard processes for primary and secondary education that mandate the implementation of education including: initial activities, main activities and final activities.

In the design phase, the initial module was designed by the researchers themselves in collaboration with experts. The module consists of eight learning activities according to the subtopics of cube, cuboid, prism and pyramid in the formats as shown in Figure 4.

Figure 4. Format of the module developed



c. Development Phase

The purpose of the development phase is to produce and monitor the progress of the developed learning module (Branch 2009). The module is the KARA module for the topic of Three-Dimensional Geometry Blocks and subtopics cube, cuboid, prism and pyramid that were examined through experts' validation, suggestions from experienced teachers, and based on the results of tests. In this study, the researcher has received the validation from three experts, one linguist and two experienced teachers. The reviewers consisted of mathematics education lecturers, Indonesian language lecturer, and senior high school teachers. The results of the analysis of the experts' validity assessment of the KARA module are in Table 4.

Table 4: Mean of the KARA module validation

Aspects assessed	Mean	Validity level
1. Design	4.40	Valid
2. Content	4.33	Valid
3. Module activity	4.50	Valid
4. Language/text	4.42	Valid
5. Graphic/figure/image	4.50	Valid

Note : $1 \leq Va < 2$: Not Valid

$2 \leq Va < 3$: Less Valid

$3 \leq Va < 4$: Adequately Valid

$4 \leq Va < 5$: Valid

$Va = 5$: Very Valid

(Telaumbanua et al. 2017)

Table 4 shows that the means of all aspects of the module are between 4.33 to 4.50, which indicate the validity levels as "valid". This means that all aspects of the module obtained good ratings from the expert panel.

Furthermore, a one-on-one test was conducted involving three Form Two students in the SMP with competency differences i.e. one student with low achievement, another student with moderate achievement and another student with high achievement. This one-on-one test covers aspects of the readability of texts in the module, and students' understanding of the Three-Dimensional Geometry Blocks topic. At this stage, the typing errors and paragraph errors in the module found by the students were corrected and improved. A small group test whose objectives are in line with the one-on-one test was done, but with a higher number of students, which was nine. This small group test covers aspects of the readability of texts, understanding of module usage, and clarity of graphics/images used. The series of analyses were done to produce a valid, effective, and practical module (Nieveen 1999).

A Pilot test was conducted to determine the usefulness of the module through observations of two people on the ability of teachers in conducting PdP using the KARA module. Findings of the observation are shown in Table 5.

Table 5: Ability of teachers in conducting PdP using the module

Observation Category	Meeting																Total	Criteria	
	1		2		3		4		5		6		7		8				
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2			
A. INITIAL ACTIVITY																			
1. Giving motivation	4	4	4	4	4	4	4	4	4	5	4	4	4	4	5	4	66	Very good	
2. Giving perception	4	5	4	5	5	4	4	4	4	5	4	4	4	4	5	4	69	Very good	
3. Communicating the learning objectives	4	4	5	4	5	4	5	4	4	5	5	5	4	5	4	4	71	Very good	
B. Main Activity																			
1. Instructing students to do the activities in the module	4	5	4	4	5	5	4	3	4	5	5	4	3	4	4	4	67	Very good	
2. Observing how students do the activities and work on the questions in the module	4	5	4	4	4	4	5	5	3	4	5	5	4	5	5	5	71	Very good	

3. Helping students to do the activities and work on the questions in the module	3	4	3	4	4	3	5	4	4	4	4	4	3	4	5	4	62	Very good
4. Optimizing students' interaction	4	4	3	3	5	5	3	3	5	5	5	4	3	4	4	4	64	Very good
5. Asking students to present their work in front of the class	5	5	5	5	5	4	5	5	4	5	5	4	4	5	4	4	74	Very good
6. Instructing students of other groups to respond to the work of the presenting group	4	5	4	5	4	4	5	5	4	4	5	4	5	5	5	5	73	Very good
7. Instructing the students to make conclusions	4	4	3	4	4	4	4	3	4	4	5	4	4	5	3	3	62	Very good
C. Final Activity																		
1. Re-affirming the conclusion of the topic	3	3	4	4	4	3	5	4	3	4	4	4	3	3	5	4	60	Very good
2. Giving practice or PR	2	5	4	5	5	5	4	3	3	4	4	3	4	5	4	4	64	Very good

Note: 1=Not good, 2=less good, 3=Good enough, 4=Good 5=Very good

Table 5 shows the results from the initial activities, main activities, and final activities. Findings show that for the initial activity, (a) in giving motivation, teachers were very good (2 teachers; 12.5%) and good (14 teachers; 87.5%), (b) in giving perception, teachers were very good (5 teachers; 31.25%) and good (11 teachers; 68.75%); (c) in communicating learning objectives, teachers were found to be very good (7 teachers; 43.75%) and good (9 teachers;

56.25%). For the main activity, (a) in instructing students to do the activities in the module, teachers were very good (5 teachers; 31.25%), good (9 teachers; 56.25%) and good enough (2 teachers; 12.5%); (b) in observing how students do the activities and work on the questions in the module, teachers were very good (8 teachers; 50%), good (7 teachers; 43.75%) and good enough (1 teachers; 6.25%); (c) in helping students to do the activities and work on the questions in the module, teachers were found to be very good (2 teachers; 12.5%), good (10 teachers; 60.5%), and good enough (4 teachers; 25%); (d) in optimizing students' interactions, teachers were very good (5 teachers; 31.25%), good (6 teachers; 37.5%) and good enough (5 teachers; 25%); (e) in asking students to present their work in front of the class, teachers were found to be very good (10 teachers; 62.5%), and good (6 teachers; 37.5%); (f) in instructing students of other groups to respond to the work of the presenting group, teachers were very good (9 teachers; 56.25%) and good (7 teachers; 43.75%); (g) in instructing the students to make conclusions, teachers were very good (2 teachers; 12.5%), good (10 teachers; 62.6%) and good enough (4 teachers; 25%). For the final activity, (a) in re-affirming the conclusion of the topic, teachers were found to be very good (2 teachers; 12.5%), good (8 teachers; 50%) and good enough (6 teachers; 37.5%); (b) in giving practice or PR, teachers were very good (5 teachers; 31.25%), good (7 teachers; 43.75%), good enough (3 teachers; 18.75%) and less good (1 teachers; 6.25%). Overall, it can be concluded that the KARA module developed is good and usable. After learning to use the KARA module, the students were given a questionnaire on their perceptions of the PdP which used the module. Analysis of students' perceptions of the usage of the KARA module in PdP consists of three aspects, namely (1) aspects of reading, which were divided into six aspects, (2) aspects of convenience, which were divided into five aspects, and (3) aspects of the system of the presentation, which were divided into two aspects. Results of the analysis of student perceptions are in Table 6.

Table 6: Students' perception of the KARA module

No	Aspect	ST	TS	KS	S	SS	Mean	Criteria
Readability Aspect								
1	Sentences in the module are not complicated	-	-	-	23	19	4.45	Very good
2	I understand every sentence in the module	-	-	9	22	11	4.05	Very good
3	I can understand mathematics material by doing the activities in the module	-	-	6	24	12	4.14	Very good
4	Instructions on how to do the activities are clear	-	-	-	25	17	4.40	Very good

5	Figures or illustrations used are complete and suitable with the topic	-	-	7	18	17	4.24	Very good
6	To me, the overall presentation of the module was interesting	-	-	6	24	12	4.14	Very good
Aspect of Convenience								
1	The user's instructions of the module are very clear and easy to understand	-	-	0	17	25	4.60	Very good
2	This module gives me ease in understanding the topic being studied	-	-	10	19	13	4.07	Very good
3	Activities in the module are easy to be carried out	-	-	9	16	17	4.19	Very good
4	The questions in the experiment stage are sorted from easy to difficult, making it easier to do	-	-	-	24	18	4.43	Very good
5	The questions in the module are related to daily life, making them easier to understand	-	-	4	25	13	4.21	Very good
Systematic Presentation Aspect								
1	The presentation of the module follows the flow of thought from easy to difficult	-	-	-	24	18	4.43	Very good
2	Practice questions given are sorted from easy to difficult	-	-	-	26	16	4.38	Very good

Note: 1=Strongly disagree, 2=Disagree, 3=Less agree, 4=Agree 5=Strongly agree

From Table 6, it was found that the readability aspect is in the category of "very good", whereby (a) sentences in the module are not complicated perceived by (19 students; 45%), (b) every sentence in the module can be understood by (11 students; 26%), (c) mathematics material can be understood by doing the activities in the module (11 students; 26%), (d) instructions on how to do the activities in the module are clear (17 students; 40%), (e) figures or illustrations used are complete and suitable with the topic (17 students; 40%), and (f) the

overall presentation of the module is interesting to (12 students; 28%). In Table 6, it was also found that the aspect of convenience is in the "very good" category, whereby (a) the user instructions of the module are very clear and easy to be understood (25 students; 59%), (b) the module gives helps students to understand topics easily (13 students; 30%), (c) the activities in the module are easy to do (17 students; 40%), (d) the questions in the experimental stage are arranged from easy to difficult, making it easier to do (18 students; 42%), (e) the questions in the module are related to daily life, making it easier to understand (13 students; 30%). Furthermore, from Table 6, it was found that the systematic presentation aspect is in the category of "very good" whereby (a) the presentation of the module follows the flow of thought from easy to difficult (18 students; 42%), (b) practice questions given are sorted from easy to difficult (16 students; 38%). The findings indicate that the students' perceptions of the use of modules in all aspects is in the "very good" category. Overall, it can be concluded that students' perceptions of the KARA module are positive or "very good".

Based on the results of the study, the experts, teachers and students stated their approval of the KARA module to be used in mathematics teaching and learning in Lower Secondary School. This is an evident from the average validity value of the module, which is 4.43, which means valid (Telaumbanua et al. 2017). This finding is also in line with a number of previous researchers, who also used the ADDIE model in developing instruments as well as teaching strategies such as Muruganatham (2015) who developed content e-package, Ummah Nasibah Nasohah, Muhammad Izuan Abd Gani & Nazipah Mat Shaid (2015) regarding Arabic language, Jupri Bacotang et al. (2016) on the teaching and learning of preschool students and Hafidzah Zulkifli, Kadijah Abdul Razak & Mohd Reduan Mahmood (2018) regarding the moral education module.

The module's validity score is quite high in two aspects, namely the validity of the module activity and graph/figure, which shows that the module developed has advantages in both aspects. This is based on the level of student development at that age range, which is between 12-15 years. If referring to the age range, then according to Piaget (1983) their cognitive development stage is at the stage of formal operations. Although in this age range, students are able to think abstractly and to reason, however Piaget (1983) suggested that at this age there was a time of change for students. Therefore, not all students experience the stage of formal operation, as this phase of the cognitive development. There are still students at this age who find it difficult to accept an abstract idea if it is not described in a concrete picture. Students at this age still need concrete objects in mathematics learning, including their day-to-day experiences. Therefore, it is very appropriate if the mathematics learning begins with concrete experiences that are closer to the student's daily life in the form of activities (Suryawati & Kamisah 2018). In addition, the format of the module including illustrations and equipped with figures, also helps students to understand topics ranging from the introduction of concrete principles to the abstract form.

In addition, the validity score for aspects of design and language is also quite high, namely 4.40 and 4.42. This is evident from the preparation of the module based on the experience and the cognitive structure of students, so that the students can associate new information based on available experiences in accordance with their current cognitive structure (Dahar 1989). In addition, the PdP process strongly emphasises the cognitive aspects of students because learning is understood as a process of creating knowledge (Sholihah & Mahmudi 2015). Not only that, the learning contained in the module encourages students to construct their personal thoughts and that it is predicted that this module can develop Higher Order Thinking Skills (HOTS) and students' mathematical motivation. This is in line with the opinion of Yuleilawati (2004) which states the characteristics of constructivist learning, which are: (1) knowledge is constructed by students based on prior experiences or knowledge, (2) learning is an interpretation of the world, (3) learning is an active process whereby meaning is constructed based on students' experiences, (4) knowledge developed because of meaningful negotiations through various information or agreement on views in interactions or cooperation with other students and (5) learning must be situated in a realistic atmosphere, where assessments must be integrated with the tasks, not as separate activities.

The findings generally show that experts, teachers and students have shown agreement with the modules produced. Although there are a number of suggestions for enhancements, based on the assessment test, pilot study and analysis conducted by the researchers, it is suggested that this module may be used by mathematics teachers in Lower Secondary Schools.

Conclusion

This module is developed based on the theory of cognitive constructivism and social constructivism theory. Other than to be used as a guide by teachers, the use of this module which is based on an experiential learning approach may also give teachers the opportunity to create different teaching techniques in PdP. It is hoped that the characteristics of teaching and learning based on Kolb's experiential learning approach used in this module is able to develop and enhance the various abilities of the students. Therefore, it is suggested that further studies are to be conducted to test the module's effectiveness on the students' mathematics achievement.

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