BIO-INOVED : Jurnal Biologi-Inovasi Pendidikan
Volume 3, Issue 2, June 2021 page. 113-118
https://ppjp.ulm.ac.id/journal/index.php/bino

OPEN ACCESS JOURNAL
P-ISSN : 2684-9062 | E-ISSN : 2714-9803
DOI: 10.20527/bino.v3i2.10322

Feasibility of the Prototype of Teaching Materials on the Topic of Classification of Living Things based on the Advantage of Local Wetland

Fahmi [(1)] *, Hery Fajeriadi [(2)], Yudha Irhasyuarna [(3)]

[(1)] Master Program of Natural Science Education, Postgraduate Program, University of Lambung Mangkurat, Banjarmasin City, South Kalimantan, Indonesia
[(2)] Master Program of Biology Education, Postgraduate Program, University of Lambung Mangkurat, Banjarmasin City, South Kalimantan, Indonesia
[(3)] Study Program of Natural Science Education, Departement of Mathematic and Natural Science Education, Faculty of Teacher Training and Education, University of Lambung Mangkurat, Banjarmasin City, South Kalimantan, Indonesia

**Corresponding Author Email:* ibnusuwandy@gmail.com

Article Information

Keyword:
Teaching Material Development
Prototype
Classification of Living Things
Contextual
Wetland

Kata Kunci:
Pengembangan Bahan Ajar
Prototipe
Klasifikasi Makhluk Hidup
Kontekstual
Lahan basah

History:
Received : 15/03/2021
Accepted : 10/06/2021
Published : 20/06/2021

Abstract

Competition in the field of education globally is increasingly competitive, but it has not been directly proportional to the development of education in several regions in Indonesia. Students still have difficulty in critical thinking, including the concept of classification of living things, because the teaching materials used are not fully related to the experience and environment of students. This study aims to develop teaching materials for the concept of classification of living things based on local potential. The development is carried out using Tessmer's formative model which includes five stages; 1) self-evaluation (self-evaluation); 2) expert opinion (expert review); 3) Individual trial (one to one); 4) small group trial; and 5) field test. The results showed that by developing a prototype of contextual teaching materials based on local advantages, it was able to increase students' interest, activity, and thinking skills which could be measured by increasing their learning outcomes.

Abstrak

Persaingan di bidang pendidikan secara global semakin kompetitif, namun belum berbanding lurus dengan perkembangan pendidikan di beberapa daerah di Indonesia. Peserta didik masih mengalami kesulitan dalam berpikir kritis, diantaranya pada konsep klasifikasi makhluk hidup, karena bahan ajar yang digunakan belum sepenuhnya berkaitan dengan pengalaman dan lingkungan hidup peserta didik. Penelitian ini bertujuan untuk mengambangan bahan ajar konsep klasifikasi makhluk hidup berbasis potensi lokal. Pengembangan dilakukan dengan menggunakan model formatif Tessmer yang meliputi lima tahapan; 1) evaluasi diri (*self-evaluation*); 2) pendapat pakar (*expert review*); 3) Uji coba perorangan (*one to one*); 4) uji coba kelompok kecil (*small group*); dan 5) uji lapangan (*field test*). Hasil penelitian menunjukkan bahwa dengan dilakukan pengembangan prototype bahan ajar kontekstual berbasis keunggulan lokal mampu meningkatkan minat, aktivitas, dan kemampuan berpikir siswa yang dapat diukur diantaranya dengan meningkatnya hasil belajarnya.

How to cite: Fahmi, F., Fajeriadi, H., & Irhasyuarna, Y. (2021). Feasibility of the Prototype of Teaching Materials on the Topic of Classification of Living Things Based on the Advantage of Local Wetland. *BIO-INOVED : Jurnal Biologi-Inovasi Pendidikan, 3*(2), 113-118.

BIO-INOVED : Jurnal Biologi-Inovasi Pendidikan
Volume 3, Issue 2, June 2021 page. 113-118
https://ppjp.ulm.ac.id/journal/index.php/bino

OPEN ACCESS JOURNAL
P-ISSN : 2684-9062 | E-ISSN : 2714-9803
DOI: 10.20527/bino.v3i2.10322

A. Introduction

Education is the spearhead of a country's success. A good education will be able to create human resources that can compete in the era of globalization which is running very fast (Fahmi & Irhasyuarna, 2019). Because of this, the Indonesian people, especially in the competition for the ASEAN Economic Community (AEC) must prepare the younger generations to be competitive in the competition.

Surveys and research conducted so far show the quality of education in Indonesia is still far from what is expected (Fahmi & Irhasyuarna, 2017). Data The EFA Development Index (EDI) is an index of educational development carried out by UNESCO, the United Nations agency in charge of education, science, and culture, in 2015 Indonesia was in position 69 of 113 countries which means it is in the middle level (UNESCO, 2015).

Not to mention if you look at surveys from PISA and TIMSS which reveal that on average Indonesian students still have difficulty answering questions about natural sciences, especially in critical thinking problems. The UN report clearly describes a downward trend in critical reading competence and understanding in the field of natural science studies (Balitbang, 2014). The culture of learning to memorize concepts and put numbers into practical formulas. This indicates the stagnation of educational development in Indonesia and the absence of overall improvement, especially in the field of natural science education.

Solving educational problems must start from the roots, which are addressed directly to the core of learning and what is taught in the classroom (Fahmi & Irhasyuarna, 2017); (Yasiro et al., 2021). The learning system usually still revolves around the transfer of knowledge from textbooks to students (Fahmi, 2016). Practices like this will only produce students who understand the concept but are poor in innovation and critical in thinking when facing a problem. Teacher-centered learning is still a common thing in the classroom and students just sit on the bench while taking notes on important information written on the blackboard. Students in the end will only try to show their best performance only at the level of application of the theories and concepts given without being able to reason further if what they receive is only that.

Innovation that can be done to overcome these problems is to be able to use appropriate approaches, models, strategies, learning methods, and learning tools. Freire (1984), a non-formal education leader, tried to raise this issue as a global issue. Such learning conditions are a banking concept of education, where knowledge is analogous to a deposit, the teacher acts as a depositor, and students as a place of deposit. The position between the teacher and students is described as a vertical relationship. It should be in good learning conditions where the positions of teachers and students are equal, no one dominates each other (Fahmi & Irhasyuarna, 2019).

Learning will be successful when students do not memorize the information they get but can criticize the information they get, can relate the conditions themselves and their surroundings to the information, and use it to make a change (Liu et al., 2009); (Johnson, 2010); (Af'idayani et al., 2018); (Rahayu et al., 2018). The abilities that emerge from this learning are commonly referred to as critical thinking skills (Watson & Edward, 2012); (Fahmi et al., 2019). Later there will be a process of change in the cognitive, affective, and psychomotor aspects as a form of individual personal and social adjustment so that with the learning process, individuals are expected to be able to adapt to the environment and their learning needs are met and bring about optimal change.

The aim of the current curriculum is for students to be scientific and solutional, which means teachers must be able to create smart students in thinking, what to make or what to do (Facione, 2012); (Fajeriadi et al., 2019). One of the main goals of education is that students have problem-solving skills. Freire (1984) mentions that the big agenda of education which he calls problem-solving in which a person can know if they "issued" the natural, cultural, and historical reality that surrounds them so that learning becomes more meaningful (Meilya, 2013); (Irwandi & Fajeriadi, 2019). If a student can criticize the problems that occur around him, then the student will also be able to make decisions about these problems.

Existing real conditions in the field there is no learning device in the form of qualified teaching materials by theory and empirical evidence. Teachers use more practical teaching materials that are less relevant to students' learning needs. The teacher seems to have difficulty in making and developing teaching materials that are by the learning needs and the student's learning environment or with the term local wisdom-based learning so that the implementation is somewhat hampered (Fahmi, 2015). This fact is necessary for research regarding the development of learning tools in the form of teaching materials based on local wisdom which in this case is a "wetland" which in general in natural science education is associated with strategies Contextual Teaching and Learning (CTL) learning as environment-based learning.

BIO-INOVED : Jurnal Biologi-Inovasi Pendidikan
Volume 3, Issue 2, June 2021 page. 113-118
https://ppjp.ulm.ac.id/journal/index.php/bino
OPEN ACCESS JOURNAL
P-ISSN : 2684-9062 | E-ISSN : 2714-9803
DOI: 10.20527/bino.v3i2.10322

The CTL strategy is a learning approach that emphasizes the relationship between context and meaning related to the surrounding environment. The design prototype based on the CTL approach provides various content features that are related to real life, as well as provides a wide choice of activities so that students with various learning styles and levels of ability can do hands-on activities and minds-on activities according to their learning environment (Wasis, 2015).

The research results of Ahiri et al. (2013); Rubini & Permanasari (2014); Fayakun & Joko (2015) show a trend that contextual learning with strategies is Contextual Teaching and Learning (CTL) able to improve students' thinking and knowledge levels.

B. Method

The development research design carried out in this study used the Tessmer (1998) development model using the learning strategy Contextual Teaching and Learning (CTL). The development model consists of five steps. The five steps are as follows: 1) Self-evaluation; 2) expert review; 3) one to one; 4) small group; and 5) field test.

The procedure for developing teaching materials in this study consisted of three stages, namely: Self-evaluation, prototyping (validation, evaluation/FGD, and revision), and field tests. In the stage self-evaluation, analysis, and design of teaching materials are carried out to produce a prototype in the first stage.

The next action was taken to produce the prototype; the second stage was validation, evaluation/FGD, and revision which included expert review, one-to-one, and small group. The results of the analysis of the three activities were then revised to become the prototype for the third stage for later field testing in the intact class (field test). The product tested in the field test is a product that has met the standards of validity and practicality to assess its effectiveness.

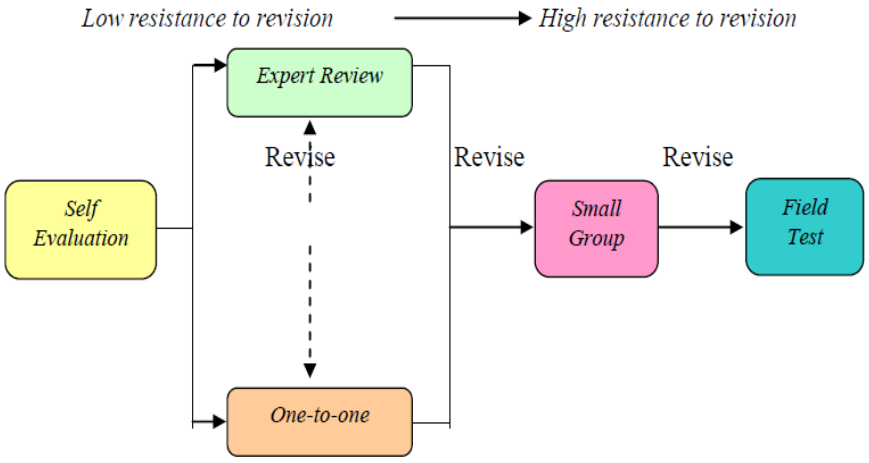

Figure 1 Tessmer Research Development Model (1998)

C. Results and Discussion

1. Development Phase of Teaching Material Prototype

The development of prototype teaching materials (validation, evaluation/FGD, and revision) was carried out with three activities, namely expert review, one-to-one, and small group. The results of the design on the prototype first developed through self-evaluation, expert review, and one-to-one review for content, constructs, and language. Then proceed with evaluating and conducting tests on 3 students (one-to-one) to observe, work on questions, and comment on them as well as analyze the results of student answers and expert assessments. These suggestions are used to revise the prototype of teaching materials.

The results of the three activities are used as material for revision. The revised prototype teaches materials of opinion or expert validation, and of the difficulties experienced by learners while testing one to one revised and tested on learners with a scale small group. The results of the revision were re-tested by the research subjects in the field test with different treatments in two different classes, to see the effectiveness of the prototype teaching materials that had been developed.

2. Implementation of Learning Outcomes Test

The cognitive learning outcomes test was carried out with the pretest and posttest methods. The test data for learning outcomes before and after learning that have been obtained are then calculated to determine the average value. Recapitulation of scores pretest and posttest at the field test stage on the topic of classification of living things. In general, the average value of student learning

BIO-INOVED : Jurnal Biologi-Inovasi Pendidikan
Volume 3, Issue 2, June 2021 page. 113-118
https://ppjp.ulm.ac.id/journal/index.php/bino

OPEN ACCESS JOURNAL
P-ISSN : 2684-9062 | E-ISSN : 2714-9803
DOI: 10.20527/bino.v3i2.10322

outcomes before treatment was 65.84 or was in a fairly good criterion. The average cognitive score after learning an increase in the gain score is 15.31 points. Scores after learning with learning tools that have been developed the average student learning outcomes increase to 81.16 points or are in a good category.

Judging from the normalized gain (n-gain), there is an increase of 0.42 points or is in the medium category. A comparison of students' levels of understanding before and after learning is presented in Figure 2.

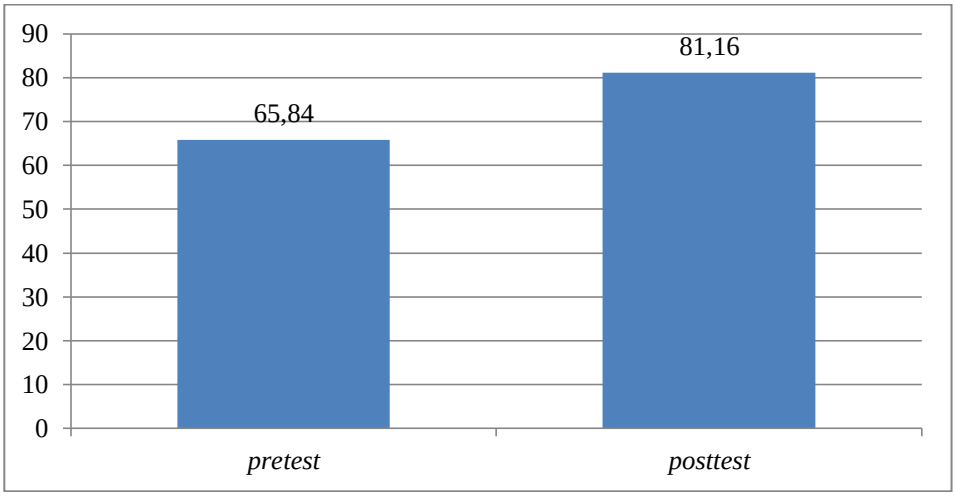

Figure 2 Percentage of Students' Level of Understanding in the Field Test

3. Feasibility of Teaching Material Prototype

The feasibility of the prototype was obtained from the results of the assessment by the validators as a whole and testing at the initial stage to the end of the study. The prototype was declared feasible to be used in research because it was able to solve the problems encountered in the research as indicated by the increase in student learning outcomes and understanding.

Referring to the average value of each validator of the Expert Team and practitioners as well as the learning process and student learning outcomes which indicate that the prototype is feasible and good to use. This is shown by most of the indicators of validity assessment and testing for each prototype that has received a score above the average. The feasibility is measured by referring to the principle of device development according to the provisions of the National Education Standards Agency (BSNP), the rules of the Ministry of National Education, and several other supporting references so that producing a prototype based on local advantages is suitable for learning.

The impact of the prototype teaching materials that are suitable for use results in learning that is carried out in a structured and good manner so that there is an increase in student and teacher activity and students' thinking skills as measured by their learning outcomes as shown in the graph in Figure 2. In this case, the use of learning strategies in the material Environmental-based teaching refers to the learning method Contextual Teaching and Learning (CTL). This is because learning becomes easier to remember and understand by students. After all, the object or learning resource used is the environment around them that always interacts with them. Learning becomes more meaningful because of the direct interaction between students and the environment so that it will also grow their concern for the environment.

In line with the findings of research conducted by Feghii et al. (2011), contextual learning is very effective in using specific tasks. For example, investigation in solving problems because there is a role for repetition and transfer of knowledge. Liu et al. (2009) and Tan et al. (2012) in their research found that contextual learning is effective learning for teachers and students in improving academic achievement. This is because learning relates subject matter to the context of the real world to motivate students to connect and apply their knowledge in their living environment.

Kevin et al. (2012) and Putri et al. (2021) in their research found that contextual learning with a scientific approach is equally able to help students learn and solve problems, as well as being able to serve as a learning platform for students to be able to think at higher levels.

D. Conclusion

Based on the results of these studies, it can be concluded that the development of prototype teaching materials on the topic of classification of

OPEN ACCESS JOURNAL
P-ISSN : 2684-9062 | E-ISSN : 2714-9803
DOI: 10.20527/bino.v3i2.10322

living things based on local advantages with contextual learning methods is very necessary and recommended to be continued. Theoretically and empirically, this is proven to be able to increase students' interests, activities, and thinking skills so that the optimal results desired in educational goals in the form of thinking skills, skills, and concern for the environment can be realized immediately.

E. References

Af'idayani, N., Setiadi, I., & Fahmi. (2018). The Effect of Inquiry Model on Science Process Skills and Learning Outcomes. *European Journal of Education Studies*, *4*(12), 177-182. DOI: 10.5281/zenodo.1344846.

Ahri, J., Dunifa, L., Tanduklangi, A., & Ghani, A.R.A. (2013). The Effect of Learning Strategies on Higher-Order Thinking Skills Students with Different Learning Styles. *International Journal of Science and Research (IJSR)*.

Balitbang Kemendikbud. (2014). *Laporan Hasil Ujian Nasional 2014: Executive Summary*. Pusat Penelitian Pendidikan Balitbang kemendikbud.

Facione, P.A. (2012). Critical Thinking: What It Is and Why It Counts. *Insight Assessment Measuring Critical Thinking Worldwide.* Measured Reasons and The California Academic Press, Millbrae, CA.

Fahmi. (2015). Penggunaan Zat Pewarna pada Kain Sasirangan sebagai Sumber Belajar Ilmu Pengetahuan Alam. *Ethno Pedagogy the Proceeding of International Seminar on Orthopedagogy*. FKIP Unlam Press.

Fahmi. (2016). Strategi Pembelajaran Contextual Teaching and Learning untuk Meningkatkan Keterampilan Berpikir Tingkat Tinggi. *Prosiding Seminar Nasional Pendidikan IPA "Mengembangkan Keterampilan Berpikir Tingkat Tinggi Melalui Pembelajaran IPA".* S2 IPA Unlam Press. Banjarmasin, Indonesia. ISBN. 978-602-60213-0-4

Fahmi & Irhasyuarna, Y. (2017). Misconceptions of Reaction Rates on High School Level in Banjarmasin. *IOSR Journal of Research & Method in Education (IOSR-JRME). 7*(1), 54-61.

Fahmi & Irhasyuarna, Y. (2017). The Misconceptions of Senior High School Students in Banjarmasin on Chemical Bonding. *Journal of Education and Practice*. *8*(17), 32-39.

Fahmi & Irhasyuarna, Y. (2019). *Pengantar Pendidikan: Manusia, Pendidikan, dan Perkembangan Zaman*. Banjarmasin: Program Studi Magister Keguruan IPA PPs. ULM.

Fajeriadi, H., Zaini, M., & Dharmono. (2019). The Validity of the Gastropods Popular Scientific Book in the Pulau Sembilan Kotabaru Coastal Area. *Journal of Biology Education, 8*(2), 142-149.

Fayakun, M., & Joko, P. (2015). Efektivitas pembelajaran fisika menggunakan model kontekstual (ctl) dengan metodepredict, observe, explain terhadap kemampuan berpikir tingkat tinggi. *Jurnal Pendidikan Fisika Indonesia*, *11*(1), 49-58. URL: http://journal.unnes.ac.id/nju/index.php/jpfi

Feghii, I., Berhoz, A., & Raholah, V. (2011). Compare Contextual Interference Effect and Practice Specificity in Learning Basketball Free Throw. *Journal Procedia Social and Behavioral Sciences*. *15*(1), 2176 – 2180.

Freire, P. (1984). *Pedagogi Hati*. Yogyakarta: LKIS Yogyakarta.

Irwandi & Fajeriadi, H. (2019). Pemanfaatan Lingkungan sebagai Sumber Belajar untuk Meningkatkan Minat dan Hasil Belajar Siswa SMA di Kawasan Pesisir, Kalimantan Selatan. *BIO-INOVED : Jurnal Biologi-Inovasi Pendidikan*, *1*(2), 66-73.

Johnson, E.B. (2010). *CTL Contextual Teaching & Learning; Menjadikan Kegiatan Belajar-Mengajar Mengasyikkan dan Bermakna*. Kaifa Learning. Ujungberung, Bandung.

Curry Jr, K. W., Wilson, E., Flowers, J. L., & Farin, C. E. (2012). Scientific Basis vs. Contextualized Teaching and Learning: The Effect on the Achievement of Postsecondary Students. *Journal of Agricultural Education*, *53*(1), 57-66.

Liu, T,-C., Peng, H., Wu, W,-H., & Lin, M, -S. (2009). The Effects of Mobile Natural-science Learning Based on the 5E Learning Cycle: A Case Study. *Journal Educational Technology & Society*, *12*(4), 344-358.

Liu, T, Y., Tan, T,-H., & Chu, Y,-L. (2009). Outdoor Natural Science Learning with an RFID-Supported Immersive Ubiquitous Learning Environment. *Journal Educational Technology & Society*, *12*(4), 161-175.

Meilya, I.R. (2013). Pengelolaan Pembelajaran Dialogis Paulo Freire pada Program Paket B di Sekolah Alternatif Qaryah Thayyibah Desa Kalibening Salatiga Jawa Tengah. *Skripsi*. Semarang: Universitas Negeri Semarang.

Putri, M.H., Fahmi., & Wahyuningsih, E. (2021). Efektivitas Perangkat Pembelajaran IPA untuk Melatihkan Keterampilan Berpikir Kritis Peserta Didik SMP pada Materi Pokok Listrik Statis. *Journal of Banua Science Education*, *1*(2), 79-84. DOI: https://doi.org/10.20527/jbse.v1i2.13

Rahayu, A.B., Hadi, S., Istyadji, M., Zaini, M., Sholahuddin, A., & Fahmi. (2018). Development of Guided Inquiry-Based Learning Devices to Improve Student Learning Outcomes

OPEN ACCESS JOURNAL
P-ISSN : 2684-9062 | E-ISSN : 2714-9803
DOI: 10.20527/bino.v3i2.10322

in Science Materials in Middle School. *European Journal of Alternative Education Studies, 3*(2), 107-117. DOI: 10.5281/zenodo.2261027.

Rubini, B., & Permanasari, A. (2014). The development of contextual model with collaborative strategy in basic science course to enhance students' scientific literacy. *Journal of Education and Practice*, *5*(6), 52-58.

Tan, T, H., Lin, M, S., Chu, Y,-L., & Liu, T, Y. (2012). Educational Affordances of a Ubiquitous Learning Environment in a Natural Science Course. *Journal Educational Technology & Society*, *15*(2), 206–219.

Tessmer, M. (1998). *Planning and Conducting Formative Evaluation*. London: Kogan Page

UNESCO. (2015). Diakses melalui http://hdr.undp.org/en/content/education-index pada tanggal 5 Angustus 2020.

Wasis. (2015). Hasil Pembelajaran Sains di Indonesia: Problem & Upaya Mengatasinya. *Prosiding Seminar Nasional Pendidikan Sains*. Surabaya: 24 Januari 2015. Program Studi Pendidikan Sains Pascasarjana Universitas Negeri Surabaya. ISBN: 978-602-72071-0-3.

Watson, G & Edward, M.G. (2012). *Watson-Glaser Critical Thinking Appraisal: User-Guide and Technical Manual, UK Supervised and Unsupervised Versions 2012*. Pearson Education Ltd.

Yasiro, L.R., Wulandari, F.E., & Fahmi. (2021). Analisis Kemampuan Berpikir Kreatif Siswa dalam Menyelesaikan Soal pada Materi Pemanasan Global di SMPN 1 Jabon Berdasarkan Prestasi Siswa. *Journal of Banua Science Education, 1*(2), 69-72. DOI: https://doi.org/10.20527/jbse.v1i2.11