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DEVELOPMENT OF LEARNING MEDIA ASSISTED BY LECTORA INSPIRE TO ENHANCE STUDENTS' MATHEMATICAL LITERACY ON SOCIAL ARITHMETIC MATERIAL

Ahmad Farham Majid[1], Ananda Nasywa Amrin[2], Helmi Hananah Rasyidin[3*], Wardah Kalsum[4], Muhammad Faiz[5]

[1,2,3*,4,5] Universitas Islam Negeri Alauddin Makassar, Makassar, Indonesia
** Corresponding author. Bajeng, 92152, Kabupaten Gowa, Indonesia.*

E-mail: ahmad.farham@uin-alauddin.ac.id [1]
deahapsah@gmail.com [2]
helmichann@gmail.com [3*]
wrdhklsum @gmail.com [4]
makassarfaiz75@gmail.com [5]

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ABSTRACT
The rapid development of digital technology demands innovative learning approaches that are relevant to 21st-century educational needs. However, results from the Programme for International Student Assessment (PISA) indicate that Indonesian students' mathematical literacy remains low, particularly in solving contextual problems such as social arithmetic. Learning media commonly used in schools are still conventional, thus less supportive of active engagement and comprehensive understanding. This study aims to develop Android-based digital learning media assisted by Lectora Inspire to enhance students' mathematical literacy in Social Arithmetic. The research employed a development method using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The subjects were 20 seventh-grade students at MTs As-Shalihin. Data were collected through expert validation sheets, student and teacher response questionnaires, learning achievement tests (pretest–posttest) based on PISA-type mathematical literacy questions, and observation of learning implementation. The results show that the developed media is highly valid (average score 4.60), practical to use (student responses 4.28 and teacher responses 4.55), and reasonably effective in improving students' achievement, with the average score increasing from 23.03 to 31.45. Therefore, Android-based digital learning media assisted by Lectora Inspire is feasible to be used as an alternative to support contextual mathematics learning, particularly in Social Arithmetic.
Keywords: *ADDIE; learning media; lectora inspire; mathematical literacy; social arithmetic.*

ABSTRAK
Perkembangan teknologi di era digital menuntut pembelajaran untuk lebih inovatif dan relevan dengan kebutuhan peserta didik abad ke-21. Namun, berdasarkan hasil PISA menunjukkan bahwa kemampuan literasi matematika siswa Indonesia masih rendah, terutama dalam menyelesaikan persoalan matematika kontekstual seperti aritmetika sosial. Media pembelajaran yang digunakan di sekolah umumnya masih bersifat konvensional, sehingga kurang mendukung keterlibatan aktif dan pemahaman siswa. Penelitian ini bertujuan untuk mengembangkan media pembelajaran digital berbasis Android berbantuan Lectora Inspire untuk meningkatkan kemampuan literasi matematika siswa pada materi Aritmetika Sosial. Metode yang digunakan adalah penelitian pengembangan model ADDIE (Analysis, Design, Development, Implementation, dan Evaluation). Subjek penelitian ini adalah 20 siswa kelas VII MTs As-Shalihin. Instrumen pengumpulan data meliputi lembar validasi ahli, angket respon siswa dan guru, tes hasi belajar (pretest posttest) berbasis soal PISA, serta observasi keterlaksanaan pembelajaran. Hasil penelitian menunjukkan bahwa media yang dikembangkan memiliki tingkat salinitas sangat tinggi (skor rata-rata 4,60), praktis digunakan (respon siswa 4,28 dan guru 4,55), serta cukup efektif meningkatkan hasil belajar, dengan rata-rata nilai siswa meningkat dari

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23,03 menjadi 31,45. Dengan demikian, media pembelajaran digital berbasis Android berbantuan Lectora Inspire layak digunakan untuk mendukung pembelajaran matematika kontekstual, khususnya materi Aritmetika Sosial.
***Kata kunci**: ADDIE; aritmetika sosial; lectora inspire; literasi matematika; media pembelajaran.*

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Introduction

Today's education system must adapt to the advancement of digital technology, which includes offering cutting-edge and pertinent technology-based learning materials that cater to the demands of students in the twenty-first century. In the process of transferring knowledge from teachers to students, technology-based learning resources are essential (Sari et al., 2024). The availability of digital media makes it possible to display information in a variety of formats, including text, audio, video, and interactive simulations, more efficiently, rapidly, and captivatingly. As a result, technology media acts as a conduit to enable more effective educational communication between teachers and students. Digital media is essential to making sure that the content is easily comprehended because of its function as a mediator or link.(Permansah & Murwaningsih, 2018; Amin et al. 2025).

Mathematics is one of the subjects taught and one that necessitates technology-based learning materials at all educational levels, including junior high school. In order to solve difficulties in daily life, critical, creative, and cooperative thinking skills are developed through the study of mathematics, a foundational topic. We call this skill mathematical literacy. In addition to counting, mathematical literacy include the ability to use reasoning to address a variety of real-world problems, including managing finances, interpreting data, and solving problems in daily life. Many mathematical topics are frequently encountered in real-life situations, one of which is social arithmetic. Junior high school seventh graders study this content.(Dewanti & Muna, 2023). The value of an item, the purchase and sale prices, the percentage of profit and loss, etc. are all covered in social arithmetic.(Friantini et al., 2020).

When it comes to 21st-century education, this skill is a crucial basis for the contemporary job (Sofiyah et al., 2025). In actuality, the mathematics literacy of Indonesian schoolchildren remains comparatively low. Indonesia's mathematics literacy was ranked 63rd out of 70 nations in the 2015 Programme for International Student Assessment (PISA) (Miftahul Jannah & Miftahul Hayati, 2024). The study that Mitasari and Murtiyasa did supports this (Mitasari & Murtiyasa, 2023), Due to their inadequate mathematical literacy, students continue to struggle with story problems in social arithmetic materials.

Android-based digital learning materials have emerged as a means of addressing these problems and providing students with unique and captivating instruction (Lestyorini & Noviyanto, 2019). In addition to offering flexibility in learning, digital media makes it possible to provide information in a visual, interactive, and contextual way (Purwita & Zuhdi, 2023). According to a (2020) study by Hafidz and Masriyah, media based on Android can greatly improve student comprehension and engagement.

Accordingly, Dismela's research (Dismela, 2022) created a social arithmetic learning resource with Lectora Inspire's help for seventh-grade junior high school students. The study's findings demonstrated that the resource was highly practical, with a practicality score above 80%, and highly valid, with a validity level of 85.07%. These results suggest that Lectora Inspire has a lot of potential as an interactive learning resource for enhancing students' contextual understanding of social arithmetic content. This media has proven to be feasible and of superior quality to support the interactive fraction learning process. (Mardati, et. al., 2024). This media has been proven effective in improving mathematical problem-solving skills in the context of online learning. (Suryaningrat,et.al., 2021; Helmi &

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Sari, 2024; Pratiwi &Nugroho, 2023). Furthermore, according to the researchers' preliminary results, lectures continue to be the main method of teaching social arithmetic in the seventh grade, with minimal support from the media. Students struggle to apply mathematical concepts to real-world situations and become less involved in their studies as a result. Therefore, educational resources that may bridge this gap via interactive, visual, and contextual approaches are needed. The development of Android-based digital media that Lectora Inspire supports is one possible remedy for this problem.

Thus, the purpose of this project is to create digital learning materials for seventh-grade students focused on social arithmetic that are built on Android and utilize Lectora Inspire. It is anticipated that this will help children grasp math better, particularly when it comes to story issues. The media used in this study is innovative because it aids students in developing their mathematical literacy by presenting information in a visual, interactive, and contextual manner. Pretest and posttest questions were also based on the PISA mathematical literacy paradigm.

Research Methods

Penelitian ini merupakan penelitian pengembangan (Research and Development) yang bertujuan untuk menghasilkan media pembelajaran digital berbasis Android berbantuan Lectora Inspire guna mengembangkan kemampuan literasi matematika siswa pada materi Aritmetika Sosial. Model pengembangan yang digunakan adalah model ADDIE, yang terdiri dari tahapan Analysis, Design, Development, Implementation, dan Evaluation (Anita et al., 2021; Safitri & Aziz, 2022)

On May 6, 19, and 20, 2025, the study was carried out in MTs As-Shalihin's grade VII. Twenty seventh-grade kids served as the research subjects. Students used material created under the Contextual Teaching and Learning (CTL) learning strategy to study throughout the Implementation stage. CTL is an educational process that connects academic subjects with students' personal, social, and cultural settings in order to help them find meaning in the content they study, according to Johnson (Hasudungan 2022). By relating learning to real-world experiences, the Contextual Teaching and Learning (CTL) approach encourages the brain to create patterns that actualize meaning (Zuliyanti & Pujiastuti, 2020).

Contextual Teaching and Learning, or CTL, is an alternative teaching strategy that addresses the learning problem by helping students integrate academic subjects with their daily (Safinah Azmir and Nela Sari Yolanda 2021). To ascertain pupils' starting skills, learning starts with a pretest. Following that, students receive instruction utilizing CTL-supported Android media from Lectora. A posttest is given after the treatment to evaluate whether learning outcomes have improved.

This study employed a number of instruments as part of its data collection methods. First, the substance of the material and the learning media created were evaluated using a validation sheet. Second, the usefulness of incorporating media into the learning process was evaluated by questionnaire responses from teachers and students. Third, the effectiveness of the media in enhancing students' mathematical literacy was assessed using a learning outcome exam that included a pretest and a posttest. Lastly, the degree to which the planned learning plan could be successfully executed in the classroom was assessed using a learning implementation observation sheet. A quantitative examination of the data was done. The average score was used to examine validation using the following formula:

$$R = \bar{x} = \frac{\sum_{i}^{n} = 1 \; v_i}{n}$$

With the description R: average assessment results from validators, Vi: score given by validator I and n: number of validators (Syaharuddin & Mandailina, 2017). Validity criteria are determined based on Table 1:

Tabel 1. Validity criteria

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Interval	Category
$x < 1{,}5$	Invalid
$1{,}5 \leq x < 2{,}5$	Less valid
$2{,}5 \leq x < 3{,}5$	Valid
$3{,}5 \leq x \leq 4$	Very valid

If the validity value for each aspect is at most in the valid category and the average validation across all aspects is at least in the less valid category, then all instruments and goods are considered to have a good level of validation. The teacher response questionnaire and the learning implementation observation sheet, which are grouped according to tables 2 and 3, are used to examine the degree of practicality.

Tabel 2. Teacher response questionnaire criteria

Average Score	Category
$x > 4{,}2$	Very Good
$3{,}4 < x \leq 4{,}2$	Good
$2{,}6 < x \leq 3{,}4$	Enough
$1{,}8 < x \leq 2{,}6$	Not good
$x \leq 1{,}8$	Very less

Tabel 3. Learning implementation criteria

Interval	Category
4,51 – 5,00	Very well done
3,51 - 4,50	Implemented
2,51 - 3,50	Quite Implemented
1,51 - 2,50	Less Implemented
1,00 - 1,50	Not Implemented

The level of activity reviewed from the analysis of teacher response questionnaires and student activity observation sheets is categorized based on Table 4.

Tabel 4. Student response questionnaire criteria

Average Score	Category
□ > 4,2	Very Good
3,4 < □ ≤ 4,2	Good
2,6 < □ ≤ 3,4	Enough
1,8 < □ ≤ 2,6	Not good
□ ≤ 1,8	Very less

Results and Discussion

Final Product Description

Using Lectora Inspire software, a digital application for Android was created as the study's learning medium. This program uses the CTL approach by relating social arithmetic concepts to real-world situations, such trade or shopping. Through group projects or debates, this tool can promote student collaboration even when used solo. On quizzes, the direct feedback option enables students to make immediate corrections to their understanding.

Students can input their username and password on the login page (Figure 1) that opens for this instructional resource. This is the default password: "12345." Students are taken to the main menu after successfully logging in (Figure 2). Competencies, Materials, Learning Videos, Quizzes, and Bibliography are the five buttons that are displayed in this menu. Students in the seventh grade are expected to find the interface easy to use and intuitive. After that, a picture of a digital application for Android that uses the Lectora Inspire software will be displayed.

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Figure 1. The initial page of the application displays the student's name and password, namely "123" to log in.

Figure 2. Display of the main menu of the application which contains the contents of the application.

Figure 1 shows the initial page when the application is accessed. This screen displays the student's name icon and the predetermined password, "123," for login.

Figure 2 shows the main menu display in the application which contains the contents of the application.

Students can view the desired learning results by selecting the "Competencies" menu after accessing the main screen (Figure 3). This site highlights basic competencies, such as financial literacy, prime factorization, and ratios, that highlight the capacity to comprehend and apply mathematical processes in practical contexts.

The "Materials" option, which offers a thorough and organized explanation of social arithmetic, is then accessible to pupils (Figure 4). In addition to discussing profit and loss, purchase and selling prices, discounts or rebates, gross, net, and tare, as well as simple interest and taxes, the content is organized beginning with the fundamentals of social arithmetic and the ideas of whole value, unit value, and partial value. Formulas and real-world examples support each of these ideas in order to provide pupils a thorough understanding of the subject matter. Here is the Figure 3-4.

Figure 3. Competency page view

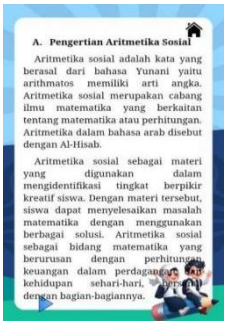

Figure 4. Display of the material page containing arithmetic material

Figure 3 above shows the competency page. Figure 4 shows the material page containing arithmetic material.

Additionally, this program has a "Learning Video" option to accommodate the range of student learning methods (Figure 5). Links to educational videos that are immediately accessible via the YouTube platform are displayed on this page. These films provide students with an audio-visual understanding of the Social Arithmetic content, which is undoubtedly beneficial for those who learn best with sound and moving pictures.

Furthermore, there is a feature called "Interactive Quiz" (Figure 6) that assesses students' comprehension of the content they have studied. Multiple-choice questions make up the quizzes, and students get instant feedback when they finish them. The contextual

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questions highlight how Social Arithmetic ideas are applied in real-world situations. Here is the Figure 5-6.

Figure 5. Learning Video page view

Figure 6. Quiz page view

Figure 5 displays the video learning page, where the video can be accessed through the provided link and will directly take you to the video uploaded to YouTube. Figure 6 displays the quiz page, where the questions are multiple-choice. After students have finished selecting their answers, they are directed to click the checkmark below to proceed to the next question. Additionally, this program offers a "Bibliography" page to support the overall learning media framework (Figure 7). The reference materials used to create the Social Arithmetic learning resources are listed on this page. This bibliography's existence validates the application's scientific component and provides teachers and students with a reliable resource for furthering their understanding of the subject matter. Here is the Here is the Figure 6.

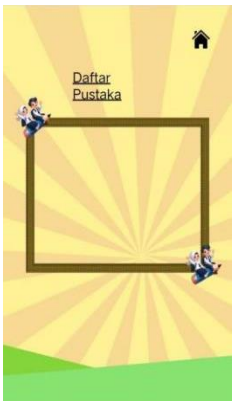

Figure 6. Display of the Bibliography page which contains sources of material in the application.

Material Validation Results

To evaluate the appropriateness of the created educational materials, content validation is carried out. Readability, conceptual accuracy, curriculum relevance, material integration, and fit for student characteristics are among the factors evaluated. A validator with experience in mathematics education performs the validation.

The assessment was conducted on 15 indicators with a score range of 1–5. The validation results are presented in Table 5 below:

Tabel 5. Results of material validation by experts.

No	Material Assessment Criteria	Score
1	The application presents Social Arithmetic topics in a clear and structured manner	4

e-ISSN 2746-5594
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2	Learning in applications according to the characteristics of junior high school students	5
3	The content of the material has a correct and coherent concept	4
4	The material is relevant to the curriculum and easy to understand	5
5	Navigation and display are easy for students to use	4
6	Navigation and display are easy for students to use (dual indicators)	4
7	The application does not make students give up when they answer incorrectly	5
8	There is positive feedback after studying the material	4
9	Evaluation encourages students to think critically	5
10	The graphic display is attractive and appropriate to the learning context	4
11	Application supports self-directed learning	5
12	Interactive evaluation or quiz features are available	4
13	Animations and interactions in the application enhance student understanding	5
14	The material takes examples from everyday life	5
15	The presence of videos in the application increases students' interest in learning	5
	Total Score	**69**
	Average Score	**4,60**

Table 5 shows that the average score was 4.60, with a total score of 69 out of a possible 75. These results are classified as "Very Valid" based on the validation criteria. This shows that the content in the created digital learning materials satisfies the standards for conceptual clarity, topic appropriateness, and curricular and student needs relevance. Thus, this media is suitable for use for classroom learning purposes as well as as a means of independent learning.

Media Validation Results

To evaluate the developed learning media's technical elements, readability, navigation, and display quality, media validation was carried out. Table 6 below displays the findings of the evaluation, which comprised 15 indications with a score range of 1 to 5:

Tabel 6. Media validation results

No	Media Assessment Criteria	Score
1	The coloring in the application does not interfere with the screen display	5
2	Animations in the application do not interfere with the screen display	4
3	The application uses a typeface and text size that is easy to read	5
4	Each display is a combination of visual elements that support the clarity of information	4
5	Graphics help remember information or material	5
6	Graphics are clear, not blurry, and easy to understand	4
7	Navigation menu between views runs smoothly	5
8	Commands/buttons are easy to recognize and use	4
9	The layout of buttons and menus is not confusing	5
10	Animation supports the visualization of material or events	5
11	The application can be used easily without any special training	4
12	The application program display is attractive and suits the character of junior high school students	5
13	The video colors in the application are proportional and do not tire the eyes	4
14	The application can run well on various devices	5
15	The application is responsive and does not lag when used	5
	Total Score	**69**
	Average Score	**4,60**

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A total score of 69 out of 75, with an average value of 4.60, was achieved based on the validation data shown in Table 6. This suggests that "Very Valid" describes the created digital learning materials. This media satisfies the requirements for attractiveness, usability, and visual quality that promote efficient learning. Validators offered qualitative input on a number of significant areas in addition to quantitative scores. Assessment criteria, such as text readability, color and visual design appropriateness, navigation clarity, curricular relevance, and media acceptability for junior high school students, served as the foundation for the validation process. Some of the validators' comments were as follows: The validators thought the graphic design was rather good, however they recommended that greater focus be placed on color choice to prevent students from experiencing visual saturation. Although the materials were deemed easily comprehensible and pertinent to the curriculum, the validators stressed the significance of include additional contextual examples that are near to students' everyday lives in order to boost their involvement. Although it was recommended that the command buttons be more uniform in size and placement, the application's navigation was deemed straightforward and user-friendly. The feedback from the quiz was rather positive, but in order to make learning more relevant, the validators recommended that responses be more varied and include a brief justification for incorrect answers. Lectora Inspire's Android-based digital learning resources have satisfied good validity standards, according to the combination of quantitative evaluation and qualitative feedback. This result is in line with earlier studies (Astutik et al., n.d.) who developed Android media for social arithmetic with realistic methods and obtained very valid validation results (91.6%).

Student Response Results to Media

A student feedback questionnaire was given out following the use of the media in the classroom in order to gauge the degree of usefulness and user acceptability. Ten statements on a 5-point Likert scale, ranging from Very Good (5) to Very Poor (1), made up the questionnaire. Table 7 below displays the findings from the evaluation of 20 students:

Table 7. Results of student responses to learning media

No	Short Statement	Average
P1	The app icon is easy to find	4,15
P2	A fun learning experience	4,60
P3	The application design is attractive and makes learning easy	4,40
P4	Application helps to understand Social Arithmetic material	4,25
P5	The material explanation is clear and easy to understand	4,45
P6	Challenging practice questions that suit students' abilities	4,35
P7	The material can be repeated at any time	4,75
P8	The application is working fine without any technical glitches	3,90
P9	Interested in learning math after using the app	4,00
P10	Media can be used for independent learning outside the classroom	4,00
	Overall Average	**4,28**

The overall average score, as shown in Table 7, was 4.28, falling into the "Very Good" range. This suggests that the digital learning materials created for Android were well received by the pupils. The highest score was seen in the statement "the material can be repeated at any time," with an average score of 4.75, indicating the media's flexibility in supporting independent learning. This result is consistent with previous studies (Pelajaran et al., 2025) which shows that the use of interactive media not only improves understanding, but also develops students' creativity in learning.

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With an average score of 3.90, the statement "the application works well without technical problems" was the one element that received the lowest grade. The following are the remedies for this: Optimizing the efficiency of applications, such as by decreasing the size of files, streamlining animations, and minimizing the usage of too complex aspects to increase responsiveness, To increase device compatibility and ensure that the program functions properly on a wider range of Android phone models, including those with low specifications, Anticipating technological issues, such as making the navigation system more reliable and offering an offline mode function for core topics so that students may still access the content even with a slow internet connection.

Teacher Response Results to Media

A survey was given to math teachers to find out how they felt about the created learning materials. Eleven statements made up the instrument, which addressed topics such as student ease of use, video and question effectiveness, clarity of presentation, and subject appropriateness. A Likert scale from 1 to 5 was used to score each statement.

According to the assessment results, the teacher assigned an average score of 4.55 and a total score of 50 out of a possible 55. This score is in the "Very Good" range according to the categories listed in Table 4. This suggests that the instructor thought the medium was excellent for teaching, pertinent to the Social Arithmetic content, and supportive of students' comprehension and self-directed learning.

It's crucial to remember that additional variables may affect the outcomes of teacher evaluations. For instance, instructors' judgments may be influenced by their familiarity with digital media, their training, and their experience with learning technology. Instructors who are used to integrating digital tools into their lesson plans are probably more open to them and will think well of them. Conversely, for teachers with limited experience with technology, positive ratings may be more influenced by initial perceptions or the instructional support provided during the pilot.

Student Learning Test Results

A learning outcome test was administered following the use of the media to assess how well it improved the students' comprehension of social arithmetic. Five descriptive questions made up the test, which had a 100 maximum score. According to the findings of the evaluation of 20 students, the average score on the pretest was 23.03, and the average score on the posttest was 31.45. As a result, the average score increased by 8.42 points.

This improvement demonstrates that the Android-based digital learning platform, supported by Lectora Inspire, contributes to student understanding, although the scores are still moderate. This underscores the merit of this platform as a learning support tool and suggests further development to optimize student learning outcomes.

These findings could have been impacted by a number of things. First, the pretest and posttest questions' degree of difficulty tended to need contextual and strategic thinking abilities, which are still tough for the majority of students. Second, even though the application is interactive, students may not interact with the media to the fullest extent possible. This could be because they don't spend enough time on it outside of class or because teachers don't provide enough advice to help them reflect on what they've learned. Third, students' experience with digital learning tools may also play a role; those who don't use educational apps frequently may need more time to become used to them.

Results of Observations on Learning Implementation

Using the Learning Implementation Observation Sheet (LOKP), observations were made on how learning was being implemented in the classroom to ascertain the degree to which learning using digital media could be carried out in accordance with the applied learning plan and model. The opening, core activities utilizing the CTL (Contextual Teaching

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and Learning) approach, and closing activities were among the 14 elements of the activity that were evaluated in this observation.

According to the observation data, the average score was 4.21 and the total score was 59 out of a possible 70. This value falls under the "Implemented" category according to the implementation category. This suggests that while there are still a few areas that could use improvement, such modeling and reflection, the majority of the planned learning activities have been executed effectively. In addition to encouraging active student participation in class, the learning materials utilized facilitate the application of contextual and interactive learning.

Overall, the study's findings show that the digital learning resources created with Lectora Inspire and based on Android are very valid, useful, and successful when used to teach social arithmetic. Several evaluation outcomes make this clear.

The material and media components both received an average validity score of 4.60, placing them in the "Very Valid" category. This shows that the media's content is in line with the curriculum, is logically organized, and is easy for children to understand. The media's technical components, navigation, and visual appeal were all judged to be excellent and conducive to learning.

The average practicality score on the student response form was 4.28, which is classified as "Very Good." A number of factors were well received by the students, most notably the opportunity to review content, eye-catching presentations, and pertinent practice questions. Teachers awarded the media an average score of 4.55 as well, suggesting that they thought it was very beneficial to the learning process. With an average score of 4.21, which fell into the "Implemented" category, the findings of observations of learning implementation further supported this conclusion.

From an average pretest score of 23.03 to 31.45 in the posttest, learning outcomes increased in terms of efficacy. This 8.42-point rise suggests that pupils' comprehension of social arithmetic may be enhanced by the media. These findings show that integrating digital media in literacy-based mathematics instruction is effective, even though the improvement is not yet at its best. This is consistent with the findings (Jalil et al., 2024) which shows the effectiveness of interactive digital media in improving the learning outcomes of junior high school students.

This finding is in line with the results of research by (Dismela, 2022), which shows that Android-based digital learning media assisted by Lectora is valid, practical, and effective in improving students' mathematical literacy in Social Arithmetic material. Similarly, Epran's research (Epran & Muhammad, 2022), which shows that the use of Android-based digital media in matrix learning can significantly increase students' interest and understanding.

But this study also creates opportunities for improvement. It is recommended that future researchers investigate and evaluate further functionalities of the created Android-based application. For instance, if using gamification components like virtual incentives, levels, or point systems can encourage students to practice more frequently. Additionally, students' conceptual understanding can be strengthened by using adaptive question repetition settings that let them practice problems of progressively higher difficulty. These characteristics could be intriguing to evaluate in subsequent studies and have the potential to greatly enhance student learning outcomes.

The alternative technology-based learning resources that can be used for contextual mathematics instruction at the junior high school and Islamic junior high school levels are made possible by this research. Creating such media is a calculated move to meet contemporary demands and encourage students' desire to learn more freely and autonomously.

Conclusion and Suggestion

This study concludes that Android-based digital learning media supported by Lectora Inspire is valid, practical, and fairly effective for mathematics learning in Social Arithmetic, although the improvement in students' learning outcomes remains moderate. The study's limitations, namely the small number of respondents and short trial period, highlight opportunities for further development. Therefore, this media is recommended as an alternative for interactive mathematics learning with necessary teacher guidance. Future research should involve more participants, extend the trial duration, add features such as gamification or adaptive exercises, and address technical improvements to ensure broader and more stable use across devices.

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