The Practicality of Model Introduction, Connection, Application, Reflection, and Extension-Paradigm of Reflective Pedagogy with BioPhy Magazine for Optimizing Learning

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Abstract. Learning outcomes in basic physics courses still show a low average score for students. This shows that the learning process has not achieved the expected target. It was necessary to innovate to overcome these problems by developing models and teaching materials. The purpose of this study was to describe the practicality of the introduction, connection, application, reflection, and extension-paradigm of reflective pedagogy learning model and the practicality of using biophy magazine teaching materials. This research is part of educational design research to the stage of formative evaluation test on a one-to-one, small group and field test. Data on the practicality of the learning model were obtained through observations of the implementation of learning carried out by two observers. Data on the practicality of teaching materials were obtained from questionnaires given to students. Based on these results, practicality of models and teaching materials were then categorized into five categories, very practical, practical, quite practical, less practical, and very less practical. The results showed that the lecturers had carried out each stage very well so that the results of the observer's assessment showed a very practical category in individual, small group and field tests. Student activities were classified as very practical in individual tests and field tests, while in small group trials, they were quite practical. Therefore, ICARE-PPR learning was classified as very practical. Biophy Magazine's teaching materials based on the floating market as a result of development are also classified as very practical with easy, efficient, useful and attractive for students.

Keywords: practicality, learning model, biophy magazine

Introduction

Analysis of the learning conditions in three study programs, namely department of physics education, department of chemist education and department of biology education in basic physics courses from 2017/2018, 2018/2019, and 2019/2020 academic years, shows that the average final grade of students is still low and needs to be improved. To answer these problems, the lecturer in the basic physics course should innovate on various things, including models and teaching materials as a source of learning support in
the lesson plans they prepare (Ramadhani et al., 2020). Innovation, of course, does not only emphasize improving the cognitive aspect but also on the affective aspect in order to support the achievement of the vision and mission of UIN Antasari in producing superior and virtuous graduates.

Excellence, in this case, can be assumed as a profile of graduates who have broad insight and master various skills, one of which is the ability to solve problems. It is intended that students who have graduated are able to play an active role in contributing to various problems that arise in society. In addition, students also need to be equipped with social skills so that they can get used to working with various parties (Ita, 2021).

Innovation in learning is needed to achieve optimal quality of education (Syukri, 2021). Educators also act as innovators who always create new ideas for achieving learning targets (Kristiawan & Rahmat, 2018). Various learning components such as learning models and teaching materials that support the process of transforming knowledge to students should always be evaluated and then developed by lecturers with reference to learning needs.

The provision with the needs can be made by applying the ICARE learning model (introduction, connection, application, reflection, and extension) and combining it with the reflective pedagogical paradigm. The ICARE learning model aims to apply the concepts learned during learning to solve problems in groups (Kadek et al., 2017; Yasa et al., 2019). The ability to understand concepts and learning outcomes is also increased through the use of this model (Aliano et al., 2018; Musri, 2020; Mufidah, 2020). ICARE can also facilitate activities in the classroom (Mazidah, 2020; Suminar, 2021). Learning outcomes can also be increased through the paradigm of reflective pedagogy approach (Wahana, 2016; Ignasius et al., 2020; Kamarudin, 2021). In addition, PPR leads to the ability to reflect on knowledge and values based on what is learned and then applied in real actions that make a positive contribution (Fathoni, 2020). The ICARE learning model combined with the PPR approach resulted in new steps that became learning innovations. The combination of the two is expected to support the achievement of a graduate profile optimally.

Another supporter of applying the model is urgent teaching materials as a source of learning (Sarini & Selamet, 2019). Innovation and creation in the manufacture of teaching materials will attract and motivate students, making it easier for them to build knowledge (Rezeqi et al., 2020). Teaching materials also need to be packaged in such a way that refers to local wisdom that develops in the community according to the characteristics of contextual learning (Pursitasari et al., 2019) and in line with one of the pillars of UIN Antasari based locally with a global perspective.

There are various forms of teaching materials, one of which is printed teaching materials. This type of teaching material usually aims to increase attractiveness through visual displays. Teaching materials with magazine format can be an alternative for learning basic physics. Magazine display that contains various rubrics will be an advantage that is able to integrate various fields of science, Islam and local wisdom. South Kalimantan’s local wisdom that can be used as a basis for developing teaching materials includes a floating market that describes a culture of collaboration (Annur, 2019).

The integration between sciences can be integrated through the support of teaching materials in the form of magazines with a floating market base. Students can study physics which is contextually presented in the framework of a floating market (fluid concept), and at the same time, can also study other fields such as biology (biological diversity and ecosystem concepts) as well as other fields related to national culture and character values. (Rahmad, 2021). Students can be strengthened in terms of affective through various group activities, which are presented through the rubric on BioPhy, which is also a reflection of the application of culture inspired by floating markets. Teaching
materials with attractive illustration designs provide attractiveness and motivation in the learning process (Nuraida, 2019; Fidami et al., 2021)

The floating market-based biophy magazine is a visual teaching material with content in various fields of science, such as physics, biology, character education and community culture. The content of local wisdom makes learning more memorable because it presents real events (Suhartoyo, 2020) community culture in the magazine rubric, which is used as the basis for delivering material in various fields of science. Knowledge construction is also more accessible because it is related to everyday life; further understanding of the functions and benefits of learning a certain concept will also be built better.

Research result Yuhroh et al. (2019) stated that the development of magazines as a learning resource on the aspects of content feasibility, language feasibility, and presentation and graphics were valid and practical. A positive response that judged that the magazine was very good was also given to the results of the developed magazine (Alfainalin, 2021). Magazine-featured presentations provide attractive illustrations and help improve learning comprehension (Puri, 2019).

The results of the development of this research also need to be tested for the level of validity and practicality. A model can be said to be practical if it can be implemented easily as well as teaching materials developed can be categorized as practical if it meets the aspects that can be implemented well, easy to use and effective (Irfadila, 2020). Based on this explanation, the researchers were interested in describing the practicality of the ICARE-PPR learning model and the practical use of the floating market-based biophy magazine teaching materials as products produced in a series of development research.

**Methods**

This type of research is part of educational design research. This research begins with preliminary followed by development of a biophy magazine to support introduction, connection, application, reflection, and extension-paradigm of reflective pedagogy learning model. Test to measure the practicality of learning models and teaching materials were carried out up to the stage of formative evaluation tests on a one-to-one, small group and field test (Zaini, 2018). Data collection was carried out in the 2020/2021 academic year in physics, chemistry and biology department.

Sampling technique used in determining research subject is purposive sampling, namely students in the three study programs who take basic physics and general biology courses simultaneously in one semester. The research subjects were students in physics, chemistry and biology study programs who programmed basic physics courses.

The data collection procedure consists of two kinds, namely data practicality of the learning model and data on the practicality of teaching materials. Data on the practicality of the learning model were obtained through observations of the implementation of learning carried out by two observers using observation sheets for lecturer and student activities. Practicality in the one-to-one test was assessed by physics students (8 people), practicality in the small group was assessed by chemistry students (10 people) and practicality in the field test was assessed by biology students (24 people). Practicality data of teaching materials is obtained from questionnaires (indicators of convenience, benefits, efficiency and interest) filled by students after learning with biophy magazine.
(Elwi et al., 2017; Sidarta et al., 2019; Istikomah et al., 2020). Then, the average answer given by the students is calculated.

Data analysis technique will be carried out by analyzed categorical descriptively based on the results of implementation of learning steps by lecturers and students through observation assessment and the answers to the questionnaire by students about biophy magazine that has been developed, the practicality of the model and teaching materials were then categorized according to Table 1.

Table 1. Categories of Practical Learning and Teaching Materials

<table>
<thead>
<tr>
<th>Score</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X &gt; \overline{X}_1 + 1,8 \times sb_1$</td>
<td>Very Practical</td>
</tr>
<tr>
<td>$\overline{X}_1 + 0,6 \times sb_1 &lt; X \leq \overline{X}_1 + 1,8 \times sb_1$</td>
<td>Practical</td>
</tr>
<tr>
<td>$\overline{X}_1 - 0,6 \times sb_1 &lt; X \leq \overline{X}_1 + 0,6 \times sb_1$</td>
<td>Practical Enough</td>
</tr>
<tr>
<td>$\overline{X}_1 - 1,8 \times sb_1 &lt; X \leq \overline{X}_1 - 0,6 \times sb_1$</td>
<td>Less Practical</td>
</tr>
<tr>
<td>$X \leq \overline{X}_1 - 1,8 \times sb_1$</td>
<td>Very Less Practical</td>
</tr>
</tbody>
</table>

(Widoyoko, 2019)

Results and Discussion

The practicality of ICARE-PPR learning can be seen based on the level of implementation of the learning syntax by lecturers and students. A learning model is called practical if it meets several indicators. Among these indicators are that they can be implemented in real terms in the field and the ability of lecturers to manage learning according to the learning syntax is included in the category of minimum assessment is quite good (Saptaria & Setyawan, 2021). The following is the average data on the results of observing the implementation of learning for five meetings in the one-to-one trial class (department of physics education), small group (department of chemist education), and field test (department of biology education).

![Figure 1. Implementation of learning by lecturers on the one to one test](image-url)
The implementation of the ICARE-PPR learning model, which is an indicator of the practicality of a learning model, is observed through the activities of lecturers and students. Referring to the data presentation of the research results, it is known that in the one-to-one test class (department of physics education), the average activity of the lecturers is included in the very practical category. The findings in this study are relevant to (Irsyad, 2020), who have received the findings of the lecturer carrying out learning guided by the plans that have been prepared. In this study, the lecturer's activities refer to the planning document as a control for the implementation of the learning syntax (Sitepu & Lestari, 2018; Ita, 2021). Lecturers carry out each stage of learning well as an indicator of the practicality of the developed model (Siswanto et al., 2016).

The application of a new learning model is categorized as practical if it can be implemented in the field at least with a good category (Kua, 2018). Learning is considered practical based on the implementation of the model in accordance with the activities (Fitria & Rachayu, 2019). A learning model is declared practical if the implementation of the model shows the steps that can be applied (Asyafah, 2019) by both lecturers and students.

Based on the results of the lecturer's activities in the three stages, namely introduction, core and closing, it is illustrated that the lecturer has carried out each stage very well so that the results of the observer's assessment show a very practical category. This finding is relevant to the results of research which explains that the level of practicality of using learning models is classified as very practical (Holisin et al., 2019; Waer & Mawardi, 2021). There are six main activities observed following the assessment instrument. These activities are common and ideal to be carried out when the lecturer starts learning. The average observer rating obtained also shows that the implementation of learning at this preliminary stage is very practical. The ICARE-PPR model contained in the core activities in planning and succeeded in obtaining an average of 4.42. Furthermore, the closing activity consisting of four activity indicators reached 4.57, both of which were very practical (Dwijayani, 2017). Thus, learning on the one-to-one test can be said to be successful and effective in meeting the practicality criteria (Rahmadhani & Wahyuni, 2020; Setiawan & Mustangin, 2020).

Some notes on the implementation of learning are used as evaluation materials to enter the next phase of the small group test. The practicality of the model in this phase was also assessed by two observers and obtained the results as presented in Figure 2 below.

Figure 2. The implementation of learning by lecturers in the small group test.
The small group test was carried out in a chemistry class with 10 students. The average activity in the preliminary and closing stages carried out by lecturers is classified as very practical (Dumiyati et al., 2019). This is because these two stages are commonly carried out so that they can be easily implemented. There are a number of standard steps at the opening and closing stages of the learning model (Hamdayama, 2016). The difference is in the implementation of the core activities, which are classified as practical based on the results of observations. The steps in the core activities in a newly developed model require more adjustments when compared to the preliminary and closing activities so that they tend to get assessment results that are classified as practical in their implementation (Waseso & Fuadi, 2020). However, in this study lecturers can still optimize the implementation of the ICARE-PPR Model.

Field tests applied in biology class showed optimal results. There are twenty lecturer activities that are indicators of the implementation of learning activities in this study because the lecturers have carried out the learning stages in the preliminary, core, and closing activities very well ICARE-PPR model, which means that the practicality of the model belongs to the very practical category. This means that the lecturer carries out the maximum learning steps model (Hayati, 2016). The optimal achievement in this field test is because the lecturer has fully mastered all the stages in the learning model after carrying out these stages in the two previous tests (one to one and small group).

The implementation of the ICARE PPR learning model was also observed through student activities in the one-to-one test, small group test, and field test. The data from the observation of the implementation of the model by students are presented in Figures 4, 5 and 6.

Apart from lecturers, the practicality of a learning model is also observed through the implementation of the learning syntax by students. In general, the student activities from the five meetings were classified as practical and very practical. Students can play an active role in learning through the model presented by the lecturer (Wulandari et al., 2017; Soenarko, 2020). The results of the one-to-one test get category variations. The first meeting was quite practical with an average score of 3.97; then, it increased to very practical at the second meeting. At the third meeting, it changed again to be practical and then increased at the fourth and fifth meetings to be very practical. The fluctuations that occur are closely related to the dynamics of the class when learning takes place (Masni, 2015). The depth of the content and the scope of the discussion of the sub-materials being studied and the state of the students during learning also affect these
fluctuations (Cahyono, 2018). However, the average assessment results still show that learning is categorized as very practical.

![Bar chart showing the average of students' activities for different types of activities.]

**Figure 4.** The implementation of learning by students on the one to one test

As a class in the first test, the score in this practical category means that the developed model can be applied well in the classroom. The series of steps that characterize the ICARE-PPR model can be implemented by students of course with good direction from the lecturer (Safitri, 2019). These results also indicate that there is good collaboration between lecturers and students in the application of the learning model. As previously known, the application of the learning model by the lecturer in the one to one test is also very practical.

![Bar chart showing the average of students' activities for different types of activities.]

**Figure 5.** The implementation of learning by students in the small group test

Learning activities in the chemistry class through small group trials based on the results of the assessment obtained practical–very practical criteria. Just like in the one-to-one test, there was a shift in categories from the first meeting to the fifth meeting, but in this test, the progress at each meeting can be seen based on the increasing categories from practical to very practical until the end of the meeting. The category increase became very practical after the third meeting. This means that there is always an increase in activity from one meeting to another in this small group trial class. Students
quickly get used to the learning model applied in class (Firmansyah, 2016). So, if averaged, the implementation of learning is included in the practical category.

Students in this small group test have been able to carry out learning activities by following the steps of the ICARE-PPR model. Most students carry out activities according to the learning syntax with good criteria class (Joesyiana, 2018). The practical categories obtained during the learning process as the average of these five meetings also show that during learning with the new model students need experience first to get used to the developed model (Indriwati et al., 2018).

Figure 6. The implementation of learning by students in the field test

The last trial was carried out in biology class and got the results that the implementation of learning by students was very practical both at the first meeting to the fifth meeting. Lecturers have shown their professionalism in teaching by optimizing the implementation of previously designed activities. The achievement of learning implementation that developed both in the one-to-one test, small group test, and field test cannot be separated from the follow-up to observer notes at previous meetings (Yulianto et al., 2017; Anwar et al., 2020). This increase in practicality by students is also because students are getting used to the learning model presented by the lecturer (Wijayanti, 2016; Hidayati et al., 2016). Over time, students are able to optimize their involvement in learning, such as interacting in groups engaging in discussions (Yensy et al., 2020), so that indicators of student activity can be carried out very well. Group settings in the ICARE PPR Model accommodate students to solve problems. The results of group discussions are also communicated classically in the form of task presentations and responding to other group assignments. All of these activities are able to encourage students to be more active in learning and contribute positively to students' mastery of the material (Apriandi & Setyansah, 2017).

The learning process is easy for students to follow because the lecturer has presented the various stages well. Based on the average value of practicality, if classified, the preliminary activities and closing activities are more optimally carried out in all stages compared to the core activities. One of the factors that influence this is that preliminary activities and closing activities are activities that students routinely carry out in each lecture process. In contrast, in core activities, students still need to adapt to the new learning model as a result of development that contains variations in stages that are different from previous models (Nuzalifa, 2021). The implementation of the learning model will be successful if the lecturers and students work together in carrying out all the steps of a model optimally (Erika et al., 2021).
The next practicality tested is BioPhy as a source of support for the learning process. In the one-to-one test stage in the physics class, the practicality of BioPhy can be seen in Table 2.

**Table 2. The Practicality of Biophy Magazine on the One to One Test**

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Averages</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>4.35</td>
<td>Very Good</td>
</tr>
<tr>
<td>Efficiency</td>
<td>4.19</td>
<td>Good</td>
</tr>
<tr>
<td>Benefits</td>
<td>4.30</td>
<td>Very Good</td>
</tr>
<tr>
<td>Interest</td>
<td>4.21</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

According to the four aspects of this individual test, the average score is 4.26. This shows that teaching materials are very practical when used in learning activities. Teaching materials received a very practical assessment based on the answers to questionnaires from students (Gazali, 2016). Teaching materials are considered easy, efficient, useful and interesting by students. Through Biophy teaching materials, students find it helpful to understand the material faster so that time is more efficient (Firmansyah & Rusimamto, 2020) and can hone problem-solving skills (Oktaviana & Susiaty, 2020). Instructions on teaching materials, both in practice questions and assignments, are clear and easy to follow (Nurjanah, 2018). The language in teaching materials is clear, dialogical and communicative (Fajarianingtyas & Hidayat, 2020). The availability of practice rubrics in teaching materials also facilitates the independent evaluation of learning outcomes (Astuti & Prabowo, 2020; Sanjayanti et al., 2020). Teaching materials that are integrated with various fields of science and Islamic studies strengthen students' awareness of the relationship between various sciences and the power of Allah SWT. Attractive design with color gradations pictures make Biophy interesting and not boring (Meiningsih, 2019).

Although almost all students gave an outstanding assessment of the product of teaching materials, but in this individual test, there were still some suggestions and criticisms from students on the teaching materials, namely: 1) the appearance should be more elegant; 2) the writing of questions and answers in the Brain Teas section still needs to be improved; 3) pictures and colors to make it more interesting and not too many; 4) practice questions can be reproduced so that students can try at home; and 5) color and layout, selection of font type and size should be improved to make it more visually appealing. Furthermore, in the small group test stage, data were obtained as presented in Table 3.

**Table 3. The practicality of Biophy Magazine on Small Group Test**

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Averages</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>4.22</td>
<td>Very Good</td>
</tr>
<tr>
<td>Efficiency</td>
<td>3.85</td>
<td>Good</td>
</tr>
<tr>
<td>Benefits</td>
<td>4.18</td>
<td>Good</td>
</tr>
<tr>
<td>Interest</td>
<td>4.07</td>
<td>Good</td>
</tr>
</tbody>
</table>

The results of the assessment by chemistry students on the teaching materials developed are classified as practical based on the average score. The aspect of convenience gets the highest score compared to other aspects. This means that students state that the teaching materials that are prepared are very practical and easy to use (Hakim et al., 2020). From the aspect of efficiency, students find it helpful to understand the material independently. Students also obtain usefulness and attractiveness to use...
because through integrated teaching materials, curiosity and satisfaction in learning increase (Fuadati & Wilujeng, 2019).

Biophy is presented with colorful pictures containing various information that relates the material to local wisdom, which is the main attraction for most students (Yolanda, 2020). The selection of pictures supports the delivery of material content and is not boring for students to read (Nafiah et al., 2019). Visualization in BioPhy magazine also makes it easier for students to understand the material being studied (Zidatunnur & Rusilowati, 2021). The appearance of the magazine also makes this teaching material less rigid so that the learning process using biophy is more interesting (Diki et al., 2022). BioPhy was also tested in biology class, with the results in Table 4.

**Table 4. The practicality of Biophy Magazine on Field Test**

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Averages</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>4,29</td>
<td>Very Good</td>
</tr>
<tr>
<td>Efficiency</td>
<td>4,10</td>
<td>Good</td>
</tr>
<tr>
<td>Benefits</td>
<td>4,44</td>
<td>Very Good</td>
</tr>
<tr>
<td>Interest</td>
<td>4,46</td>
<td>Very Good</td>
</tr>
</tbody>
</table>

Biology students' assessment of BioPhy is in the very practical category. The attractiveness and benefits of BioPhy include a higher rating followed by two other aspects of the assessment, namely ease of use and efficiency of use. Thus, in this field test, the target of using teaching materials was achieved as a source of support for the application of learning models as a means of fulfilling learning objectives.

Teaching materials can be classified as practical if they meet several criteria such as easy to use, efficient when used, leading to increased interest (interest), in accordance with the speed of learning, useful in facilitating a better understanding of concepts. (Andromeda et al., 2018). Based on the presentation of the data, it is known that the practicality of using teaching materials by students of Department of Physics Education, Department of Chemist Education, and Department of Biology Education are respectively 4.26 (very good); 4.08 (good); and 4.32 (very good). So, overall the practicality of using teaching materials is seen from the aspect of ease of use, the usefulness of teaching materials, and the attractiveness of teaching materials with practical criteria, even in some aspects classified as very practical (Putri & Syafri, 2021; Fatmawati, 2021).

The findings of the research indicate that teaching materials provide benefits to support the absorption of materials and are very attractive in their design (Nurasisih et al., 2020). Teaching materials are able to increase student motivation and are not boring (Selviani et al., 2018). Teaching materials are easy to use by students (Hidayati, 2021) to understand the teaching material and be able to help them learn independently without the help of a lecturer (Fitriah, 2019). Students can study independently with teaching materials. Teaching materials make students more independent in finding various information (Zainuddin et al., 2018). Teaching materials are able to direct students to think critically so that they support their ability to solve problems (Dharmono et al., 2019).

Teaching materials are classified as practical to use (Afrizon & Dewi, 2019) because the integration of local wisdom with physics contained in BioPhy makes students feel educational benefits, namely making it easier for them to master the material. In addition, teaching materials related to the local wisdom of South Kalimantan can be seen directly in the surrounding environment (Harefa, 2017; Wati et al., 2017).

The content of Islamic values and local wisdom in teaching materials has also succeeded in growing interest, encouraging curiosity, and increasing student motivation so that teaching materials are interesting and students are able to understand their
contents independently (Winarti et al., 2015; Almuharomah et al., 2019). This is also supported by the study of Harefa (2017) which shows that learning with ethnoscience makes students not bored with learning, and they feel various benefits so that they are interested in learning it.

**Conclusion**

ICARE-PPR learning is classified as very practical according to the indicators of the implementation of the syntax of the learning model by lecturers and students. Biophy Magazine's teaching materials based on the floating market as a result of development are also classified as very practical with easy, efficient, useful and attractive for students.

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Ita, et al. : *The Practicality of Model Introduction, Connection,*......


