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Biology Critical Thinking Skill on Nutrient toward Indigenous (Rujak Cingur) Based E-Worksheet: Development and Validity

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ABSTRACT: This research aims to (1) produce a biology e-worksheet based indigenous Rujak Cingur on nutrient (2) examine the value of feasibility of biology e-worksheet based indigenous Rujak Cingur on nutrient. This research uses 4D model. The model consists of 4 steps; (1) *define*, this stage aims to analysis the problem, (2) *Design* start to design product that will be developed according to the results of the needs in learning analysis, (3) *Development*, the process of creating and developing product according to design, (4) D*isseminate* to improve the product based on criticism and suggestions from the questionnaire responses done by respondents after using the developed product. Validity of the instrument is counted by the percentage agreement through the validation nutrient of media expert, material expert, and questionnaire responses of respondents. The results of these research and development are (1) produce a biology e-worksheet based indigenous Rujak Cingur on nutrient (2) the developed media own a high score of feasibility with a very good predicate. This shows that the developed learning media is feasible to use in learning.

KEYWORDS: a biology e-worksheet, indigenous Rujak Cingur, nutrient, *research development*

I. INTRODUCTION

Learning skills development has been a current issues over past 30 years [1]. Critial thinking skills' development is required to demand the 21st century learning process [2-3]. Critical thinking skills is used to appraise the objective, reflective, trusted fair-minded and practical problems in the future [4-5]. This skill is necessary to enhance for biology learning process [6-7]. However, critical thinking skill student engagement is not satis [8-9]. Indeed, it can cultivate the other 21th century skills [10]. Therefore, critical thinking skills is notable to perpetrate.

The world is in the society 5.0 era [11]. In this era, competition is quite tight with competition for the human resources. This is determined by the nation's education level. Improving the education quality starts from improving the quality of learning [12-15]. Improving the learning quality begins with arranging appropriate learning according to current conditions. Biology is learning that requires an increase in the quality of learning [16]. This is due to biology requires the ability to reason in thinking and the ability to have critical thinking skill to explain various natural events and solve problems, both qualitatively and quantitatively [17-19]. However, biology critical thinking skills engagement for high school students in Surabaya necessitates to escalate. Therefore, students' critical thinking skills has to be rehearsed in learning biology.

Students' low critical thinking abilities are a problem that must be solved [20]. Critical thinking skills are very important to face challenges in life in the 21st Century [21-23]. Critical thinking skills are high-level thinking skills that involve activities such as: analyzing, synthesizing, considering, creating and applying knowledge to real world situations [19] [24-26]. Through learning that trains critical thinking skills, students are expected to be able to solve problems and phenomena in everyday life. When critical thinking skills are applied, students can think objectively, logically, become strong thinkers and problem solvers, and produce conclusions for doing something [27]. Therefore, it is prominent to develop e-worksheet for biology critical thinking skills.

Learning is a process of interaction between students and educators and learning resources [28-30]. In the learning process, teachers are required to design learning tools well so that they can produce maximum learning outcomes [31]. The learning tool consists of several components, including: Learning Objectives Flow, teaching modules, learning media and assessment instruments. Teachers can innovate learning by designing and developing teaching materials [32]. One of the important teaching materials used by teachers to facilitate learning activities is worksheet. The current worksheet development is still in the printed form which only presents material that is descriptive, black and white, less attractive and not adapted to the curriculum and

students' conditions [33]. However, in the society 5.0 era, all aspects of ICT are demanded to be integrated. Based on this description, it is necessary to develop worksheet in electronic form (e-worksheet). Electronic student activity sheets can be operated with a computer or mobilephone are attractive to students and are easily accessible to all students [34]. The learning process that uses E- worksheet is considered more effective [21] so that students complete tasks by utilizing internet access via electronic devices. Therefore, E- worksheet is very necessary and important to develop.

Rujak Cingur is one of the indigenous knowledge in Surabaya. It can be uncovered in home-grown tradition such as Javanese food. Thus, Rujak cingur is One of the typical Surabaya foods that is interesting to discuss in biology lessons. However, currently, the younger generation is less fond of traditional food because of the low prestige value of traditional food [35]. On the other hand, many teenagers like fast food which is low in nutrition, which disrupts the growth and development process in teenagers and can cause many health problems for the body [36]. Consuming types of fast food makes teenagers very vulnerable to nutritional deficiencies and premature pathological changes in teenagers [37]. The younger generation's lack of exposure to traditional food causes them to prefer fast food. This encourages the study of traditional food issues in Biology class XI learning, especially regarding nutrition substances. Therefore, E-worksheet based on Indigenous knowledge Rujak Cingur is important in Biology learning.

II. METHOD

This research is a development research. It use 4D model consisting of defining, developing, designing, and disseminating [38]. This research was held in Surabaya (100 students in total). The stages of research based on this model are (1) define, this stage aims to analysis the problem, (2) Design start to design product that will be developed according to the results of the needs in learning analysis, (3) Development, the process of creating and developing product according to design, (4) Disseminate to improve the product based on criticism and suggestions from the questionnaire responses done by respondents after using the developed product. This model has a structure arranged systematically as illustrated on the figure 1.

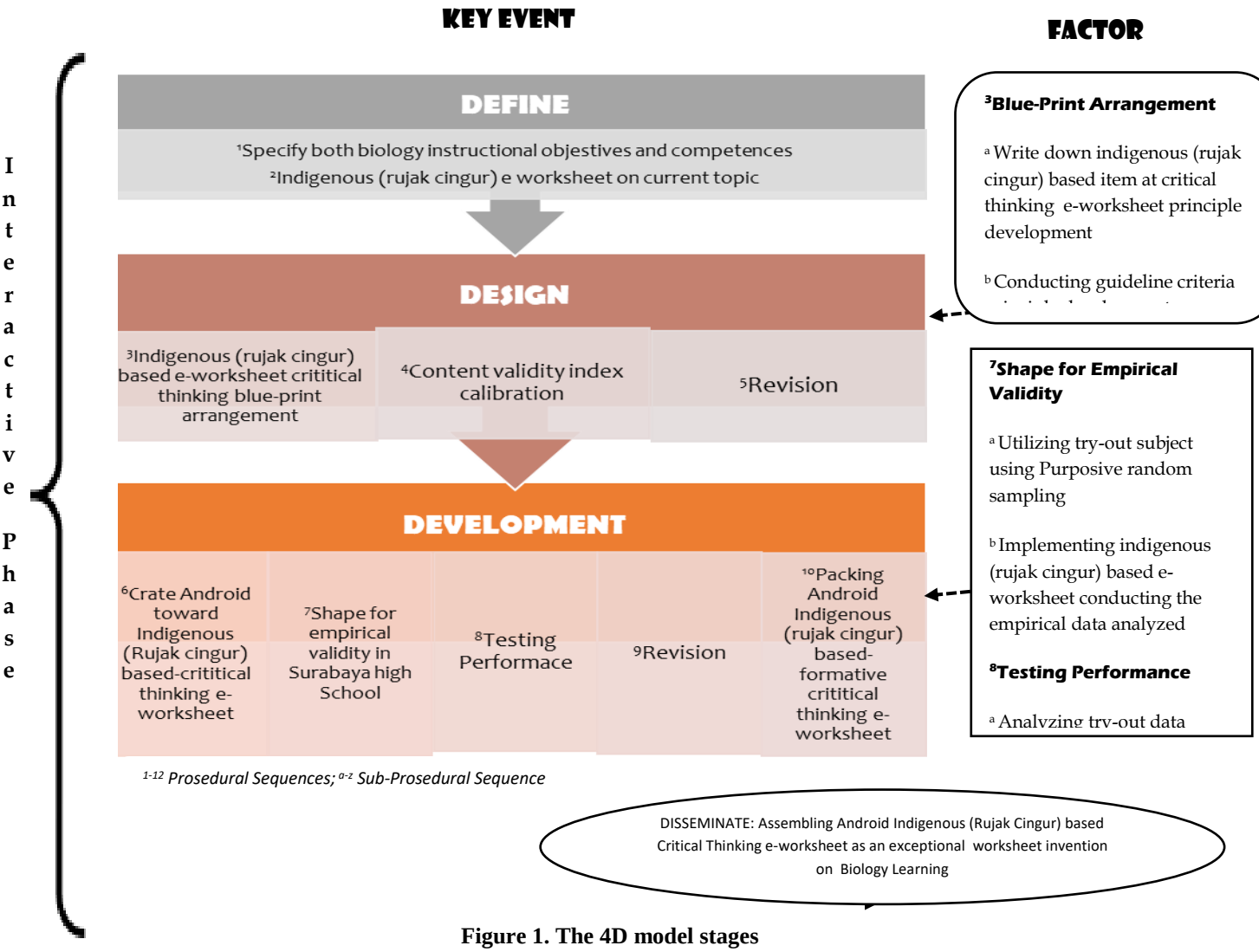

Figure 1. The 4D model stages

This research was conducted on the second grade high school students of science program. The learning was done in groups by practice using e-worksheet based indigenous knowledge Rujak Cingur and then discussing. The e-worksheet based indigenous knowledge Rujak Cingur use is expected to help students understand the nutrient. The research and development of e-worksheet based indigenous knowledge Rujak Cingur obtain validation data and suggestions for improvement from material and media experts. Furthermore, improvements of product were made on first revision. The product improvement result on first revision was developed and used by respondents in school. The responses of respondents were obtained through the questionnaire responses after using the product. The result of the questionnaire responses was used to hold evaluation and advanced improvement on second revision. These research and development were done in September 2023.

The collecting data method uses expert validation sheet and students as respondent questionnaire responses. The validation sheet was used to obtain expert judgement. The questionnaire responses sheet was used to obtain assessment from the respondents. This collecting data method was used to obtain data about the use e-worksheet based indigenous knowledge Rujak Cingur. The analysis of the instruments of expert validation sheet and questionnaire responses is used to test the developed product feasibility. The score result from each instrument is stated in,

$$P = \frac{f}{N} \times 100\% \quad (1)$$

f is the frequency sought for the percentage, N is number of cases (overall data), and P is percentage number. Product feasibility criteria can be seen in table 1.

Table 1. Product Feasibility Criteria

Questionnaire Score	category
80.01 % < score ≤100.00%	Very good
60.01 % < score ≤ 80.00%	good
40.01 % < score ≤ 60.00%	reasonable
00.00 % < score ≤ 40.00%	poor

III. DISCUSSION

Based on define stages, there is problem in biology learning such as the lack of worksheet and the instructional is less contextual [5], [19]. This result was gained through the observation and interview in SMA Negeri 16 Surabaya. The interview was conducted on teachers and students. Based on the design stage, there is a medium plan to solve the problem in biology learning. The indigenous (rujak cingur) based e-worksheet on nutrient for second grade high school students is expected can overcome the problem. The first stage of creating the worksheet is making the draft of blueprint that can stimulate students to think critically. Then the worksheet drawing stage started by sketching on the paper. After drawing worksheet manually on the paper, the next stage is coloring and filling text dialogue by using the corel draw 2017 application. The complete pictures with extension .jpg are arranged into e-worksheet by the help of Sigil application [34]. The indigenous (rujak cingur) based e-worksheet on nutrient files with extension .EPUB can be opened on android smartphone, where in android smartphone there is already Reasily EPUB or EPUB Reader application. Android-based indigenous (Rujak Cingur) e-worksheet is designed for android operating system with minimum specifications such as: (1) the file size less than 250 MB, (2) minimum 512 MB RAM, (3) minimum android version of ICS (Ice Cream Sandwich), and (4) a minimum of 240x320 pixel screen. The blue print packed in Indonesian indigenous (rujak cingur) based e-worksheet on nutrient tells the nutrient in Rujak cingur. Figure 2 shows the display of the indigenous (rujak cingur) based e-worksheet on nutrient on smartphone.

Android-based indigenous (rujak cingur) based e-worksheet on nutrient that have been completed are then validated by experts to get improvements. The product improvement results are then developed to be tested on students (development). The implementation stage is done by implementing the product in biology learning at school. The goal is to find out the students' responses to the developed media. The students' responses to the use of developed product can be seen from questionnaire responses as an evaluation material (evaluation). The validation result of indigenous (rujak cingur) based e-worksheet nutrient from expert and respondent assessment is explained as follows:

Figure 2. Android-based indigenous (rujak cingur) based e-worksheet on nutrient.

3.1. The validation of indigenous (rujak cingur) based e-worksheet on nutrient by material experts

The result of research and development in the form of indigenous (rujak cingur) based e-worksheet on nutrient is validated through the expert assessments. The assessment by material experts covers three aspects of the assessment namely; (1) content feasibility, (2) presentation, and (3) linguistic. Each aspect has its own assessment indicators. The result of validation of each component is expressed as a percentage. The result of validation done by the material expert is presented in the table 2.

Table 2. The validation result of indigenous (rujak cingur) based e-worksheet on nutrient by material experts.

Aspect	%	Category
Content Feasibility	90,00	Very good
Presentation Feasibility	83,33	Very good
Linguistic Feasibility	93,33	Very good

The result of validation shows that each aspect (content feasibility, presentation, and linguistic) get a "very good" average category. This result of validation shows that android-based indigenous (rujak cingur) based e-worksheet on nutrient is feasible to use in learning. These results are supported by study [39-41].

3.2. The validation of indigenous (rujak cingur) based e-worksheet on nutrient by media experts

The result of research and development in the form of android-based indigenous (rujak cingur) based e-worksheet on nutrient is validated through expert assessments. The assessment by media experts covers six aspects of assessment namely; (1) quality of content, (2) linguistic, (3) implementation, (4) visual display, (5) picture, and (6) ease of use. Each aspect has its own assessment indicators. The result of validation by media experts is presented in the table 3. The result of validation shows that each aspect (quality of content, linguistic, implementation, visual display, picture, and ease of use) get a "very good" average category. This result of validation shows that android-based indigenous (rujak cingur) based e-worksheet on nutrient is feasible to use in learning [42].

Table 3. The validation result of android-based indigenous (rujak cingur) based e-worksheet on nutrient by media experts.

Aspects	%	Category
Quality of Content	96,67	Very good
Linguistic	90,00	Very good
Implementation	93,33	Very good
Visual Display	86.67	Very good
Picture	96,67	Very good
Ease to use	86.67	Very good

3.3. The students' responses to android-based indigenous (rujak cingur) based e-worksheet on nutrient

The result of research and development in the form of android-based indigenous (rujak cingur) based e-worksheet on nutrient is tested on students. The goal is to find out students' responses to the developed media. The students' responses are given through three aspects of assessment, namely; (1) interest, (2) theory, and (3) language. Each aspect has its own assessment indicators. The result of assessment of each aspect is expressed as a percentage. The result of assessment by respondents is presented in the table 4.

Table 4. The students' responses to android-based indigenous (rujak cingur) based e-worksheet on nutrient.

Aspect	%	Category
Interest	91.67	Very good
Theory	88.89	Very good
Language	99.30	Very good

The students' responses show that the three aspects of assessment (interest, theory, and language) get an average percentage in the "very good" category. This result is supported by the research [42] which states that the respondents give very good responses to the developed media. The result of responses indicates that the developed media is feasible to use in learning. The result of product development indicates the form of indigenous (rujak cingur) based e-worksheet on nutrient is able to overcome the biology learning problem. The biology learning becomes more contextual, interesting, and diverse [43]. Learning biology by using comic can also improve students critical thinking skills [44].

CONCLUSION

The result of research and development is the product of indigenous (rujak cingur) based e-worksheet on nutrient. The assessment of android-based indigenous (rujak cingur) based e-worksheet on nutrient by media experts and material experts shows the high score of feasibility with a very good predicate. The assessment was done by respondents also shows the high score of feasibility with a very good predicate after experiencing the comic. Therefore, it is concluded that android-based indigenous (rujak cingur) based e-worksheet on nutrient is feasible to use in biology learning.

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