RESEARCH ARTICLE

Development of mathematics learning media assisted by Prezi media on building space material Grade VI SD 1 Godegan Yogyakarta

Farid Nur Irfan[1]   **Trisniawati Trisniawati**[1*]   **Nelly Rhosyida**[1]

[1] Program Studi Pendidikan Guru Sekolah Dasar, Universitas Sarjanawiyata Tamansiswa, Yogyakarta, Indonesia

Correspondence to: Trisniawati Trisniawati, Program Studi Pendidikan Guru Sekolah Dasar, Universitas Sarjanawiyata Tamansiswa, Yogyakarta, Indonesia; Email: trisniawati@ustjogja.ac.id

Abstract: This research aims to: 1) develop the Prezi application media for mathematics learning on the topic of spatial structures in elementary schools, 2) describe the feasibility of the Prezi application media for mathematics learning on the topic of spatial structures in elementary schools through the validation assessment by media experts and subject matter experts. The use of the Prezi application media to display sound media, animated movements, and images falls under the Research and Development (R&D) category. The research conducted by the researcher consists of several stages: (1) information and research collection, (2) media production planning, (3) initial product development, (4) preliminary product testing, (5) validation by media experts and subject matter experts, (6) product revision, and (7) final product design. The data collection techniques used in this study include observation, questionnaires, and interviews. Two instruments are utilized: assessment sheets for subject matter experts and media experts. Qualitative and quantitative analysis techniques are employed to analyze the collected data, converting average scores into categorized values. The research and development results include: 1) utilizing Prezi to create a learning media product for mathematics on the topic of spatial structures with engaging and interactive features, and 2) the feasibility of the Prezi media, as assessed by media experts, is 80%, categorized as "Good" and deemed feasible. According to subject matter experts, the feasibility of the Prezi media obtained a score of 75%, categorized as "Good" and deemed feasible. Media experts' validation results for the Prezi application media yielded a "Good" rating. Based on the above explanations, the development of Prezi-assisted learning media for spatial structures in the sixth grade at Godegan Elementary School is suitable for mathematics learning.

Keywords: build space, mathematics, Prezi application media, elementary school

1 Introduction

It is essential to give full attention and support to education so that society can achieve better progress and development (Xezonaki, 2023; Widodo et al., 2023). According to Law No. 20/2003 on the National Education System, education is a deliberate and planned effort to create a learning environment and learning process that facilitates the active development of learners' potential, including spiritual aspects, self-control, personality, intelligence, noble character, and skills needed for themselves, society, nation, and state. The national education system is the overall educational components that are interconnected in an integrated manner to achieve national education goals (Dahal et al., 2022; Dahal et al., 2023).

Mathematics is one of the subjects faced at almost all levels of education, from early elementary school to college (Nugroho, Trisniawati & Rhosyida, 2022). In the development of Curriculum 2013 (K13) in Indonesia, learning mathematics in elementary schools in grades 4-6 is separated from thematic learning because the content of mathematics has differences with other subject content. According to Kemdikbud (2016: 2), to master abstract mathematical concepts, thinking skills in the 4Cs are needed, namely creative, critical thinking, communicative, and collaborative. Mathematics is considered one of the subjects contents that requires a deeper understanding of the material compared to other subjects' contents in elementary school (Dahal, Luitel & Pant, 2022).

Teaching mathematics in elementary schools has its importance because mathematics is a subject that provides important provisions for life and learning in other fields of science (Haris & Ahmad, 2022). Mathematics involves understanding numbers and calculations, including logical reasoning skills and problem-solving related to numbers. Mathematics is also an exact and systematically structured field of knowledge. By studying mathematics, students will develop good logical thinking skills and be able to apply them in everyday life. However, sometimes

some students find math difficult, uninteresting, and dull (Zulyadaini, 2016). Therefore, this problem should be a serious concern, especially at the elementary school level, the primary stage in the student learning process.

Math needs to be presented in a fun way for students to motivate them to learn math. Teachers have various ideas or creativity to grab students' attention and foster motivation, one of which is by connecting mathematical material with everyday situations in life so that students can understand how mathematical problems have relevance and can be solved in their daily context (Papadakis & Kalogiannakis, 2020; 2022). In mathematics, students must use diagrams, symbols, models, and images to develop their thinking skills (Setiawan, 2020). Math also involves skills in identifying patterns and finding solutions to existing problems. Meyers (in Sulianto, 2008) said that a person can think critically when they can understand the content and theory of their field of study. Therefore, for students to think critically about mathematics, they must understand mathematics learning well. Currently, there are various difficulties and obstacles in the delivery of mathematics learning (Fitri & Amelia, 2021).

Learning can be done in person or online (Yirci et al., 2023). According to Dewi (in Rosali, 2020), *online learning* is a discovery in education that overcomes the challenges of providing various learning resources. Online learning is an effective and efficient breakthrough in the teaching and learning process that suits the needs of students (Dewi, 2017). The learners' characteristics determine the success of a learning model or media. Online learning has advantages, such as improving learners' skills in using technology (mobile phones or computers), the flexibility of learning anywhere, covering a wide range of learners, and facilitating the improvement and storage of learning materials. In addition, online learning media can train students' independence. Students can learn independently without relying on direct guidance from the teacher. They can collaborate with learning media as if exchanging responses with a teacher (Widjayanti et al., 2018).

At the elementary school level, the subject of building spaces in mathematics is often less attractive and preferred by students. An interview with the mathematics teacher at SD 1 Godegan on October 22, 2020, revealed that grade VI students still have difficulty understanding the material of building spaces. Students only learn through textbooks and worksheets without any direct explanation. In addition, students have not been actively involved in learning due to the limited learning media that can support the learning process that provides opportunities for students to understand the material, improve thinking skills, and develop reasoning skills that are hampered (Kalogiannakis & Papadakis, 2020; 2022; Sari et al., 2021).

Learning media is a device or instrument used in the educational process, whether in the form of imagery, audio, audiovisual, or multimedia (Papadakis, Kalogiannakis & Gözüm, 2022). Learning media is very important in supporting the effectiveness of the learning process in the classroom. In online learning, the development of learning media needs to be aligned with the growth of students' intelligence so that they can easily capture the material being taught (Wiryanto, 2020). However, some teachers face obstacles in delivering material by making application-based learning materials (Rigianti, 2020). In addition, the lack of teacher knowledge and skills in creating applications that can support student understanding is also a challenge. One of the obstacles teachers and students often face related to learning media is learning the material of building space. Based on the previously mentioned constraints, researchers are interested in adopting Prezi application media in teaching the material of building space to grade VI students at SD 1 Godegan. Prezi application is software used for online presentations and also serves as a tool for exposing and sharing ideas through virtual platforms (Perron & Stearns, 2010). The program contained in the Prezi application facilitates users to enlarge and shrink the media to be presented more flexibly. In addition, the Prezi application can make learning more interesting because it presents material dynamically (Ampera, 2017). This application media can be accessible online and offline through computers, laptops, and cell phones. In addition, this Prezi application has more remarkable, engaging, and varied themes than other presentation applications. So that in conveying space-building material to students, teachers can be more helpful during online and offline learning. Furthermore, it is hoped that the material can be conveyed well so that the indicators in the curriculum can be achieved (Papadakis, Alexandraki & Zaranis, 2021). Based on this with the Prezi application media, it is necessary to develop Preziassisted learning media.

2 Methods

This research uses a development research method with a research design following the Research and Development (R&D) model. The development research method produces a specific product and tests its effectiveness (Sugiyono, 2015, p. 407). In this study, the development model adopted followed the practical techniques recommended by Borg & Gall and adapted

by Arcana et al. (2014). The development process consists of three steps: exploratory studies, initial product development, expert validation, and product revision. The research subjects in the pilot test were grade VI students. The research subjects were grade VI students of SD 1 Godegan for a limited field trial totalling eight people. The research sample used a random sampling technique. The research subjects for the primary respondents were grade VI students of SD 1 Godegan, totalling 24 people.

The data analysis techniques used in this study include three methods, namely observation, questionnaires, and interviews. According to Arikunto (Abidin & Purbawanto, 2015), research instruments refer to tools or facilities researchers use to collect data more efficiently. In this study, the research instruments consisted of feasibility instruments assessed by expert researchers as well as feasibility assessment instruments from teachers on the enhanced Prezi application media. The feasibility determination is based on the ideal criteria set by Widoyoko (2009).

The accumulated data is then presented. The proportion/percentage of results is obtained by computing the average value of responses based on the assessment apparatus of the reviewer (material experts and media experts). The calculation of the percentage of suitability was carried out using the formula proposed by Sudijono (2011) :

$$\text{Percentage of perfection for each aspect} = \frac{\Sigma \text{ average score}}{\Sigma \text{ maximum score for each aspect}} \times 100$$

$$\text{Overall perfection percentage} = \frac{\Sigma \text{ overall average score}}{\Sigma \text{ overall maximum score}} \times 100$$

This Prezi application media development research is decided by the minimum product feasibility value in the C (Enough) category. Suppose the *average evaluation* score by material experts, media experts, and grade VI class teachers of SD 1 Godegan is at least C (Sufficient). In that case, the product developed is considered valid and feasible.

3   Results

The results of this research and development are to determine the validity and practicality of Prezi media in learning mathematics of building spaces carried out at SD 1 Godengan Yogyakarta.

3.1   Product Planning

3.1.1   Potential and problems

Based on the interview conducted at SD 1 Godegan, the researcher identified several problems. Some problems include students having difficulty understanding abstract mathematics and symbols, lack of focus during learning due to uninteresting teaching media used by the teacher, and the instructional process relying more on conventional methods as there is a lack of interactive learning media to support the delivery of materials.

3.1.2   Data collection

In the next stage, the researcher collected information to understand the student's needs regarding the researched and developed learning media. This was done through observation and interviews. Through direct observation of the learning process, it was observed that the students were engaged in conversations with their peers because the learning was uninteresting and monotonous using conventional methods, where the teacher only relied on textbooks, student books, and limited media. Meanwhile, interviews with the 6th-grade teacher at SD 1 Godegan revealed challenges in delivering mathematics lessons, as students found it difficult to understand and not enjoyable due to their lack of focus during the lessons.

3.1.3   Product results

(1) Product Development Design includes competency maps and framework development.
(2) Pre-production: In this stage, the researcher prepares the tools and materials used to create the Prezi media, such as a PC/Laptop, Prezi media creation website application, arrangement of learning objectives (KI/KD), solid geometry materials, solid geometry images, and supporting sample images.
(3) production includes designing the Prezi media application and arranging the Prezi media.

3.1.4   Product validation

Product validation by Media Experts, Subject Matter Experts, and Teachers. The validation is conducted by three experts: a subject matter expert, a media expert, and a teacher. The following are the validation results from the subject matter expert and media expert. (Figure 1 to 8)

Figure 1   Title section of Prezi media

The title section is the opening page containing the topic's title being discussed in the Prezi media. It already includes instructions for usage.
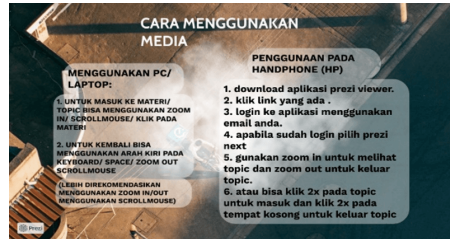

Figure 2   Usage instructions section of Prezi media

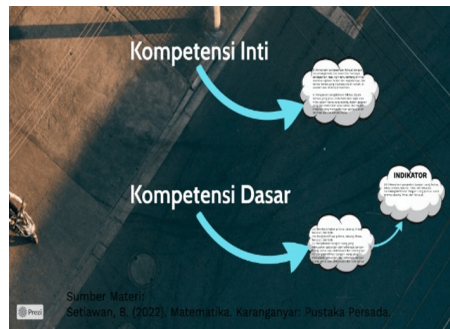This section presents steps or instructions for using the Prezi application media.

Figure 3   KI, KD, indicators, and objectives section

This section presents the Core Competencies (KI), Basic Competencies (KD), Indicators, and Objectives of the solid geometry topic presented through the Prezi application media.

Figure 4   Section on understanding solid geometry

Figure 5   Section on types of solid geometry

Figure 6   Material section

Figure 7   Section on formulas for solid geometry

Figure 8   Section on examples of solid geometry problems

3.1.5   Material expert validation

Based on the validation results from Material Expert 1, an expert lecturer, the product achieved a perfection score of 78.75. Meanwhile, Material Expert 2, a teacher, scored the product with a perfect score of 86.25. When averaged, the overall perfection percentage for both material experts is 82.5%. According to the scale of perfection percentage, the product falls into the category of "very good," indicating its validity and suitability for use.

3.1.6   Media expert validation

The validation results for the perfection score of the product by Media Expert 1, an expert lecturer, is 80, while Media Expert 2, a teacher, achieved a score of 92. The average perfection percentage for both media experts is 86%, falling into the category of "very good" on the scale of perfection percentage. Therefore, the product is considered valid and suitable for use.

4   Discussion

4.1   Development of Prezi application media

The Prezi application media was developed through the product planning phase, identifying potential and problems obtained from teacher interviews. Based on the identified problems and potential, the researcher aimed to develop an interactive multimedia application engaging for mathematics learning. The development of Prezi media went through stages such as product development design, pre-production, and production. However, this Prezi application has some limitations, such as the inability to use hyperlinks and certain features being locked because it is a paid application.

4.2   Media validity evaluation

The validity of the media was assessed based on the evaluation criteria by subject matter experts, media experts, and teachers. The evaluation results indicated that the content and

the Prezi application media were categorized as "Very Good," signifying their suitability and idealness for use. (See Figure 9)
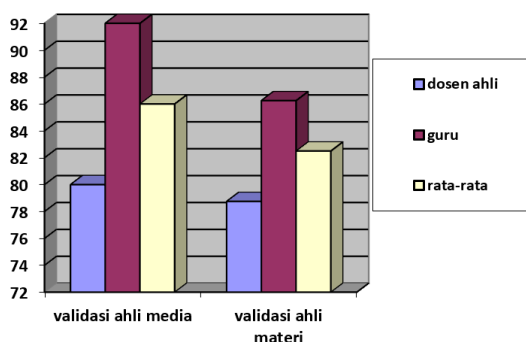
Figure 9   Level of validation by media experts and subject matter experts

According to the research conducted by Widowati and Purwanto (2018) on developing Prezi-based learning media to enhance students' critical thinking skills on the respiratory system of living organisms, Prezi media offers several advantages. These advantages include the ability to zoom in on small texts without blurring, accessibility both online and offline, clear instructions for usage, user-friendly operations, and engaging content with visuals, formulas, and example problems related to solid geometry.

5   Conclusion

Based on the research, analysis, and discussion, the following conclusions can be drawn development of Prezi Application Media for Solid Geometry in Mathematics for Grade VI Elementary School Students The development of Prezi application media for solid geometry in mathematics for Grade VI students at SD 1 Godegan is a multimedia learning tool designed using the Prezi website and extracted into an application format. The purpose of developing this media is to facilitate students in understanding the delivered learning material (Papadakis et al., 2022). This interactive media was developed through research and development (R&D). Validity of Prezi Media for Solid Geometry in Mathematics for Grade VI Elementary School Students The validity of the Prezi application media for mathematics in Grade VI has been developed and evaluated by subject matter experts and media experts to assess the feasibility, including the validity and practicality of the media product. The validation results from the subject matter expert indicate a "Good" rating. The validation results from the media expert also indicate a "Good" rating. From the above explanation, it can be concluded that the development of Prezi application media for solid geometry in mathematics for Grade VI at SD 1 Godegan is suitable for implementation in solid geometry mathematics learning.

Conflicts of interest

The authors declare that they have no conflict of interest.

References

Aadzaar, R. M. (2018). Pengembangan Multimedia Pembelajaran Matematika Pokok Bahasan Lingkaran Di SMP. Prosiding Seminar Nasional Pendidikan Matematika Etnomatnesia, 90-97.

Abidin, Z., & Purbawanto, S. (2015). Pemahaman Siswa Terhadap Pemanfaatan Media Pembelajaran Berbasis Livewire Pada Mata Pelajaran Teknik Listrik Kelas X Jurusan Audio Video Di Smk Negeri 4 Semarang. Edu Elektrika Journal, 4(1), 38-49.

Anas Sudijono. (2012). Pengantar Statistik Penelitian Pendidikan. Jakarta: Rajawali Pres.

Arcana, I Nyoman. 2014. Pengembangan Multimedia Pembelajaran Bilingual "Lisrew" Berbasis Teknologi Informasi dan Komunikasi pada Pembelajaran Fisika di SMA. Laporan Penelitian Dikti, tidak diterbitkan. Surabaya:Universitas Khatolik Widya Mandala Surabaya.

Dahal, N., Luitel, B. C., & Pant, B. P. (2022). Exploration of the Workshop activity for peer assessment in online courses of mathematics. Advances in Mobile Learning Educational Research, 2(2), 475-482. https://doi.org/10.25082/AMLER.2022.02.016

Dahal, N., Luitel, B. C., Pant, B. P., Shrestha, I. M., Manandhar, N. K., & Luitel, L. (2023). Procedures for online peer assessment: Assessing algorithm problems in school mathematics for future teachers. Advances in Mobile Learning Educational Research, 3(1), 739-747. https://doi.org/10.25082/AMLER.2023.01.022

Dahal, N., Manandhar, N., Luitel, L., Luitel, B., Pant, B., & Shrestha, I. (2022). ICT tools for remote teaching and learning mathematics: A proposal for autonomy and engagements. Advances in Mobile Learning Educational Research, 2(1), 289-296.
https://doi.org/10.25082/AMLER.2022.01.013

Dewi, L. (2017). Rancangan Program Pembelajaran Daring Di Perguruan Tinggi: Studi Kasus Pada Mata Kuliah Kurikulum Pem-Belajaran Di Universitas Pendidikan Indonesia. Edutech, 16(2), 205.
https://doi.org/10.17509/e.v16i2.7616

Fitri, A., & Amelia, W. (2021). Pengembangan Media Pembelajaran Matematika Berbasis Video Animasi Materi Bangun Ruang Kelas V SDN Gunung Sahari Utara 01 Pagi. QALAMUNA: Jurnal Pendidikan, Sosial, Dan Agama, 13(2), 945-956.
https://doi.org/10.37680/qalamuna.v13i2.1199

Haris, W. A., & Ahmad, S. (2022). Peningkatan Hasil Belajar Matematika Subtema Denah Dan Skala Menggunakan Model Cooperative Learning Tipe Cooperative Integrated Reading And Composition (CIRC) Di Kelas V SDN 56 Anak Air Kota Padang, 5, 320-330.

Henry Aditia Rigianti. (2020). KENDALA PEMBELAJARAN DARING GURU SEKOLAH DASAR DI KABUPATEN BANJARNEGARA. Elementary School 7 (2020) 297-302, 2(1), 1-12.
https://doi.org/10.31316/esjurnal.v7i2.768

Kalogiannakis, M., & Papadakis, S. (2022). Preparing Greek Pre-service Kindergarten Teachers to Promote Creativity: Opportunities Using Scratch and Makey Makey. In Children's Creative Inquiry in STEM (pp. 347-364). Cham: Springer International Publishing.
https://doi.org/10.1007/978-3-030-94724-8_20

Kalogiannakis, M., & Papadakis, S. (Eds.). (2020). Handbook of research on tools for teaching computational thinking in P-12 education. IGI Global.
https://doi.org/10.4018/978-1-7998-4576-8

Nugroho, S. A., Trisniawati, T., & Rhosyida, N. (2022). Developing powerpoint-based interactive multimedia of mathematics learning multiples and factors materials for elementary school. Advances in Mobile Learning Educational Research, 2(2), 411-420.
https://doi.org/10.25082/AMLER.2022.02.009

Papadakis, A., Barianos, A., Kalogiannakis, M., Papadakis, S., & Vidakis, N. (2022). ARION: A Digital eLearning Educational Tool Library for Synchronization Composition & Orchestration of Learning Session Data. Applied Sciences, 12(17), 8722.
https://doi.org/10.3390/app12178722

Papadakis, S., & Kalogiannakis, M. (Eds.). (2020). Handbook of research on using educational robotics to facilitate student learning. IGI Global.
https://doi.org/10.4018/978-1-7998-6717-3

Papadakis, S., & Kalogiannakis, M. (Eds.). (2022). STEM, robotics, mobile apps in early childhood and primary education: Technology to promote teaching and learning. Springer Nature.
https://doi.org/10.1007/978-981-19-0568-1

Papadakis, S., Alexandraki, F., & Zaranis, N. (2021). Greek parents' app choices and young children's smart mobile usage at home. In Interactive Mobile Communication, Technologies and Learning (pp. 39-50). Cham: Springer International Publishing.
https://doi.org/10.1007/978-3-030-96296-8_4

Papadakis, S., Kalogiannakis, M., & Gözüm, A. I. C. (2022). STEM, STEAM, computational thinking, and coding: Evidence-based research and practice in children's development. Frontiers in Psychology, 13, 1110476.
https://doi.org/10.3389/fpsyg.2022.1110476

Perron, B., & Stearns, A. (2010). A Review of A Presentation Technology: Prezi.
https://doi.org/10.1177/1049731510390700

Rosali, E. S. (2020). Aktifitas Pembelajaran Daring Pada Masa Pandemi Covid-19 Di Jurusan Pendidikan Geografi Universitas Siliwangi Tasikmalaya. Geography Science Education Journal (GEOSEE), 1(1), 21-30.

Sari, S. G., Fauzan, A., Armiati, A., & Yerizon, Y. (2021). Pengembangan Media Pembelajaran Matematika Interaktif Berbasis Problem Based Learning di Kelas V SDN 22 Duku Kecamatan Koto XI Tarusan. Jurnal Cendekia: Jurnal Pendidikan Matematika, 5(2), 2123-2132.
https://doi.org/10.31004/cendekia.v5i2.771

Setiawan, Y. (2020). Pengembangan Model Pembelajaran Matematika SD Berbasis Permainan Tradisional Indonesia dan Pendekatan Matematika Realistik. Scholaria: Jurnal Pendidikan Dan Kebudayaan, 10(1), 12-21.
https://doi.org/10.24246/j.js.2020.v10.i1.p12-21

Sugiyono (2015). Metode Penelitian Kombinasi (Mix Methods). Bandung: Alfabeta.

Sulianto. (2008). Pendekatan Kontekstual Dalam Pembelajaran Matematika Untuk Meningkatkan Berpikir Kritis Pada Siswa Sekolah Dasar. Pythagoras: Jurnal Pendidikan Matematika, 4(2), 14-25.

Surani & Ampera, D. (2017). Pengembangan Media Pembelajaran Prezi Pada Mata Pelajaran Membuat Pola Di Smk Awal Karya Pembangunan Galang. Jurnal Pendidikan Teknologi Dan Kejuruan, 19(1).
https://doi.org/10.24114/jptk.v19i1.7150

Widjayanti, W. R., Masfingatin, T., & Setyansah, R. K. (2018). Media Pembelajaran Interaktif Berbasis Animasi Pada Materi Statistika Untuk Siswa Kelas 7 Smp. Jurnal Pendidikan Matematika, 13(1), 101-112.
https://doi.org/10.22342/jpm.13.1.6294.101-112

Widodo, J. P., Subandowo, M., Musyarofah, L., & Slamet, J. (2023). Interactive gamification-flip-book for developing students' outcomes. Advances in Mobile Learning Educational Research, 3(2), 754-762.
https://doi.org/10.25082/AMLER.2023.02.002

Widowati, C., & Purwanto, A. 2018. Pengembangan Media Pembelajaran Berbasis Prezi dalam Meningkatkan Berpikir Kritis pada Materi Siswa Pernafasan Makhluk Hidup. Prosiding Seminar Nasional Pendidikan, 115-119.

Widoyoko, Eko Putro S. 2009. Evaluasi Program Pembelajaran (Panduan Praktis Bagi Pendidik dan Calon Pendidik), Yogyakarta: Pustaka Pelajar.

Wiryanto, W. (2020). Proses Pembelajaran Matematika Di Sekolah Dasar Di Tengah Pandemi Covid-19. Jurnal Review Pendidikan Dasar: Jurnal Kajian Pendidikan Dan Hasil Penelitian, 6(2), 125-132.
https://doi.org/10.26740/jrpd.v6n2.p125-132

Xezonaki, A. (2023). The use of Kahoot in preschool mathematics education. Advances in Mobile Learning Educational Research, 3(1), 648-657.
https://doi.org/10.25082/AMLER.2023.01.014

Yirci, R., Karakose, T., Kocabas, I., Tülübaş, T., & Papadakis, S. (2023). A bibliometric review of the knowledge base on mentoring for the professional development of school administrators. Sustainability, 15(4), 3027.
https://doi.org/10.3390/su15043027

Zulyadaini. (2016). Perbandingan Hasil Belajar Matematika Model Pembelajaran Kooperatif Tipe Coop-Coop dengan Konvensional. Jurnal Ilmiah Universitas Batanghari Jambi, 16(1), 153-158.