

# ELECTRONIC MODULE BASED ON PROBLEM BASED LEARNING FOR ISLAMIC BOARDING SCHOOL IN SUKOHARJO

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**Abstract.** Electronic module (e-module) based on Problem Based Learning (PBL) is a digital based learning media which is designed based on PBL in the material description stage. This study aimed to provide suitable e-module based on PBL for Islamic Boarding School. In this study, data was collected through an online and offline validation form that was given to six validators; there are two material expert validators, two media expert validators, and two practitioners or teachers in the different Islamic boarding school in Sukoharjo. The result has shown that e-module are feasible to use, which score of material expert validation, media expert validation and practitioner are 84.59%, 92.58%, and 92.22%. There is no doubt that PBL is valuable tool to teach biology to improve student critical thinking and problem solving skills effectively.

**Keywords:** Electronic module, Problem Based Learning, Islamic Boarding School

## 1. INTRODUCTION

Higher Order Thinking Skills (HOTS) is one of important skills required for student in the 21<sup>st</sup> century (Pratama and Retnawati 2018) to solve their life problems (Ratna and Retnawati 2019). Industrial revolution 4.0 and society 5.0 affected humans very easy to get the information from internet, student face amount of knowledge and data (Gozali et al. 2021). The Indonesia' rank of PISA 2015 was 62 from 70 country (OECD 2019), those scores showed that Indonesia is still far below from the other countries. This mean those students' higher order thinking skills in Indonesia are still low. Related to teaching material in Islamic boarding school which is not yet optimal in practicing HOTS (Kasim and Abdurajak 2018), (Kasim and Abdurajak 2018), it is therefore necessary to make e-module based on Problem Based Learning (PBL). Making e-module based on PBL model can foster active and meaningful students learning activities in solving HOTS questions (Imelda and Anzelina 2019). Based on the background, this study aimed to develop e-module with PBL model on digestive system for junior high school student grade VIII.

## 2. LITERATURE REVIEW

### 2.1 Electronic Module (e-module)

An electronic module or e-module are electronic-based book which is created by technology advances and specifically designed according to learning material, that can be learned by student independently (Serevina et al. 2018) without or with the guidance of the teacher (Sofyan, Anggereini, and Saadiah 2019). E-module used as aids by the teacher as the evidence of classroom effectiveness and substitutional media (Jaenudin, Baedhowi, and Murwaningsih 2017).

Electronic module based on PBL is a digital based teaching materials that are designed based problem based learning in the material description stage (Serevina et al. 2018). Electronic module based on PBL that can improve students' science process

skills (Rustana, Aminah, and Budi 2021). Module must have some characteristics, there are self-instruction, self-contained, stand alone, adaptive, user friendly (Rustana, Aminah, and Budi 2021). E-module based on PBL can practice student to solve authentic problems and create meaningful learning because using learning theory of constructivism, cognitivism, and humanism (Rahmawati, Lestari, and Susilo 2021).

## **2.2 Problem Based Learning (PBL)**

Problem Based Learning is a student centered approach that students are engaged in solving problems by a small group setting (commonly 6-10 students per group), encourages communication, collaboration, knowledge integration, problem solving, and critical thinking skills (Krzic, Brown, and Bomke 2020) with teacher as a tutor (Hung 2019). PBL is designed to help students to improve their critical thinking skill, problem solving skill, and intellectual skills by experiencing it in real situation or simulated situation to solve the problem (Jaenudin, Baedhowi, and Murwaningsih 2017). PBL have some characteristics, there are: 1) contextual learning ; 2) all age group are entered; 3) focusing on real problems; 4) teacher as a tutor or facilitator (Brien, Hamburg, and Southern 2019), (Silver, Bridges, and Mckeown 2019); 5) used ill structured problem and multiple perspective; 6) independent learning; 7) collaborative (Youngerman and Culver 2019), communicative and cooperative learning (Ariyana et al. 2018). The stage of PBL are : 1) student oriented to problem; 2) organized student to learn ; 3) guide investigation; 4) develop and present result; 5) analyze and evaluate problem solving process (Arends 2012).

## **2.3 Biology**

Biology is study about living organism, their interaction (Renn and Barrows 1931), (Jayawardana and Gita 2020), and their process that occur in the life (Anwar 2005). Biology as a subject have some characteristics : 1) active learning; 2) discovery/ inquiry approach; 3) scientific literacy; 4) constructivism; 5) science, technology and society; 6) tentative truth (Jayawardana and Gita 2020), 7) comprehensive and non-misconception materials (Meylani, Putra, and Ardiansyah 2018). Biology as a subject have learning objectives such fostering social, spiritual attitudes, and providing knowledge and skills (Kemendikbud 2019).

## **2.4 Islamic Boarding School**

Islamic boarding school are one of the religious education institution (Laila et al. 2020) therefore commonly also called as *pesantren* (Latif and Hafid 2021) become special because merge the knowledge of character (Hayah 2017), spirituality and intelligence (Rukmana, Susantini, and Bashri 2020), that able to open and blend tolerance or moderate attitudes (Hamidah 2019). The term *pesantren* derived from *santri*, defined as a place where the student learn and living in the dormitory under the guidance of a *kyai* or religious leader (Latif and Hafid 2021). Many Islamic Boarding School forbidden for *santri* to bring and use the technology (Laila et al. 2020)

## **3. RESEARCH METHODS**

This e-module used Problem Based Learning model to develop students' Higher Order Thinking skills (HOTS). This e-module used Borg and Gall research and development method (Gall, Gall, and Borg 2003) which is adjusted to the ability of researcher to construct the module and collecting validation data. The 10 steps of Borg and Gall instructional model adjust become 7 steps due the time constraints and research costs (Sugiyono 2015). The 10 steps of Borg and Gall model are : (1) research and information; (2) planning; (3) developing preliminary form of product; (4) preliminary field testing; (5) revising main product; (6) main field testing; (7) operational product revision; (8) operational field testing; (9) final product revision; and (10) dissemination and implementation. This 10steps has been modified by Sugiyono become 7 steps: (1)

potential and problems; (2) information gathering; (3) Product design; (4) design validation; (5) design revision; (6) product trials; (7) product revision. The 7 steps are summarized in the Table 1.

**Table 1. The application of Borg and Gall for the PBL teaching e-module**

| Borg and Gall with adjustment | Description of steps                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Potential and problems        | This steps describe the potentials and problems that will be used as research data and then analyzed and making the material selection for construct the e-module.                                                                                                                                                                                                   |
| Gathering the information     | Research and information have observations and interviews also literature reviews                                                                                                                                                                                                                                                                                    |
| Product design                | This step describe how to design PBL e-module with PBL learning process: 1) orienting the students toward the problem; 2) organizing the students to learn; 3) guiding the students to perform investigation both individuakky and collectively 4) developing and presenting the problem solving procedure; 5) analyzing and evaluating the problem solving process. |
| Design validation             | The PBL e-module is developed and validated by 6 experts (2 material experts, 2 media expert and 2 practitioner) in the relevants field to ensure its suitable to applied to the the largest students.                                                                                                                                                               |
| Design revision               | The revision of e-module in order to get better referring the comment and suggestion of validator experts.                                                                                                                                                                                                                                                           |
| Product trials                | product trial in Islamic boarding school classroom                                                                                                                                                                                                                                                                                                                   |
| Product revision              | The revision of e-module referring the comment and suggestion of students in Islamic boarding school classroom.                                                                                                                                                                                                                                                      |

### **Problem based learning e-module**

E-module equipped with picture, audio and video which is helped the different student learning. E-module build with 3D page flip professional.

E-module designed according to the PBL learning approach. The first, e-module served the contextual problems that students will have to solve later. And then, student must understand the task and look for the necessary material or data to solve the problem. Students Investigates the material or data both individual and collective with teacher guidance or not. The solution of the problem then presents and evaluate.

E-module validated by the 6 experts. The two material experts are biology educators with 5-15 years of teaching experience to provide their comment on the objective, content, teaching and learning outcome and suitability of the module. The two media experts are media lecturer, understand about media and design of learning. The two practitioners are two biology teachers in different school in Sukoharjo.

This research use modified instrument from BSNP (BSNP 2014). The instrument indicators for two material experts, two media experts and two practitioners are summarizes in the Table 2.

**Table 2. Instrument indicators for validator expert**

| Validator    | Aspect              | Sub Aspect                                      |
|--------------|---------------------|-------------------------------------------------|
| Material     | Content/<br>aspect  | 1. Suitability content/material with KI and KD  |
|              |                     | 2. Material accuracy                            |
|              |                     | 3. Appropriateness of learning support material |
| Media        | Presentation aspect | 1. Presentation technique                       |
|              |                     | 2. Presentation of learning                     |
|              |                     | 3. Presentation equipment                       |
| Practitioner | Appearance aspect   | 1. Cover design                                 |
|              |                     | 2. Content design                               |
|              |                     | 3. Size                                         |
| Practitioner | Programming aspect  | 4. Ease of application                          |
|              |                     | 1. Straightforwardness                          |

|                                                        |
|--------------------------------------------------------|
| 2. Use of interactive dialogic language                |
| 3. Appropriateness of the level of student development |
| 4. Cohesiveness of coherence                           |

**Table 3. Scale assessment instrument research**

| Answer             | Score |
|--------------------|-------|
| Strongly agree     | 5     |
| Agree              | 4     |
| Neutral            | 3     |
| Not agree          | 2     |
| Strongly not agree | 1     |

**Table 4. Interpretation of the Likert scale result**

| Percentage | Interpretation  |
|------------|-----------------|
| 90%-100%   | Very feasible   |
| 75%-89%    | Feasible        |
| 65%-74%    | Moderate        |
| 55%-64%    | Unfeasible      |
| 0%-54%     | Very unfeasible |

Source: (Agung 2010)

## 4. RESULTS AND DISCUSSION

### 4.1 Material expert

**Table 5. Result of material expert validation**

| No.     | Measured Aspect                                 | Percentage | Interpretation |
|---------|-------------------------------------------------|------------|----------------|
| 1.      | Content/ material aspect                        | 84.23      | Feasible       |
|         | a. Suitability content/material with KI and KD  | 87.14      | Feasible       |
|         | b. Material accuracy                            | 82.5       | Feasible       |
|         | c. Appropriateness of learning support material | 83.33      | Feasible       |
| 2.      | Presentation aspect                             | 85.46      | Feasible       |
|         | a. Presentation technique                       | 86.67      | Feasible       |
|         | b. Presentation of learning                     | 80         | Feasible       |
|         | c. Presentation equipment                       | 88         | Feasible       |
| Average |                                                 | 84.59      | Feasible       |

#### 4.1.1 Content/ material aspects

Overall, content/ material aspects are good (84.23%). It means the e-module have good aspect in content or material. The suitability content/ material with KI and KD consist of material equipment and material depth of learning has percentage 87.14% which is means feasible to use. The material accuracy is accuracy concept, description, and exercise has percentage 82.5% which is feasible to use. The appropriateness of learning support material consist of appropriateness the description, example and exercise; development of reasoning and proof; and interrelationships between concept/ table/ diagram/ question; student transform communication from idea to presentation; cultivating literacy; developing insight into diversity, nationality and national integration pay attention to the code of ethics of writing and copyright; and free from issue of SARA, pornography, gender bias, region and profession. The Appropriateness of learning support material has average 83.33% which is means feasible to use.

Developing an effective learning course increases when more relevant information is collected on learners (Ghirardini 2011). Learning objectives and relevant topics are structural and various organized. This e-module based PBL model used contextual teaching and learning that could be an effective way to situate learners in meaningful

learning by helping them to connect the element in the contexts to each other (Sung et al. 2019)

#### Presentation aspects

Presentation aspect also good (87.80%). it means the e-module have good presentation. Presentation technique consist of presentation systematic consistency, coherent which means the concept are presented by theory and followed by application of theory then evaluation as a final; and balance the number of pages between subchapters. Presentation of learning aspect consist of student centered learning which is interactive and participative; and development of metacognition, imagination, and creative thinking student. Presentation equipment consist of completeness of introduction (foreword, list of content, learning objectives, concept map), content (material according SK and KD, chapter components, sub chapters and their developments) and closing section (evaluation, systematic and accurate bibliography).

#### 4.2 Media expert

**Table 6. Result of media expert validation**

| No.     | Measured Aspect        | Percentage | Interpretation |
|---------|------------------------|------------|----------------|
| 1,      | Appearance aspect      | 89.56      | Feasible       |
|         | a. Cover design        | 88.33      | Feasible       |
|         | b. Content design      | 91         | Very feasible  |
|         | c. Size                | 90         | Very feasible  |
| 2.      | Programming aspect     | 90         | Very feasible  |
|         | d. Ease of application | 90         | Very feasible  |
| Average |                        | 92.58      | Very feasible  |

##### 4.2.1 Appearance aspects

Cover design consist of cover layout (appearance and composition); cover typology (title font size, title colour, font type, number of letters); cover illustration which is reflected the content of the e-module and interesting shape illustration; details and cover colour composition (detail, sharp and clear). Content designs consist of layout, typology, illustration, variation of letters, and arrangement of the text in the e-module. Size is of book size according the international standardization organization (ISO).

Interactive e-module with narration, animation and interactive practice promote students' performance and interesting in their study (Sung et al. 2019). The use of e-module becomes one of effective ways to improve active learning students, so that learning situation becomes interesting and students are motivated (Jaenudin, Baedhowi, and Murwaningsih 2017) and the learning objectives and learning outcome are maximally reached.

##### 4.2.2 Programming aspect

Programming aspect is of ease of operation consisting of ease of use the e-module, ease of selecting menus, ease of interacting the program, ease to understand navigation structure, button function speed, button reaction accuracy, ease of finding page, ease of setting up running animations, capacity of program files for easy duplication.

Good electronics module improving efficiency of students' independent work to train students in enhancing their competitiveness (Rustana, Aminah, and Budi 2021). E-module have some characteristics, there are interactive term ease navigation, allow the under to display/load images, audio, video, and animation and completed with formative quiz to understand student feedback (Jaenudin, Baedhowi, and Murwaningsih 2017) also user friendly (Rustana, Aminah, and Budi 2021).

#### 4.3 Practitioner

Practitioner validation consist two teachers from different school in Sukoharjo. Result of validation is summarized in Table 7.

**Table 7. Result of practitioner validation**

| No.     | Measured Aspect                      | Percentage | Interpretation |
|---------|--------------------------------------|------------|----------------|
| 1.      | language aspect                      | 92.22      | Very feasible  |
| a.      | Straightforwardness                  | 93.33      | Very feasible  |
| b.      | use of interactive dialogic language | 91.67      | Very feasible  |
| Average |                                      | 92.22      | Very feasible  |

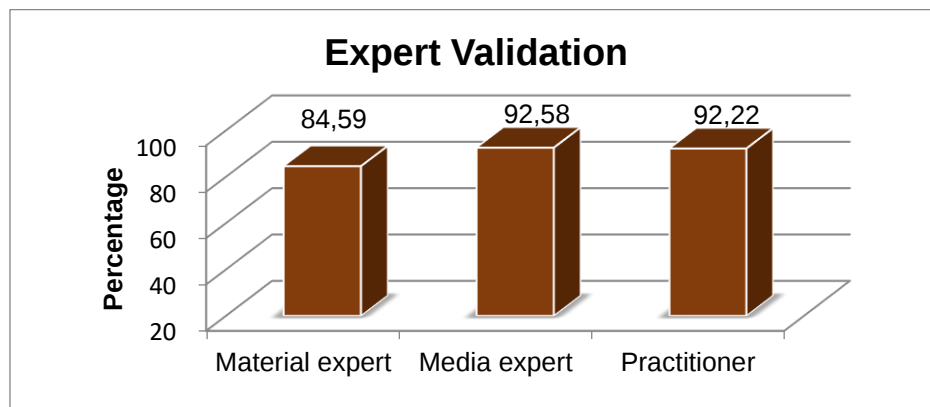
##### 4.3.1 Language aspect

Straightforwardness consist of sentence effectiveness; word writing accuracy; spelling, punctuation, and grammar. Interactive dialogic languages consist of the use of dialogic and interactive language, suitability of language with the level of student development, coherence and integration of subchapters and paragraphs.

The content language must easily to understand by student (Ee et al. 2023). Learning using e-module based PBL can make learning more meaningful, it can increase interaction between students, increase the ability to construct knowledge through the process of investigation, and change their mindset to be more objective (Rahmawati, Lestari, and Susilo 2021).

#### 4.4 Discussion

The verification of the e-module aimed to improve the suitability of the module in order to use in the Islamic boarding school. Overall, the expert agreed that this e-module is feasible to use.



**Figure 1. Percentage of expert validation graph**

Figure 1 shows that e-module feasible to use with score 84.59%, 92.58%, and 92.22% on material expert, media expert, and practitioner. The e-module integrated with PBL model that can improve problem solving skills and develop critical and creative thinking (Permatasari, Gunarhadi, and Riyadi 2019). Electronic module integrated with PBL model provides innovative learning source for students, so that learning is more effective, interesting, and study actively to achieve learning objectives (Jaenudin, Baedhowi, and Murwaningsih 2017). E-module based PBL can be utilized for independent learning with minimal teachers' help or guidance (Jaenudin, Baedhowi, and Murwaningsih 2017).

## CONCLUSION

In conclusion, e-module is feasible to use because this module has score achieved 84.59%, 92.58%, and 92.22% in material expert, media expert and practitioner. The result shown that e-module can make learning easier and can create an independent learning. This e-module is integrated with PBL model, with clearly objective learning, clearly content, useful technique and suitable language which easy to use for students. E-module can used by different learning style which the all various way of learning can cover it (Wahidah, Ibrahim, and Muslim 2019). The role of multimedia and interactive tools in this module is very important to increasing students' transfer of knowledge in Islamic Boarding School students. The results indicate that e-module recommended for use by biology teacher and student junior high school grade VIII. This module has been designed in accordance with the 2013 curriculum in Indonesia. Researcher hope that in future more extensive can be carried out.

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