VALIDITY OF MOBILE LEARNING-BASED LEARNING MEDIA ON SMARTPHONES HYDROCARBON MATERIALS

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ABSTRACT

This research was aimed to develop learning media, as well test the level validity of mobile learning based learning media on hydrocarbon material smartphones. This development research uses the smart apps creator software and the canva application. This research used the Research and Development (R&D), with the ADDIE development model. In this study focused on the media development stage/development stage. The research subjects were one chemistry teacher and 35 students in class XI MIPA SMA Negeri 4 Tanjungpinang. The results of media validation in the development of mobile learning based learning media on smartphones on hydrocarbon material obtained a result of 68.75% with valid criteria and the results of material validation obtained a value of 89.28 % with very valid criteria. Based on the research that has been done, it can be concluded that mobile learning based learning media on hydrocarbon material smartphones is valid so it is suitable for use in chemistry learning.

ABSTRAK

Penelitian ini bertujuan untuk mengembangkan media pembelajaran, sekaligus menguji tingkat validitas media pembelajaran berbasis *mobile learning* pada *smartphone* materi hidrokarbon. Penelitian pengembangan ini menggunakan *software smart apps creator* dan aplikasi *canva.* Penelitian ini menggunakan *Research and Development* (R&D), dengan model pengembangan ADDIE. Pada penelitian ini difokuskan pada tahap pengembangan media/tahap *development*. Subjek penelitian adalah satu orang guru kimia dan 35 siswa kelas XI MIPA SMA Negeri 4 Tanjungpinang. Hasil validasi media dalam pengembangan media pembelajaran berbasis *mobile learning* pada *smartphone* pada materi hidrokarbon diperoleh hasil sebesar 68,75% dengan kriteria valid dan hasil validasi materi diperoleh nilai sebesar 89,28% dengan kriteria sangat valid. Berdasarkan penelitian yang telah dilakukan dapat disimpulkan bahwa media pembelajaran berbasis *mobile learning* pada *smartphone* materi hidrokarbon sudah valid sehingga layak digunakan dalam pembelajaran kimia.

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INTRODUCTION

Learning chemistry in the form of theories, chemical concepts and having different characteristics from other disciplines in the field of science is one of the triggers for difficulties faced in the chemimstry teaching and learning process (Nazariati *et al*, 2022). Moreover, in the teaching and learning process teachers only convey learning orally and the teacher's lack of competence in using appropriate learning media, results in students' lack of understanding of concepts (Sariati *et al*, 2020). Media has an important role in learning, because without media the teaching and learning process does not run smoothly (Widiadi, 2016).

Based on the observations results at SMA Negeri 4 Tanjungpinang, it was found that in the teaching and learning process teachers had not maximized the use of learning media, both non-electronic and electronic media. Teachers usually only use non-electronic media, such as print media/package books and whiteboards without any other supporting media. This causes students' daily test results to be low/not meeting the Minimum Completeness Criteria scores bar set up by schools.

In the teaching and learning process, teachers play a more active role as facilitators. One of the teacher's responsibilities is to provide students with learning tools that suitable with student needs and current developments. The world of education has also adapted to the use of technology. The focus of education has shifted from teachers to students as a result of increasing the use of technology in teaching (Syahnaz, 2019). The process of receiving material when studying cannot be maximized if you only rely on printed books and teacher limitations regarding media

use. So, this can open up opportunities to develop learning media with the latest information technology as an effective solution. One of the learning innovations in the use of technology is mobile learning (Sanjaya, 2018).

Mobile learning is a form of utilizing information and communication technology as an interactive learning medium in the learning process, so that the student learning process is expected to be more interesting and not limited by space and time (Yuliani, 2010). Mobile learning utilizes mobile devices, and more spefically is a smartphone. Utilizing mobile learning on smartphones can be used as an effective and efficient learning medium and learning will feel more interesting because learners not only using textbooks as a learning resource but also will provides with more initeractive platforms. Because of its flexible nature, this mobile learning media can also be used for learning in the classroom or outside the classroom and school schedules (Adriani & Sabekti, 2018).

Relevance, usefulness, attractiveness and usefulness are the four most important characteristics of good learning media (Mulyanta, 2009). The more interesting and useful a media is used, the more relevant the media is. The media used in the teaching and learning process can be a tool to overcome educators' limitations in delivering material and teaching time constraints (Yektyastuti & Ikhsan, 2016).

Based on the description above, this research is interested in developing mobile learning-based learning media on smartphones for hydrocarbon material that is in accordance with the competencies and curriculum used and is practical and efficient so as to overcome the problems that exist in chemistry learning, especially in

hydrocarbon material. However, to develop learning media that is suitable for use, it is necessary to assess the validity of the media. Validity of the media aims to determine the level of validity of the media being developed, so that it can make it easier to understand the concept of the material and its use in chemistry learning. The aim of this research is to determine the validity of developing mobile learning-based learning media on smartphones with hydrocarbon materials.

METHODS

This research is development research or Research and Development (R&D) design. Research and development (R&D) is a type of research that can be used to produce a product in a certain field and test the effectiveness of the resulting product (Sugiyono, 2019). The research and development model used in this research is the ADDIE model. This research focuses on the learning media development stage or development stage. Even though the development procedure is shorter, it includes a testing and revision process to ensure that the product being developed meets the criteria for a good product, has been empirically tested and does not contain errors. It should be understood that the development process requires a lot of testing and revision (Zahroh & Sudira, 2014).

The mobile learning-based learning media on smartphones that developed hydrocarbon material was tested for its level of validity. The assessment of the quality of learning media was carried out by one media expert and one material expert from the Chemistry education lecturer at Raja Ali Haji Maritime University. The validity test by media experts was carried out once, while the validity test by material experts was carried out twice. The types of data in the research are qualitative data and quantitative data by analyzing and processing data in the form of percentages obtained from assessing the validity of learning media from media experts and material experts. To find out the criteria for assessing the level of validity are presented in Table 1.

Table 1. Validity Assessment Criteria

No	Percentage	Information
1	81,26% - 100%	Very valid and can be used without making revisions.
2	62,51% - 81,25%	Valid or usable but needs to make minor revisions
3	43,76% - 62,50%	Invalid, it is recommended not to use it because it requires major revisions
4	25,00% - 43,75%	Very invalid and should not be used

Source : Sugiyono (2019)

RESULT AND DISCUSSION

The media developed in this research is based on mobile learning on hydrocarbon material smartphones. Hydrocarbon material is one of the learning materials that introduces various organic chemical compounds which are composed of Carbon (C) and Hydrogen (H) atoms. The media includes almost all hydrocarbon materials such as the characteristics of C atoms, types of C atoms, alkanes, alkenes, alkynes and isomers of hydrocarbon compounds. Apart from containing explanations of the material, the media also contains learning videos and practice questions that students can work on after understanding the material. The colors on the media are quite attractive and the explanations on the media are easy to understand. The results of the development of mobile learning-based learning media on smartphones are as follows.
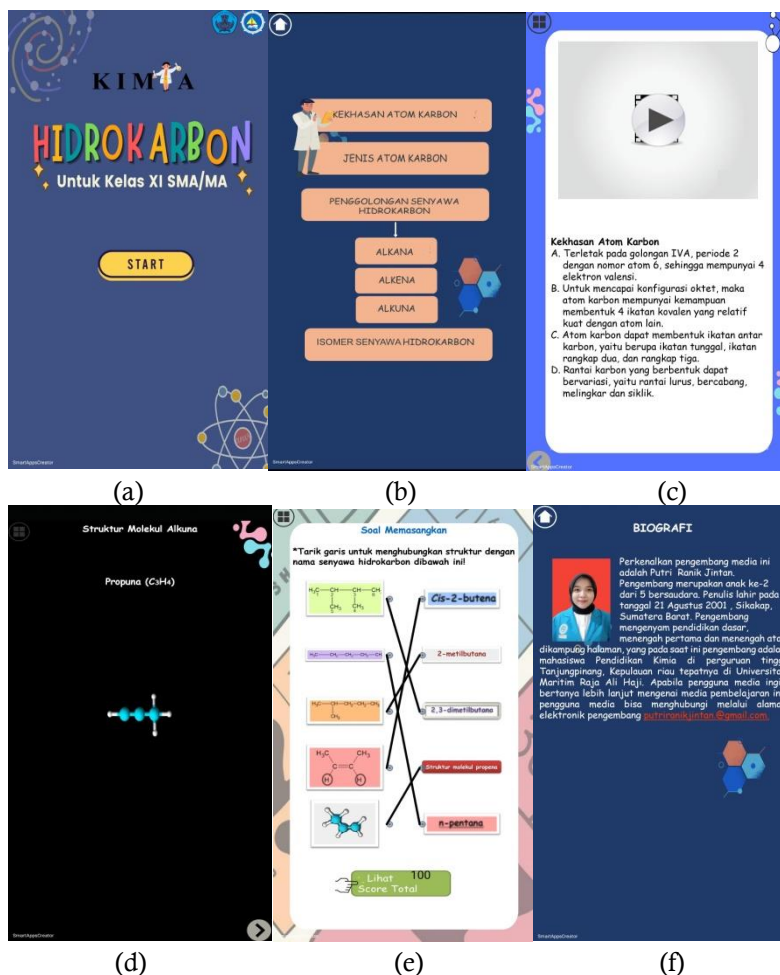
Figure 1. (a) Initial media display; (b) Display of the BC/IoCA menu; (c) Display of the material menu; (d) Display of the molecular structure menu; (e) Display of the evaluation menu; (f) Display of the media developer profile

Before being tested on students, the media was validated first by one media expert and one material expert, each of whom is a chemistry education lecturer who is an expert in the field of chemistry learning. Product validation is an important part of a number of research methods, both qualitative and quantitative. Validators provide suggestions and comments during the validation process, so that the media is revised in the learning media parts that need to be created. This validation aims to determine the level of suitability of the learning media being developed.

Media Validation

In the validation process, criticism, suggestions and input were obtained from media experts. The media validation results are presented in Figure 2.
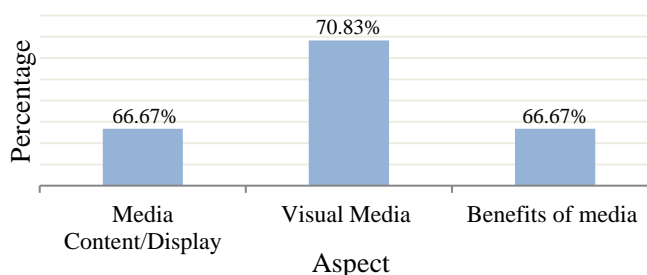

Figure 2. Media Validation Results

Overall, the validation results for mobile learning-based learning media by media experts were 68.75%, which is included in the valid/usable criteria but requires minor revisions. Media validation is carried out by paying attention to three aspects of assessment, namely media presentation/content, media visuals and media benefits. In the media presentation/content aspect, the percentage was 66.67%, which is considered valid criteria. This shows that the media has instructions for using the media, the media programming flow is easy to use and the programming flow is simple, making it easier for users to access the media. This is in accordance with what Wulandari (2018) stated that a media product must have simple operations, so that users do not have difficulty operating the product.

The visual aspect of media obtained a percentage of 70.83%. The visual aspect of media can be seen that the material is arranged systematically, the appearance/background color is attractive, the placement, suitability and clarity of the material images, audio-visual suitability, as well as the ease of the writing to be read and the size of the writing used is appropriate so that it can be seen clearly when used. This is in accordance with research by Sugiharni (2018) that media that has a clearly visible graphic display can aid understanding, thus helping users remember the information they have learned.

The media benefits aspect obtained a percentage of 66.67%, which includes valid criteria but requires minor revisions. This shows that the media can arouse students' interest in learning, the media can be used independently and the media is easy to understand. In accordance with the opinion of Rasyid *et al* (2016) that the use of learning media at the teaching orientation stage will significantly increase the efficiency of the learning process and delivery of lesson content. Apart from arousing students' interest in learning, learning media can help students learn independently according to their learning abilities.

Material Validation

In the first validation the material overall got a score of 64.28% with valid criteria but required minor revisions and the results of the second validation overall got a score of 89.28% with very valid criteria. The results of material validation can be seen in Figure 3.
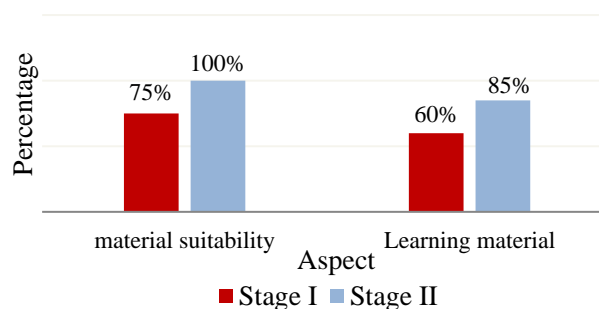

Figure 3. Material validation results

The material validation assessment was carried out by paying attention to two aspects. It can be seen that in stage I of the material validation of the two assessment aspects, there is one aspect that is invalid, namely the subject matter aspect which received a score of 60%, so it requires a minor revision. According to Arsyad (2019) the media must support material that is facts, concepts, principles and

generalizations. However, not all material can be presented clearly through learning media, some material must be presented in concepts or symbols or something more general and then include an explanation. The learning media chosen must be adjusted to the students' abilities and needs when presenting the content of the material. From the results of the first validation that was carried out on learning media, improvements were made according to suggestions and input from the validator. After repairs/revisions have been made, revalidation/phase II validation is carried out.

The overall results of the second validation obtained a score of 89.28% with very valid criteria that can be used without revision. The validation percentage of the content suitability aspect increased after improvements from 75% to 100% with very valid criteria. This is an assessment of Basic Competencies, Indicator of Competences Achievement (IoCA) and learning objectives. The content suitability aspect assessment shows that the material presented in the media is in accordance with the basic competencies contained in the applicable curriculum. In line with Arsyad's (2019) research, the choice of learning media should be based on learning objectives. Learning materials must comply with the instructions and not deviate from the learning objectives. Learning media can not only influence students' cognitive aspects, but can also influence other aspects.

The second aspect, namely the learning materials, experienced an increase after improvements were made from a score of 60% with invalid criteria to 85% with very valid criteria that can be used without revision. This is an assessment of the correctness, clarity and consistency of the material presented in the media, the ease of the material to be understood, the availability of examples of questions and conclusions, as well as the suitability of the images displayed with the material in the media that are appropriate and can be understood by users. According to Arsyad (2019) conformity with theory and material must be the basis of learning media. The choice of media is not due to teacher fanaticism towards the media that is considered the most preferred, but rather in accordance with theories that have been proven to be true.

The overall evaluation of the validity of mobile learning-based learning media on smartphones with hydrocarbon material based on the validator team's assessment can be seen in Table 2.

Table 2. *Mobile* based learning media assessment results

No	Evaluation	Score (%)
1	Media Validation	68.75%
2	Material Validation	89.28%
	Overall Average	79.02%

hydrocarbon material Mobile learning-based learning media on smartphones which was developed based on the assessment of media validation experts and material validation experts obtained percentages of 68.75% and 89.28% with very valid criteria. Apart from that, the overall validator assessment obtained a percentage of 79.02% with valid criteria which shows that the learning media based on mobile learning on smartphones is valid and suitable for use in learning hydrocarbon material.

CONCLUSION

Based on the validation test results from the development of mobile learning-based learning media on smartphones on

hydrocarbon materials by media experts, a percentage of 68.75% was obtained with valid criteria and the results of material expert validation tests obtained a percentage of 89.28% with very valid criteria, so the test results were obtained. The overall validation is 79.02% with valid criteria and is suitable for testing on chemistry teachers and students. For this reason, based on the research results, it can be concluded that the mobile learning-based learning media on smartphones with hydrocarbon material developed is valid for use in the chemistry learning process.

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