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Validity of the Innovative KIT and Biology Practicum Guide Based on Local Potential

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Abstract: Learning activities that facilitate the essence of natural science are practical activities. Practical activities can improve science process skills, psychomotor skills, and mastery of material concepts. Facilities and infrastructure that support practical activities are important for every school to have. However, not all schools can provide laboratories and practical tools, especially schools in rural areas. This study aims to describe the validity of the innovative biology practical kit (KIT) and guides developed based on local potential. This type of research is Research and Development (RnD) with an ADDIE research design (analyze, design, develop, implement, and evaluate). Data were collected using a questionnaire technique and analyzed descriptively quantitatively. Based on the results of the validity test, the innovative biology practical kit (KIT) and the biology practical guide based on local potential that were developed are included in the criteria of very valid with an average percentage of 88.89% for the innovative biology practical kit and 86.97% for the biology practical guide. This indicates that the innovative biology practical kit based on local potential and the biology practical guide can be used in learning.

Keywords: Biology; Excretion; KIT; Practical; Circulation; Validity.

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Introduction

Natural science (IPA) is a science that studies nature and the phenomena that occur in nature. Science learning should not only emphasize the mastery of concepts, but also on scientific processes and attitudes (Ahadia et al., 2016). Learning activities that facilitate the essence of natural science are through practicum or experimental activities.

Biology is a branch of natural sciences that is a requirement for practicum activities. Practicum activities have a positive effect on learning. Practicum has been proven to be effective in improving science process skills (Athiyyah et al., 2020 ; Yetri et al., 2019), psychomotor skills (Ratu & Erfan, 2018; Astuti et al., 2021), mastery of concepts (Ramadhani et al., 2022; Munandar et al., 2019), and motivate students to be actively involved in learning (Dasopang & Jahro, 2020). Therefore, the existence of facilities and infrastructure that support practicum activities is important for every school to have. In fact, not all schools can provide laboratories, practicum equipment, and carry out practicum activities, especially schools in rural or suburban or rural areas. This is due to several factors, namely the relatively expensive price of practicum tools (Ahadia et al., 2016) and the use of tools that are not easy (Oktafiani et al., 2017).

Based on the results of an interview with one of the principals of public high schools in rural areas of South Kalimantan, his party has only provided laboratory facilities but practicum equipment is not yet available because the procurement of practicum equipment requires quite high costs and is waiting for assistance from the government. Currently, student practicum is carried out virtually and online. Meanwhile, virtual practicum provides a different experience than hands-on practicum students. Research by Astuti et al., (2021) shows that practicum that is carried out offline is more effective than online practicum. Offline practicum provides a hands-on experience for students so that learning becomes more meaningful and enjoyable (Jelita et al., 2021). The lack of interest in learning science is not because of the difficult learning material but because they do not have a meaningful and enjoyable learning experience when learning science. Teachers only teach concepts and theories of memorization that make them bored.

The inadequacy of facilities and infrastructure to support student practicum in rural schools should not prevent students from continuing to develop skills in science learning. South Kalimantan, which is rich in local potential, such as its natural resources in the form of plants, animals, and other natural materials, can be used as supporting materials for science practicums, which can be packaged in the form of innovative practicum KIT based on local potential and equipped with practicum guides. The use of local potential as a material for making practicum KIT can be in the form of choosing media/wood, using natural dyes from plants, and other materials that are easy to obtain from the surrounding environment that is environmentally friendly.

Several researchers have developed a biology and physics practicum KIT (Rizaldi et al., 2020; Ahadia et al., 2016; Ramadhani et al., 2022; Purwanto et al., 2022; Mulhayatiah

et al., 2018). However, no research has been found that utilizes local potential, especially South Kalimantan, to make KIT and biology practicum guides. Based on the description above, a research was conducted with the title Development of KIT and Guidelines for Innovative Biology Practicum Based on Local Potential.

Methods

This type of research is RnD (Research & Development) using ADDIE development design adapted from (Branch, 2009). Design ADDIE is an acronym for 5 phases of development, namely Analyze, Design, Develop, Implement, and Evaluate.

At this phase, the researcher conducts an analysis of biology learning in the form of analyzing student needs, learning models, learning methods, learning media, learning resources that are often applied in biology learning, and students' skills in biology learning. Initial analysis was carried out on the results of the preliminary survey through questionnaires to biology students and unstructured interviews with biology teachers about biology learning in schools. Based on the results of the survey through questionnaires and interviews, it was found that the biology learning carried out still applies conventional learning, namely using lecture and question and answer methods. This results in the difficulty of understanding students on abstract material concepts such as the concept of the circulatory cycle in the human body and the concept of the process of urine formation in humans. In addition, students rarely and even some have never done biology practicum activities due to the limitations of school facilities and infrastructure, both in terms of providing laboratory space, providing practicum equipment, and managing available laboratory equipment due to limited human resources. This results in students' process skills not being properly trained in biology learning. So far, students have relied on the Student Worksheet (LKS) as the main handbook in learning. The LKS contains material descriptions, sample questions, and practice questions. Based on this, the researcher developed a Biology Practicum KIT in the form of teaching aids on the concept of the circulatory cycle and excretory system (the process of forming urine in humans) which is equipped with a practicum guide to help students understand the concept of the material. Through the development of the Biology Practicum KIT in the form of teaching aids on the concept of the circulatory system and excretory system equipped with a practicum guide, students are expected to have direct experience in conducting biology practicum as well as improve their understanding and skills about the material concepts of the circulatory cycle and the excretory system (the process of forming urine in humans). At this phase, the researcher evaluates and revises independently by paying attention to the IP and KD of the material with the developed product.

At the design phase, the researcher begins to make a practicum KIT design, design the layout of the practicum handbook, and compile research instruments. The researcher makes a design of the practicum KIT by utilizing local potential according to the material that has been determined at the analyze phase. The researcher also designed a practicum guidebook as a guide for the use of the practicum KIT in the form of LKPD and practicum guides. At this phase, the researcher evaluates and revises independently by paying attention to the IP and KD of the material with the product design developed.

At the design phase, the researcher began to design product designs, namely the Circulatory System Practicum KIT and Excretory System (Urine Formation Process), designing concepts and content that will be included in the practicum guide as a complement to the use of KIT. The initial draft of the Circulatory System and Excretory System Practicum (Urine Formation Process) can be seen in the following picture:

Figure 1. Design of the KIT series of props concept material cycle blood circulation and urine formation process
(Source: researcher documentation)

The practicum guide is designed based on the learning phases of the guided inquiry model. The initial draft of the practicum guide consists of a cover, chapter/topic of material (consisting of competency standards, basic competencies, indicators of competency achievement, and worksheets (consisting of student identity, practicum topics, practicum objectives, tools, materials, work procedures, material summaries, bibliography, test results, data analysis/discussion, conclusions, and evaluation). The following is the initial draft of the practicum guide:

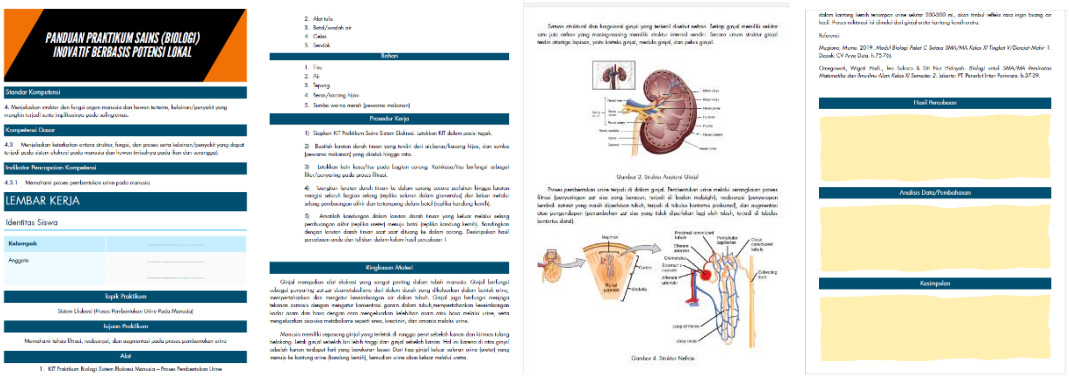

Figure 2. Design biology practicum guide
(Source: researcher documentation)

In the development phase, researchers created innovative KIT based on local potential and practical guides based on a previously prepared design. The local potentials referred to include ironwood, a local plant native to Kalimantan forests, and everyday

objects commonly found in everyday life, as materials for the innovative KITs. Furthermore, the validity of the KITs and practical guides was tested by validators consisting of biology lecturers and high school biology teachers. At this phase, in addition to the validation tests conducted by the validators, the developed innovative KITs were also tested and revised based on suggestions or input from the validators before being implemented in learning activities (implementation phase).

Figure 3. Biology Practicum KIT
(Source: researcher documentation)

The Biology Practicum KIT is a teaching aid for the concept of the circulatory cycle and excretory system (the process of forming urine in humans) has several components of tools and materials as follows:

Table 1. Biology Practicum KIT Tools and Materials

No.	Tool	Material
1	*Hand pump*	Squirt
2	Transparent hose size 1/4 & 3/16	Natural dyes from plants (dragon fruit: red color, telang flower: blue color, turmeric: yellow color)
3	Paintbrush	Oil paint
4	Sandpaper	Tiner
5	Plaster	Fill the glue shot
6	*Styrofoam*	Teaching Aids Pictures/Descriptions
7	*Sealtape*	
8	*Cutter*	
9	Plywood Size 120x20 cm, thickness 8 mm	
10	Funnel	
11	Glue Shoot	
12	Sterile Gauze	

After the product is completed, the next product enters the validity test phase. Product validity tests are carried out to measure the validity of the product. The validity test was carried out by 3 experts consisting of 2 lecturers and 1 biology teacher. Based on

this validity test, the researcher found out the shortcomings of the developed product and then evaluated in the form of improvements according to the comments and suggestions given by the validator. After the product is declared valid and improved, the product then enters the implementation phase.

As for the biology practicum KIT, the researcher conducted a trial use of the KIT and made several revisions or improvements to the parts of the KIT that did not function optimally (installation of pumps on the KIT of the circulatory system, placement of hoses and funnels on the KIT of the excretory system and the use of natural dyes from plants). Meanwhile, in the biology practicum guide, the researcher adds the content to a cover, a foreword page, a table of contents, instructions for use, chapters/topics of the material (consisting of competency standards, basic competencies, indicators of competency achievement, and worksheets (consisting of student identity, practicum topics, practicum objectives, tools, materials, work procedures, material summaries, bibliography, experimental results, data analysis/discussion, conclusions, and evaluation)).

At the implementation phase, the researcher tested the product in the form of a revised KIT and practicum guide according to input from the validator to high school/MA students. The trial was conducted to find out the students' response after using KIT and innovative biology and physics practicum guides based on local potential.

At the evaluation phase, the researcher analyzes the results of the KIT test and the practicum guide for students. Furthermore, these results are used to make improvements to the developed products.

$$P = \frac{f}{N} \times 100\ \%$$

Description: P = Percentage of the data questionnaire
f = Total score obtained
N = Maximum number of scores

The level of validity of the developed product will be determined through the following criteria:

Table 3.4 Product Validity Criteria

Value (%)	Criterion
80,01 – 100%	Highly Valid
60,01 – 80%	Valid
40,01 – 60%	Less Valid
20,01– 40%	Invalid
0 – 20%	Highly Invalid

Source: Adapted from (Sari & Putra, 2022).

Results & Discussion

The validity of the KIT and the Biology Practicum Guide is seen from the results of the validity test by the validator. The Biology Practicum KIT developed is a teaching aid on the material of the Circulatory System and Excretory System (Urine Formation Process). The validity test of the KIT and Practicum Guide was carried out by a validator team consisting of biology lecturers and biology teacher. The validity test of the Practicum KIT was carried out on 7 aspects that represented the assessment of the validity of the Circulatory System Practicum and the Excretory System (Urine Formation Process). The results of the validity of the Circulatory System and Excretory System Practicum (Urine Formation Process) can be seen in table 4.1

Based on Table 4.1, it is known that the validity test results of the Circulatory System and Excretory System Practicum KIT (Urine Formation Process) obtained a total score of 214 out of a maximum score of 240. The lowest percentage in the efficiency aspect of the practicum KIT was 76,67% and the highest percentage in the aspect of the suitability of the content and concept of the practicum KIT. The average percentage of validity of the Practicum KIT is 88,89% and is included in the criteria is very valid. The percentage of validator assessments on the validity of the Circulatory System and Excretory System Practicum KIT (Urine Formation Process) in each aspect can be seen in Figure 4.1.

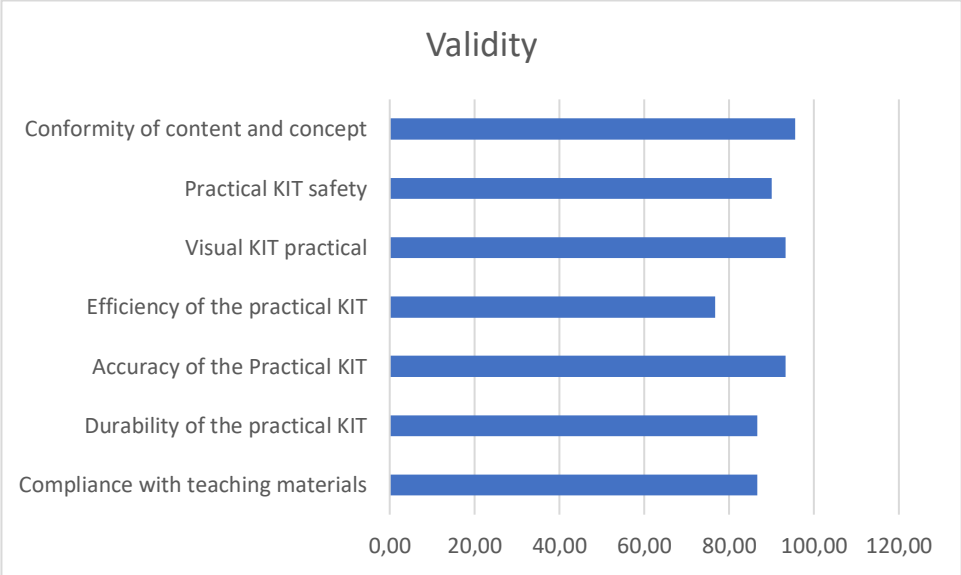

Figure 4. Chart of the Percentage of KIT Validity on Each Aspect
(Source: Data Processing Results)

Based on Figure 4. It is known that the results of the validity test of the Circulatory System Practicum and Excretory System (Urine Formation Process) which includes seven aspects of assessment to measure validity, in the aspect of the suitability of the practicum KIT with the teaching material was obtained a percentage of 86,67% with very valid criteria. In the aspect of resilience of the practicum KIT, a percentage of 86,6% was obtained with very valid criteria. In terms of the accuracy of the practicum KIT, a percentage of 93,33%

was obtained with very valid criteria. In terms of efficiency of the practicum KIT, a percentage of 76,67% was obtained with valid criteria. In the visual aspect of KIT practicum, a percentage of 93,33% was obtained with very valid criteria. In the security aspect of the practicum KIT, a percentage of 90% was obtained with valid criteria. In terms of the suitability of the content and concept of the practicum KIT, a percentage of 95,56% was obtained with very valid criteria.

Based on the results of the validity test of the KIT Practicum of the Circulatory System and Excretory System (Urine Formation Process), the lowest percentage in the efficiency aspect of the KIT practicum was obtained at 76,67% of the valid criteria. This is due to the large size of the practicum KIT (120 x 20cm) and the existence of several parts of the KIT that do not fit together, resulting in this KIT being less efficient to store and move in a narrow space. In addition, the use of the KIT requires water as a practical medium so that if the user is not careful, the KIT and the KIT operating place can get wet due to water spillage when the KIT is used spilled. However, the KIT developed is valid and can be used by paying attention to how to use it correctly to minimize errors during use.

The highest percentage in the aspect of conformity of the content and concept of the practicum KIT was 95,56% of the valid criteria. This is because the KIT is developed in accordance with the concept of the material based on learning outcomes and the purpose of learning the material. The average percentage of 88.89% of the criteria is very valid showing that the developed practicum KIT can be used in learning. This is in line with Akbar (2017) who stated that the validity criterion of 85,01%-100,00% has a very valid validity level so that it can be used without revision.

The developed practicum KIT is relevant to learning outcomes and the learning objectives that have been set so that it is expected to help visualize the material in learning, especially in the material of the circulatory system and the process of urine formation. This is in line with Riyadi et al., (2018) which states that a teaching aid needs to be designed in accordance with learning objectives and can be a good learning medium for students. This is also in accordance with (Masturoh et al., 2019) which states that teaching aids or Practicum KIT can help students in finding the truth of concepts through direct experience that is difficult to show through learning by lecture method. The experience can provide a deeper understanding of the concepts he is learning (Abadi & Kholiq, 2020). The practical kits developed are made of wood and several other environmentally friendly materials, so they have an attractive visual appearance, are safe and easy to use even though they are less efficient in terms of storage due to their large size.

The validity of the biology practicum guide on the material of the Circulatory System and Excretory System (Urine Formation Process) is seen through the results of the validity test. The validity test of the practicum guide was carried out by a validator team consisting of biology lecturers and biology teacher. The validity test was carried out on 3 aspects that represented the assessment of the validity of the practicum guide, namely the material aspect, the media, and the language aspect.

The results of the validity of the practicum guide can be seen in Figure 5 below.

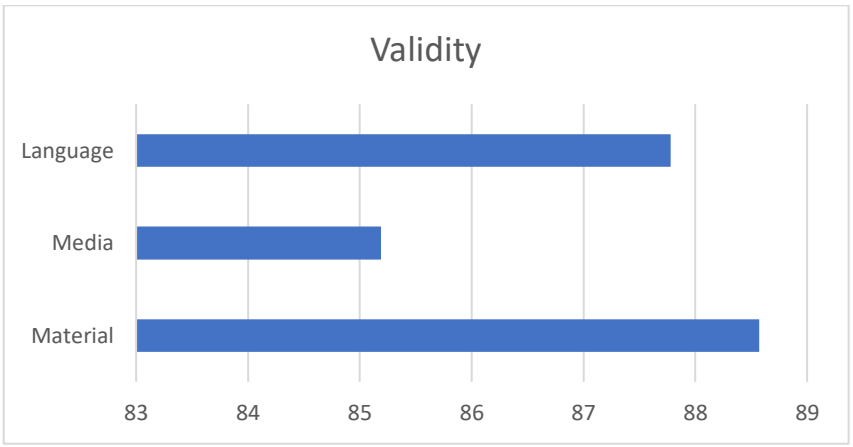

Figure 5. Percentage Validity Chart of Practicum Guide Each Aspect
(Source: Data Processing Results)

Based on Figure 5. It is known that the results of the validity test of the Practicum Guide of the circulatory system and excretory system (process of urine formation) which include three aspects of assessment to measure validity, in the material aspect a percentage of 88,57% was obtained with very valid criteria, in the language aspect a percentage of 85,18% was obtained with very valid criteria, and in the language aspect a percentage of 87,78% was obtained with valid criteria. The lowest percentage in the media aspect of 85,19% of the criteria is very valid. The practicum guide developed is too formal (typical of a reference book) and contains a narrative of the presentation of the material so that it can make students less enthusiastic or bored or even lazy to read the material presented.

The highest percentage in the material aspect of 88,57% of the criteria is very valid. The practicum guidelines developed are adjusted to the learning outcomes and learning objectives so that they are in accordance with the material presented. The average percentage of validity of biology practicum guidelines is 86,97% and is included in the criteria is very valid. This shows that the practicum guidelines developed can be used in learning. This is in line with Akbar (2017) who stated that the validity criterion of 85,01%-100,00% has a very valid validity level so that it can be used without revision. The practicum guidelines developed are relevant to the learning outcomesand the learning objectives that have been set so that it is expected to help in visualizing the material in learning, especially in the material of the circulatory system and the excretory system (the process of urine formation).

Practicum guidance is needed so that learning activities in the practicum can be well organized, effective, and help students understand the concepts of the material being

taught so that learning goals can be achieved and learning is meaningful. This is relevant to Rahayu (2012) in (Subamia et al., 2014) whose states that in the delivery of science learning, a means in the form of a learning model and appropriate learning tools are needed. In order to support practicum activities in science learning, of course, appropriate practicum tools are needed as well. The practicum kit contains practicum instructions, tools/materials for practicum purposes that can help students to understand science concepts in a more meaningful way.

Conclusion & Recommendation

The author concludes that The innovative biology practicum kit based on local potential was declared highly valid, with an average score of 88,89%, based on validity testing, meaning it can be used without revision. The biology practicum guide was declared highly valid, with an average score of 86,97%, based on validity testing, meaning it can be used without revision.

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