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DEVELOPMENT OF A MOBILE APPLICATION MODULE BASED ON MICROLEARNING IN INFORMATICS SUBJECT FOR GRADE VII

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Abstract

Independent learning facilities in Informatics lessons that have not been maximized have resulted in gaps in understanding of class VII students at SMPK Cor Jesu Malang. Conventional modules used as learning media are less effective for kinesthetic learning style students. Microlearning-based mobile application modules are alternative media that can overcome independent learning problems for kinesthetic learning style students. The mobile application module offers an attractive appearance and content, specific learning topics, easy access, multi-platform use (android and IOS), as well as clear guides and tutorials. The purpose of this research is to develop microlearning-based mobile application modules, and to determine the validity and feasibility of media in supporting class VII Informatics learning. This media focuses on learning topics Getting to Know the Functioning of Hardware, Operating Systems, and Applications. The development of mobile application modules adapts the ASSURE model. The validity of the media was tested by media experts and material experts, as well as field trials on students to see their responses to the developed mobile application modules. The mobile application module meets valid criteria based on the results of the percentage of media experts 96.3% and material experts 91.7%. The developed media also received positive responses from the majority of students, so that microlearning-based mobile application modules can be declared valid and feasible as independent learning media for kinesthetic learning style students.

Keywords: Mobile Application Module; Microlearning; Informatics Learning.

1. Introduction

The Industrial Revolution 4.0 (IR4) has resulted in a a massive digital acceleration in all aspects of life. Unlimited computing and data science, the development of...internet of things (IoT), as well as massive digital technology, are creating connectivity between humans and machines. The RI4 era is marked by increasing advances in information technology, communication, connectivity, the development of digital and virtual systems, artificial intelligence, and the convergence of humans and machines (Lase, 2019). This change has an impact on various sectors, including technology and education.

Education in the RI4 era needs to be oriented to keep pace with current developments. The RI4 era offers many attractive opportunities for education, particularly the ease of accessing various types of information services with fast access anywhere and anytime. Technological devices can be used as tools and supports for current educational activities. Educational institutions and educators need to have successful strategies to face the challenges of the RI4 transformation, one of which is by developing a system that adapts to the learning needs of today's students (Shahroom & Hussin, 2018). Learning in the form of digital media (such as text or images) is good online and offline, and aims to increase the effectiveness of teaching, knowledge and personal skills of students (Lin et al., 2017).

Approach heutagogue in line with the current digital revolution, because it combines various approaches that make students feel they have freedom in learning. Heutagogue aims to develop students' capabilities through learning as a proactive system, while students play a key role as agents in independent learning (Blaschke & Hase, 2019). Heutagogue can develop students' skills in expanding the boundaries of attitudes, skills and knowledge independently. Heutagogue is different from learning theory constructivism or behaviorism, but rather an instructional strategy that is centered on the learner (Moore, 2020).

Heutagogueoften referred to as self-determined learning (SDL), where students can determine what they want to learn and how to learn it, and know their needs in learning a particular concept (Hase & Kenyon, 2007). SDL enables online learning with educators. The SDL model emphasizes student independence in the learning process (Raley et al., 2021; Wehmeyer et al., 2012). Use of SDL allows for independent learning activities to occur formally (in class) and informally (outside class).

A module is a medium that supports independent learning (SDL). A module is a collection of learning materials systematically arranged and can be studied independently. The main characteristics of a module are that it contains activity components in the form of learning materials, methods, learning objectives based on core competencies or competency achievement indicators, and instructions for independent learning activities. This allows students to study the module sequentially without a teacher (Rahmawati et al., 2019). The module is mandatory to be used as independent teaching material as a substitute for the role of a teacher in the classroom (Saprudin et al., 2021).

Current technology allows digital modules to be accessed not only via a computer (PC), but can also be accessed using mobile devices such as Android and iOS. Students can learn wherever and whenever they want with digital modules. SDL-based modules center on students as the primary controllers of independent learning activities (Blaschke, 2012). Ease of access to digital modules should not be an obstacle for students in carrying out independent learning activities at this time.

The results of student interviews and teacher consultations at SMPK Cor Jesu Malang on March 13, 2022, indicated that there are still issues related to the use of digital modules as independent learning media in Informatics lessons for grade VII. Examples of problems were encountered in the learning topic "Understanding the Functionality of Hardware, Operating Systems, and Applications." This learning topic covers assembling computer (PC) components, while content in conventional modules can only be presented in the form of text, illustrations, images, and...link only relevant ones. The limitations of these media affect the level of understanding of students, especially those with different learning styles.kinesthetic.

Developing digital modules requires an appropriate approach to provide solutions for students with different learning styles. Kinesthetic require more complex simulations or hands-on activities to be able to understand the learning well (Tarigan et al., 2021). Theory Cone Experience (cone of experience) Edgar Dale, revealed that learning activities that can be presented in interactive digital media (reading, listening, viewing images or diagrams, watching videos or films, watching demonstrations, and discussions) only provide a 50% independent learning experience. Cone Experience adding new notes to conventional digital modules, so that new alternative media are needed that can improve students' independent learning experience to the maximum.

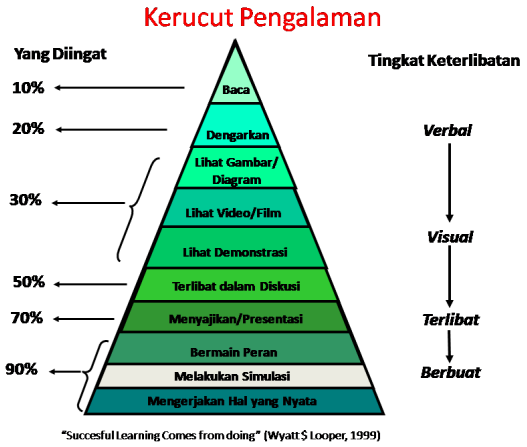

Figure 1. Edgar Dale's Cone of Experience

Microlearning is a suitable method for overcoming independent learning problems. Microlearning is a learning method on a small scale. The content in microlearning is designed into small parts through various types of media, the information contained is made into short content, enables students to quickly understand content, and makes it possible to learn anywhere and anytime via digital devices (Susilana et al., 2022). Microlearning makes the content of the material easier to understand and remember for a long time, besides that microlearning also increases the effectiveness and efficiency of the learning process (Basith & Al-Bari, 2022). Microlearning provides practical and sophisticated solutions to overcome educational problems along with the development and growth of modern technology (Alshehri, 2021).

This research focuses on producing an application module, an applicatione based microlearning in Informatics class VII at SMPK Cor Jesu Malang. Application-based module mobile It can module MobileIt Android and iOS devices and can be accessed comprehensively using an internet connection. Application module development mobile. This is expected to further support student competency and increase interest in learning. Another goal of this development is to facilitate independent learning for students wherever and whenever they wish, thereby achieving learning objectives.

2. Method

This development reTech focuses on developing application modules. mobile based microlearning. The subjects of this study were seventh-grade students at SMPK Cor Jesu Malang who had previously participated in learning about the functions of hardware, operating systems, and applications. Application module development mobile based microlearning This adapts the ASSURE development model. The ASSURE model includes 6 systematic stages, namely: (1) Analyze learners, (2) State objectives, (3) Select methods, media and materials, (4) Utilize media and materials, (5) Require learner participation, (6) Evaluate and revise.

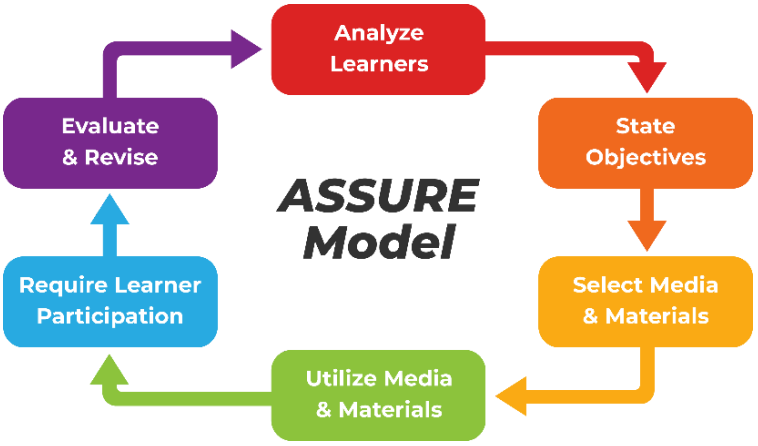

Figure 2. ASSURE Development Model

Development Procedures

2.1. Analyze Learners

The first step in this development was to identify and analyze the characteristics of seventh-grade students at SMPK Cor Jesu Malang. The main objective of this analysis was to identify the gap between the desired abilities, skills, and attitudes of students and their current abilities. The field analysis revealed the need for new alternative learning media that could support independent learning in the material "Understanding the Functionality of Hardware, Operating Systems, and Applications," especially for students with learning styles kinesthetic.

2.2. State Objectives

The second step is to establish specific learning objectives. These objectives are derived from the curriculum, syllabus, information contained in the modules, and information from the material developers or Informatics instructors. The resulting learning objectives are intended to enable students to understand the functions and characteristics of computer hardware, operating systems, and applications.

2.3. Select Methods, Media and Materials

The third step is to determine the appropriate methods, tools or media, and materials. The available learning media are in the form of digital modules file PDF, then modified into new learning media in the form of application modules mobile based microlearning. Application module mobile based microlearning is a learning media that is considered appropriate and effective in overcoming the independent learning problems of class VII students at SMPK Cor Jesu Malang.

2.4. Utilize Media and Materials

The fourth step is to develop media in the form of application modules mobile microlearning-based. Media development using software Adobe IllusAdobe Photoshop And Flutter Flow. And design (user interface) as well as UX (user experience) in the module has

been adjusted to the needs analysis of class VII students at SMPK Cor Jesu Malang, and uses a learning design that is adjusted to the design microlearning.

2.5. Require learner participation

The fifth step was to validate the media with one media expert and one material expert to determine the validity of the developed media. Furthermore, a field trial was conducted with 30 seventh-grade students at SMPK Cor Jesu Malang. The field trial aimed to determine student responses to the developed media.

2.6. Evaluate and Revise

The sixth stage involves evaluation and revision to perfect the application module media.mobilebased on suggestions and input from media experts, material experts, and class VII students at SMPK Cor Jesu Malang.

Product eligibility of application modufors mobile was determined using a media feasibility questionnaire instrument by 1 media expert and 1 material expert. The student response questionnaire was used for the feasibility test from grade VII students at SMPK Cor Jesu Malang. The types of data obtained from expert validation were quantitative and qualitative data containing input and suggestions provided, while for the trial, descriptive quantitative data was obtained. The instrument used in data collection was a scale questionnaire.Likedwith a 1-4 assessment scale, accompanied by a sheet for input and suggestions regarding module application mobile.

Scale selection Liked with a 1-4 assessment scale, the response variability is greater than with a 1-3 or 1-5 assessment scale.LikedWith a scale of 1-4, it can reveal the differences in respondents' attitudes (more likely to be pro or con) more effectively. Data analysis used in the validation of the application module mobile based on microlearning this is as follows:

$$P = \frac{\sum_{x}}{xi} \times 100\%$$

Information:
P : Percentage
X : Total score of respondents' answers
Xi : Ideal score total
The results of the scores obtained will then be measured for their level of validity using a criteria table as shown in table 1:

Table 1. Validity Criteria Table

Criteria	Percentage Level	Information
Valid	86%-100%	No Revision
Less Valid	70%-85%	Revision
Invalid	<70%	Revision

3. Results and Discussion

3.1 Result

Figure 3. Main Menu Display of the Module

Figure 4. Initial Display of Learning Topics

Figure 5. Display of Learning Topic Content

Module validation result data application mobile based microlearning presented in table 2. The results of the validation questionnaire data processing from media experts obtained a figure of 95.8% so that it met the valid criteria, then from the validation questionnaire data processing from material experts obtained a figure of 91.7% so that it was also classified as valid.

Table 2. Table of Validation Results of Media Experts and Material Experts

Validator	Percentage Level	Criteria	Information
Members of the Media	96,3%	Valid	No Revision
Subject Matter Expert	91,7%	Valid	No Revision

Media trials on students were conducted to see the related responses. module application mobile based microlearning The questionnaire was developed with two types of statements: positive and negative. The trial results are presented in Table 3, including the total score and percentage (%).

The results of the students' responses describe their experiences in learning with the help of module application mobilebasedmicrolearning. There are 3 main aspects, namely: (1) Attractiveness, (2) Clarity, (3) Accuracy. Based on the results of data processing of the respondent response instrument, in statements related to the attractiveness aspect, the average figure obtained was (93.6%), the clarity aspect was (92.9%), and the accuracy aspect was (90%). From these results, it can be concluded that average mode application mobile based microlearning received a positive response from students, and can be declared suitable as a learning medium for the material Understanding the Function of Hardware, Operating Systems, and Applications.

Table 3. Table of Student Response Results

Aspect	Positive Statement	Total score	%
Attractiveness	I feel happy in using the application module mobile This	111	92,5
Attractiveness	Application module mobile this is easy to use	118	98,3
Attractiveness	Video *YouTube* I can run it easily	114	95
Clarity	The language used is easy for me to understand	112	93,3

Accuracy	I feel motivated to learn after using the application module mobile.	104	86,7
Negative Statements			
Attractiveness	Application module mobile this is not interesting	117	97,5
Attractiveness	The images and illustrations in the module are less attractive.	116	96,7
Attractiveness	I am less challenged to complete the quiz questions in the application module mobile.	98	81,7
Clarity	I feel the material in the application module mobile this is difficult to understand	111	92,5
Accuracy	Application module mobile this is not what i need	112	93,3

3.2 Discussion

The aim of this research is to develop an application module mobile based microlearning In addition, this research also aims to determine the validity and suitability of the module in supporting learning. Innovation in the development of application modules mobile is to offer a simple and attractive display design, diverse content, easy to understand material, support multi platform (Android and IOS), focused learning topics, and supports practical activities for student independent learning. UI and UX design in the module is in accordance with the learning model microlearning. Module development application mobile which is combined with the model microlearning is still rarely found, thus adding a new point to this research.

Application module mobile based microlearning proven effective in over coming independent learning problems of class VII students at SMPK Cor Jesu Malang.The use of learning strategies tailored to students' learning challenges. Previous research has shown that innovative learning strategies play a crucial role in developing students' knowledge toward positive change in the current era (Cahyati & Saputra, 2022; Widyaningrum & Rahmanumeta, 2016). Approach heutagogue relevant to developments in the RI4 era (Sulistya, 2019). Approach heutagogue make schools create a student-centered learning environment, so that students can determine their own learning direction and can develop their strengths, potential, creative thinking, and skills (Blaschke & Marin, 2020).

Approach selective in digital learning media has an impact on the quality of student learning. Several previous studies have shown that the development of selectiveable to explore forms of digital media for student centered learning (SCL) (Praherdhiono et al., 2018). Learning design heutagogis proven to encourage developmentdigital self-determined (Gillaspy & Vasilica, 2021). Implementation heutagogue also proven to be appropriate for facilitating students, because it is in accordance with technological and educational developments (Febry et al., 2022). Learning heutagogue with digital media effectively in developing 21st century competencies (critical thinking, creativity, collaboration, and communication) (Atmoko et al., 2020; M. Fakhriza, 2021)

Application module mobile Developed using the ASSURE model. The ASSURE model connects students, media, and materials. ASSURE is practical and effective for designing individual and class learning activities (Adi et al., 2021). Based on previous research, ASSURE is a simple development model that can be applied to create an interesting learning process for students (Al-Khattat et al., 2019; Karakis et al., 2016). The learning process in the ASSURE

model can integrate media with the latest technology, so that learning becomes more effective and memorable for students (Eva, 2016; Hidayati, 2021).

Microlearningin the application modulemobileThis makes it easier and more focused for students to learn the material. Students can choose the topic they want to study. Based on previous research, microlearning has the effectiveness and efficiency to convey learning content concisely, but the content presented remains in accordance with the topic to be conveyed (Nugraha et al., 2021). Other research proves, microlearning can convey information about a specific idea in a compact and focused way, so that the material is easy for students to understand (Beste, 2023).

Learners perform better when they can access short, engaging content at their own pace. Short, engaging content is easier to understand than large, complex information in a single session. Previous research can prove, microlearning as a learning method can increase learning ability by 18% compared to traditional methods (Sirwan Mohammed et al., 2018). Other research states, microlearning can facilitate the transfer of learned material from short-term memory to long-term memory (Shail, 2019). Some of these studies show that, microlearning is an approach that has been proven to be suitable and effective in overcoming students' independent learning problems.

The percentage obtained from the media validation stage by media experts is (96,3%). The media expert questionnaire was created based on 2 main aspects with the following explanations: (1) The graphic feasibility aspect aims to ensure that the display design and content presented can attract students' interest in learning, as well as ensuring that the content is in accordance with the material, (2) The electronic media feasibility aspect aims to ensure that students can easily access the media, as well as review the suitability of the audio-visual communication used in the media. From the media validation, the following responses were also obtained: the media can help students, the media has an attractive design appearance, the content of the material in the media is also clear and suitable for use. From the media validation data, it can be concluded that, the media application modulemobilebasedmicrolearning valid for use as a learning medium for class VII students of SMPK Cor Jesu Malang.

The percentage obtained from the material validation stage by material experts is(91.7%). The subject matter expert questionnaire was created based on 3 main aspects withexplanation as follows: (1) The aspect of content suitability aims to review the suitability, accuracy, currency and attractiveness of the content of the material, (2) The aspect of presentation suitability aims to ensure that the media has content that is suitable to be presented to support students' independent learning, (3) The aspect of language suitability aims to ensure that the language used in the media is in accordance with good linguistic principles and is appropriate to the level of the students. From the validation of the material, the following responses were also obtained: the media has a simple and attractive interface design, the content is designed according to the material and learning objectives, the use of illustrations is good, and is supported by videos andlink which increases student literacy.From the material validation data, it can be concluded that the mediaapplication modulemobilebasedmicrolearning valid for use as a learning medium for class VII students of SMPK Cor Jesu Malang.

Validity of the application modulemobilebasedmicrolearningsupported by data from the responses of class VII students at SMPK Cor Jesu Malang. Based on the attractiveness aspect, the average result was (93.6%) with the following details: (1) Students who feel happy using application modulemobile is (92,5%), (2) Students who consider the application

modulemobile easy to use is (98,3%), (3) Students who feel the videoYouTube easy to run is (95%), (4) Students who don't agree that application modulemobile not attractive is (97,5%), (5) Students who do not agree that the images and illustrations in the module are less interesting is (96,7%), (6) Students who do not agree that they are not challenged enough to complete the quiz questions in the module is (81.7%). These data results align with previous research, showing that Android-based modules are practical for students to use in independent learning (Rubianto, 2020). Other research reveals that the use of relevant, entertaining, varied and interactive media in microlearning is one of the variables that contributes to more effective and efficient learning (Yuniarsih et al., 2022).

Based on the clarity aspect, the average results obtained (92,9%) with the following explanation: (1) Students who think the language used in the media is easy to understand are (93.3%), (2) Students who do not agree that the material in the application module is easy to understand mobile. The percentage of students who found it difficult to understand was (92.5%). The linguistic elements in module development must be considered and adapted to the level or stage of education of the students. The material must also be designed according to the students' learning capacity. Previous research revealed that media microlearning effectively helps students to learn the content of the material in a relatively short time (Faizah et al., 2020). Some of these studies prove that,microcontent on microlearning makes it easier for students to understand the material quickly and supports long-term learning with a gradual pattern.

Based on the accuracy aspect, the average results obtained (90%) with the following details: (1) Students who feel motivated to learn after using the application modulemobile is(86.7%), (2) Students who do not agree that the application module mobile does not match what they need is (93.3%). Previous research revealed that the use of microlearning in learning can relieve mental fatigue in students, prevent learning boredom, demotivation, and other cognitive disorders (Shail, 2019). Microlearning allows students to adjust the learning environment and time to suit their mood and ability to understand the lesson (Shail, 2019). Application module mobile based microlearning proven to function in formal, non-formal, and informal learning environments.

Input and suggestions from students are also used as a reference for validity. Application module mobile which is developed. The following input and suggestions were obtained, including: the module is very easy to use, the module has an attractive appearance, the material in the module is easy to understand, the language used is also easy to understand, interesting features and content in the module need to be added, the number of questions in the quiz also needs to be added to make it more interesting, the application module mobile it would be easier if it could be downloaded at Play Store or App Store. Usage application module mobile based microlearning as a support in learning is assessed positively by students.

Observations were also made on learning activities in the classroom when students used the application module mobile. The learning activities as a whole went well and smoothly as expected. Exercise questions and quizzes in the application module mobilecan be done well and smoothly by students. The students' responses and the overall average results observed by the researcher show that the use of application module mobile based microlearning can meet the needs of students in learning activities, both in class and independent learning.

4. Conclusion

Application module development mobile based microlearning in informatics class VII. This is done through 6 stages, starting from analyzing student needs until the media is ready for use. The product developed is application module mobile based microlearning. The module contains material Understanding the Functions of Hardware, Operating Systems, and Applications. Application Module mobile offers an attractive appearance and content, easy-to-understand material, use via Android and iOS devices, and topics focused on students' independent learning.

The results of expert validation stated that, application module mobile based microlearning valid for use as an alternative learning media in Informatics lessons for grade VII. The results of the trial on 30 grade VII students of SMPK Cor Jesu Malang also received positive responses, so the media can be said to be suitable for use as a supporting medium for Informatics learning for grade VII. Application module mobile has met the valid and feasible criteria, but several standards need to be optimized for further development. Standards that need to be optimized include: the completeness of the media still needs to be optimized according to the characteristics of the module, usage guidelines for users (students, teachers, and parents) can be added in the form of demo videos, the media will be easier and lighter to use if it is available in the form of website, media will be better if it is not limited to just one material, and media will be more optimal if it can be downloaded on various platforms.

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