IJEDs
http://ijeds.ppj.unp.ac.id/index.php/IJEDS

International Journal of Educational Dynamics
Vol. 3 No. 2 (pp. 48-55) June 2021
p_ISSN 2655-4852
e_ISSN 2655-5093

DEVELOPMENT OF MATHEMATICS INTEGRATED SCIENCE BASIC CONCEPT MODULE ABOUT CLASSIFICATION THINGS TO IMPROVE UNDERSTANDING OF PGSD STUDENTS

*Yanti Fitria, Aissy Putri Zulkarnaini

Department of Elementary School Teacher Education (PGSD), Faculty of Education – Universitas Negeri Padang (UNP), Indonesia
*E-mail: yanti_fitria@fip.unp.ac.id

Received: 01 Feb. 2021, Revised: 10 Jun. 2021, Accepted: 30 Jun. 2021

ABSTRACT

This study aims to develop a Mathematics Integrated Science Basic Concept Module with a user guide to improve student understanding and the level of use by lecturers and students. The development method used is the ADDIE model. The feasibility test was carried out by three content experts, three design experts, and the usability test was carried out by three science lecturers. Product trials were conducted on second-semester students of UPP IV Bukittinggi majoring in PGSD, Universitas Negeri Padang. The instruments used were the Likert scale and a questionnaire. The data collected in this study were analyzed using descriptive statistical analysis and non-parametric statistical analysis. The findings of this study indicate that the developed module is very feasible from the aspect of module content with a percentage of 94.5% and the aspect of module display with a percentage of 85.6%. The results of the Kendall's W concordance coefficient test for experts from the aspects of the content and appearance of the module along with the guidelines for its use, it is known that there is a harmonious assessment given between the experts. The results of the usability test assessment show that the assessment given by science lecturers is in the Very Good (VG) category with a percentage of 89.1%. This means that the developed module can be operationalized by science lecturers as a relevant medium in giving lectures on basic science concepts related to understanding the classification of living things. Furthermore, from the results of the Kendall Concordance coefficient test, it is known that there is an alignment of the assessments given by the three science lecturers. The usability test was also carried out on students and the results were in the Very Good (VG) category with a percentage of 91.5%. This shows that the developed modules can be used by PGSD students and their guides by lecturers. This means that students can understand the module components being developed in terms of usability, language use, appearance, and attractiveness as well as module content. Then, the results of Kendall's W concordance coefficient test showed that there was an alignment of the assessments given by students and lecturers. Based on these results, in general, it can be concluded that the developed modules are appropriate and can be used to assist students in increasing their understanding of the classification of living things integrated with groups.

Keywords: Module Development, Classification of Living Things, Mathematics, PGSD

INTRODUCTION

One of the disciplines that must be included in the basic education curriculum is natural science. This is explained in Law Number 20/2003 concerning the Basic Education Curriculum article 37 paragraph 1 that "The primary and secondary education curriculum must contain: religious education, civic education, language, mathematics, natural sciences, social sciences, arts, and sciences. culture, physical education and sports, skills/vocational and local content". From the explanation above, it can be interpreted that natural science as one of the compulsory disciplines in basic education is expected to be

understood as best as possible by elementary school students. One of the efforts to increase understanding of existing materials in natural education disciplines is the integration of Natural Sciences (IPA) with other disciplines. In line with this, Berlin & White (1992) revealed, one way to facilitate students' understanding of science is to integrate it with mathematics. This can be interpreted that mathematics can be used as a tool to understand materials in science (science). Based on this opinion, to find out how effective mathematics-integrated science can improve students' understanding of science, Ross & Hogaboam-Gray (1998) found that students who studied mathematics-integrated science got better learning outcomes than the control class, similar findings were also expressed by Hill (2002) in grade 6 students in an elementary school in America.

Berlin & White (1992) define integration between science and mathematics as mixing two disciplines that support each other and cannot be separated from each other. Based on this understanding, it can be interpreted that the integration between science and mathematics is the use of mathematics as a tool that can explain material in science more effectively and easily. According to Hurley (2001), developing 5 types of integration between science and mathematics, among others: 1) sequenced integration, involves the sequence of learning science and mathematics; 2) partial integration, involving a combination of both and separate between science and mathematics; 3) enhanced integration, namely the use of one discipline as the main one and the other as a supporter; 4) total integration, equal learning between science and mathematics; and 5) parallel integration, separate but simultaneous learning of science and mathematics. This type of integration developed by Hurley is independent. Each type emphasizes a different type of integration.

Therefore, based on the results of the research above, the researcher is interested in conducting the same research in the S1 PGSD environment. This integration model will be developed in the form of educational products, namely modules. This is because using the module can increase student motivation, in this case, students can carry out their learning activities without the direct presence of a teacher (DEPDIKNAS, 2008). The module is a self-study package that includes a series of learning experiences that are planned and systematically designed to help students achieve learning goals (Mulyasa, 2002). In addition, students can learn independently without being dependent on teachers and students can learn without being bound by place and time (Putri et al., 2013). In line with this, Vembrianto (1981) revealed several advantages of the module including 1) students get a strong motivation to achieve teaching goals; 2) students can learn according to the speed of their respective understandings; 3) students are actively involved in the learning process; and 4) students obtain information repeatedly about the learning progress that has been achieved. While the facts in the field show that student learning outcomes are low. Recapitulation of student grades on the classification of living things. The average value of students in the basic concepts of Science II can be seen in Table 1 below.

Table 1. Average student scores in my eyes see basic concepts of science II

No	Class	Score
1	201821290032	67,48
2	201821290031	70,91
3	201821290039	64,96
4	201821290030	70,19
	Average	68,39

Based on the Table 1 above, the average value of students in the 4 study groups in the basic concepts of Science II is 68.39. Furthermore, the results of the analysis of the needs

of the lecturers found that one of the most difficult materials for students is the classification of living things and there is no use of the mathematical integrated classification of living things modules. However, the use of modules already exists, both modules compiled by lecturers and modules printed by the center. Based on this, the researchers wanted to develop a module to improve students' understanding of the classification of living things, namely focusing on cognitive, psychomotor, and affective abilities. The researcher hopes that the product developed in this research can be used in Science Basic Concepts lectures. According to the research described above, the advantage of the module that will be developed by the author is the integration between science and mathematics. Science material becomes easier to understand with mathematics. This is supported by Berlin & Lee (1989) that student learning outcomes using the integration model of science and mathematics have increased. Based on the explanation above, this research is designed to achieve the following development objectives: 1) to produce an appropriate Content Integrated Classification of Living Organisms module; and 2) to describe the level of use of the Assemblage Integrated Classification module by students and lecturers.

METHODS

The development model used is the ADDIE development model developed by Dick & Carry (1996) to design a learning system (Hariyati et al., 2013). The ADDIE model uses five stages of development, namely: 1) **Analysis**, namely conducting a needs analysis. Identify problems, identify products that match the target, thoughts about the product to be developed, and see the level of research subject's needs for the product to be developed; 2) **Design**, designing the product concept to be developed; 3) **Development**, realizing products that have been designed at the design stage and conducting feasibility trials by experts on the products being developed to see the level of feasibility of the product; 4) **Implementation**, testing the product as a real step to implement the product being made, and testing the level of practicality/usability of the product; and 5) **Evaluation**, namely the process to see whether the product made has achieved the goal or not. The achievement of the objectives is seen from the level of feasibility and the level of usability.

Analysis

In this first stage, a needs analysis is carried out based on a literature review and identifies problems in the field regarding the extent to which students understand the classification of living things. This is by the opinion of Branch (2009) which states that the analysis stage can be done in two ways, namely: 1) The analysis was carried out by requests that refer to the literature review; and 2) The analysis is carried out according to needs, meaning that students as research subjects determine the material to be developed in product development. Next, develop an understanding research instrument on the classification of creatures that will be given to students. Researchers will distribute questionnaire sheets to students. Filling out this questionnaire aims to find out whether students have studied with modules or not, whether or not they have known about integrated science before and to find out students' opinions and interests about the development of an integrated mathematics science module and measure the level of student need for the modules to be developed.

Design

Furthermore, at this stage, the researcher will discuss with the supervisor. The following will be discussed. 1) The framework of the module is to be compiled; 2) The final goal (performance objective), namely the ability that must be achieved by students after finishing studying a module; 3) System (scheme/conditions, methods, and tools) evaluation; 4) Outlines of the material to achieve the goal; and 5) The material/substance in the module is in the form of concepts/principles, important facts that are directly related and support the achievement of competence and must be mastered by students. The results of this stage produce a design that is ready to be developed.

Development

In this third stage, development activities were carried out by validating the module design to increase students' understanding of the classification of living things integrated into groups. Branch (2009) explains "the purpose of the development phase is to generate and validate the learning resources". This stage aims to produce a module formulation by analyzing the things that are needed or should be in the manufacture of the module until finally the module formulation that has been refined is obtained. The series of activities carried out in this stage is validation to see the level of feasibility of the content and appearance of the module by experts. Furthermore, the results of the validation are analyzed and considered as suggestions and inputs in drafting the module to be implemented.

Implementation

The purpose of this stage is to see students' understanding of the materials through a module readability test conducted by students to know the accuracy of using the language understood by students. After that, the science lecturer validated the module to see the usability of the module, namely how well the science lecturer understood using this module. At this stage, science lecturers and students are allowed to read the module as a whole, then fill out the instrument to assess the usability of the module that has been read.

Evaluation

The purpose of this stage is to assess the quality of the designed module product. At this stage, the researcher evaluates the product that has been implemented through Focus Group Discussion (FGD) with science lecturers. Evaluation is intended to get a complete picture of the developed module so that it can consider whether the developed module still needs to be revised or not.

RESULTS

Validation Test

It is known that the overall assessment of the experts on the content of the module is in the Very Eligible (SL) category with a percentage of 94.5%. This means that the experts assess that the module content meets the aspects required by PGSD students. Furthermore, the topics presented are by the needs of students and the use of simple language so that they are easy to understand. Then, to find out the alignment of the assessment results between each validator regarding the content of the module, a statistical test was carried out. Researchers used the Kendall Concordance Coefficient test with the help of the SPSS version 20 program. The results of data processing can be seen in this Fig 1 below.

Test Statistics

N	3
Kendall's W[a]	.086
Chi-Square	.778
Df	3
Asymp. Sig.	.855

a. Kendall's Coefficient of Concordance

Figure 1. The results of data processing

Based on Fig 1 above, the Asymp value is obtained. Sig. 0.855 which is smaller than the significance level of 0.05 and the chi-square count is 0.778. Thus, the data shows that there is a harmony in the assessments of the three experts on the research product from the aspect of the module content. This means that the experts have similarities or matches in scoring the items assessed on the aspect of the module content. The overall assessment from the experts on the module display is in the Eligible (SL) category with a percentage of 85.6%. This means that all graphic aspects contained in the module can describe and convey information according to the material. Furthermore, to find out the alignment of the assessment results between each validator regarding the module display, statistical tests were carried out. Researchers used the Kendall Concordance Coefficient test with the help of the SPSS version 20 program. The results of data processing can be seen in this Fig 2 below.

Test Statistics

N	3
Kendall's W[a]	.605
Chi-Square	5.444
Df	3
Asymp. Sig.	.142

a. Kendall's Coefficient of Concordance

Figure 2. The results of data processing

Based on Fig 2 above, the Asymp value is obtained. Sig. 0.142 which is smaller than the predetermined significance level of 0.05 and chi-square count of 5.444. Thus, it can be interpreted that there is a harmony in the judgments of the three experts on the research product from the aspect of appearance.

Practicality Test

The data presented in this study are data relating to the assessment of science lecturers and students on the level of usability of the module. The results of the data processing of the module usability assessment by science lecturers can be seen in Table 1 below.

Table 1. The data processing of the module usability assessment by science lecturers

No	Indicator	Lecture's Score			∑ Lecture's Score	∑ Score Max	%	Category
		A	B	C				
1	Planning	19	18	16	53	60	88,3	VG
2	Implementation	32	33	27	92	105	87,6	VG
3	Evaluation	19	19	17	55	60	91,6	VG
Amount		70	70	60	200	225	89,1	VG

Information: VG = Very Good

The results of the assessment of the science lecturers were carried out with statistical tests to determine the alignment of the assessments of the science lecturers regarding the assessment of the usability of the module. The data were analyzed using the Kendall Concordance Coefficient test using the SPSS version 20 program. The results of data processing can be seen in Fig 3 below.

Test Statistics

N	3
Kendall's W[a]	.778
Chi-Square	4.667
Df	2
Asymp. Sig.	.097

a. Kendall's Coefficient of Concordance

Figure 3. The results of data processing

Based on Fig 3 above, the Asymp value is obtained. Sig. of 0.097 which is smaller than the predetermined significance level of 0.05 and chi-square count of 4.667. Thus, there is a match between the assessments of science lecturers on the products developed. The researcher also conducted a usability test on students. The following are the results of the student assessment of the developed module.

Table 2. The results of the student assessment of the developed module

No	Indicator	∑ Lecture's Score	∑ Score Max	%	Category
1	Usefulness	187	200	93,5	VG
2	Language Usage	181	200	90,5	VG
3	Appearance and Attractiveness	618	700	88,2	VG
4	Content	464	500	92,8	VG
Amount		1450	1600	91,25	VG

Based on Table 2, it can be seen that the student's assessment of the usability of the module is in the Very Good (SB) category with a percentage of 91.25%. These results can be interpreted that students give a positive assessment of the module as a medium used in increasing understanding of the classification of living things. Students can feel the benefits of using the module in learning, the use of light and simple language, the display with a variety of colors and images as well as the content of the module in the form of material on the classification of living things in an integrated set. Statistical tests were also conducted to determine the alignment of student assessments regarding the usability of the

module. The analysis uses the Kendall Concordance Coefficient test using SPSS version 20. The results of data processing can be seen in Fig 4 below.

Test Statistics

N	20
Kendall's W[a]	.265
Chi-Square	15.900
Df	3
Asymp. Sig.	.001

a. Kendall's Coefficient of Concordance

Figure 4. The results of data processing

Based on Fig 4 above, the Asymp value is obtained. Sig. of 0.001 which is smaller than the predetermined significance level of 0.05 and the chi-square count of 15.900. Thus, it can be interpreted that there is an alignment of assessments given by students to the products developed.

CONCLUSION

The product developed in this study is the "Integrated Classification of Living Organisms Module" which is feasible in terms of content and appearance and is ready to be used by science lecturers and students. Therefore, based on the results of the development and discussion, the following conclusions can be drawn. 1) The developed module, namely the "Integrated Classification of Livin Organisms Module" along with its usage guide, is in the Very Eligible (SL) category in terms of content and appearance. This means that the experts state that the module can describe and convey information and is considered appropriate to be used to improve students' understanding of the classification of living things; 2) The usability of the module and its usage guide is in the Very Good (SB) category. This means that science lecturers have no difficulty in operationalizing the modules and their use guides to improve students' understanding of the classification of living things; and 3) Thus, it can be concluded that the modules and guidelines for their use that have been compiled can be used and utilized by science lecturers and are by the needs of PGSD students from the aspect of content and appearance in the implementation of lectures on campus.

REFERENCES

Berlin, D. & White, A. (1992). Report from the NSF/SSMA Wingspread Conference: A Network Integretad Science and Mathematics Teaching And Learning. *School Science and Mathematics*: 92(6):340-342.

Berlin, D.F. & Lee, H. (2005). Integrating Science and Mathematics Education: Historical Analysis. *School Science and Mathematics.* 105 (1):15-24.

Branch, R. M. (2009). *Instructional design: The ADDIE approach* (Vol. 722). Springer Science & Business Media.

Depdiknas. (2008). Peraturan Pemerintah RI No.19 Tahun 2005 tentang Standar Nasional Pendidikan. Jakarta: Depdiknas.

Dick & Carey (1996). The Systematic Dessign of Instuction, New York :Harper Collins Publishers

Hill, M.D. (2002). The effects of Integrated Mathematics/Science Curriculum and Instruction on Mathematics Achievement and Student Attitudes in Grade Six (Unpublished Doctoral Dissertation). West Texas A&M University. UMI Number: 3056684.

Hariyati, E., Mardiyana, M., & Usodo, B. (2013). Efektivitas Model Pembelajaran Kooperatif Tipe Team Assisted Individualization (TAI) dan Problem Based Learning (PBL) Pada Prestasi Belajar Matematika Ditinjau Dari Multiple Intelligences Siswa SMP Kabupaten Lampung Timur Tahun Pelajaran 2012/2013. *Jurnal Pembelajaran Matematika*, *1*(7).Fitria, Yanti. 2017. *Efektivitas Capaian Kompetensi Belajar Siswa Dalam Pembelajaran Sains Di Sekolah Dasar*. Universitas Negeri Padang.

Hurley, M.M. (2001). Reviewing Integrated Science and Mathematics: The Search For Evidence and Definitions From New Perspectives. *Reviewing Integrated Science and Mathematics.* 10(5):259-268.

Putri, R. M., Neviyarni, S., & Daharnis, D. (2013). Pengembangan Modul Bimbingan dan Konseling untuk Pencegahan Penyalahgunaan Narkoba di Sekolah. *Jurnal Konseling Dan Pendidikan*, *1*(2), 121-135.

Mulyasa, E, (2002), Manajemen Berbasis Sekolah, Bandung: PT. Remaja Rosdakarya.

Ross, J.A. & Hogaboam-Gray, A. (1998). Integrating Mathematics, Science, and Technology: Effects on Students. *International Journal of Science Education.* 20(9):1119-1135.

Vembrianto, S. T. (1981). Pengajaran Modul. *Yogyakarta: Yayasan Pendidikan Paramita*.