

Students and teachers' necessity toward science interactive multimedia e-books based on local potential of *gamelan* to increase students' curiosity

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Abstract. This study aims to determine the needs of students and teachers towards the development of interactive multimedia e-books based on local potential of *gamelan* to increase student curiosity. This study uses a survey method. Data collection using a needs analysis questionnaire and interviews. A needs analysis questionnaire given to 34 students of SMP Negeri 6 Yogyakarta and 13 science teachers of SMP/MTs in the Special Region of Yogyakarta. Interviews conducted with two science teachers at SMP Negeri 6 Yogyakarta. Questionnaire data analysis techniques used quantitative descriptive while interview data analysis used descriptive qualitative. The results of this study are the students' curiosity is not optimal, especially on indicators of the desire to do material exploration (44%) and the desire to seek answers (18%). Plans to integrate the local potential of *gamelan* in science learning get positive responses from students (82%) and teachers (100%). As many as 80% of students and 100% of teachers agree that science learning uses interactive multimedia e-books. Based on data analysis, it can conclude that students and teachers need interactive multimedia e-books based on the local potential of *gamelan* to increase student curiosity.

Keywords: *curiosity, gamelan, interactive multimedia e-book, needs analysis, science*

1. Introduction

Education has an essential role in building high-quality, intelligent, and competitive human resources. Through education, students are trained to develop their potential. Potential learners can develop well through the implementation of effective learning. The utilization of ICT in the learning process can be one way of learning to run effectively. Teacher preparation complete with ICT equipment and facilities is one of the main factors in the success of technology-based learning [1]; therefore, the use of ICT in learning becomes very important.

Technology can be used by teachers to develop teaching materials that are appropriate to the characteristics of students. Teaching materials that are widely available in schools and used by students is printed textbooks. Teaching material is one of the essential elements that must be available to conduct teaching and learning activities [2]. One of the teaching materials based on computer technology is an e-book. E-books emerged as one of the modern technologies that present content more interestingly and interactively that has never been seen before through traditional printed books [3]. E-books are electronic or digital versions of traditional printed books that can be accessed with the help of appropriate hardware and e-book reading software [4]. E-books have many advantages over printed books.



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The advantages of e-books include being able to load multimedia content in them; this is certainly different from printed books; therefore, e-books present more interesting teaching material and make learning more enjoyable [5]. E-books allow users to insert images, animations, videos, and others to help students to better understand the lesson in depth [6], [7]. The existence of multimedia elements contained in e-books and are interactive so that it gives rise to a new term that is interactive multimedia e-books. Interactive multimedia e-books contain diverse content through the incorporation of animation, sound, and video into content that is composed of digital text and images [8]. The existence of multimedia elements as well as being interactive makes this interactive multimedia e-book have a special advantage over printed books or ordinary e-books that are only text and images.

Integration of local potential into learning in schools is needed, especially in the current situation where the younger generation is experiencing a decline in respecting local potential and local culture [9]. Potential which is owned by one particular area is called local potential. Local potential is a specific resource owned by an area that includes potential natural resources, human resources, geography, culture, and history [10]. Integration of local potential in science learning is needed so that students do not forget their identities [11]. Local potential based learning is one approach that utilizes a variety of potentials that exist in a particular region as a source of learning science [12]. One of the local potentials in Yogyakarta Special Region is *gamelan*. *Gamelan* has elements of science that can be taught to students through science learning. Through the integration of the local potential of *gamelan* into learning science will make learning contextual, because students in everyday life already know *gamelan*. *Gamelan* can be made of tin (Sn) and Copper (Cu) and can also make of brass or iron [13]. During the process of making and also the material for making this *gamelan*, there are elements of science that can be taught to students, so hopefully, students' curiosity can also be stimulated.

Curiosity is essential for the success of students in school because curiosity is an aspect of intrinsic motivation that has excellent potential to improve student learning outcomes [14], [15]. Curiosity is a miracle of the human mind that acts as a driving force for learning, new insights, and innovation for both individuals and society [16]. Indicators of curiosity include the desire to explore information (material), dare to ask questions, adventure with information and willingness to explore information [17]. Meanwhile, according to [18], another indicator of curiosity is looking for answers to questions about learning material. Indicators of the desire to explore information can be characterized by reading textbooks. If used effectively, technology can play a role in stimulating student curiosity [19]. One form of technology that can use in science learning is an interactive multimedia e-book.

This study aims to determine the needs of teachers and students towards the development of interactive multimedia e-books based on the local potential of *gamelan*. Some aspects that need to know from students and teachers in need of analysis conducted by [20] are the learning process in schools, textbooks, learning based on local potential, the use of technology in learning and the need for learning media. In this study aspects that will be used for the analysis of the needs of students and teachers are aspects of the process and learning outcomes, aspects of the use of textbooks, student curiosity, integration of the local potential of *gamelan* and the need for interactive multimedia e-books.

2. Research method

This research uses survey method. Data collection using a needs analysis questionnaire and also interviews. The questionnaire contained 14 questions divided into five aspects, namely aspects of the process and learning outcomes, aspects of interest in textbooks, aspects of student curiosity, aspects of potential local *gamelan* and aspects of interactive multimedia e-book needs. A needs analysis questionnaire was given to 34 students of SMP Negeri 6 Yogyakarta and 13 science teachers of SMP / MTs in Yogyakarta Special Region. Interviews were conducted with two science teachers at SMP Negeri 6 Yogyakarta as supporting data. Questionnaire data analysis techniques used quantitative descriptive while interview data analysis used descriptive qualitative

3. Results and Discussion

The results of the analysis of the needs of students and teachers towards the development of interactive multimedia e-books based on the local potential of *gamelan* to increase students' curiosity can be known in every aspect. Five aspects are the focus of this need analysis, namely aspects of the process and learning outcomes, aspects of interest in science textbooks, aspects of student curiosity, aspects of local potential of *gamelan* and aspects of interactive multimedia e-book needs. The responses of students and teachers to the learning process and results are shown in table 1.

Table 1. Students and teacher responses to the science learning process and outcomes.

Item Number	Questions for students	Answer (%)		Questions for Teacher	Answer (%)	
		Yes	No		Yes	No
1	Have you been having difficulty when studying science materials?	44	66	Do the students that you teach experience difficulties when learning science material?	85	15
2	Are you satisfied with the results of the daily assessment of science that you have obtained?	59	41	Are you satisfied with the learning outcomes obtained by students?	8	92

Difficulty in learning material is one indicator used to find information related to fundamental problems in the learning process. Based on table 2, it is known that there are differences of opinion between students and teachers related to the difficulties of students in learning material and satisfaction with student learning outcomes. Students who find it difficult to learn material is only 44% while different opinions are shown by the teacher, 85% of teacher state that the students they teach have difficulty when learning science materials. Other data shows that as many as 59% of students are satisfied with the learning outcomes they have obtained, while 92% of teachers feel dissatisfied with the learning outcomes obtained by students. The majority of students are satisfied with the learning outcomes that have been obtained, this shows that students are more quickly satisfied with their learning outcomes while the teacher is still not satisfied.

The results of teacher responses through the questionnaire were strengthened by the results of interviews conducted with science teachers, which stated that the main problem faced by science teachers were that student learning outcomes were still low. When the daily assessment, many students of class VII who have not yet reached the KKM (minimum completeness criteria), where students who enter the KKM (minimum completeness criteria) only about 24%. The same thing happens when PTS (midterm assessment) and PAS (end of semester assessment), where the average value of students is only around 63. Learning outcomes are indicators of the success of a study program [21], so learning outcomes become very important. Other information obtained from interviews is that students have difficulty in understanding symbols and are weak in calculations.

Textbooks are one of the important things that must be there. Therefore, it is necessary to know whether the textbooks used by students are interesting and easy to use for learning. The response of students and science teachers to science textbooks can be seen from 3 indicators, namely the attractiveness of the arrangement of the material, the material is easy to understand and the colors used are interesting. The science book in question is a book from the Ministry of Education and Culture that is loaned to students. Following are the results of the responses of students and teachers to the science textbooks, which are shown in table 2.

Table 2. Students and teacher responses to science textbooks.

Item Number	Questions for students	Answer (%)		Questions for Teacher	Answer (%)	
		Yes	No		Yes	No
3	Do you think the material in the science textbook compiled interestingly?	59	41	According to you, are the materials in the science textbooks used by students compiled in an exciting way?	15	85
4	Do you easily understand science material when learning by using science textbooks?	59	41	According to you, do students easily understand the material when learning from science textbooks?	15	85
5	Do you think the colors used in the science textbook are exciting	65	35	Do you think that the colors used in the science textbook are exciting?	46	54

The material in the science textbooks according to the majority of teachers (85%) is not interesting. Different responses were shown by students, where 59% of students stated that the material in the Science textbook was interesting. Meanwhile, 85% of teachers stated that students did not easily understand the material when learning from science textbooks while 59% of students stated it was easy to understand material from science textbooks. There is a very clear difference in responses between teachers and students related to the attractiveness of the arrangement of the material and easy or not easy to understand the material in the science textbooks. Regarding the colours used in the science textbooks, the responses of the teacher and students regarding the colours used are not too different. This means that the colours used in textbooks are good enough according to students and according to the teacher.

Textbooks play an essential role in determining the success of students in the teaching and learning process because books are the leading agents in conveying knowledge to students [22]. The importance of textbooks for students' success in learning, the existing textbooks need to be continuously improved so that they are more exciting and easily understood by students. The majority of teachers give negative responses to the attractiveness of the composition of the material and whether or not the content is easily understood, meaning that the teacher views that the existing textbooks are not in line with teacher expectations.

Curiosity is the desire of someone to know about something; therefore, students must have a high curiosity for the subject matter. There are three indicators used to determine students' curiosity, namely the desire to explore the material, ask the teacher about the subject matter, and enthusiastically look for answers. Reading science textbooks is one sign of students who have a desire to explore content. Table 3 shows the curiosity that is owned by students.

There is a similar response between the teacher and students regarding the question of whether students are diligently reading textbooks. It can be seen that 66% of students are not diligent in reading textbooks. The results of this study are in line with the results of research conducted by [20], where more than half of the students stated that they rarely read textbooks before class. Although students rarely read textbooks, apparently many students dare to ask the teacher. The majority of students and teachers state that students are diligent in asking a related subject matter. However, based on the open answers submitted by the teacher in the questionnaire, as many as 11 stated that the number of students who usually ask questions at each meeting was less than 35% of students. This data is supported by the results of interviews with teachers, where the teacher stated that students who often asked questions were not evenly distributed even some students did not want to ask. Another indicator

Table 3. Students and teacher responses to student curiosity.

Item Number	Questions for students	Answer (%)		Questions for Teacher	Answer (%)	
		Yes	No		Yes	No
6	Are you diligent in reading science textbooks?	44	66	Based on your observations, are students diligent in reading science textbooks?	23	77
7	Do you usually ask the teacher when there is material that you don't understand?	68	32	Are the students that you teach, diligently asking about the material during the science learning process in class?	53	47
8	Do you usually work on the problems in the Science textbook without being told by the teacher?	18	82	Based on your observations, do students usually work on the problems contained in the Sciences textbook with their own awareness without being instructed by the teacher?	8	92

of curiosity is the enthusiasm of seeking answers; in this case, can be marked by the excitement of students in working on the problems contained in the science textbooks. Based on the questionnaire known that as much as 82% of students do not work on the questions contained in the textbook if not instructed by the teacher. This is supported by the teacher, where 92% of the teachers stated that students did not work on the question contained in the Natural Sciences textbook when not instructed by the teacher.

The curiosity aspect of students is still weak on the indicator of the desire to look for answers; therefore, it is necessary to have interactive questions in the form of quizzes. A printed book certainly cannot facilitate an interactive quiz; consequently, it is essential to use technological assistance, for example, in the form of an e-book. In general, indicators of student curiosity that need to be improved are the desire to explore material and the desire to look for answers. Students may have high curiosity, but relevant resources may not be available to satisfy that curiosity [19]. Therefore, teachers need to provide relevant learning resources so that students' curiosity can be optimized.

Integration of local potential in learning science is important and very possible because many local potentials can be associated with science material, one of which is the local potential of *gamelan*. One suitable learning method to be applied in science learning is science learning based on local potential [12]. Before integrating the potential of local *gamelan* in science learning, it is undoubtedly necessary to analyze the needs of students and teachers. The results of the needs analysis shown in table 4.

Table 4. Students and teacher responses to the local potential of *gamelan*.

Item Number	Questions for students	Answer (%)		Questions for Teacher	Answer (%)	
		Yes	No		Yes	No
9	Do you know <i>gamelan</i> instruments?	100	0	Do you know of <i>gamelan</i> instruments?	100	0
10	Have you ever learned about <i>Gamelan</i> in science learning?	6	94	Have you ever integrated the local potential of <i>gamelan</i> into science learning?	8	92
11	Do you want to know about the process of making <i>gamelan</i> related to science material?	82	18	Do you agree if the process of making <i>gamelan</i> related to science material taught to students?	100	0

Gamelan is a traditional musical instrument that is famous on the islands of Bali and Java. Students in Yogyakarta, of course, be familiar with *gamelan* instruments. This is evident from all students (100%) knowing *gamelan* instruments. Not only students who know *gamelan*, all teachers who are given a questionnaire also know about *gamelan*. Although teachers know *gamelan* instruments, only 8% of teachers have integrated the local potential of *gamelan* in science learning. From the interviews, it was also known that the science teacher at SMP Negeri 6 Yogyakarta in particular, had never integrated the local potential of *gamelan* in science learning. The same statement conveyed by students where 94% of students said they had never studied *gamelan* in science learning. The desire of students to find out more about *gamelan*, especially about making *gamelan* is high. It is known that as many as 82% of students say they want to know the process of making *gamelan* associated with science material and 100% of teachers also agree if the process of making *gamelan* is taught to students. It can be said that the integration of the local potential of *gamelan* in science learning can be done because all teachers and students know about *gamelan* in general and are supported by the wishes of students who want to know the process of making *gamelan*.

The interactive multimedia e-book is a teaching material in which there are multimedia elements and can be used directly by students. Interactive multimedia e-book teaching materials are still relatively new and not too widely used, therefore it is necessary to know the response of teachers and students related to this teaching material. The results of students' responses to the need for interactive multimedia e-books are shown in table 5.

Table 5. Students and teacher responses to the need for interactive multimedia e-books.

Item Number	Questions for students	Answer (%)		Questions for Teacher	Answer (%)	
		Yes	No		Yes	No
12	Did you know about interactive multimedia e-books?	20	80	Did you know about interactive multimedia e-books?	77	23
13	Has your teacher ever asked you to use an interactive multimedia e-book that is opened on a computer/laptop when learning science?	12	88	Have you ever used interactive multimedia e-books in the science learning process?	8	92
14	Do you agree if science learning uses interactive multimedia e-books?	80	20	Do you agree if in learning science using interactive multimedia e-books?	100	0

The majority of teachers (77%) know about interactive multimedia e-books, but only 8% of teachers have used interactive multimedia e-books or the like in science learning. From interviews, it founded that the unavailability of interactive multimedia e-book teaching materials in schools was the reason teachers did not use them in science learning. Based on interviews it was also known that one of the teachers at SMP Negeri 6 Yogyakarta had used an interactive multimedia e-book type product online, but now the product could not be used because the website was already inaccessible. Other information obtained from the interview is that at SMP Negeri 6 Yogyakarta, there is a complete computer laboratory facility that not yet utilized for science learning. The existence of computer facilities that support it is indeed very possible to use interactive multimedia e-books in learning science. All teachers who are given a questionnaire also agreed that if in science learning using interactive multimedia e-books. Students also give a positive response where as much as 80% of students agree with the use of interactive multimedia e-books in science learning. Based on research [23], the use of interactive multimedia e-books in learning can improve student learning outcomes, interests, and motivation. The development of interactive multimedia e-books is also expected to increase students' curiosity.

4. Conclusion

Based on the results of the analysis of the needs of students and teachers, it can conclude that students and teachers need an interactive multimedia e-book based on the local potential of *gamelan* to increase student curiosity.

References

- [1] Ghavifekr S and Rosdy W A W 2016 *International Journal of Research in Education and Science* **1** 175 <https://doi.org/10.21890/ijres.23596>
- [2] Harsono Y M 2007 *TEFLIN Journal* **18** 169 <https://doi.org/10.15639/teflinjournal.v18i2/169-179>
- [3] Ebied M M A and Rahman S A A 2015 *Journal of Education and Practice* **6** 75
- [4] Vassiliou M and Rowley J 2008 *Library Hi Tech* **26** 360 <https://doi.org/10.1108/07378830810903292>
- [5] Nurchaili 2016 *Libria* **8** 204
- [6] Nguyen N 2015 *International Journal of Learning, Teaching and Educational Research* **11** 77
- [7] Embong A M, Noor A M, Hashim H M, Ali R M and Shaari Z H 2012 *Cyprus Int. Conf. on Educational Research (Kyrenia)* vol 47 (Amsterdam: Elsevier) p 1802–9 <https://doi.org/10.1016/j.sbspro.2012.06.903>
- [8] Marczak M 2013 *The Journal of Teaching English with Technology* **13** 35
- [9] Wilujeng I, Prasetyo Z K and Suryadarma I G P 2017 *Int. Conf. on Research, Implementation, and Education of Mathematics and Science (Yogyakarta)* vol 1868 (New York: AIP Publishing) p 2 <https://doi.org/10.1063/1.4995189>
- [10] Wilujeng I and Suryadarma I G P 2017 *Int. Conf. on Learning Innovation (Malang)* vol 164 (Paris: Atlantis Press) p 17–21 <https://doi.org/10.2991/icli-17.2018.4>
- [11] Susanti, Prasetyo Z K and Wilujeng I 2017 *International Journal of Environmental and Science Education* **12** 1817–27
- [12] Jumriani J and Prasetyo Z K 2017 *European Journal of Engineering and Formal Sciences* **1** 6 <https://doi.org/10.26417/ejef.v1i1.p6-16>
- [13] Ferdiansyah F 2010 *Mengenal secara mudah dan lengkap kesenian karawitan (Gamelan Jawa)* (Yogyakarta: Garailmu) chapter 2 pp 28
- [14] Ostroff W L 2016 *Cultivating curiosity in K-12 classrooms* (Virginia: ASCD) pp 3
- [15] Pluck G and Johnson H 2011 *Education Science and Psychology* **2** 24 <https://doi.org/10.1017/CBO9781107415324.004>
- [16] Lindholm M 2018 *Science and Education* **27** 987 <https://doi.org/10.1007/s11191-018-0015-7>
- [17] Raharja S, Wibhawa M R and Lukas S 2018 *Polyglot: Jurnal Ilmiah* **14** 151 <https://doi.org/10.19166/pji.v14i2.832>
- [18] Hayumuti, Paranimmita R and Setyo G 2014 *Prosiding Seminar Nasional KSDP Prodi S1 PGSD (Malang)* (Malang: UM) p 118
- [19] Arnone M P, Small R V, Chauncey S A and McKenna, H P 2011 *Educational Technology Research and Development* **59** 181–98 <https://doi.org/10.1007/s11423-011-9190-9>
- [20] Putry A A, Warsono, Supahar, and Jumadi 2018 *Proc. Int. Conf. on Research, Implementation, and Education of Mathematics and Science (Yogyakarta)* vol 1097 (Bristol: IOP Publishing) p 1-10 <https://doi.org/10.1088/1742-6596/1097/1/012014>
- [21] Mahajan M and Singh M K S 2017 *Journal of Humanities and Social Science* **22** 65–7 <https://doi.org/10.9790/0837-2203056567>
- [22] Rosyida E 2016 *English Education: Jurnal Tadris Bahasa Inggris* **9** 43-4
- [23] Hsiao C C, Tiao M M and Chen C C 2016 *BMC Medical Education* **16** 1-8 <https://doi.org/10.1186/s12909-016-0816-9>

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