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Game-Based STEM Module Development for KSSM Science Teachers

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ABSTRACT

The study was conducted to identify the needs and specifications of a STEM Module based on a game approach in teaching science for lower secondary school students. In this study, the needs analysis was carried out on purposively selected science teachers from different schools in the northern district of Kedah, Malaysia. The data was collected through semi-structured interviews based on the purposive sampling of 7 science teachers. The qualitative data obtained from the interview sessions with the teachers were analyzed into specific themes. Three major themes were identified, namely: (1). The requirement of resources and teaching materials to motivate Science teaching (2) The suitability of game-based teaching approaches in teaching KSSM Science and (3) The characteristics of the required modules. The analysis of the findings shows that the Game Based STEM module has a great potential to be developed for the use of science teachers in making active and motivating science learning among secondary school students. Apart from the three main themes identified, suggestions and specifications derived from interviews with the teachers would give us useful information for developing the contents for the module. The teachers need appropriate modules for because they lack effective and relevant resource materials with the latest content in addition to lack of time to prepare them themselves due to the latest curriculum changes. The findings can be used for designing and developing the module in a subsequent study.

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Introduction

Since Malaysian Independence, the education system has undergone many changes, starting from the Razak Report (1956), all the way through Integrated Based Curriculum for Primary Schools (KBSR), Integrated Based Curriculum for Secondary Schools (KBSM) and Standard Based Curriculum for Secondary Schools (KSSM), particularly in the area of Science education. In line with that, the National Science Education Philosophy aims to produce the culture of science and technology among students by focusing on the development of individuals who possess the competitive, dynamic, resilient and driven characteristics to master scientific knowledge and technological capabilities. KSSM was enacted to meet the new policy requirements under the Malaysia Education Blueprint (PPPM) 2013-2025 so that the quality of the curriculum implemented in secondary schools is comparable to international standards.

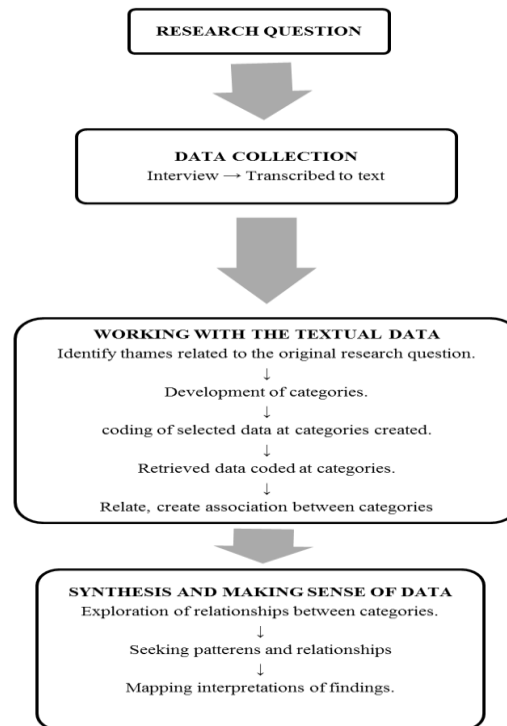
To ensure that the aspirations outlined in the 2013-2025 PPPM are achieved, the Ministry of Education has made suggestions for teachers to be innovative in their pedagogy by using new approaches in order to enhance students' interest in learning at school, for example, one of them is game based model in science education. The most obvious benefits of playing educational games in classroom is increasing motivation for learning (Bottino, Ott&Tavella, 2014; Groff, Howells & Cranmer, 2010; Hung, Huang & Hwang, 2014; Milosevic et al., 2010; Rosas et al., 2003; Wastiau, Kearney & Van, 2009; Yang, Chien & Liu, 2012; Yang, 2012). In addition, it makes learning more fun and helps students pay attention and stay focused (Perrotta et al., 2013).

The development of Game-Based Learning (GBL) in most western countries has become an innovation in educational pedagogy since 1970s (Prensky, 2007). GBL is not only enhance students' skills, achievements, and motivation to learn, but also make students interested to learn more effectively (Papastergiou, 2009 & Yam, 2011.). Ya-Ting (2012) and Wilson, Colonge & Henderson, (2016) believes that games can apply collaborative and active learning and the design of most learning methods is based on the principles of social constructivism.

Background of the Study

This study was conducted to obtain information from KSSM science teachers on the requirements of the module that will be developed to solve existing problems faced by teachers such as they need appropriate modules for because they lack effective and relevant resource materials with the latest content in addition to lack of time to prepare them themselves due to the latest curriculum changes. In the module development study, the needs analysis study is a part of the module's design and development process. According to Richey and Klein (2007), the strength of the design and development of the module is that this study is used to solve problems in specific contexts. The analysis phase is the initial phase of the study when information is collected from the context and environment that is to be studied (Saedah, Norlidah, DeWitt & Zaharah, 2013). Thus, before the module is developed, a necessary analysis is conducted to determine the probability of any problems taking place. The purpose of the analysis phase is to identify the reasons for the probability of the occurrence of problems (Branch, 2009; Gagne, Wager, Golas& Keller, 2005) and to do what is necessary to solve the problems (Reinbold, 2013). The needs analysis phase provides important information in determining the design and development of instructional materials for the next phase (Gagne et al., 2005). In the context of this study, the needs analysis study was conducted at the beginning of the module development study to find out which type of teaching methods is most suitable for KSSM science learning in order to improve students' achievement and motivation, and eventually increase their high-order thinking skills.

In order to fulfill this objective, this research was conducted to identify the requirements needed by teachers in taking on the game-based approach to teach science at schools. In this study, the needs analysis was done after the problem was identified and information on the details and specifications of the module was obtained from the teacher. This study utilized semi-structural interview methods on seven different Ministry of Education (KPM) Science teachers from different schools. Figure 1 shows the research flow diagram of this study.

Figure 1*The Research Flow Diagram of This Study*

Game-Based Learning and Constructivism

Game-based learning (GBL) offers numerous advantages and benefits that can contribute to a variety of learning outcomes. For example, GBL teaches learners how to directly apply knowledge of science and guide them how to relate with real-life problems (Chang, Wu, Weng & Sung, 2012). Finding from Asniza, Zuraidah, Baharuddin, Zuhair & Nooraida (2021) shows that GBL can attract many students to participate in teaching and learning sessions particularly in Biology classrooms involving pre-university students. It is clearly seen from the findings where the data analysis show that students' engagement and achievement increases when students are treated with this method of teaching and learning through an online game-based learning. Playing is an important activity within constructivist theories as learners create meaning from their experiences (Tam, 2000). Central to constructivist ideas is the concept that children actively construct knowledge and create their ideas as opposed to simply absorbing information (Tam, 2000; Pastore and Falvo, 2010). Research on video games has shown that games are often inherently proactive and explorative activities that encourage self-reliant learning (Annetta et al., 2007), making gaming environments an ideal setting for constructivist-based learning. Jonassen (1994) describes elements of constructivist learning environments that contain many representations of reality, present the natural complexity of the real world, construct knowledge instead of only reproduce it, support collaborative knowledge building, and provide tasks in context rather than in abstraction. These are all concepts highly relevant to game-based learning. There has been many research conducted on the use of constructivist theory in instructional environments (Jonassen, 1999; Wilson, 1996, Yang, 2012) and games (Ahamer, 2004; Dickey, 2007). Several areas of constructivist approach are particularly relevant when considering the design of games: problem solving to engage students in tackling learning concepts (Jonassen, 1999); reflexivity and self-awareness (Honebein, 1996); the social experience of learning (Honebein, 1996), and real world, case-based learning environments (Jonassen, (1994) & Yang (2012)).

STEM Games

Studies have revealed significant development in game players as they reason, debate, and construct solutions to game problems, activities, and contingencies (Steinkuehler & Duncan, 2008). This has been a useful development that has established the value of games as learning spaces, and thus their potential to be harnessed for intentional learning in school. As a result, specially funded research and development projects have applied game-based learning in schools, particularly in STEM (science, technology, engineering, and mathematics) subjects (Barab, Thomas, Dodge, Carteaux&Tuzun, 2005; Dede, Clarke, Ketelhut & Bowman, 2005). But there is a small number of games that integrate STEM concepts. Research has shown the values of engaging players in science games for solving complex scientific problems (Cooper et al., 2010; Kawrykow et al., 2012). The science game, Foldit, offers a way for players to engage in real science and participate in a puzzle that contributes to the development of new strategies and algorithms for protein structure prediction (Cooper et al., 2010). Science games have also provided value as learning and instructional aids for students to make them understand a concept more easily. Annetta et al. (2009) evaluated a crime scene investigation video game with genetics learning concepts, finding that, while there was no significant difference in learning when compared to a control group, students that played the video game were significantly more engaged in the genetics content.

Pastore and Falvo (2010) examined teachers' perceptions of gaming in the classroom environment. Ninety eight participants completed a survey. The results of the study revealed that the majority of the teachers agreed that gaming enhances students' learning and motivates students. However, only about half of the participants indicated that they used or intended to use gaming in their teaching. Although these findings indicate that positive attitudes or perceptions do not always lead to behavioral intention, the literature does not explain the support needs of the teachers who intend to use gaming in the classroom. Therefore, this need analysis research was conducted to identify the support or requirements needed by teachers in taking on the game-based approach to teaching science at schools.

The Problem Statement

The deterioration of students' interest and motivation in learning science and mathematics could have long term negative implications on the progress of a country (Mohd Norawi, 2014). In the Malaysian context, enrollment and entry to the science stream compared to the arts stream at the upper secondary level is less than the expected the ratio of 60:40 (MOSTI, 2012). The decline in the number of students choosing science and mathematical stream and the indifferent attitude towards science will pose a threat to the nation's progress. This situation, should it persist, can have negative impacts on the government's efforts to produce citizens with scientific literacy and culture, as envisioned in the Vision 2020. Therefore, the Ministry of Education (KPM) has introduced the STEM education (science, technology, engineering and mathematics) and undertakes various efforts to promote this field to all levels of education in Malaysia. However, according to Lay (2017), Malaysia still faces challenges in realizing the desire to produce competent students in the STEM field. International assessment findings show that Malaysian students' performance in the field of science is less encouraging due to the lack of competence in solving questions that require high-level thinking skills (HOTS) (KPM, 2018).

Among the highlighted issues and challenges in the STEM education are the lack of interest among students and their opinions that the STEM field is difficult. Furthermore, students are not encouraged to enter pure science stream in order to maintain the performance and GPA of the school. TIMSS 2011 and 2015 assessments (IEA, 2016) respectively reported that only 4 percent and 6 percent of Malaysian students perceived themselves as having high levels of confidence and motivation in the field of science. The Ministry of Education has carried out several strategies to enhance students' achievement and interest in the STEM field. One of the strategies is to use more enjoyable learning approaches such as more practical connections with the real world, open exploration approaches, the

gamification of STEM, STEM comics and STEM digital games (Ministry of Education, Malaysia 2018). The strategy is meant to enhance existing routine-learning practices that require students to be passively remember facts by memorization, involve in indoctrination of knowledge directly to students without considering the students' real life contexts.

Science teachers also are lacking of instructional training and do not have enough exposure to current pedagogical content knowledge, and facing the problems of insufficient facilities. The situation worsens, where they do not have adequate support in implementing STEM education (Ramli & Talib, 2017; Siew, Amir & Chong, 2015). At the same time, teachers are also struggling to finish the syllabus to prepare students for examinations. These constraints lead the teachers to be less creative in integrating the students' cultural experience in teaching activities according to the constructivist approaches, and instead prefer to use stereotypical and more teacher-centered approaches (Abdul Hadi, 2014). This learning environment bores the students and makes them weary because there is only a one-way communication. It creates a static atmosphere in the classroom where the students become demotivated to further explore what they were taught in the classroom.

The challenge for science education is to overcome the motivational problems among students by using effective teaching strategies and approaches (Salmiza, 2008; Palmer, 2009). GBL can help increase students' motivation in the learning process (Schell, 2008; Ad NorAzli, 2015; Anisha, 2015; Melvina, 2018). Educators and students need to understand the value of game experience and recognize its role in helping students to form meaningful contextual information (Abrams, 2009). In this regard, the value of education is related to the pedagogical choice made by the teachers who are responsible for carrying out the teaching process (Bottino et al., 2008). The various types of games and challenges in GBL can attract students to learn and compete with each other. The positive attitude arising from the implementation of this method will lead to a more effective, cheerful and conducive learning atmosphere. The effectiveness of GBL in improving the motivation and ability of students to learn proves that the integration of technology in education greatly helps in strengthening teacher's pedagogy. Studies by Papastergiou (2009) and Tuzunet. al. (2009) show that students' motivation improved when the GBL method is applied in learning.

According to Miller and Almon (2009), the key challenge in implementing a fun practice of teaching using a game-based approach is that many new teachers are not yet experienced enough to teach in a child-centered classroom. They still need resources, guidance and training to improve their knowledge and skills, especially for teaching science in a student-centered learning environment. In Malaysia, the transformation of the standard-based curriculum into KSSM requires truly professional teachers, meaning that their teachings need to be up to standard and also take into account the needs of the students. To improve teachers' knowledge, guidance in the form of an instruction program needs to be developed so that teachers can adapt student-centered learning to the standard they need to achieve. In order to meet the standards, teachers require appropriate guidance so they can implement flexible game approaches (Almon & Miller, 2012). In the KSSM DSKP Science document, it is recommended that teachers perform the teaching and learning process by integrating various activities in the fun learning approaches (KPM, 2015). However, the document does not detail out how the teaching and learning process should be performed. The teaching practice need to be enhanced by adapting alternative approaches that are more captivating in order to make students more interested and motivated while nurturing their innovative thinking.

The Research Objective

A needs analysis was conducted to identify the requirements of the module prior to its development and be evaluated in the next phase (Saedah et al., 2013). This study was conducted to obtain data needed to produce an innovative game-based approach module for KSSM science teaching and learning. Based on the objective of the study, this study was also conducted to find the answer to the question: What are needed to produce a suitable module to be used by teachers in teaching KSSM science for secondary students using Game-Based approach?

- a) Is there any requirement of resources and teaching materials to motivate Science teaching?
- b) What is the suitability of game-based teaching approaches in teaching KSSM Science?
- c) What is the characteristic of the module needed to prepare the game based module to the students?

Methods

A qualitative research design was used in this study. This study utilized semi-structural interview methods on seven different Ministry of Education (KPM) Science teachers from different schools. This method was used by Norlidah (2010) and Aliza and Zamri (2015) to obtain the data for needs analysis to produce Physics pedagogical module and pre-school Malay language module. Sample selection techniques were conducted by purposively selecting respondents from homogeneous groups who could provide diverse information. Respondents were selected based on the criteria of STEM teachers who conducted KSSM in schools. In anticipation of questions that could provide better information, interview protocols that were piloted before actual interviews were considered. Researchers selected a respondent who had the same characteristics as the actual study samples and interviewed the respondent to see the suitability of the questions. Based on the pilot study, three questions were simplified and improved. The improved questions were used in the actual study. Once the process of interviewing and data collection in the actual study was done, the researchers completed the transcript and returned the transcript to the respondents for review. After the transcripts had been reviewed, the respondents signed an interview confirmation form to confirm the interview information. Validated interview transcripts were analyzed with the help of Atlas.ti version 7 software. The transcript analysis process was done thematically, by giving separate labeling code for each study respondent. The data from the interviews were categorized, subcategorized and analyzed using deductive coding methods based on the predetermined themes (Miles & Huberman, 2014).

Findings & Discussions

Researcher analyzed the interview data thematically to gain in-depth information on the need to design and develop game-based modules to assist science teachers in their science teaching. The setting of this theme is based on the researcher's study literature on the need to build additional teaching modules to assist science teachers in improving student science achievement and student motivation in learning science. Table 1 shows the list codes of respondents in the researcher's study.

Table 1

Codes of Respondents

No.	Respondents	Codes of respondents
1	Respondent 1	R1
2	Respondent 2	R2
3	Respondent 3	R3
4	Respondent 4	R4
5	Respondent 5	R5
6	Respondent 6	R6
7	Respondent 7	R7

Based on interview data analysis, the findings from the seven respondents produced three themes, which are listed here.

Theme 1: The requirement of resources and teaching materials to motivate Science teaching**Table 2***Example of Quotes, Codes and Categories of this Themes 1*

Quotes	Codes	Categories
..books and materials are still lacking R1L2	still lacking	Lack of
..need reference ... R2L1	need	resources
..teachers and students are still unfamiliar ... R3L1	reference	and
My problem is in terms of materials ... R6L2	Less	materials
..books are less because the information is not much anymore R6L5	materials	for teaching
... necessary, if the subject is particularly difficult ... R1L3	Necessary	Need a
..if there is material we can make R2L3	Agree	game -
..I agree if anyone develops this game based module ... R3L4	It's very good	based teaching
... I think if there are individuals who take the initiative to build modules for some titles, I think it's very good ... R4L3	Need module	module
... need module..R5L2		
..very necessary because there are still not enough people to build ... R6L4		
..need R7L4		
... teachers need to explore new syllabus ... R1L1	to explore	The new
..this new syllabus is more ... R2L2	new	syllabus
... project related information, problem based is still a little, teachers do not understand ... R3L2	syllabus	and
... KSSM's new syllabus has more topics than KBSM..R4L1	Syllabus is more	difficult
..teachers need to take a lot of time to complete the syllabus and many activities need to be done..R5L2	Do not understand	
... this new KSSM syllabus is very difficult ... R6L1	KSSM	
KSSM ..syllabus is more advance, the syllabus of many, should be plenty of time for students to understand R7L3	syllabus is very difficult	
	Syllabus is more advance	

All seven respondents agreed that they needed appropriate resources and materials to take on the game-based approach for teaching and learning science in schools. They proposed a module that detailed how to teach science using game-based approach. All respondents agreed on the need to create a module as a resource for guiding teachers to implement game-based learning approaches in teaching and learning science in schools. For example, respondent 1 (R1), respondent 3 (R3) and respondent 4 (R4) said there should be a module suggesting how to approach the teaching of science to students.

R1: "... For me there is a need for a module! I think we need clear instructions, which students can read and understand. With easy-to-understand game guidelines and guide for the time allocation so that the games can be carried out easily. Students are not just playing games; they can also understand which scientific concepts are involved in the games...."

R3: "... For me, I strongly agree if anyone is trying to produce a game-based module for Science, it's great.

R4: "... For me a module is really necessary. I would like to recommend a module that contains game guides, tailored to the developmental stage of the students, easy to understand and readily available...."

The respondents said that game-based approach made learning fun of the students and think that students are more motivated and able to learn better through playing. This is consistent with a study by Plass, Homer, & Kinzer (2015) and Nurul Hafizah, Samsiah, Mahani, & Nor Liza, (2019) which states that teaching and learning process that uses methods such as games will make students more motivated to learn because students are engaging in activities that are relevant for learning. However, teachers today are more engaged in student-centered and exam-oriented activities because they are tied with too much syllabus and the need to improve school performance. The approach is simply to fulfill the requirements that have been outlined. Teachers give the more difficult and burdensome new syllabus as the excuse for why they cannot diversify their teaching approaches. For example, respondent 7 (R7) and respondent 5 (R5) said that:

R7: "... The activities carried out mostly are unplanned activities, we don't exactly have many ideas for them. If we feel like doing something then we do it, otherwise if we don't have any ideas then we don't do it. After all, with the new KSSM, teachers are still learning about it, the students are still learning about it, it's difficult.... "

R5: "... We focus more on giving students exercises for them to do and then discussing the exercises... It is safe to say that teaching is more exam-oriented... The new KSSM syllabus has many topics to be taught and is more difficult..."

From the quotes given, we can conclude that teachers think that they really need a proper Game-Based STEM Module to be developed, which can help them with the teaching and learning process in the classrooms.

Theme 2: The suitability of game-based teaching approaches in teaching KSSM Science

Table 3

Example of Quotes, Codes and Categories of This Themes 2

Quotes	Codes	Categories
..yes! We can do! if the students really like the game ... R1L1	We can do	Game-based learning is very suitable to be applied in the teaching of science
... game activities are fun if they can be done ... R1L2	Game activities are fun	
... students are more interested in learning, easier to understand and not bored in class ... R2L1	Agree	
... I strongly agree to use the game method, very much in line with the new syllabus ... R2L3	Good	
... if I am, I think it's ok..R3L1	Interested	
..I think it's ok, just need a guide ... R4L2	easy to understand	
..this is good! students are interested ... R5L1		
..very good, my experience is quite good..R6L2		
... the method of this game is very good, easy to understand ... R6L3		
... good, because students really like to play, they understand faster..R7L2		
... sometimes we have time constraints to make ... R1L5	time constraints	Constraints to carry out game -based activities
..no problem just in terms of time and no material only ... R2L2	Syllabus	
... teacher problem in terms of time to prepare, no idea ... R3L2		
..for me, if playing will take a long time, not enough time ... R4L1		
... but if you look at the syllabus, the syllabus is hard to finish, time consuming ... R5L2		
... our time is limited ... R6L5		
... perhaps the atmosphere is not suitable ... R7L3		

From the Table 3 above, we can see all seven respondents agreed that the use of game-based approach is very suitable for teaching and learning in schools. They said that game-based approaches make it fun for students to learn. Six respondents believed that children were more motivated and able to learn better by playing but gave certain reasons they could not make the game-based approach as their teaching approach in the classroom. For example, according to respondent 1 (R1), material, time and control are the factors for him rarely using this approach at school.

R1: "... Students like the game-based approach, but sometimes because of time constraints we cannot do it. There isn't enough time and it's hard to control the students. The problems are in terms of time and materials..."

The same response was also given by respondent 2 (R2).

R2: "... We can do game-based learning activities, because students will be more interested in learning, understand their lessons more easily and are not bored in class ... We can do it if there are materials..."

Respondent 4 (R4) stated that time and planning were the factors for most teachers' not implementing this game-based learning approach.

R4: "... For me it's time, when we play it will take a long time. I personally think there isn't enough time if we play.

The findings of this interview shows that game-based teaching approach is very suitable and teachers need assistance in the forms of material resources to implement it at school to ensure that students are more interested and motivated to improve their achievement in science. This observation was also shared by Russell (1999), who mentioned in his research paper that one of the advantages of playing games was that the students would learn from each other better, as opposed to obtaining information from teachers just by hearing it being repeated. Pastore and Falvo (2010) also found that, the majority of the teachers agreed that gaming enhances students' learning and motivates students. According to Gagne et al. (2005), in the analysis phase a number of causes for problems related to teaching are identified, as well as their solutions. Therefore, once the needs analysis process is completed, researchers should be able to determine the type of teaching that can solve the problems, and suggest strategies based on the empirical data so that the teaching can be done well (Branch, 2009).

Theme 3: The characteristics of the required modules

Table 4

Example of Quotes, Codes and Categories of This Themes 3

Quotes	Codes	Categories
... the game should be fun ... R1L6 ... games that make it easy for students to understand are fun ... R2L1	Fun	a fun game.
... need to state the title involved and which subtitle is taken ... R2L2 ...Additionally, the titles, subtitles and objectives to be reached should be told in the teacher's guide.. R3L4 ... there must be a teaching objective ... R5L2	title and sub titles Objectives	It should be mentioned title and sub titles and teaching objectives should be stated in the lesson plan
... questions should also take into account the form of actual exam questions, so students are not lazy ... R7L3appropriate module should expose students to real questions...R3L2		have questions like a real exam
..... there needs to be a teacher's guide ... R1L1 ...need a guide to play R2L3 ... for teachers there should be a manual, a list of requirements, teachers can prepare before running the activity ... R3L4	Guide Manual	there needs to be a teacher's guide

...It is okay if we still want to play but there should be a guide, some planning and time settings. So it won't drag on to the next period...R4L2		
..I think I need a teacher's guide R5L3		
...In the module there should be a teacher's guide; teachers' guides are really important so that teachers are better prepared, they know how to play, what materials to prepare before the game...R6L3		
.. but there should be a guide, some planning..R7L4		
... games that make it easy for students to understand are fun ... R1L1	Easy to understand	games that make it easier for students to learn and understand
... if there is a game they can play, then they understand the lesson is really good ... R3L2	students can understand	
....games that have clear instructions..R5L2		
..easy for students to play, less dependent on the teacher ... R4L3		
... a game that allows students to understand another important topic ... R6L7		
..not just play, after that students understand ... R7L8		
..should be based on HOTS ... R5L1	HOTS	It is necessary to apply HOTS
.. module should expose students to real questions and there is HOTS R7L1		

Table 4 shows the finding of the need analysis about the characteristics of the required modules in order to develop game based module for STEM teacher. Among the suggestions presented were fun games, need of teacher guides, time allocations, game suggestions and appropriate game material suggestions. All respondents suggested that the module should detail the implementation steps and explain how the implementation can be done. A total of three respondents suggested that this module should contain a clear lesson plan and teaching objectives. The other two respondents suggested that there should be a flexible time allocation and the rest (two respondents) suggested that the elements of high-level thinking skills (HOTS) ought to be included in the games.

Branch (2009) says that good teaching materials are materials that can sharpen one's capabilities by increasing knowledge and skills. Based on the results of the needs analysis, the module development process should take into account the aspects that can enhance the knowledge and skills of teachers such as ways to fulfill the learning objectives stated in the DSKP KSSM Science. In addition, the teaching activities in this module should take into account the aspects that can improve teachers' skills on how to use teaching resources, get students to focus and follow learning activities, and guide students in small groups.

Conclusion

A needs analysis study requires researchers to gather information about the context and situation of the research from teachers who are also the target users of the module. In the context of this study the researchers gathered information about the existing practice of teachers and their needs so that the information obtained can help the researchers to produce a module capable of solving the existing problems faced by teachers. The results of the needs analysis show that a game-based approach module should be developed to help teachers improve their teaching and learning of science. The findings show that most teachers agree on the importance of game-based approach and the benefits of this approach to children. However, teachers rarely use this approach in schools due to certain constraints. Factors such as the lack of resources for the teachers, inappropriate game materials, planning and time constraints cause them to rarely use this approach. To solve the problems faced by teachers, materials in the form of modules need to be developed to enhance their knowledge and skills

in planning and conducting science teaching and learning that are more efficient and based on the students' needs.

The findings also show that teachers need resources and teaching materials in the form of modules that detail how to teach and learn. This instructional guide should include fun game activities for teaching and learning and takes into account the level of student knowledge. In short, the modules developed should take into account suggestions and specifications such as being easily available, can explain to teachers how to provide teaching aids as well as the ways games are performed. Teachers also suggest that this module contains examples of daily lesson plans, game activity suggestions and explanations about the types of games. Needs analysis study is important in obtaining information about the contents and specifications of the module to be developed. The results of the analysis show that a game-based approach module for the teaching and learning of language skills should be developed. The development of modules should take into account teachers' problems and existing needs so that the module produced is appropriate for the teachers to use. The findings of this needs analysis will be used by researchers as a guide to designing and developing modules in the next phase of the development process.

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