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Computer Based Instruction (CBI)-flipped classroom development in learning: The experts' validity

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ABSTRACT

Technology has reached a level where it is time for genuine education reforms that increase student content attainment by teaching lessons relevant to the 4.0 industrial revolution. Students who are generation Z prefer to use technology in learning because, in the digitalization era, students raised on new media technology are impatient if they only fill out worksheets and listen to lectures. However, based on the observation, many students are bored with instructional media implemented in learning that is not computer-based innovative, and creative media. Therefore, the CBE-Flipped classroom is a computer-based learning media solution relevant to the development of learning in the 4.0 industrial revolution. After developing the CBE-Flipped classroom, researchers need to know whether the CBE-flipped classroom is what is expected. Researchers also need a paradigm of whether they have developed a valid CBE-flipped classroom so that the CBE-flipped classroom can be applied effectively as an instructional media in the classroom during the learning process. So, this study aims at describing the expert validity of the CBE-Flipped classroom before implementation in the learning process. Based on the study results, it can be concluded that the media design has been valid in terms of didactic, construction, and technical aspects. While the results of material validation also indicated that the material on the media has been valid in terms of quality of content, learning, interaction, and appearance. It can be concluded that the CBE-Flipped classroom can be applied effectively as an instructional media in the classroom during the learning process.

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INTRODUCTION

Technology has reached a level where it is time for genuine education reforms that increase student content attainment by teaching lessons relevant to the 4.0 industrial revolution. In the era of the industrial revolution 4.0, the challenges faced by education involve the cultivation of new technology. Because the industrial revolution 4.0 is moving toward the socio-technology-digital era, everything becomes unlimited using computerization and complete data (Vojtovič et al., 2016). In the era of the industrial revolution 4.0, the challenges faced by education involve the cultivation of new technology. The learning process is said to be effective if, in the learning process, students can

achieve the expected learning goals. To achieve the learning objectives as expected, it is necessary to develop learning components that can support the learning process. One of them is instructional media to support education to run effectively.

Instructional media as a means of improving the quality of education is very important in the learning process (Amaral & Meurers, 2011). Instructional media is one of the tools to facilitate the transfer of knowledge from teachers to students (Dori & Dori, 1994). The use of instructional media can enhance student's learning process in teaching and learning processes, which in turn can enhance the learning outcomes they achieve (Jia et al., 2013). There are various kinds of instructional media, namely models/props, flowcharts, tables, and computer-based media (Hayadi et al., 2017). Instructional media can help students understand and apply learning concepts so that learning objectives can be achieved by students (Sukardi et al., 2017).

However, there is a gap between hope and reality. Generation Z students prefer to use technology in learning because, in the digitalization era, students raised on new media technology are impatient if they only fill out worksheets and listen to lectures (Collins & Halverson, 2009). However, based on the observation carried out in the vocational high school, many students are bored of instructional media implemented in learning, not computer-based innovative and creative media. So, it affects the learning process. It has not been optimal, and it is proven because there are still students' learning outcomes that have not reached the Minimum Completeness Criteria (KKM). Computer-based instructional media is one solution to increase the student's motivation in the learning process.

Computer-based instructional media is one of the strategies in formal education that is more open and flexible (García-Pérez et al., 2016). Computers as education and training tools have helped shape the educational environment. Computer-based instructional media can develop student skills (Hawkins et al., 2016), so learning media using computers in the learning process plays an important role, such as interactive learning multimedia (Sukardi et al., 2017), animation media (Rosen, 2009), mobile learning (Crompton et al., 2016), e-learning that combines flipped classrooms (Rahayu, 2017), virtual labs (Klentien & Wannasawade, 2016), and many more computer-based learning media that are developing today.

Learning media using computers as learning media also plays an important role in the learning process (Kablan & Erden, 2008). This learning media can help make it easier for teachers to deliver subject matter, save time both in teaching preparation and the learning process, and be used repeatedly (Hayadi et al., 2017). CBE-Flipped classroom is a computer-based learning media solution that is relevant to the development of learning in the 4.0 industrial revolution. With the development of Internet technology, virtual communication, and learning management systems, many college and university instructors are interested in this flipped classroom (Berrett, 2012). The development of the application of flipped classrooms in the last few years explains that flipped classrooms have been effectively used in learning (Bergmann & Sams, 2012; Kenna, 2014; Overmyer, 2014).

This CBE-flipped classroom has advantages. Among others, students start learning with preparation because they will be given a video before learning begins, and this will make it easier for students to understand learning. This media is also flexible in terms of time, this media encourages students to be active, and the media also provides a context in the form of cases to improve students' problem-solving abilities. However, in developing a product, the product being developed must not be finished and must go through an expert validity process. After developing the CBE-Flipped classroom, researchers need to know whether the CBE-flipped classroom is what is expected. Researchers also need a paradigm of whether they have developed a valid CBE-flipped classroom, so that the CBE-flipped classroom can be applied effectively as an instructional media in the classroom during the learning process. So, this study aims at describing the expert validity of the CBE-Flipped classroom before implementation in the learning process.

METHODS

This study is a quantitative study using a survey method. This study described the expert validity of the CBE-Flipped classroom. There are two validities of this study, design validity and

material validity. Experts validated the CBE-Flipped classroom in informatics, computers, vocational education, and technology. The experts will be given the questionnaire to validate the CBE-Flipped classroom.

The validation sheet is intended to determine the validity of the media by experts. This media validation questionnaire uses a Likert scale based on five alternative answers. Two parts must be validated through a validation questionnaire, namely design media validation and material validation in the CBE-flipped classroom. The validation results are taken based on the validation questionnaire filled out by the experts, and the media will be implemented after the experts state valid. The media and material validation questionnaire grid can be seen in Table 1 and Table 2.

Table 1. Design Media Questionnaire Grid

No.	Validation Aspect	Indicators
1	Didactic	a. Suitability of material with the basic competencies b. Truth of concept c. The suitability of the examples used in the material d. The material is easy to understand e. Material contains character values
2	Construction	a. Correct spelling usage b. Use of correct sentences c. Consistency in the use of terms, symbols, scientific/foreign language names
3	Technical	a. The video is easy to understand b. Video are in accordance to the characteristics of learning material c. Media can be used easily d. The instructions are appropriate e. The buttons / icons on the media are clear and appropriate. f. The video can motivate students to learn g. The video used is interesting h. The learning activities is not confusing i. Fonts are easy to read

Table 2. Material Questionnaire Grid

Aspects	Indicators
Learning	1. Suitability with Competency Standards 2. Suitability with Basic Competencies 3. Have clear learning objectives 4. The material according to the learning objectives 5. The accuracy of language selection in providing material descriptions 6. The accuracy of the material description and evaluation 7. Helping to improve students' skills and knowledge
Content	1. The correctness of the material description 2. Drawing agreement material 3. The suitability of the evaluation with the material

The data of the CBE-flipped classroom validation results in the form of material validation and design media validation were analysed using the following Formula 1.

$$V = \frac{\sum s}{[n(c-1)]} \quad (1)$$

To determine the level of validity according to Aiken's V Formula (Azwar, 2014, p. 113), the range of numbers V obtained will be obtained between 0 to 1.00. So that if the value of V is getting closer to number 1, it can be interpreted as a high enough coefficient so that it can be categorized as the media in the "valid" category. If the validity value is 0 or close to the number 0, then the media is declared invalid or in the low valid category.

RESULTS AND DISCUSSION

Before implementing the learning activities, the CBE-flipped classroom should already have a valid status through a validation test. The media validation test stage was carried out so that the feasibility of the CBE-flipped classroom developed could be identified based on the assessment of informatics, computers, vocational education, and technology experts. The purpose of holding validation activities in this study is to obtain valid status from experts. If the CBE-flipped classroom is not yet valid, then the validation will continue until a valid CBE-flipped classroom is obtained. The CBE-flipped classroom in this study is declared valid if the validator has stated that the CBE-flipped classroom is valid and there are no more revisions to the classroom.

Validity test data is obtained from instrument data filled in by validators who are informatics, computers, vocational education, and technology experts. The input results of the validator can be used as a revision for the CBE-flipped classroom until, finally, the CBE-flipped classroom is declared valid and suitable for research. The following results of the questionnaire data.

Design Media Validation

Design media validation is the result of product design validation. Two validators carried out the design media validation, and the design media validation had three aspects of the assessment requirements, namely didactic, construction, and technical. The design media validation was carried out twice. In the initial validation phase, the CBE-flipped classroom can be used, but there are still revisions based on the suggestions given by the validator. Based on the validators' advice, the researcher improved advice and then re-assessed the design media validation. The results of experts' design media validation assessment data can be seen in Table 3.

Table 3. Media Validation Results

No.	Assessment Aspects	V	Category
1	Didactic	0.825	Valid
2	Construction	0.854	Valid
3	Technical	0.805	Valid

Based on Table 3 shows the results of the design media validation from experts on CBE-flipped classrooms. The validation results indicate that the CBE-flipped classroom has been valid of didactic aspects [V-value = 0.825], construction aspect [V-value = 0.854], and technical aspects [V-value = 0.805], so it can be concluded that the media design of CBE-flipped classroom was valid in terms of didactic, construction and technical aspects. The researcher revised the product according to the suggestions given by the experts. The suggestions and improvements given by the experts for the CBE-flipped classroom can be seen in Table 4.

Table 4. Experts' Suggestion

No.	Before Revising	After Revising
1.	It is better to improve the learning material in the CBE-flipped classroom	Learning material has been improved
2.	Adjust the learning material to the syllabus	The learning material is in accordance to the syllabus
3.	Develop learning procedures for students and teachers	Learning procedures for students and teachers have been added to the media

Material Validation

Two experts carried out material validation in computer and vocational education. The purpose of material validation is to determine the accuracy and suitability of the learning materials contained in the CBE-flipped classroom and whether it is in accordance with the learning needs. Experts carried out the material validation in aspects of content, learning, interaction, and appearance quality. In implementing its validity, experts review the material in the flipped classroom-based learning media, then the validator gives value to the material in the CBE-flipped classroom. Furthermore, the results of the assessment given by the validator are calculated as the validity value. The results of the material validation can be seen in Table 5.

Table 5. Material Validation Results

No.	Assessment Aspects	V	Category
1	Quality of Content	0.792	Valid
2	Quality of Learning	0.875	Valid
3	Quality of Interaction	0.750	Valid
4	Quality of Appearance	0.859	Valid

Based on Table 5 shows that the results of the CBE-flipped classroom material validation. The results of the validation indicate that the material on the CBE-flipped classroom has been valid for quality of content [V-value = 0.792], the quality of learning [V-value = 0.875], the quality of interaction [V-value = 0.750], and quality of appearance [V-value = 0.859]. So, it can be concluded that the material on the media is valid in terms of quality of content, learning, interaction, and appearance.

The CBE-Flipped classroom was developed using e-learning because e-learning is a smart platform that can provide more feedback quickly, so this can increase active student participation (Sakti et al., 2020). After developing the CBE-flipped classroom, experts will then validate the CBE-flipped classroom. The validation stage aims at obtaining the CBE-flipped classroom that is valid. The validation stage has two activities that are carried out. Where in the validation activities, there are validation activities for CBE-flipped classrooms, which several experts assess. CBE-flipped classroom validation was carried out in two aspects of the assessment, namely the assessment of the media design validity and the assessment of the material validity. The experts' responses about the validity of the CBE-flipped classroom that was developed was the validation of the CBE-flipped classroom.

The data was obtained from a validity questionnaire filled out by each expert and a discussion by showing the CBE-flipped classroom. The CBE-flipped classroom was indicated to be valid by experts in the aspect of didactic [V-value = 0.825], construction [V-value = 0.854], and technical [V-value = 0.805], so it can be concluded that the media design is valid in terms of didactic, construction and technical aspects. The results of this assessment are also in line with previous research conducted by Rey (2018), which indicated that the developed product has been valid in the very valid category [Average score= 90%].

While the results of material validation show that the material on CBE-flipped classroom has been valid for quality of content [V-value = 0.792], the quality of learning [V-value = 0.875], the quality of interaction [V-value = 0.750], and quality of appearance [V-value = 0.859]. So, it can be concluded that the material on the media has been valid in terms of quality of content, learning, interaction, and appearance. The results of this assessment are also in line with previous research conducted by Rey (2018), which obtained results of material experts I and II were very valid category [Average score= 89.58%].

Based on suggestions and assessments by both experts of material and design, revisions were improved to the CBE-flipped classroom in accordance with the experts' suggestions so that the CBE-flipped classroom media developed has been valid. It is because the media presentation has included all the components that consist of presentation systematics consistency, conceptual coherence, suitability of illustrations to the material, presentation of text, tables, pictures, and reference lists, learning motivation generator, summary, assessment, feedback and follow-up (Sakti et al., 2020;

Usmeldi, 2016). So, it can be concluded that the CBE-flipped classroom is feasible to be tested as an instructional media in the learning process.

CONCLUSION

Based on the study results, it can be concluded that the media design has been valid in terms of didactic, construction, and technical aspects. While the results of material validation also indicated that the material on the media has been valid in terms of quality of content, learning, interaction, and appearance. Based on the findings, the implication of this study was the CBE-flipped classroom would provide practical contributions, especially in the implementation of the learning process for teachers and students, as well as adding references to science regarding the use of technology as an instructional media. The impact or effectiveness of the CBE-flipped classroom has not been studied through this research, so this can be used as a recommendation for other researchers to conduct further research so that it can serve as a guide in developing learning media on other materials and concepts effectively.

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