

ELECTRONIC LEARNER WORKSHEET BASED ON ARTICULATE STORYLINE 3 PLACE VALUE MATERIAL FOR GRADE II ELEMENTARY SCHOOL LEARNERS

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Abstract

Student Worksheets in Elementary Schools still rarely apply technology in learning. The Student Worksheets currently circulating in schools are still general in nature and there are no specific instructions for using Student Worksheets for teachers and students. The aim of this research is to develop mathematics teaching materials, especially place value material in Grade II Elementary Schools and measure the feasibility, effectiveness and practicality of the Electronic Student Worksheets developed. This research uses the ADDIE model. The instruments used for data collection are questionnaires and documentation. The questionnaire consists of a material expert, media expert, practitioner (teacher) questionnaire and a student response questionnaire. Data analysis techniques use quantitative and qualitative descriptive. The research results obtained from the feasibility test mean the average percentage of media experts and material experts is 83.35%. The practicality test obtained an average of 88.3% from teacher and student response questionnaires. The effectiveness test obtained an average of 0.79. Based on the data obtained, the Electronic Student Worksheet Based on Articulate Storyline 3 was declared feasible, practical and effective for use at the elementary school level. Researchers hope that this research can add new experiences in learning and can be used as a reference for other similar research.

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Articulate Storyline
3,
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Introduction

Learner Worksheets are printed teaching materials in the form of sheets of paper containing materials, summaries and instructions for implementing learning tasks that must be carried out by students that refer to the basic competencies or basic competencies that must be achieved. (Effendi, Herpratiwi, and Sutiarmo 2021). Learner Worksheets are worksheets that contain work steps in accordance with the learning strategy designed so that students can easily understand learning. Learner Worksheets should be prepared by the teacher himself because the teacher knows the characteristics of the students. However, there are still many teachers who have not developed. Learner Worksheets in the learning process. (Nadifatinisa and Sari 2021) Thus, students have difficulty understanding the material. Learners find math lessons difficult which includes number, geometry, measurement and data processing. One of the number materials in elementary school is place value material. The concept of place value is a basic concept that must be mastered and understood by students in elementary school. (Sari 2018) stated that someone who has difficulty with the concept of place value is very likely to make mistakes in mentioning (reading) and writing multidigit numbers. Learners are often wrong when writing number symbols and number names, errors occur when learners determine place value and number value, and errors in writing number symbols based on value. This error may occur because students have difficulty understanding the concept of place value (Mulyasari and Fazrul Prasetya Nur Fahrozy 2023).

The results of interviews with grade II teachers stated that the ability of students on place value material was still lacking, because the teacher only used mathematics Learner Worksheets and math textbooks that had been provided by the school. The math Learner Worksheets that are widely circulated in schools today are still general in nature and mostly only contain a summary of the material. The materials provided are usually instantaneous without detailed explanations and there are no specific instructions for using the worksheets for teachers and students. The existing mathematics Learner Worksheets only allow one-way communication which causes learners to have

less opportunity to develop thinking patterns and form mathematical concepts (Masdar and Lestari 2021), This will cause students to be less interested in existing math Learner Worksheets. For this reason, it is necessary to develop a mathematics Learner Worksheet on place value material that is interesting, practical and effective. An interesting math Learner Worksheet for students is one that can show text, images, sounds and videos related to the material being studied. This is what makes the presence of electronic-based math Learner Worksheets so important in learning activities.

In today's digital era, elementary school children can already operate various technologies such as computers, cell phones, video games and others, because the development of information technology in this digital era has a tremendous impact in several aspects of life, one of which is in the aspect of education (Suastika and Triwahyuningtyas 2019). This ability can be utilized to direct students to use information technology-based learning media at school in order to get meaningful learning and make it easier for students to understand learning (Fatia and Ariani 2020). Technological developments can be utilized to develop Electronic Learner Worksheets. Learner Worksheets can experience innovation in terms of presentation, one of which is integrated with electronic media or technology known as Electronic Learner Worksheets (Zahroh and Yuliani 2021). The use of Electronic Learner Worksheets can support active learning activities through the stages of activities that lead students in mastering concepts (Pangesti et al. 2022). Electronic Learner Worksheets are organized systematically into specific learning units that are presented in an electronic format that contains animations, images, videos, navigation that makes users more interactive in learning (Firtsanianta and Khofifah 2022). Electronic Learner Worksheets can be made with various applications namely canva, quiz, powtoon, prezi, liveworksheet, and Articulate Storyline 3. One of the computer programs that can be developed into learning media is the Articulate Storyline 3 program.

Articulate Storyline 3 is a software that can be used to demonstrate and create interesting interactive learning media because there can be video features, audio, images, links, and more varied forms of problems as well as a series of stages of learning activities such as investigation and problem solving that are useful for understanding the concept of place value learning material. (Ramadhan 2023). The resulting learning media can be accessed or operated through smartphone or laptop devices. The advantage of Articulate Storyline 3 is that the creation mechanism is fairly easy, because the function of the creation item is the same as power point. Media in the form of audio, video and various files can be imported or inserted into the application. In addition, Articulate Storyline 3 media can also create quizzes with various types of formats. In line with research (Nugroho and Arrosyad 2020) stated that the interesting and clear Articulate Storyline 3 media can help students' understanding of the material. The development of e-LKPD based on the Articulate Storyline 3 application is an application that can design teaching materials in a more interesting way. (Sindu, Santyadiputra, and Permana 2021). In accordance with research (Nugraheni, 2017) stated that Articulate Storyline 3-based interactive multimedia can be used to improve students' learning comprehension.

Research conducted by Nurmala, Triwoelandari, and Fahri (2021) about the development of articulate storyline 3 media in STEM-based science learning to develop the creativity of elementary / MI school students. The difference is, this research uses a research method in the form of the ADDIE model, while the research is based on the ADDIE model Nurmala, Triwoelandari, and Fahri (2021) in his research using the ASSURE model, the same research was also conducted by Plutzer (2021). regarding the development of interactive multimedia based on Articulate Storyline 3 to increase students' learning interest in integrated thematic learning in grade III Elementary School, the difference in this study is for written and audio-visual material. While research Plutzer (2021) shows that learning media based on Articulate Storyline 3 software for integrated thematic learning for grade III elementary schools by presenting material in writing and not including audio-visual teaching materials in it. The same research was also conducted by (Ariani 2020) regarding the development media for Articulate Storyline 3 on learning factors and

multiples of a number in class IV elementary school. The difference is that this researcher focused on place value material in class II, whereas the researcher (Ariani 2020) in his research focused on learning material for factors and multiples of a number in class IV. In addition, researchers use the latest version of the application (version 2023) with the latest features and the media developed really involves students to be active not just observing worksheets. Therefore, teachers want to develop worksheets through other ways, so that learning is more meaningful. Worksheets are expected to be easy to use and easy to develop with innovations that are in accordance with technological developments and are immediately available to students. This research is important to provide ideas for making and developing electronic worksheets based on Articulate Storyline 3 for grade II in place value learning. The ideas presented are the latest innovative solutions such as using technology-based video, image, character and slide features that must be tested for feasibility, practicality and effectiveness to further develop learning outcomes.

Methods

This research is a type of research and development or commonly called Research & Development (R&D). The model used is the ADDIE development model. According to (Hanafi 2017) argues that the ADDIE development model is a development model that serves as a framework in guiding designers for something complete, and this development model is very appropriate to use to develop educational products and other learning resources. ADDIE (Arini, Syahrudin, and Sudatha 2017) is a method of Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model can be presented as follows:

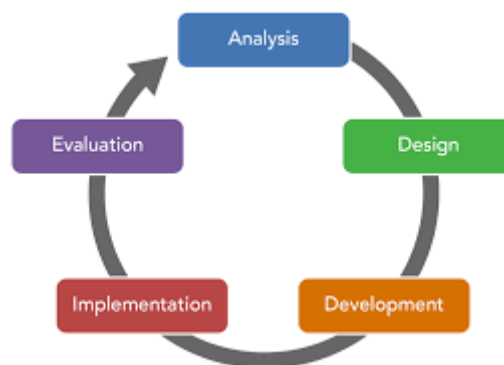


Figure 1 ADDIE Model
Source:(Mufliva and Iriawan 2022)

Based on Figure 1, the development of this Electronic Learner Worksheet uses the ADDIE development model which consists of five stages, namely analysis, design, development, implementation and evaluation. The first stage is the analysis carried out is the analysis of material, analysis of teaching materials, and analysis of the characteristics of Learners. The second stage is the design or planning of the Electronic Learner Worksheet that will be made for research. The third stage, namely development or development, is the stage of developing Electronic Learner Worksheets that are ready to be tested. In this stage the Electronic Learner Worksheet is validated to determine the feasibility test of the product. The validation carried out at this stage aims to test the feasibility of the Electronic Learner Worksheet based on Articulate Storyline 3. This feasibility test is carried out through validation by media experts and material experts. The validation sheet uses a Likert scale with very good to less good criteria. The fourth stage is implementation. At this stage the development results are applied in the learning process to determine the effect on students' understanding (Widyastuti and Susiana 2019), The practicality of the product was tested in the field at an elementary school using 10 grade II elementary school students. Conducting a product practicality test by filling out a questionnaire by the second grade homeroom teacher and

students. Furthermore, the fifth stage is evaluation by testing the effectiveness of the product by answering the Pre-Test and Post-Test questions given before (Pre-Test) and after (Post-Test) the media is tested. The next step is to improve the product that has passed the feasibility test, practicality test and effectiveness test so that it becomes a product that can be used in learning. The form of instrument that will be used in this research is a validation sheet by media and material experts and a questionnaire for the practicality of teachers and students. The analysis technique used in this research is descriptive qualitative and quantitative analysis.


Results and Discussion

Interactive learning content development research, The final result in this study is to produce an Electronic product of Articulate Storyline 3-based Learner Worksheets on place value material for grade II elementary school students using the ADDIE model with a scale of 5 stages, namely Analyze, Design, Development, Implementation, Evaluation.

In the first stage carried out, namely the analysis stage (Analyze), the researcher analyzes the curriculum and learning materials to be applied in the media, namely the mathematics subject of place value material, after conducting a needs analysis by interviewing a grade 2 teacher and by looking at the activities / behavior of students in elementary schools then the researcher designs related content in the media to be used. Researchers determined the second grade place value material which was then developed into an Electronic Learner Worksheet based on Articulate Storyline 3. The basic competency that must be achieved is to determine the place value of numbers in units, tens, hundreds, thousands, and so on. Every integer has a number place value, where the place value of each digit in the number. Therefore, the more digits a number has, the more its place value will be (Khaira and Hasan 2020). The ability to recognize the place value of numbers in mathematics can be improved by using various media related to the place value of numbers (Wisudawaty, Sumekar 2015). Based on the results of this analysis, it is hoped that the development of E-LKPD based on Articulate Storyline 3 on place value material, as teaching materials that can help teachers and students in the learning process.

At the design stage, planning is carried out to determine and create teaching materials to be developed. There are 4 parts that make up the general framework, namely: title/cover, introduction in the form of information, attendance, material, and student worksheets. The final result of the Articulate Storyline 3-based E-LKPD product place value material in html format which is then hosted so that it can be accessed via smartphone or laptop. The following E-LKPD design can be seen in table 1

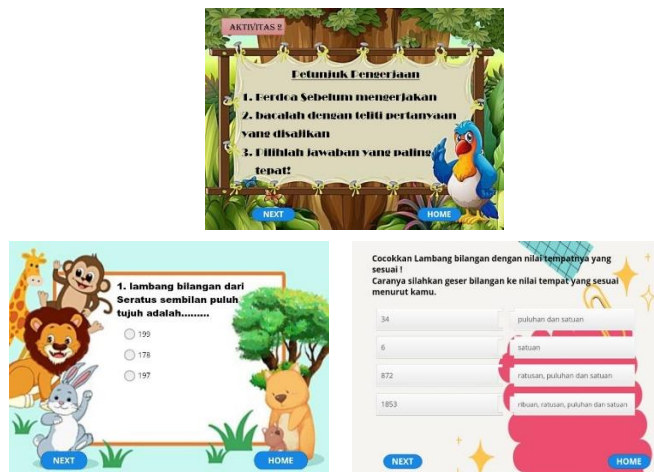
Table 1 E-LKPD Design Based on Articulate Storyline 3

No	Image	Description
1.	The front cover has the title of the learner worksheet. The name of the Learner Worksheet is place value grade II elementary school.	

5. The menu summarizes material about place value both in writing and audio-visually such as place value songs.



6. Learner Worksheets are experiments that will be carried out by students regarding several practice questions about place value material, in the form of multiple choice questions, and matching questions and answers.



7. There is a reflection sheet that learners will respond to.



8. There is a display of the score of the practice question results.



In line with the opinion of (Melisandi and Lazulva 2023) Through electronic worksheets, students based on Articulate Storyline 3 can create unique classes and can encourage students to be active in learning, because the material is equipped with quizzes that can be done immediately and without waiting for corrections to answers from the teacher (Hariyati and Rachmadyanti 2022) because the score has automatically appeared from the system.

At the development stage, an Electronic Student Worksheet product was developed using the Articulate Storyline 3 application by integrating place value material that had been obtained from various relevant mathematics teaching materials and adjustments were made to mathematics learning in class 2 as a realization of what had been designed in In the previous stage, after that a validation test was first carried out by material experts and media experts with the aim of obtaining

results in the form of criticism and suggestions/input regarding the quality of teaching materials from validators for these two aspects.

Table 2 Product Feasibility Validation Results

Aspect	Maximum score	Aspect score	Percent	Description
Media expert	48	44	91,7%	Very worthy
Material expert	44	33	75%	Worthy

Based on the results of the feasibility assessment, the average obtained from all validators is 83.35% in the "very feasible" category, so that the Articulate Storyline 3 based Electronic Student Worksheet assessment criteria that have been achieved meet 2 eligibility criteria, namely media suitability and material suitability. . Learning using electronic student worksheets based on Articulate Storyline 3 place value material can be used in mathematics learning in class II elementary schools. Based on the validation of the results presented in table 2, using the Electronic Student Worksheet Based on Articulate Storyline 3, the place value material was declared valid or appropriate. Electronic Assessment of Student Worksheets Based on Articulate Storyline 3 place value material by material experts obtained the following input: "Usage instructions must be detailed, learning objectives must be adjusted to GPA, it is better to add a Return to previous page menu, the presentation of the material must be adapted for class II children. As for the electronic assessment of Student Worksheets Based on Articulate Storyline 3 place value material by media experts, the following input was obtained: "The sequence of Home should be coherent, the background is corrected, the size of the writing is enlarged", provided that the teaching materials can be used after being revised, in line with the results study (Santoso 2021) However, with several improvements such as input that has been explained by material experts and then followed up by researchers before the product is tested at the target school, this is the basis that the material presented in the media developed is considered capable of increasing students' activities and learning outcomes. Research result (Indriani, Artika, and Ningtias 2021) shows that the use of the Articulate Storyline 3 application in independent learning of negotiation texts can make it easier for students to understand the material, make learning more effective and efficient, and can motivate students in the learning process.

At the implementation stage, when the results related to the quality of the teaching materials are known and indicated as suitable for use, then the Electronic Student Worksheets are tested at the destination school. (Ariyanti 2022), and found the results that the Electronic Student Worksheet product was based on Articulate Storyline 3 and was equipped with features on the Electronic Student Worksheet such as learning videos, text-based animations and various unique problem solving models and was able to make students understand the material being taught better. At this stage, teachers and students access electronic Student Worksheets Based on Articulate Storyline 3 place value material on smartphone or laptop devices owned by students with internet access provided by the school. This activity was attended by 10 students and 1 class II teacher. At this stage, an assessment of the practicality test of Electronic Student Worksheets based on Articulate Storyline 3 place value material was carried out by giving questionnaires to teachers and students as shown in table 4 below:

Table 4 Results of Practicality of Electronic Student Worksheets

Respondent	Aspect Score	Maximum Score	Percent	Description
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Teacher	55	64	85,9 %	Very practical
Students Very	254	280	90,7%	Very practical

Based on table 4 of the results of the practicality assessment, the average score obtained from all respondents was 88.3% in the "very practical" category, so that the Electronic Student Worksheets based on Articulate Storyline 3 on place value material were declared practical to use as teaching materials for classroom mathematics learning. II. Based on the explanation above, using Electronic Student Worksheets Based on Articulate Storyline 3 place value material is stated to be "very practical". Electronic Assessment of Students' Worksheets Based on Articulate Storyline 3, place value material also received input through a teacher response questionnaire as follows: "The learning media is quite interesting, but children's songs need to be added." In line with (Suryaningsih et al. 2021) states that learning through electronic Student Worksheets Students can understand and be motivated in learning place value because learning becomes more interesting and not boring.

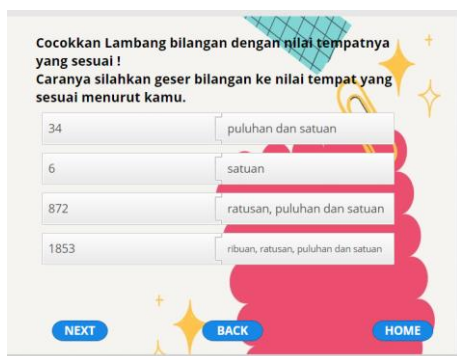


Image A (matching drag and drop)



Image B (matching drop –

down)

Figure 2 Student Answers in Electronic Student Worksheets

Students, when working on practice questions, directly drag the correct answer to the questions provided, which are in Figure A, using the matching drag and drop feature. In picture A you can see the symbol for the number 34 matched with the place values in the form of tens and ones, then there is the symbol for the number 6 with the ones place value, next there is the symbol for the number 872 with the place values for hundreds, tens, ones, then there is the symbol for the number 1,853 with the place values thousands, hundreds, tens and ones. In picture B with the drop-down matching feature, students do the exercise by selecting items from the drop-down menu to be analyzed based on the answer choices by matching according to the place value of the number symbol provided. All items in the column must be matched correctly to all column items. options so that the question can be scored as correct. In picture B, students match based on the description of place value by selecting the items provided. There is a symbol for the number 831 with the description 8 being hundreds, 3 being tens and 1 being ones. In pictures A and B, students can be seen actively working with unique features, one of these features is matching drag and drop (Wibowo 2016) which can be seen in image A and the drop-down matching feature in image B. In images A and B, it can be seen that students already know or understand how to determine the place value of ones, tens, hundreds and thousands. This feature makes students active because students directly drag and match the correct answers to the questions that have been provided

(Fauhah and Rosy 2020). This makes learning activities more impressive and attracts attention because of the active involvement of students in them.

The results of the Evaluation Stage were carried out twice, namely before being given the media (Pre-test) and after being given the media (Post-test). Pre-Test and Post-test were carried out to see the effectiveness of the Electronic Student Worksheets. Electronic Student Worksheets Based on Articulate Storyline 3 are declared effective if there is an increase in students' interest in learning (Nurmarwaa et al. 2022). Teaching methods by providing pre-tests and post-tests will help improve student learning outcomes in teaching and learning activities (Effendy 2016). Pretest activities are given to class 2 students before learning using the Electronic Student Worksheet. This is done with the aim of determining students' initial abilities, while the post-test aims to see the extent of cognitive development in students in order to determine improvements in learning outcomes using electronic student worksheets. Based on the results of testing the effectiveness of the Articulate Storyline 3-Based Electronic Learner's Worksheet on place value material. The following is a recapitulation and diagram of the results obtained by students in working on the Pre-Test and Post-test questions as follows:

Table 3 Recapitulation of Pre-Test and Post-Test Scores

Subject	Amount	
	Pre-Test Score	Post-Test Score
10 Elementary School Students	620	920
Average	62	92
N gain (g)	0,79	
High Classification	High	



Figure 3 Results of Pre-Test and Post-Test Improvement

Based on table 3, it is found that the N-gain (g) obtained from the average of the Pre-Test and Pre-Test results is 0.79 in the >0.7 category with the "high" classification, so the Pre-Test and Pre-Test results Student tests have increased significantly (Oktavia, Prasasty, and Isroyati 2019). The increase in student scores from the Pre-Test and Pre-Test using the Electronic Student Worksheet Based on Articulate Storyline 3 can be seen that the teaching material is effective. Based on this assessment, it shows that Electronic Student Worksheets based on Articulate Storyline 3 on place value material can help teachers in developing creative and innovative ideas, especially in procuring teaching materials as learning innovations (Suryaningsih et al. 2021), because this can build students' creativity in learning mathematics. Next, the final step of the ADDIE learning system design model is to provide value to the development of teaching materials

in learning (Cahyadi 2019). An assessment of what has been assigned to students is carried out regarding the media used as well as questionnaires that have been distributed to respondents (students) (Ernawati 2017). The evaluation results are used to provide feedback on the development of teaching materials (Cahyadi 2019) so that the results are obtained as a reference to find out whether the learning objectives have been met.

Conclusions And Recommendations

From the process and results of developing the Electronic Student Worksheet based on Articulate Storyline 3, the conclusion is that the Electronic Student Worksheet based on Articulate Storyline 3 in class II Elementary School was declared feasible or valid using a validation questionnaire carried out by material expert validators and media experts using an average of 83.35% in the "very feasible" category. And obtained the results of the practicality test which were obtained based on the teacher and student practicality questionnaire which had an average percentage of 88.3% in the "very practical" category, and obtained the effectiveness results which were obtained in the evaluation test by 10 students by getting a score an average of 0.79 in the "high" category. So that the Electronic Worksheet for Students based on Articulate Storyline 3 in class II is said to be feasible, practical and effective for use in the learning process, especially place value material at the elementary school level.

With this research, it is hoped that the development of electronic student worksheets based on Articulate Storyline 3 can improve the quality of teaching carried out by teachers on place value material in class II. For other researchers, it is hoped that they can develop Electronic Student Worksheets based on Articulate Storyline 3 with other more interesting features.

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