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Research Article

Developing an Interactive Multimedia Innovation Based on Android Using the Smart Apps Creator 3.0 as Teaching Material for Buffered Solution Course

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Abstract.

The use of interactive multimedia using Android in chemistry learning materials will make the process of learning more effective, efficient, and interesting. This study focused on developing interactive multimedia using the help of the Smart Apps Creator 3.0 software to improve student learning. This research follows the 4D model development research (Define, Design, Develop, Disseminate). The research sample consisted of 25 students of class XI in a senior high school Grade. The results showed that the interactive multimedia based on Android developed was related to BSNP, with an average acquisition of an eligibility test from a material expert of 3.80 and the average eligibility of a media expert of 3.81 on a scale of 4.00. The learning outcomes of students who were taught using Android-based interactive multimedia were in the high category with an N-Gain value of 0.71, and the learning outcomes obtained by students were higher than the KKM value set at school of 75. These results indicated that this Android-based interactive learning multimedia was appropriate to use as buffered solution material for the high school teaching and learning processes.

Keywords: interactive multimedia, android, chemistry, learning materials

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1. INTRODUCTION

Teachers as educators in addition to having professional competence must also have the three skills of the new literacy movement. Teachers who have technological literacy skills will have an impact on the ability to use information and communication technology (ICT) as a means of supporting the teaching and learning process. Learning that integrates ICT in the teaching and learning process will make learning more attractive, effective and efficient [1]. ICT which is integrated in the teaching and learning process can be used as a learning resource and learning media [2]. The use of technology

as a medium of learning in the teaching and learning process can help teachers communicate and interact with students both inside and outside the classroom [3].

The integration of ICT in the teaching and learning process can change the paradigm of the role of the teacher who is only a teacher into a facilitator, collaborator, mentor, trainer and instructor who can provide great choice and responsibility to students to experience learning events, so that students expect. will be more active in the teaching and learning process. To give the importance of the role of ICTs in the teaching and learning process, teachers must have the skills to use ICT in developing learning media that lead to interactive multimedia. It can make learning more effective, efficient, and attractive by presenting and combining text, sound, images, animation, audio and video. The use of interactive multimedia in the teaching and learning process can make it easier for students to understand abstracted chemistry. The development of interactive multimedia android which was tested was given a very good response by students with an average of 98.08% [4]. The acquisition of a high average value of student responses is due to the application of the interactive multimedia android developed which makes it easier for students to learn chemistry.

Mobile internet or mobile learning (m-learning) is a multimedia that is starting to develop in the world of education today [5] which can be used in smartphones that have an Android operating system. The advantages of Android-based learning is not only to be used as a source of independent learning but also learning media that can be accessed by users anytime and anywhere without being limited by space and time [6].

Most of students who study at the high school Grade have smartphones that have an Android operating system. Unfortunately, the use of smartphones for students has not been used optimally for learning because smartphones are only used as a means of communication, playing games and exploring various social networking sites. Those are showed by the results of interviews with chemistry subject teachers, students are prohibited from bringing smartphones to school.

Activities carried out in the form of efforts to convert smartphones by students to support the teaching and learning process are expected to change negative views on smartphone use. Students who use smartphones will help teachers in teaching a lot of chemistry, but the learning time is available in limited classes. The completeness of the teacher in teaching chemistry with the help of smartphones is expected to have an impact on the acquisition of high learning outcomes by students.

Many supporting software has been used by previous researcher in developing Android-based interactive multimedia, such as Adobe Flash [7], Android Studio version

3.5 Integrated Development Environment (IDE) with the Java programming language [8][9] and others. Based on the researcher's observations, Smart Apps Creator 3.0 (SAC) is still rare to use in helping to develop interactive multimedia. Therefore, researcher is interested in developing Android-based interactive multimedia on buffered solution material using the Smart Apps Creator 3.0 (SAC) software. The use of SAC has several advantages, including being able to develop interactive multimedia based on Android without using programming language [10] which is very suitable for researcher who do not understand programming language. This study aims to obtain android-based interactive multimedia that meets the eligibility standards of the National Education Standards Agency (BSNP) which can improve student learning outcomes.

2. RESEARCH METHOD

The type of research used in this research is development research (R&D) using the 4 D model (Define, Design, Develop, and Disseminate) [11], as a stage in developing android-based interactive multimedia on buffered solution material. Android-based interactive multimedia was developed using the help of the Smart Apps Creator 3.0 software which was tested on 25 students.

The data collection techniques used were direct observation, interviews, questionnaires and learning outcomes tests, which were analyzed using descriptive statistical data analysis techniques which included the average score of the eligibility test by material and media experts and the average score of learning outcomes. In addition, inferential statistical data analysis techniques are also used, namely the t-one sample test using the SPSS 22 for Windows program, after completing the prerequisite test, called the normality test.

3. RESULTS AND DISCUSSION

In the development of Android-based interactive multimedia, research stages are used in accordance with the 4-D model (Four-D Models) which includes the stages of define, design, develop and disseminate. The following is an explanation of the stages of developing Android-based interactive multimedia on the buffered solution material.

3.1. Defining Session

Defining session need to be carried out to obtain initial data that can be used as a reference in developing Android-based interactive multimedia which includes needs analysis, concept analysis, task analysis and formulation of learning objectives. Currently SMAN 1 ABDYA has implemented the offline learning process with the lesson hours for each meeting reduced to 30 minutes / lesson hour. Based on the results of interviews with Chemistry subject teachers, information was obtained that SMAN 1 ABDYA really needs Android-based interactive multimedia because the use of instructional media can help teachers complete the delivery of a lot of chemical material but the learning time is limited and can make chemistry learning more interesting. In addition, the interactive multimedia based on android developed is also very suitable for schools implementing online learning during the Covid-19 pandemic.

Concept analysis is needed to obtain information about the sequence of learning concepts in the buffered solution material, determine the learning methods and approaches that are in accordance with the characteristics of the concept, and determine the level of concept attainment that is expected to be mastered by students.

Task analysis is carried out by referring to the results of the concept analysis as well as the core competencies and basic competencies contained in the syllabus. Based on the results of the task analysis, the assignments assigned to students consisted of 10 multiple choice practice questions which could be used interactively and the assignment of making practicum reports with the report format contained in interactive multimedia based on android. And learning objectives are formulated based on the basic competencies contained in the revised 2013 curriculum syllabus.

3.2. Design Session

The interactive multimedia design based on android that will be developed is made in the form of a historyboard and storyboard. Making a historyboard is intended so that the product being developed has a clear flow so that it can facilitate the development process. While making storyboards aims to describe the media as a whole which is used as a guide in making media [12].

In addition, the interactive multimedia based on android that will be made must use an attractive display designed by choosing the appropriate color, which can make students interested in using it. The design that researcher use in making Android-based interactive multimedia is made by yourself using the help of the CorelDRAW X7 software

and is also downloaded on the freepik.com site. Freepik is one of the leading microstock agencies and search engine for vector designs, photo illustrations and free templates.

The interactive multimedia design based on android that will be developed will contain learning material regarding the buffered solution with the contents of the material referring to the results of concept analysis by looking at the suitability of the material content with the learning objectives to be achieved in the buffered solution material. In addition, there will also be animations that serve to explain abstract concepts, learning videos taken from YouTube, practicum, and interactive evaluations.

3.3. Development Session

Android-based interactive multimedia development on buffered solution material using the Smart Apps Creator 3.0 software is packaged in the form of an android application (apk.) which contains learning material and objectives, concept maps, animation, video, practicum, sample questions and interactive evaluation.

The interactive multimedia that has been developed will be tested for its eligibility by material and media experts, then revisions are made until the product is eligible and can be used as a learning medium for the buffered solution material. The eligibility criteria for a media are obtained from the average score of the valid expert which is converted according to the eligibility conversion table to determine the eligibility level of a learning media [13].

Material expert validation

Material validation was carried out by a Chemistry Education lecturer and teacher using a eligibility questionnaire instrument based on the National Education Standards Agency (BSNP). The aspects that will be tested to predict the eligibility of a media consist of the eligibility of content, language and presentation.

The content eligibility aspect consists of 5 components include material coverage (1), accuracy (2), finesse (3), fostering the productive character of students (4) and designing curiosity (5). The data on the results of the assessment by material experts on the eligibility of the content in detail are shown in Figure 1.

Based on Figure 1. the average eligibility test by lecturers and teachers for the aspect of content eligibility is 3.65 which is included in the very eligible category.

The language eligibility aspect consists of 6 components include suitability with the development of learners (1), communicative (2), dialogical and interactive (3), straightforward (4), coherence and concordance of thought lines (5), as well as the use of the

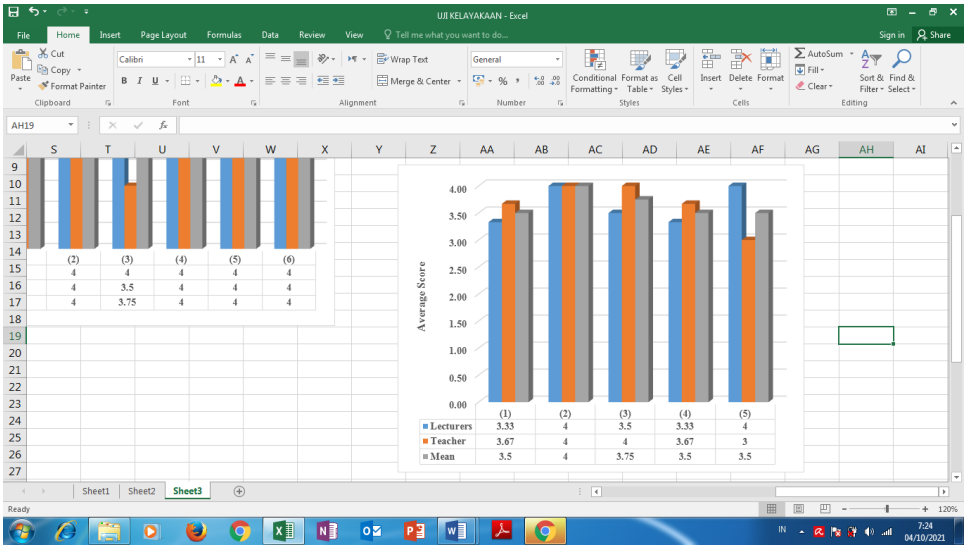

Figure 1: Content eligibility test results by material experts.

term symbols and symbols (6). The data on the results of the assessment by material experts on the eligibility of language aspects in detail are shown in Figure 2.

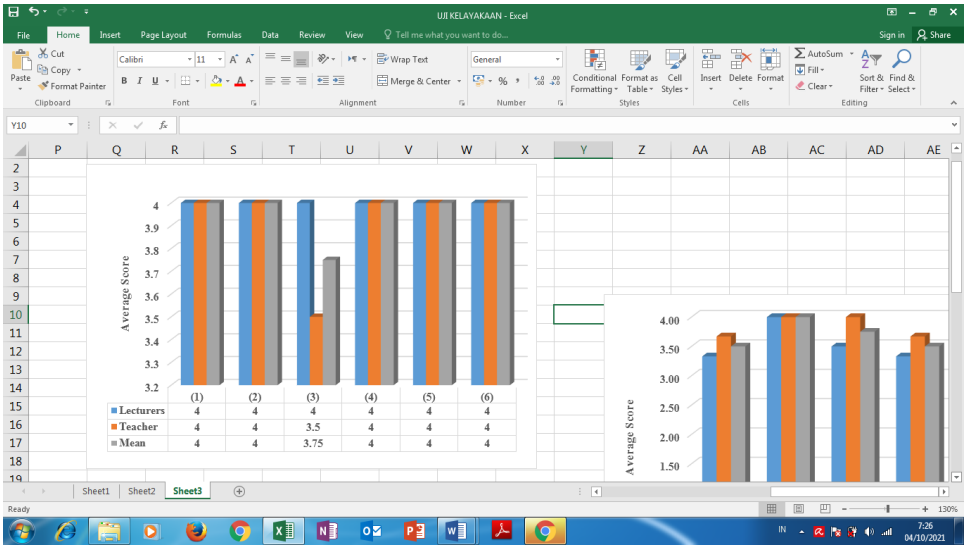

Figure 2: Language eligibility test results by material experts.

Based on Figure 2. the average eligibility test by lecturers and teachers for the aspect of language eligibility is 3.95 which is included in the very eligible category.

While the aspect of the eligibility of the presentation consist of 3 components includes media display design, visual and video display and audio and media operation. The data on the results of the assessment by material experts on the eligibility of presentation in detail are shown in Figure 3.

Based on Figure 3. the average eligibility test by lecturers and teachers for the eligibility aspect of presentation is 3.81 which is included in the very eligible category.

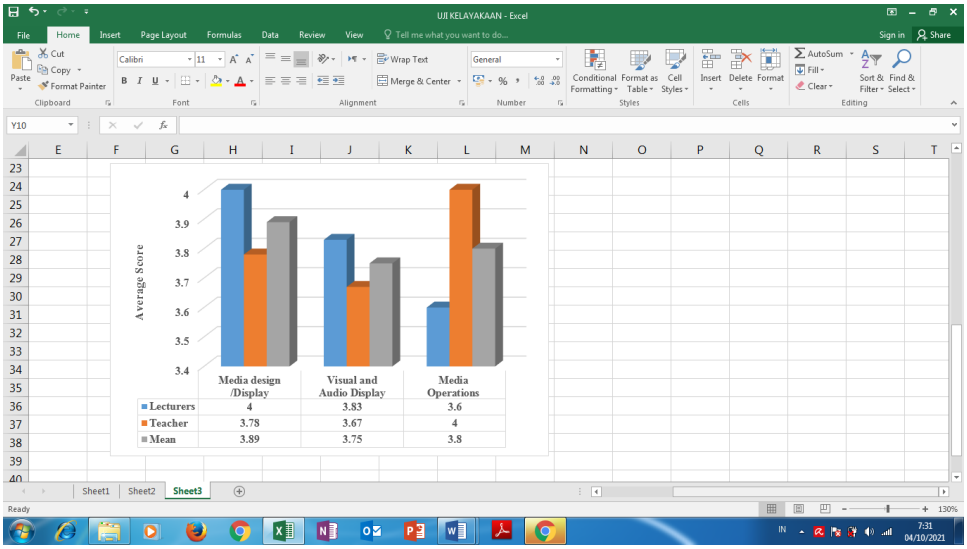

Figure 3: Results of eligibility test for presentation by material experts

Media expert validation

The media expert's assessment is carried out by someone who is an expert in the fields of multimedia development, system analysis and knowledge management. The media expert's assessment is focused on the eligibility aspect of presentation which consists of 3 components which include; design / display, media and visual operations. The detailed assessment data by media experts is shown in Figure 4.

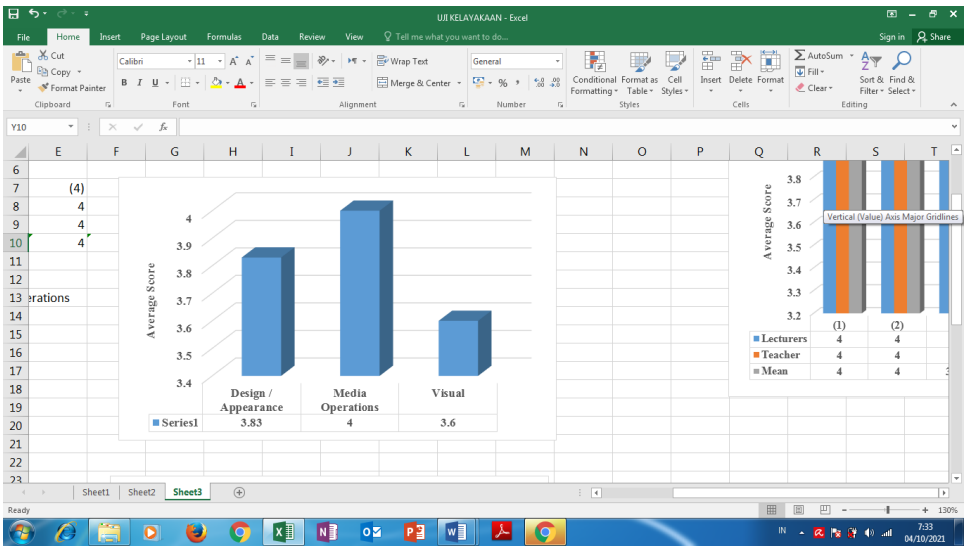

Figure 4: Eligibility test results by media experts.

Based on Figure 4. the average eligibility test by media experts for the design / display component is 3.83 which is in the very eligible category, for the media operating component there are 4 which are included in the very eligible category, and for the visual component 3.6 also included in the very decent category. While the average for

all components is 3.81, so it can be concluded that the results of the eligibility analysis by media experts are very eligible to be applied with some suggestions and input given.

3.4. Disseminate Session

Interactive multimedia that has been revised and is eligible to be tested is implemented in chemistry learning of buffered solution material in class XI Semester II SMA Negeri 1 ABDYA by distributing interactive multimedia based on android to tablets owned by schools and smartphones owned by students. Android-based interactive multimedia distribution is carried out by sending android-based interactive multimedia files in the form of apk. using Bluetooth or sending the file to the WhatsApp group that was created before learning began, then the students installed interactive multimedia based on Android guided by the researcher.

The use of interactive multimedia based on android in chemistry learning aims to improve student learning outcomes by fulfilling the KKM values set by the school. Student learning outcomes are measured by first giving a pretest before the implementation of Android-based interactive multimedia which aims to measure students' initial understanding of the material to be taught and then at the end of the learning is given a posttest which aims to measure student learning outcomes after being taught using interactive multimedia based on android. The increase in student learning outcomes is measured by determining the N-Gain value (normalized Gain) obtained by each student, the results are presented in Table 1.

Table 1: Data on the n-gain value of students' learning outcomes.

Number of Students	Average value		N-Gain	Classification
	Pretest	Posttest		
25	26.4	79.2	0.71	High

Furthermore, to measure the learning outcomes of students whether or not the KKM value set by the school can be measured by using the one sample t test using SPSS which previously carried out the prerequisite test first, namely the normality test. After the data is normally distributed, then the hypothesis can be tested using the one sampel t test using SPSS. The results of the one-sampel t test output test using SPSS are seen in Table 2.

Based on the results of the one sample t test, the sig value is obtained. = 0.028 <0.05, then H0 is rejected and Ha is accepted, so it can be concluded that the learning outcomes of students after the application of interactive multimedia based on android

Table 2: The results of the one-sample t-test.

	Test Value = 75					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Learning outcomes	2.339	24	.028	4.200	.49	7.91

development results can meet the KKM standards that have been set in schools, namely 75.

This research has succeeded in developing interactive multimedia based on android on chemistry learning which is eligible to be applied to the buffered solution material in class XI semester II in accordance with BSNP standards. Based on the results of the needs analysis carried out, interactive multimedia based on Android is very suitable to be used as a medium in learning chemistry on buffered solution material. The use of android-based interactive multimedia on buffered solution material helps teachers deliver a lot of material but the time available is limited. Android is a prospective technology in the future that can be used as a learning medium because it has high flexibility and portability, so the use of android in chemistry learning will help students understand the abstractness of chemistry to be more concrete and easier to understand [14].

The advantage of developing interactive multimedia based on Android using the help of Smart Apps Creator 3.0 software is that it is easy to use without the need to understand programming languages and the products to be produced are also very good and very easy to implement. The results of the eligibility test for interactive multimedia based on android that have been developed obtained an average of 3.80 material expert eligibility test which is stated to be very valid for use with some of the suggestions and input given. while the average media expert eligibility test was obtained at 3.81 which was stated to be very valid to use with several suggestions and inputs. After revising some of the suggestions and input given by experts, Android-based interactive multimedia can be distributed to each student to be implemented in learning chemistry of buffered solution material.

The distribution of android-based interactive multimedia to each student to be implemented in chemistry learning of buffered solution material is carried out by sending android-based interactive multimedia files in the form of apk. with a capacity of 52.43 MB using Bluetooth or sending the file to the WhatsApp group, then students install themselves on their respective smartphones guided by researcher. The implementation

of interactive multimedia based on android in chemistry learning of buffered solution material can improve student learning outcomes by fulfilling the KKM value set by the school of 75.

The increase in student learning outcomes is measured by looking at the *N-Gain* value obtained, which is 0.71 which is included in the high category. The acquisition of a high increase in student learning outcomes was also followed by the fulfillment of the KKM value set by the school, namely 75 because the results of the one sample t test obtained the sig value. = 0.028 <0.05, then H0 is rejected and Ha is accepted, so it can be concluded that the learning outcomes of students after implementing Android-based interactive multimedia development results are higher than the KKM standards that have been set in schools, namely 75, with an average posttest score of students. amounted to 79.2. Similar results were also obtained by Humaira, Muchtar and Sitorus in 2020 with the title "The Development of Android-Based Interactive Multimedia for High School Students". It was found that the use of interactive multimedia based on android developed could improve student learning outcomes by looking at the *N-Gain* value. The gain was generated from the pretest and posttest learning outcomes data [8]. Student learning outcomes that are taught with interactive multimedia that have been developed have increased because this multimedia is equipped with material that includes learning objectives to be achieved, learning videos, interactive question exercises, tryouts and experimental buffers. In addition, the use of instructional media can increase students 'interest in the material being taught [15], which can increase students' curiosity about the learning material being taught [16].

4. CONCLUSION

Smart Apps Creator 3.0 is a tool for developing interactive multimedia based on Android that is easy to use and the resulting product is very easy to apply, which can be used as an interesting learning medium for learning chemistry that can improve student learning outcomes. The interactive multimedia based on android that has been developed is very suitable for use as a learning medium in the buffered solution material so that learning is more interesting and the teacher can complete the teaching material.

References

[1] Myori DE, Chaniago K, Hidayat R, Eliza F, Fadli R. Peningkatan kompetensi guru dalam penguasaan teknologi informasi dan komunikasi melalui pelatihan

pengembangan media pembelajaran berbasis android: Jurnal Teknik Elektro dan Vokasional. 2019; 5(2):102.

[2] Anshori S. Pemanfaatan tik sebagai sumber dan media pembelajaran di sekolah. Civic-Culture: Jurnal Ilmu Pendidikan PKn dan Sosial Budaya. 2007:10-20.

[3] Anshori S. Pemanfaatan teknologi informasi dan komunikasi sebagai media pembelajaran. Civic-Culture: Jurnal Ilmu Pendidikan PKn dan Sosial Budaya. 2018; 9924:88–100.

[4] Amaliyah L, Irwansyah FS, Windayani N, Ramdhani MA. Design of android interactive multimedia for the concept of aromatic compound. MATEC Web of Conferences. 2018; 197:1–4. https://doi.org/10.1051/matecconf/201819716004.

[5] Santoso G, Susanto A, Wardani B. Santoso, perancangan konten m-learning dengan sistem live multimedia berbasis selular perancangan konten m-learning dengan sistem live multimedia berbasis selular. J Teknol. 2009; 2:124–9.

[6] Tamhane KD, Khan WT, Tribhuwan SR, Burke AP, Take SB Mobile learning application. International Journal of Scientific and Research Publications. 2015;5(1).

[7] Prabowo A, Anggoro RP, Adiyanto R, Rahmawati U. Interactive multimedia-based teaching material for trigonometry. Journal of Physics: Conference Series. 2018;1097(1). https://doi.org/10.1088/1742-6596/1097/1/012138.

[8] Humairah N, Muchtar Z, Sitorus M. The development of android-based interactive multimedia for high school students. Presented at the (2020). https://doi.org/10.2991/assehr.k.201124.027.

[9] Puspa VR, Hidayat T, Supriatno B. Development of android-based digital determination key application (e-KeyPlant) as learning media for plant identification. Journal of Physics: Conference Series. 2021;1806(1). https://doi.org/10.1088/1742-6596/1806/1/012145.

[10] Khasanah K, Muhlas M, Marwani L. Development of e-learning smart apps creator (sac) learning media for selling employees on paid tv. Akademika. 2020;9(02):129–43.

[11] Thiagarajan S, Semmel DS, Semmel MI. Instructional development for training teachers of exceptional children: a sourcebook. Minnesota: ERIC; 1974. p. 103.

[12] Waryanto NH, Storyboard dalam media pembelajaran interaktif. 2005.

[13] Lestari SR, Silaban R. Development e-teaching material based moodle web. Journal of Physics: Conference Series. 2021.

[14] Susilawati W. Improving students' mathematical representation ability through challenge-based learning with android applications. Journal of Physics. Conference Series; 2020. https://doi.org/10.1088/1742-6596/1467/1/012010.

[15] Domingo MG, Garganté AB. Exploring the use of educational technology in primary education: Teachers' perception of mobile technology learning impacts and applications' use in the classroom. Computers in Human Behavior. 2016;56.

[16] Nurfajriani, Nasution Z. Pengaruh software macromedia flash pada pembelajaran dengan model kooperatif tipe team assisted individualization terhadap hasil belajar kimia siswa pada pokok materi termokimia. 2015;7(3):18-24.