

Development of Digital Teaching Materials Based Microsoft Sway to Increase Literature Science

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Abstract. This project intends to design and evaluate digital teaching materials based on Microsoft Sway to improve the scientific literacy of primary school pupils. This study is a development study employing methodologies with a design that is consistent with Borg and Gall. This study focuses on teachers and students Public Elementary Cchool Karangmlati 1, Public Aelementary Cchool Bintoro 9, and Public Aelementary Cchool Bolo. Data collecting strategies include (1) interviews (2) questionnaires (3) testing, and (4) documentation. Data analysis strategies employing qualitative and quantitative analysis. The conclusion of this study is This instructional material has also been evaluated for practicability using a validity test, with an average score of over 85 and a very practicable category. The findings of the model's effectiveness test using the t-test indicated that digital teaching materials based on Microsoft Sway were effective in enhancing the scientific literacy of primary school students..as proven by the posttest results being greater than the pretest results. This was also supported by the results of teacher responses and 85% students expressed interest in the developed teaching materials.

Keywords: Digital Teaching Materials; Science Literacy; Microsoft Sway

1 Introduction

Scientific literacy is an important aspect to face technological developments and answer challenges in the digital era. For a generation to be able to compete, make the proper decisions based on their knowledge, and solve issues in the digital era, they must possess critical thinking and a strong scientific mentality. Literacy is the ability for pupils to use fundamental abilities to daily tasks in order to comprehend and apply knowledge to solve difficulties [1]. Scientific literacy is significant because it gives a context for solving societal problems and the ability to make knowledgeable and informed decisions that will influence their and their children's quality of life[2]. It was further mentioned that scientific literacy is extremely beneficial for one's survival [3][4][5][6].

However, the reality found in the field is that the level of scientific literacy is still low, especially in Indonesia. according to[1], Indonesian pupils score worse than the OECD average in reading, arithmetic, and science skills, with a score of 396 out of 489 for scientific literacy in 2018. In addition, only a tiny percentage of students in Indonesia possess the maximum degree of competency (Level 5 or 6) in a single topic. Moreover, only a tiny proportion of students attain a minimal level of competency (Level 2 or higher) in one topic. Factors causing the low scientific literacy of students include teacher-centered learning and the use of digital teaching materials has

not been maximized, students' reading interest is low, students' use of smartphones is not appropriate, teachers' limitations in mastering digital technology (IT), in teaching teachers tend to prioritize theory. and memorization. Students in the digital era prefer web-based learning to conventional learning, this is in line with research[1]which states thatIn the millennial era, students are more interested in website-based learning than conventional learning. The use of mobile technology in online learning in educational institutions is very much needed by teachers in the digital era[4]This statement is supported by[4], Teacher-centered learning does not provide opportunities for students to develop communication skills and does not improve students' literacy skills. Moreover, several studies have demonstrated that the creation of ICT-based teaching materials or computer technology is more successful at boosting student motivation, enhancing the quality of teacher instruction, and facilitating student learning. [5][6].

Based on the aforementioned facts and backed by the findings of preliminary study, it is required to build primary school learning aids that can increase students' scientific literacy. Efforts to increase students' scientific literacy can be accomplished through the use of digital teaching resources based on Microsoft Sway. In accordance with the periods in the digital era, the production of instructional materials must also incorporate the natural environment and the advancement of digital technology. This statement demonstrates the significance of Microsoft Sway-based digital instructional resources for enhancing scientific literacy in science education.

2 Research Methodology

2.1 Research Design

This research employs a research and development methodology. The approach utilized to perform this R&D study is based on the view of Borg and Gall[2], which consists of ten steps: The development is the creation of Microsoft Sway-based digital teaching resources in the form of links to increase the scientific literacy of primary school children. The procedure to be used in conducting this R&D research is based on the opinion of Borg & Gall Research and information collection (Research & Initial Information Collection).

2.2 Sources and Types of Data

Students and teachers provided information for this study. This research collected information regarding needs analysis, product efficacy, and product viability. Teacher and student interviews conducted at the start of the project yielded data for needs analysis. The results of increasing the value of learning outcomes from the pretest-posttest of the experimental group and the posttest difference test of the control-experimental group, which demonstrated an increase in students' scientific literacy, provided information on the effectiveness of teaching materials. The data on the viability of instructional materials is derived from the outcomes of expert evaluations, which provide scores and suggestions for enhancing instructional materials prior to testing. And student response questionnaires and interviews with teachers after learning activities on teaching materials developed by researchers.

2.3 Research Instruments

The instruments used were interview guidelines, preliminary research questionnaires, expert test questionnaires (material experts, media experts in ICT), student and teacher response questionnaires, and tests (pretest-posttest).

2.4 Data Analysis

Data analysis techniques using qualitative and quantitative analysis. Analysis of the data obtained from needs analysis, feasibility analysis, and analysis of the effectiveness of digital teaching materials based on Microsoft Sway. At the stage of analysis of data needs analyzed by descriptive analysis descriptive analysis of the results of interviews and observations towards teachers and students. The data generated from the validation questionnaire, student and teacher response questionnaires will analyzed using a rating scale made with 4 alternative answers from the highest answer 4 to the lowest is 1. As for looking at the feasibility of the product developed based on the Percentage and Eligibility Criteria for Microsoft Sway-Based Digital Teaching Materials based on expert judgment. To test the hypothesis, whether Microsoft Sway-based digital teaching materials are said to be effective, an analysis of the average pretest-posttest results of the experimental group was carried out using the N gain formula. Furthermore, it proves the significance of the effectiveness of -based digital teaching materials microsoft sway used t-test data analysis test

3 Research Results

This chapter describes the study of the need for Microsoft Sway-based digital teaching materials, the design and development of teaching materials, and the assessment of the effectiveness of Microsoft Sway-based teaching materials to increase the scientific literacy of primary school children. The complete research stages can be seen in the following picture.

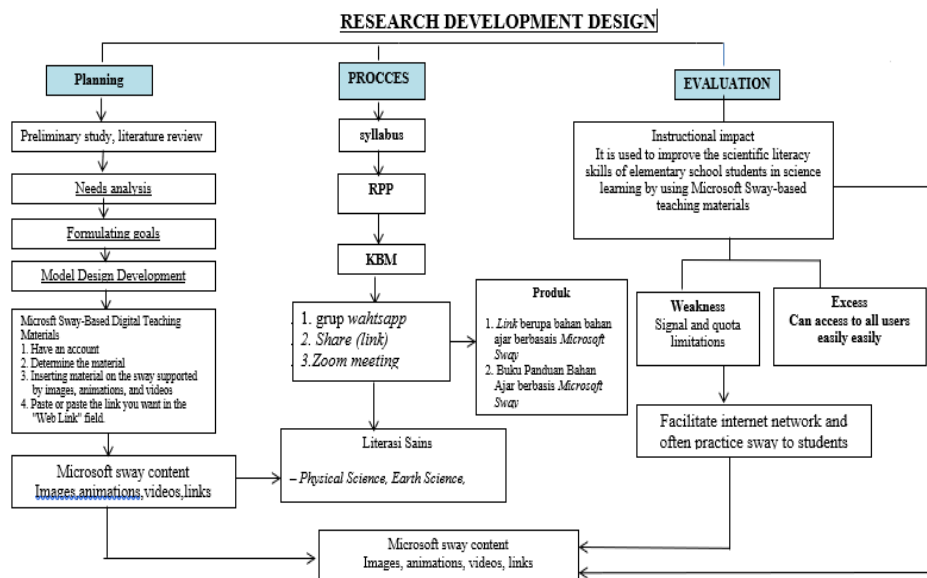


Figure 1. Research Development Design

Before being used, the draft of teaching materials in the form of links and guidelines for the use of learning materials were validated by three validators to assess their validity and feasibility.

The following is a detailed explanation of the results of expert validation of the developed teaching materials.

The validation in this study includes the Assessment of the Validity and Feasibility of Digital Teaching Materials Based on Microsoft Sway With a score of 89.58. Assessment of the Validity and Feasibility of the Guide to the Use of Microsoft Sway-Based Digital Teaching Materials obtained a score of 85.93. While the Assessment of the Validity of Microsoft Sway-based digital teaching materials obtained a score of 87.5. So it can be concluded that the developed Microsoft Sway-based digital teaching materials are very suitable for use for learning.

These results are also supported by the results of students' positive responses based on the results of the questionnaire recapitulation where the average student response gain in the experimental classes 1, 2, and 3 is in the very good indicator with an average percentage above 80%. The score explains that students agree with the indicators that have been described by researchers in student response questionnaires to teaching materials. This means that digital teaching materials based on Microsoft Sway can be well received by students, especially grade 4 State Elementary School Karangmlati 1, State Elementary School Bintoro 9 and State Elementary School Bolo. In addition, it is also supported by a positive response from the teacher based on the results of interviews that have been conducted.

3.1 Gain Test Results

The normalized gain test was used to determine the average increase between the pre- and post-test scores of the control and experimental groups.

The average findings of the pre- and post-tests for the control group demonstrated an increase in the scientific literacy ability of fourth-grade students at SD NegeriKatonsari 1 from an N-gain of 0.086 to 0.3 ($0.3 > \text{N-gain}$). The literacy skills of the control group rose less dramatically. In the experimental class 1 State Elementary School KarangMlati 1, the N-gain was calculated to be 0.314, which is included in the interpretation of the medium category ($0.3 \text{ N-gain } 0.7$). In the experimental class 2 SD NegeriBintoro 9 sample, the N-gain of 0.353 was interpreted as belonging to the medium category ($0.3 \text{ N-gain } 0.7$). This indicates a considerable gain in the scientific literacy skills of students in experimental groups 1, 2, and 3.

3.2 Effectiveness Test Results

The independent sample t-test was used to compare the average pre- and post-test scores of the experimental and control groups. The following are the results of the t-test for independent samples.

The independent sample t-test results for experimental group 1 reveal that the average posttest value is greater than the average pretest value. This is shown by a significance score of 0.05, which is 0.000, and a t count of 9.681 df out of 24 when the t table is 1.711. Consequently, t count is more than t table.

The findings of the independent sample t-test calculation for experimental group 2 suggest that the average posttest score in the experimental group is greater than the average pretest score. This is evidenced by the significance score of 0.05, which is 0.000, and the t-count of 9.350, with a df of 34, whereas the t-table is 1.691, demonstrating that t-count is bigger than t-table.

The independent sample t-test results for experimental group 3 of 22 reveal that the average posttest score is greater than the average pretest score. This is evidenced by a significance score of 0.05, which is 0.000, and a t count of 14.720 df of 39, but t table is 1.685; thus, t count is bigger than t table. Then it can be stated that there is a significant difference between the experimental and control groups in the mean of the pre- and post-tests.

3 Discussion

Microsoft Sway-based digital teaching materials are presented in the form of links containing elementary science material, each of which is used as a learning activity with reference to the realm of literacy, science, namely the realm of context, scientific competence, scientific knowledge, and attitudes towards science. This is in accordance with the purpose of scientific literacy to equip students through the development of self-potential in solving everyday problems. [3] in his research stated that the physics-oriented web teaching materials for junior high schools were scientific literacy-oriented and could help teachers and students learn heat material. Similarly, [4] asserts that the usage of learning multimedia has an influence on students' scientific literacy because the rise in scientific literacy among experimental students is greater than among control students.

The results of the efficacy test indicate that digital teaching materials based on Microsoft Sway can increase the scientific literacy of elementary school pupils, as evidenced by the outcomes of growing scientific literacy skills in experimental groups 1, 2, and 3. In addition, the results of the study revealed a significant difference between the test scores of the control group and the experimental group, with the experimental group doing better after using Microsoft Sway-created digital teaching materials. The results of the paired t test for calculating significant differences are $t_{count} > t_{table}$. This indicates that Microsoft Sway-based digital teaching resources can enhance the scientific literacy of fourth-grade elementary school students [5] Microsoft Sway application is effective in improving collaboration skills between the promotive aspects of interaction and individual accountability aspects. Another opinion expressed by [6] Some of the functions of Microsoft Sway include presentations, interactive multimedia, adding text, images, videos, graphics and others from several devices, sharing information about relationships, etc. so that this application has various capabilities that teachers can use in learning.

Starting from the 2013/2014 academic year, elementary schools throughout Demak Regency have implemented the 2013 curriculum. Digital teaching materials based on Microsoft Sway in the form of links, serve to complement the thematic book teaching materials for the 2013 curriculum, in addition to LKS. These teaching materials can be used to enrich students' knowledge about various things about water in the surrounding environment, learned from the content of life science, physical science, and earth science in every learning activity. In addition to knowledge, it also improves science skills in children and fosters character or discipline, honesty, and concern for others in accordance with the 2013 curriculum concept, namely cognitive, affective and psychomotor.

Microsoft Sway-based digital teaching resources are particularly suitable and effective for usage in the digital age, even during the present Covid 19 pandemic, because students can access the links to these teaching materials at any time and from any location. So that this Microsoft Sway-based digital teaching material is effective to be used as teaching material.

5 Conclusion

The teaching materials developed are adapted to the needs obtained from preliminary research. Microsoft Sway-based digital teaching materials are presented in the form of links containing elementary science material, realm of literacy, science, namely the realm of context, scientific competence, scientific knowledge, and attitudes towards science. This teaching material has also been tested for feasibility with a validity test with an average score for each aspect above 85 with

a very feasible category. The results of the effectiveness test using the t test found that digital teaching materials based on Microsoft Sway were effective in improving the scientific literacy of elementary school students.

References

- [1]. SE Program, Pakuan U. The Effect of STREAM-Based Teaching Materials Using Smart Apps Creator 3 on Students' Scientific Literacy. 2022;2(1):78–93.
- [2]. Zen E. Science Literacy and Why it is Important. *J Geol Educ* [Internet]. 1990 Nov 1;38(5):463–4. Available from: <https://www.tandfonline.com/doi/abs/10.5408/0022-1368-38.5.463>
- [3]. Rodriguez Espinosa JM. The importance of Scientific literacy in our Society. *Distant Worlds* [Internet]. 2005; (“Astrophysics, and how to attract young people into Physics”; *Proc. JENAM 2005*):28–31.
- [4]. Jgunkola BJ, Ogunkola BJ. Scientific Literacy: Conceptual Overview, Importance and Strategies for Improvement. *J Educ Sociai Res*. 2013;3(1):265–74.
- [5]. Vieira RM, Tenreiro-Vieira C. Fostering Scientific Literacy and Critical Thinking in Elementary Science Education. *Int J Sci Math Educ* [Internet]. 2016;14(4):659–80. Available from: <https://doi.org/10.1007/s10763-014-9605-2>
- [6]. Valladares L. Scientific Literacy and Social Transformation. *Sci Education* [Internet]. 2021;30(3):557–87. Available from: <https://doi.org/10.1007/s11191-021-00205-2>
- [7]. OECD. Program for international student assessment (PISA) results from PISA 2018. *Oecd* [Internet]. 2019;1–10. Available from: <https://bit.ly/3MnNSp8>
- [8]. Harefa N, Fransisca Dewi Silalahi N, Sormin E, Sanga Lamsari Purba L, Sumiyati S. The difference of students' learning outcomes with project based learning using handout and sway Microsoft 365. *J Pendidik Kim*. 2019;11(2):24–30.
- [9]. Zaenap S, Utaminingsih S, Santoso. Media Technology Takontikasi Games Based on Realistic Mathematics. *J Phys Conf Ser*. 2021;1823(1).
- [10]. Ramdani SD, El Islami RAZ, Pratiwi H, Fawaid M, Abizar H, Maulani I. Developing digital teaching materials on Basic Electricity based on problem-based learning in vocational education. *J Vocational Educator*. 2021;11(1):78–91.
- [11]. Sariyatun, Joebagio H, Akhyar M. Teachers' perception on digital teaching material development in social science education. *J Turkish Science Education*. 2018;15(Special Issue):13–21.
- [12]. Borg, WR & Gall M. *Educational Research: An Introduction*, Fourth Edition. New York: Longman; 1983.
- [13]. Ikayanti R, Suratno S, Wahyuni D. Critical Thinking Skills In Science On Junior High School By Problem Based Learning Models. *Pancar Educator*. 2017;6(3):9–16.
- [14]. Juniati N, Jufri AW, Yamin M. The Use of Learning Multimedia to Improve Students' Scientific Literacy. *J Incandescent Mipa*. 2020;15(4):312–6.
- [15]. Huang HW. Effects of smartphone-based collaborative vlog projects on EFL learners' speaking performance and learning engagement. *Australas J Educ Technol*. 2021;37(6):18–40.
- [16]. Meikayanti EA, Huda MB. Ability to Present Scientific Writing in Indonesian Language Courses Using Microsoft Sway Presentations. *Widyabastra J Indonesian Language and Literature Learning Science*. 2017;5(2):73–7.