

## Developing TIE “Trigonometry It’s Eazy” Games Using Ispring Suite 11 for Trigonometry Learning Media

Nosi Maria Chrisa<sup>1\*</sup>, Aldila Wanda Nugraha<sup>2</sup>

<sup>12</sup>Universitas Bhinneka PGRI

**Corresponding Author:** Nosi Maria Chrisa nosimariac@gmail.com

---

### ARTICLE INFO

*Keywords:* Development, Learning Media, Games, Trigonometry

*Received :* 03, May

*Revised :* 16, May

*Accepted:* 22, June

©2024 Chrisa, Nugraha: This is an open-access article distributed under the terms of the [Creative Commons Attribution 4.0 International](https://creativecommons.org/licenses/by/4.0/).



### ABSTRACT

This development research motivates increasingly rapid technological advances, but educators must correctly use these for medical advances. This can be seen from the need for more innovation in creating exciting learning. Monotonous learning activities confuse students and affect learning outcomes, especially in trigonometry material. This research aims to develop a valid, practical, and effective TIE smartphone game media, "Trigonometry It is Eazy," based on *Ispring Suite 11*. This research uses the Research and Development (R&D) development method, also used in the ADDIE development process. The subjects of this research were teachers and students of grade X at Santo Thomas Aquino Catholic High School, Tulungagung, with a total of 95 students. Data collection techniques include validity questionnaires from media and material experts, teacher and student response questionnaires, and student learning outcomes tests. The validity test results from media experts obtained a score of 91.42% in the very valid category, and material experts obtained 79% in the quite valid category. The results of the practicality test by teachers were 80.86%, and students were 89.86% in the convenient category. The media effectiveness results obtained an assessment of 90.54% in the very effective category.

---

## **INTRODUCTION**

In today's life, technological progress occurs very rapidly and cannot be avoided (Abdullah & Yunianta, 2018). Technological progress is seen in various fields, including education. This technological development can be utilized in learning, for example, as a learning medium for delivering learning material in class (Saraswati & Novalyan, 2018). Learning media is an alternative tool that can be used to understand learning skills and encourage students during the learning process to increase effectiveness and efficiency in achieving learning goals (Abdullah & Yunianta, 2018). One mobile device that can be developed as a learning medium is a smartphone. In the current technological era, almost every student has a smartphone (Widyatama & Pratama, 2022).

However, student use of smartphones has yet to be optimized to support learning. Most students use their smartphones only to make phone calls, send text messages, and access entertainment applications such as music, social networks, cameras, and games to learn math on their own devices. Very few students still use smartphones to access applications. (Widyathama and Prathama, 2022). Using learning materials in games can create an exciting learning process for students (Hasanah, 2021). Games are one way to encourage students to spend time playing and learning (Widyatama & Pratama, 2022). Games are a learning tool that encourages students to play games more (Abdullah & Yunianta, 2018). Students are more accustomed to games as a means of entertainment. The attraction of a game should make players addicted, so it would be even better if the game could also support the players' learning (Hasanah, 2021).

The learning process does not involve learning mathematics, which is considered the most challenging subject for students. One of the materials used is trigonometry. The core material of trigonometry requires students to use careful and critical thinking in solving problems (Veranita & Setyadi, 2021). Previous research (Laja, 2022) identified difficulties experienced by students in solving trigonometry problems, namely difficulty remembering and understanding trigonometric identities. Previous research (Farid Gunadi et al., 2022) also found that many students needed to interpret mathematical concepts in trigonometry material, causing difficulties in learning trigonometry.

Many students of grade X need help understanding and solving trigonometry problems. The Ministry of Education and Culture data, which explains the results of the 2019 National Examination (UN), Trigonometry material for high school has the lowest score compared to other mathematics materials tested, namely 34.59. Therefore, one of the things that teachers as learning facilitators need to do is develop the latest learning media to improve the quality of learning to help students absorb lessons more efficiently and increase the number of students who desire to learn in and out of class (Suendarti & Liberna, 2021). Alternative media that needs to be developed is game-based educational learning media (Widyatama & Pratama, 2022). Today's developments cannot be separated from smartphones and games; students prefer playing games because they make students feel challenged to play them (Ulya et al., 2021). Therefore, there is a need for innovation and the

development of learning tools that can motivate students to minimize the difficulties that become obstacles for students in learning mathematics (Suendarti & Liberna, 2021). Through the game-based educational learning tool "Trigonometry It's Eazy" created by four researchers, learning material can be added to the game so that students not only play but also carry out the learning process.

## LITERATURE REVIEW

Media is a means of sending or communicating messages (Hasiru, 2021). From an academic viewpoint, media may be a key instrument for the victory of the instructing and learning handle since its nearness can coordinate essentialness to understudies (Rohani, 2020). Learning media comes from the Latin "medius," which implies "center," middle person, and presentation. In Arabic, media alludes to a middle person or courier from the message's sender to the beneficiary. In this manner, media may pass on or channel educational messages (Nurrita, 2018). Learning media is not, as it were, an apparatus to progress the interaction prepared between instructors and understudies, as well as understudy interaction with the environment, but also an educating device that can back teachers' instructing strategies within the learning handle (Hamdan, 2020). Learning media alludes to anything that can fortify contemplations, feelings, and consideration. It will help convey messages and facilitate the learning process in a conscious, targeted, and controlled manner (Hasiru, 2021).

The game comes from English, which means a game in Indonesian. Games use electronic media, which are very popular among all groups as a medium of entertainment and learning (Ramadaniati, 2021). Games are a technology that is developing rapidly because they are trendy and easy to access (Siagian, 2022). Educational games are designed explicitly for learning activities but can also be used for playing and having fun (Simanjuntak, 2020). They are games designed to provide specific lessons for students to develop concepts and understanding (Ramadaniati, 2021). Educational games aim to stimulate students' interest in studying game-based learning materials and help students understand learning materials more efficiently and with fun (Windawati & Koeswanti, 2021).

Therefore, games and play are entertainment that have a fun gaming aspect. They aim to convey messages and information from teachers to students and have their own advantages, namely helping students learn something even while playing the educational process. Games can be used as media and adapted to students' needs to facilitate learning regardless of space and time. In this research, the game was created using *Ispring Suite 11*.

*Ispring Suite 11* is software for creating learning media with supporting media aspects such as audio and visuals. It can work with several supporting software programs (Martin et al., 2024), making the resulting media more exciting and interactive (Widyawati, 2022). *Ispring Suite 11* software can create quizzes in any format, with results displayed at the end and editable in Flash format (Farman, 2021). Application features include the ability to incorporate

additional interactivity into Microsoft PowerPoint and export PowerPoint to certain formats. This interactivity can take the form of flash animations, quizzes, videos, FLV, and games (Widyawati, 2022). Ispring Suite 11 is software integrated with PowerPoint that can be used to develop learning media, including games. It is straightforward to use without needing to learn highly complex programming languages.

Trigonometric functions are one of the materials in the Mathematics subject for grade X. Trigonometry comes from the Greek words “trigonum”, which means three angles, and “metron”, which means measurement. Trigonometry is a branch of mathematics that studies angles in triangles, such as sine, cosine, and tan. Trigonometry teaching materials are new teaching materials for the class. Therefore, students need to study them until they understand trigonometry concepts. This can be achieved by practicing many trigonometry questions (Palayukan & Pelix, 2018).

## METHODOLOGY

This research utilizes research and development to develop or produce media that provides benefits. Research and development is a research method for developing and testing products that are then developed in the world of education (Maydiantoro, 2020). The ADDIE model is used in research because it has sequential stages and is interactive in each process. The ADDIE model stands for Analytics, Design, Development, Implementation, and Evaluation. This model was chosen because its stages describe a systematic approach to learning development (Sagihartini & Yudiana, 2018). The ADDIE model is shown in Figure 1.

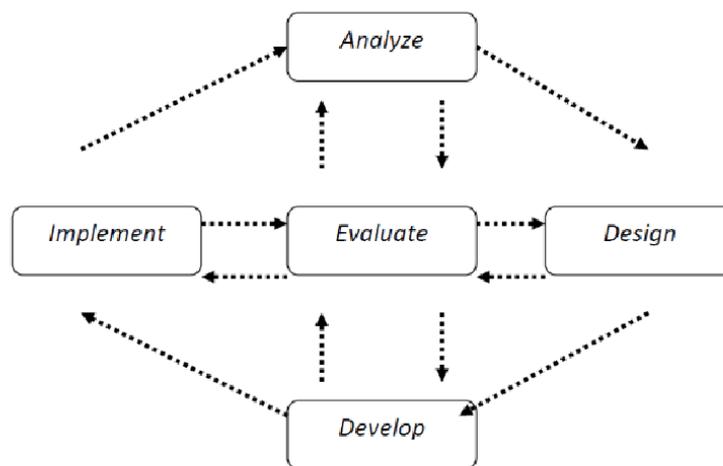


Figure 1. The ADDIE model

### Analyze

Before developing a learning aid media, we must conduct a needs, technology, and curriculum analysis. A needs analysis was carried out to describe the condition of students, school facilities, and the mathematics learning process at Santo Thomas Aquino Catholic High School for grade X. This research will develop a game-based learning media that suits what

students need. Technology analysis was carried out to analyze the technology used by teachers and students in learning so that researchers could develop a game using the technological facilities used by teachers and students at Santo Thomas Aquino Catholic High School. The purpose of carrying out curriculum analysis is to pay attention to the curriculum implemented at Santo Thomas Aquino Catholic High School so that the games developed can meet curriculum needs and help in the learning process.

### **Design**

The design stage is carried out to describe and create product specifications to facilitate the process of making products and media specifications. At this stage, the researcher creates a game design that will be made according to the analysis results obtained so that the game developed will increase students' enthusiasm and interest in the learning process on Trigonometry material. At this stage, the initial design of the product to be developed will be carried out. We will start by determining the design of learning materials and designing the game with an attractive visual appearance.

### **Development**

Development is a process where everything that is needed or will support the product must all be prepared in absolute form. Products in the form of games that have been designed are made according to the designs that have been prepared. It is at this development stage that game creation can be done using Ispring Suite 11 software from flowcharts and storyboards as well as prototypes that have been created. At this stage, the media is also used as a reference for validation to determine the validity aspects of the product that has been developed.

### **Implementation**

Products developed and declared valid will be implemented, or product trials will be conducted by assessing the learning media applied by class X students at Santo Thomas Aquino Catholic High School. At this implementation stage, data collection will be carried out using questionnaires and quiz tests on trigonometry material contained in the TIE game. The results will be managed and analyzed to see whether the obtained results have met the students' needs or whether something still needs to be revised.

### **Evaluation**

The evaluation stage is the final stage of the ADDIE model, which is a process to see whether the product produced can be used. At this evaluation stage, it plays a vital role in product improvement. A team of experts will assess and confirm the product and test results. This evaluation stage aims to use the product as a learning medium to help the learning process, making learning even more effective.

### **Product Trial Test**

At the trial stage, testing will take place in two stages; the first is to carry out validation tests with media and material experts. Media experts will play a role in assessing media developed through user interface (UI), multimedia, audio and visual displays, and software engineering. Meanwhile, material experts play a role in assessing the material contained therein. This assessment will focus on aspects, namely suitability of material with KD, accuracy of media, up-to-date material, language, presentation techniques, and contextual nature. The second trial was aimed at all students in class.

The test subjects used in this research were lecturers at Bhinneka PGRI University, mathematics teachers, and all grade X students at Santo Thomas Aquino Catholic High School. Sampling uses a non-probability sampling technique with a total sampling method, namely a sample determination technique. If all population members are sampled because the population is less than 100, then the entire population is used as the research sample (Annisa et al., 2023). The researcher used a total sampling technique based on the results of observations with grade X mathematics teachers which stated that the majority of class really don't understand trigonometry material. The criteria used in this research were all grade X students who had a poor understanding of trigonometry.

### **Data Collection**

Quantitative data is obtained from media evaluations carried out by validators and understudies. Subjective information is obtained from validator appraisals through input, recommendations, audits, and reactions from understudies who have conducted trials. The data collection techniques used in this development research are validity questionnaires, teacher and student response questionnaires, and learning outcomes tests. The questionnaire seeks assessments and input from media experts, material experts, and students.

### **Data Analysis**

The data analysis technique in this research uses quantitative and qualitative analysis techniques (Sari, 2018), which describe the results of product development that has been developed. Data obtained from instrument testing is analyzed to obtain assessment results for the product that has been developed.

Validators have a part in surveying media since they are specialists in their field and competent. The information given can be utilized to decide the legitimacy of the media created. The validator comprises two validators: one fabric master validator, whom the lesson instructor will evaluate, and one media master validator, who was evaluated by a Bhinneka PGRI College teacher who is competent in diversion advancement.

The assessment given by material experts covers several aspects, including the suitability of the material with KD, the accuracy of the media, up-to-dateness of the material, language, presentation techniques, and contextual nature. The assessment given by media experts covers several aspects, including user interface (UI), multimedia, audio and visual displays, and

software engineering. The media that has been developed is valid and can be used after being declared valid by two validators. To analyze the data, you can use the following formula and validity percentage table, which are sourced from Maesari (2020).

$$\text{Validity Percentage (\%)} = \frac{\text{Result Score}}{\text{Maximum Score}} \times 100\%$$

Table 1. Validity Percentage

No.	Questionnaire Value	Validity Category
1.	85% < x ≤ 110%	Very Valid
2.	70% < x ≤ 85%	Enough Valid
3.	50% < x ≤ 70%	Less Valid
4.	x ≤ 50%	Not Valid

Source : (Rosiyanti, 2021)

Media can be said to be valid if the validity test data's percentage results are at least 70% or in the "Quite Valid" category. If they are less than 70%, then revisions must be made regarding the media (Rosiyanti, 2021). Responses from teachers and students become an assessment of the practicality of the media. This practicality assessment is carried out to determine whether the media that has been developed is practical. To analyze the data, you can use the formula and practicality percentage table below, which are sourced from Maesari (2020).

$$\text{Practicality Percentage (\%)} = \frac{\text{Result Score}}{\text{Maximum Score}} \times 100\%$$

Table 2. Practicality Percentage

No.	Value%	Practicality Category
1.	85 - 110	Very Practical
2.	75 - 84	Practical
3.	60 - 74	Enough Practical
4.	40 - 59	Less Practical
5.	0 - 39	Not Practical

Source: (Rosiyanti, 2021)

Media can be said to be Practical if it gets a minimum rating of "Practical," and if the score obtained is less than the category, then revisions must be made to the media (Rosiyanti, 2021).

The product effectiveness test is obtained from a test of student learning outcomes, which is assessed with a predetermined Minimum Completeness Category (KKM). The Minimum Completeness Category of Mathematics at Santo Thomas Aquino Catholic High School, grade X, is 75. To be able to analyze the data, you can use the following formula and effectiveness percentage table, which is sourced from (Maesari et al., 2020).

$$\text{Effectiveness Percentage (\%)} = \frac{\text{Result Score}}{\text{Maximum Score}} \times 100\%$$

Table 3. Effectiveness Percentage

No.	Effectiveness Value	Effectiveness Category
1.	$x \geq 80\%$	Very Effective
2.	$60\% < x \leq 80\%$	Effective
3.	$40\% < x \leq 60\%$	Enough Effective
4.	$20\% < x \leq 40\%$	Less Effective
5.	$x \leq 20\%$	Not Effective

Source: (Rosiyanti, 2021)

Media can be effective if students' learning tests have completed 60% of the minimum score or meet the "Good" category (Rosiyanti, 2021).

## RESULTS

### Analyze

The majority of grade X need a better understanding of the concept of trigonometry. Therefore, the learning media will be more valid, practical, and effective if you use the TIE game "Trigonometry It's Eazy," which can be accessed via smartphone so that all students can use the game as a learning media.

Technological analysis relates to what is needed in the media development stage, such as hardware and software, to produce games that can operate well. In this development, researchers used Website APK 2 builder to convert HTML into a smartphone application. The hardware used by researchers to create games is an Acer Aspire A314-35 laptop with an Intel Celeron N5100 processor and 16 GB RAM. Meanwhile, the software used is Ispring Suite 11 and Website APK 2 Builder.

Curriculum analysis is carried out so that the material contained in the game is by the curriculum standards used in learning at Santo Thomas Aquino Catholic High School. The trigonometry material used in grade X uses the Independent Curriculum, which includes Learning Outcomes and Learning Objectives.

### Making Games

The entire game creation stage on a smartphone uses *Ispring Suite 11* software. All components of the flowchart, storyboard and game prototype are implemented into *Ispring Suite 11* as the main software for making games and using Photoshop as supporting software for making graphic designs.

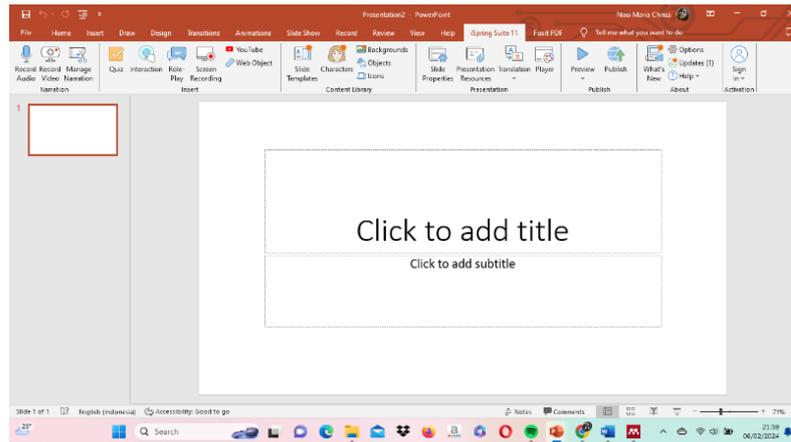


Figure 2. Appearance Ispring Suite 11

### Product Revision

Based on input and suggestions from media expert validators and material experts, carrying out a revision stage in media. Following is a revision from media experts:

Table 4. Product Revision

Before Revision	After Revision

Figure 10. View of ITE games Background quiz too contrasting.

Figure 11. View of ITE Games After Revision

Replace background quiz from number 1 - 10.

There is no entry of student data during work quizzes.

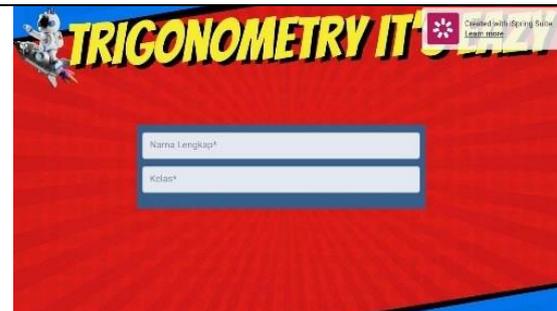


Figure 12. View of Student Data Added student data entry during processing quizzes.

The manufacturing stages design of games include:

Table 5. The Manufacturing Stages Design of Games

- |  |   |
|--|---|
| 1. Logo creation games use Photoshop. On manufacture logos | 2. The creation of the initial display of games made it interesting students' |
|--|---|

“games” using astronaut characters TIE.



Figure 3. Games Logo

interest in running TIE games.



Figure 4. Initial View Games

3. Creating menus on games of which there are several buttons include curriculum, materials, training, quizzes, and instruction.



Figure 5. Menu Display Games

4. The creation of an instructions menu on games that contains instructions use and function of buttons and objects in games, which functions to make the operation more accessible for students.

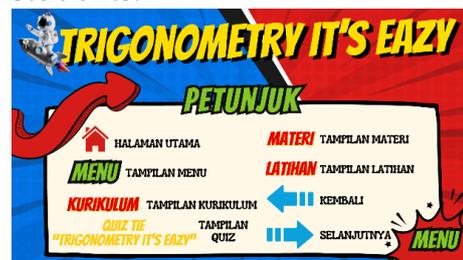


Figure 6. Instruction Menu Display Games

5. Creating a material menu containing a presentation of material divided into two main sub-chapters, namely Trigonometric Comparisons and Utilization of Trigonometric Comparisons. In the material menu, learning can be repeated to improve students' understanding of trigonometry material.



Figure 7. Material Menu Display Games

6. Creating a training menu containing practice questions related to the material Trigonometry has 5 essay questions, and after completing the exercises, there is a discussion on the practice questions given as students learning media.

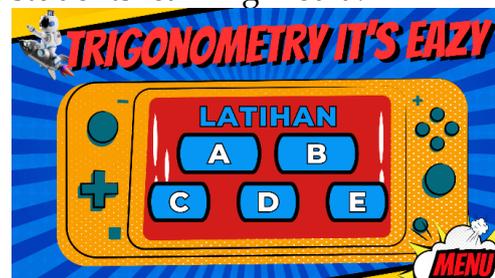


Figure 8. Exercise Menu Display Games

7. Menu creation quiz ITE contains 10 multiple-choice questions with

8. Final stage games that have been created will be continued with

trigonometry material and each of the questions has levels of difficulty. This quiz serves to find out the extent of capturing the trigonometry material that has been explained in the material menu. There is a score at the end of the question connected to the link Google Drive as teacher "assessment" material, and at the end, there is a score discussion of question quizzes that have been given.

export project to HTML, then use Website 2 APK Builder software to change into smartphone games.

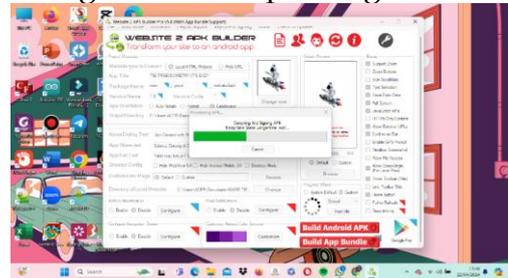


Figure 9. Change Process HTML to Apk



Figure 9. Quiz Menu Display Games

### Media Expert Validation

Media Validation is carried out by the Informatics Study Program Lecturer from the Faculty of Science and Technology, Bhinneka PGRI University, Mr Agung Prasetya, M.Kom. The media expert validation sheet has 21 assessment indicators.

Table 6. Media Expert Validation Result

Earned Value	Total Value	Percentage	Category
96	105	91.42%	Very Valid

### Material Expert Validation

The Grade X Mathematics Teacher carried out material validation. Santo Thomas Aquino Catholic High School, namely Mr. Antonius Hadi Handoko, S.Pd. The material expert validation sheet has 20 indicators evaluation. The following are the results of the assessment from material experts:

Table 7. Material Expert Validation Result

Earned Value	Total Value	Percentage	Category
79	100	79%	Enough Valid

### Media Practicality Test

The media practicality test was carried out using a questionnaire to find out the response of the grade X mathematics teacher, namely Mr. Antonius Hadi Handoko. S.Pd. and all grade X students of Santo Catholic Thomas

Aquino High School, totalling 95 students. Before doing the media practicality test, the questionnaire was validated by validators. Following is the result of teacher and student responses:

Table 8. Media Practicality Test Result

Earned Value	Total Value	Percentage	Category
93	115	80.86%	Very Practical

Result for the students :

Practicality Percentage (%) =  $9795/10925 \times 100\%$

Practicality Percentage (%) =  $0.8986 \times 100\%$

Practicality Percentage (%) = 89.86%

### Media Effectiveness Test

The media effectiveness test is carried out to determine whether the developed media can help students learn trigonometry material. The results obtained were that 86 students obtained a completeness score from the KKM :

Percentage Effectiveness (%) =  $86/95 \times 100\%$

Percentage Effectiveness(%) =  $0.9052 \times 100\%$

Effectiveness Percentage(%) = 90.52%

## DISCUSSION

Validity test results by media and material experts were assessed in the categories "Very Valid" and "Enough Valid". This shows that the TIE game "Trigonometry It's Eazy" that own design and sound operation of the software by the applicable curriculum. The practicality test results are based on a questionnaire containing teacher responses, and students receive an assessment is "Very Practical" category. This shows that teachers and students are comfortable using the TIE game "Trigonometry It's Eazy" as a learning media. Effectiveness test results are based on student learning results using the TIE quiz "Trigonometry It's Eazy," including in the "Very Effective" category. The thoroughness minimum score proves this: 86 students out of 95 students. This shows the effectiveness of using the game "Trigonometry It's Eazy" for participants.

This research results from several theories, namely learning processes that are interesting for students created by using learning materials in games (Hasanah, 2021). Games are one way to encourage students to spend time playing and learning (Widyatama & Pratama, 2022). Games can be a source of learning if they aim to achieve goals learning, (Yunianta, 2019). The media games help participants' problem-solving students in learning trigonometry, which according to (Suendarti & Liberna, 2021). Students learning obstacles can be identified as coming from the length of the process. Learning takes a long time and makes students bored, so they need help understanding and memorizing trigonometry formulas taught by the teacher. Development games use *Ispring Suite 11* software. The advantage is that it can insert several media such as images, audio, video, and flash, which is easy to distribute anywhere and optimizes the web deeply. There are also several feature-making quizzes with various questions such as multiple choice, multiple responses, type-in,

matching, sequence, numeric, fill-in-the-blank and true or false (Widyawati et al., 2022).

## CONCLUSIONS AND RECOMMENDATIONS

Media validity tests from media expert validators obtained a score of 91.42% in the "Very Valid" category, and material expert validators obtained a score of 79% in the "Enough Valid" category. The conclusion that the media is in the form of games has validity with categories "Very Valid".

Test the practicality of the media from the teacher response questionnaire to get a score of 80.86% in the "Very Practical" category, and responses from all participants grade X students at Santo Thomas Aquino Catholic High School got grades 89.86% in the "Very Practical" category. Based on the responses from teachers and students, it was concluded that the media from games has high practicality and can be used as a learning medium.

Test the effectiveness of the media tested on all grade X students Santo Thomas Aquino Catholic High School has 95 students. It is known that 86 students have completed the course, and 9 students still need to complete the minimum score value. The percentage of media effectiveness games is gaining an assessment of 90.54% in the "Very Effective" category, concluding that the media is very effective for student learning activities.

## FURTHER STUDY

Based on the media developed, there are still several limitations or shortcomings that can be further developed in research furthermore. Some things that can be developed further are that media needs to be developed because it can only be used in Android type 11 and iOS 8. Also, the curriculum limitations are still limited to the use of an independent curriculum.

## REFERENCES

- Abdullah, F. S., & Yunianta, T. N. H. (2018). Pengembangan Media Pembelajaran Matematika Trigo Fun Berbasis Game Edukasi Menggunakan Adobe Animate Pada Materi Trigonometri. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 7(3), 434. <https://doi.org/10.24127/ajpm.v7i3.1586>
- Adrillian, H. (2022). Pengembangan Game Edukasi Matematika Untuk Meningkatkan Kemampuan Numerasi Siswa SMP. *Jurnal Pendidikan Matematika*, 6(2), 95-108. <https://doi.org/10.36526/tr.v>
- Amanda, D. A., & Putri, A. R. (2019). Pengembangan Game Edukasi Pada Mata Pelajaran Matematika Materi Bangun Datar Berbasis Android di SDN 1 Jepun. *JOEICT (Jurnal of Education and Information Communication Technology)*, 3(2), 160-168.
- Amirulloh, T. R. A., Risnasari, M., & Ningsih, P. R. (2019). Pengembangan Game Edukasi Matematika (Operasi Bilangan Pecahan) Berbasis Android Untuk Sekolah Dasar. *Jurnal Ilmiah Edutic*, 5(2), 115

- 123.<https://journal.trunojoyo.ac.id/edutic/article/viewFile/5355/3634>
- Annisa, W. N., Nurfitriyanti, M., & Masruroh, A. (2023). Pengaruh Kecerdasan Intrapersonal Terhadap Pemahaman Konsep Matematika. *Jurnal Pembelajaran Matematika Inovatif*, 6(1), 1-10. <https://doi.org/10.22460/jpmi.v6i1.12659>
- Binarso, H. (2018). Ponsel Pintar. *Jurnal Teknoinfo*, 2, 5-16.
- Farid Gunadi, Wiwit Damayanti Lestari, Z. S. Y. (2022). Kesulitan Belajar Matematika Siswa Pada Materi Trigonometri Berdasarkan Self-Esteem. *Jurnal Pendidikan Matematika*, 7, 32-45.
- Farman, F., Anjelina, S., Putri, Q. T., Mardiah, N. A., & Sari, K. (2021). Pengembangan Instrumen Penilaian Pembelajaran Matematika Berbasis Ispring Suite. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 10(4), 2040. <https://doi.org/10.24127/ajpm.v10i4.4288>
- Hamdan, B. H. (2020). Media Pembelajaran Efektif. [https://www.google.co.id/books/edition/Media\\_Pembelajaran\\_Efektif/pBgJEAAAQBAJ?hl=en&gbpv=1&dq=video+pembelajaran&pg=PA166&printsec=frontcover](https://www.google.co.id/books/edition/Media_Pembelajaran_Efektif/pBgJEAAAQBAJ?hl=en&gbpv=1&dq=video+pembelajaran&pg=PA166&printsec=frontcover)
- Hartanto, M. B., & Yuniarthe, Y. (2020). Membangun Aplikasi Game Petualangan 2D Pesawat UFO Berbasis Android. *Jurnal Teknologi dan Informatika*, 1(1), 1-11.
- Hasanah, I., Siahaan, J., Muntari, M., & Burhanuddin, B. (2023). Pengembangan Media Pembelajaran Kimia Berbasis Power Point Ispring Suite Untuk Meningkatkan Motivasi Belajar Siswa Selama Pembelajaran Mandiri Di Sman 1 Gunungsari. *Journal Chemistry Education Practice*, 6(1), 78-85. <https://doi.org/10.29303/cep.v6i1.4353>
- Hasanah, U., Safitri, I., Rukiah, R., & Nasution, M. (2021). Menganalisis Perkembangan Media Pembelajaran Matematika Terhadap Hasil Belajar Berbasis Game. *Indonesian Journal of Intellectual Publication*, 1(3), 204-211. <https://doi.org/10.51577/ijipublication.v1i3.125>
- Hasiru, D., Badu, S. Q., & Uno, H. B. (2021). Media-Media Pembelajaran Efektif dalam Membantu Pembelajaran Matematika Jarak Jauh. *Jambura Journal of Mathematics Education*, 2(2), 59-69. <https://doi.org/10.34312/jmathedu.v2i2.10587>
- James Anthony. (без дата). 12 Alat Perangkat Lunak eLearning Terbaik tahun 2024. *Finances Online*. <https://financesonline.com/12-best-elearning-software-tools/>
- Laja, Y. P. W. (2022). Analisis Kesulitan Mahasiswa Pendidikan Matematika dalam Menyelesaikan Soal Limit Trigonometri. *Mosharafa: Jurnal Pendidikan Matematika*, 11(1), 37-48. <https://doi.org/10.31980/mosharafa.v11i1.1129>
- Maesari, C., Marta, R., & Yusnira, Y. (2020). Penerapan Model Pembelajaran

- Problem Solving untuk Meningkatkan Kemampuan Pemecahan Masalah Matematika Siswa Sekolah Dasar. *Journal on Teacher Education*, 1(1), 92–102. <https://doi.org/10.31004/jote.v1i1.508>
- Martin, R. T., Ade, M., Yusri, K., & J, F. Y. (2024). Android-Based Interactive Multimedia Development Using ISpring Suite 11 in Informatics Engineering Class X Senior High School. 5(1), 53–57. <https://doi.org/10.30596/ijems.v5i1.16783>
- Maulana, M. I., & Junianto, E. (2022). Penerapan Model Addie Dalam Pembuatan Permainan Edukasi Bahasa Inggris Berbasis Android. *Jurnal Responsif : Riset Sains dan Informatika*, 4(1), 12–22. <https://doi.org/10.51977/jti.v4i1.680>
- Maydiantoro, A. (2020). Model Penelitian Pengembangan. *Journal Chemistry Education Review (CER)*, 3(2), 185.
- Mimin Ninawati, Burhendi, F. C. A., & Wulandari, W. (2021). Pengembangan E-Modul Berbasis Software iSpring Suite 9. *Jurnal Educatio FKIP UNMA*, 7(1), 47–54. <https://doi.org/10.31949/educatio.v7i1.830>
- Muthoharoh, V., & Sakti, N. C. (2021). EDUKATIF : Jurnal Ilmu Pendidikan Media Pembelajaran Interaktif Menggunakan Adobe Flash CS6 Untuk Pembelajaran IPS Siswa Sekolah Menengah Atas Abstrak. *Jurnal Ilmu Pendidikan*, 3(2), 364–375.
- Nabila, H., & Nursyahidah, F. (2023). Pengembangan Media Pembelajaran Materi Bangun Ruang Sisi Datar Berbasis Etnomatematika Menggunakan ISpring Suite. *Jurnal Pendidikan*, 2016, 280–287. <https://ejournal.uksw.edu/scholaria/article/view/9741>
- Nurrita. (2018). Pengembangan Media Pembelajaran dan Hasil Belajar Siswa. *Jurnal Basicedu*, 03, 171–187.
- Puspendik. (2019). Hasil Ujian Nasional Tahun 2019. Hasil UN Puspendik Kemdikbud, 5(1), 39. [https://hasilun.pusmenjar.kemdikbud.go.id /%0Ahttps:// hasilun.puspendik.kemdikbud.go.id](https://hasilun.pusmenjar.kemdikbud.go.id/%0Ahttps://hasilun.puspendik.kemdikbud.go.id)
- Ramadaniati, S., Sani, D. A., & Arif, M. F. (2021). Rancang Bangun Mobile Game Adventure Of Studies Sebagai Media Pembelajaran. *INTEGER: Journal of Information Technology*, 6(1), 1–8. <https://doi.org/10.31284/j.integer.2021.v6i1.1200>
- Rohani, S.Ag, M. P. (2020). Media pembelajaran. *JURNAL e-DuMath*, 8.
- Rosiyanti, H. (2021). Pengembangan Media Pembelajaran Aplikasi Pokamathh Pada Materi Aljabar Kelas Vii. *FIBONACCI: Jurnal Pendidikan Matematika dan Matematika*, 7(1), 1. <https://doi.org/10.24853/fbc.7.1.1-10>
- Safira, D. V. T., Marliani, D. S., Nasihah, D. D., Nurmaulidiyah, N., Mubarak, J. F., & Ratnaningsih, N. (2022). Pengembangan Media Interaktif Berbasis Android Berbantuan ISpring dan Website 2 APK Builder pada Materi

*Chrisa, Nugraha*

Aritmatika Sosial. GAUSS: Jurnal Pendidikan Matematika, 5(2), 15–28.  
<https://doi.org/10.30656/gauss.v5i2.5817>