

Educational Game "Sianting" to Improve Literacy and Anti-Bullying Education Using Problem-Solving Approach

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Abstract:

The implementation of this research is due to the ineffective literacy learning and anti-bullying education in schools. Acts of bullying experienced by students at school still occur. The research objectives: (1) develop an educational game 'Sianting' with a problem-solving approach that integrates literacy learning with anti-bullying education; (2) test the feasibility of the 'Sianting' educational game. This research was conducted using the ADDIE model R&D method. Data collection techniques used were observation, interviews, documentation, and tests. The 'Sianting' game media was tested through expert and field tests. The results showed that the 'Sianting' game was declared valid based on expert and user validation. 'Sianting' game is effectively applied in literacy learning and anti-bullying education at school. The practicality of the 'Sianting' game is very good. The results of material expert validation get a percentage value of 95%, media experts get a percentage of 93.75%, and users get a percentage value of 92.5%, so it is 'very valid.' The results of limited trials in small groups get a percentage value of 89.37%, and extensive trials in large groups get a percentage value of 91.47%. The average pretest results get a value of 69, and the average post-test gets a value of 86, showing an increase in the average value obtained by students after using the 'Sianting' educational game media. Thus, the 'Sianting' game is valid, practical, and effective in improving students' literacy skills and anti-bullying educational understanding of media.

Keywords:

Anti-Bullying Education; Educational Game; Literacy; Problem-Solving; Sianting

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Introduction

The phenomenon of bullying cases that occur in society is not a new problem. However, the issue is not addressed optimally. According to [Francis and Strobel \(2022\)](#), bullying cases can affect children's health. Bullying is a severe problem in education ([Tirtayani, 2023](#)). Teachers sometimes do not take mocking and discriminating against friends seriously, even though this behaviour is classified as bullying that can be done repeatedly ([Rahmat et al., 2023](#)).

Bullying is an unpleasant action/behaviour carried out by a person or group in a verbal, physical, or social form that occurs in the natural or virtual world, causing discomfort and pressure on someone ([Supriyatno et al., 2021](#)) ([Simangunsong et al., 2023](#)). Bullying can also take the form of cyberbullying ([Milenia & Rosada, 2023](#)). Bullying can happen to anyone. Bullying can occur because the perpetrator feels powerful over the victim. The perpetrator considers bullying typical ([Ulfatun & Santosa, 2021](#)).

School bullying can affect children's emotional, physical and social development ([Darmayanti et al., 2022](#)). In addition, bullying can affect the learning environment, making it unfriendly to children and disrupting learning activities ([Rahman et al., 2020](#)). Bullying can hurt both victims and perpetrators. For victims of bullying, actions can affect physical and emotional development. Students' focus on participating in learning activities at school will be disrupted; students become afraid and anxious ([Aswat et al., 2022](#)). For the perpetrators, it impacts psychological, social, and criminal behaviour ([Pratiwi & Buchori, 2023](#)).

Data from Komisi Perlindungan Anak Indonesia (KPAI), during 2023, it received reports of violence against children totalling 2,877 cases, and 329 cases occurred in schools. As of March 2024, KPAI has received complaints of 383 cases, and 34% of these incidents occurred in schools ([KPAI, 2024](#)). Based on these data, bullying in schools must be taken seriously. In this case, the government has taken strategic steps to prevent and handle one through [Permendikbudristek No. 46 of 2023](#). Education units must jointly take concrete actions to prevent and handle bullying in their institutions.

Schools can make efforts to prevent bullying and deal with it through anti-bullying education programs ([Ulfatun & Santosa, 2021](#)). Anti-bullying education programs are carried out continuously, with teachers as the main actors involving students and school residents ([Varghese & Burton, 2023](#)). The goal is to provide an understanding of bullying actions and the impact of bullying, including the complaint mechanism and handling of bullying cases so that bullying cases in schools can be minimized ([Supriyatno et al., 2021](#)).

The needs and performance analysis results at SDN Gogodeso 2 show that students' level of understanding and awareness about bullying behaviour still needs to be improved. The results of the initial assessment questionnaire of bullying behaviour given to grade 5 students show there are still students who experience actions such as often being teased by their friends, teasing by calling their parents' names and being teased because of their physique. In general, students understand the act of bullying, but the awareness of not committing such acts is still lacking because they consider it normal. Students' understanding of the impact on victims of bullying is still low. Likewise, the pretest results of grade 5 students' literacy skills show that some students still need to improve. According to the teacher's explanation, the school has taken measures to prevent bullying, such as socializing students and promoting habituation. The school has also implemented literacy programmes such as reading before learning begins and during recess, facilitating reading corners. However, the results of these efforts have yet to be maximized.

This situation needs to be addressed immediately; one of the efforts that can be made is improving literacy skills and anti-bullying education for students. Literacy

skills are skills that every student needs to have ([Kirom & Lestanti, 2022](#)). Literacy and anti-bullying education programmes are critical to implement in schools to prevent student bullying ([Djamzuri & Mulyana, 2023](#)). Literacy programs can be conducted through learning using various digital devices. ([Amalia & Suharto, 2024](#)). Anti-bullying education can be implemented through media in the form of educational games. Educational games are games designed for learning to foster students' interest in learning and training critical, logical and systematic thinking ([Nikiforidou, 2018](#); [Sabirli & Coklar, 2020](#)). Educational game media is expected to be effective in anti-bullying education for students. The research objectives are (a) to develop an educational game media 'Sianting' that integrates literacy learning with anti-bullying education and (b) to test the feasibility of the educational game 'Sianting'.

The educational game developed integrates literacy learning with anti-bullying education presented in an educational game platform. This educational game is called "Sianting" (Literasi Anti-Bullying). Game development is tailored to the level of development and characteristics of students. The "Sianting" educational game presents learning materials as games to create an atmosphere of learning while playing. At each stage, challenges will be made to be interesting for students and increase their learning motivation.

The educational game "Sianting" was developed using a problem-solving approach. The problem-solving approach can create a student-centred learning situation ([Saputra & Elfia, 2022](#)). The results showed that the problem-solving approach is very suitable for use in elementary school ([Ahmad, 2023](#)). The development of the educational game "Sianting" uses Smart Apps Creator (SAC). SAC is an application that creates applications on Android and IOS without coding. The results of the application created can be saved in HTML, EXE, and APK formats ([Windawati & Koeswanti, 2021](#)).

Learning development through various interactive media can create a more exciting atmosphere. Students do not quickly feel bored when participating in learning ([Kustyarini et al., 2020](#)). Interactive learning media positively creates a learning process that affects students' quality and learning outcomes ([Afify, 2020](#)). One interactive learning media is educational games designed for learning with educational elements and values ([Cheung & Ng, 2021](#)). Educational games have advantages over conventional games, such as using interactive images and animations that can improve memory related to learning materials and develop cognitive, social, emotional, and physical motor skills. Educational games can also positively affect students' interest in learning and active participation ([Yu et al., 2021](#)).

Research shows that educational games can prevent bullying in schools ([Martel & Martín, 2022](#)). In addition, educational games can improve literacy skills ([Maqsood & Chiasson, 2021](#); [Oktarika et al., 2022](#)). However, there are still not many studies that develop educational games that integrate literacy with anti-bullying education. This research develops an educational game that integrates literacy with anti-bullying education and a problem-solving approach. The educational game 'Sianting' is expected to be a practical and feasible media for integrating literacy learning with anti-bullying education. They use a problem-solving approach in educational games to train students to improve their problem-solving skills and knowledge. Through this research, a series of tests were also carried out to determine the validity and effectiveness of the 'Sianting' educational game.

Research Method

The implementation of this research uses the R&D method. The R&D method is product-orientated with various systematic stages ([Chen, 2019](#)). [Yuan et al. \(2003\)](#)

stated that the R&D method is carried out through various stages of needs analysis, development, and product testing. This research uses the ADDIE development model according to the Robert Maribe Branch development stages. The following flow chart shows the research stages (Branch, 2009).

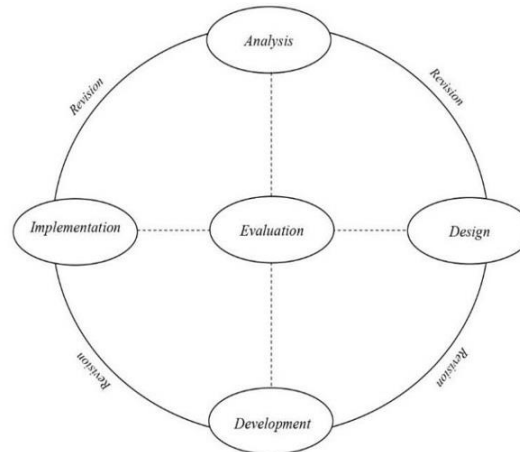


Figure 1: Flowchart of the Research

This research was conducted with the research subjects of grade 5 elementary school students, totalling 17 students, as well as the principal and grade 5 teacher at SDN Gogodeso 2. The selection of research subjects was a recommendation from the school based on the performance results and needs analysis conducted. Data were collected using observation, interviews, documentation, and tests. This study used research instruments like field notes, questionnaires, tests, and interview guidelines. Data analysis techniques used qualitative and quantitative data. Qualitative data is obtained through observation and interview results, while quantitative data is obtained through questionnaires and test results.

The stages of this research include five stages. The first stage is analysis, which is analyzing the performance and needs of schools carried out on teachers and students. This stage was conducted to obtain data on literacy learning and anti-bullying education in schools. Performance analysis was conducted to obtain data on the learning approaches and problems experienced in learning literacy and anti-bullying education. Based on the performance analysis, the learning approach that can be applied according to student needs is problem-solving. The needs analysis was conducted to determine the learning media that suits students' needs. Based on the needs analysis results, educational games can be used as learning media for literacy and anti-bullying education according to student needs. The second stage of design is designing educational games based on performance results and needs analysis using the problem-solving approach. At this stage, consultation with experts and teachers is carried out.

The third stage of development is developing educational games with the SAC application. The educational game developed is 'Sianting' (Literasi Anti-Bullying), which integrates aspects of literacy as an anti-bullying educational media. Researchers validated the 'Sianting' game to media and material experts at this stage. Furthermore, improvements were made based on the experts' suggestions and input. The fourth implementation stage is implementing the 'Sianting' game for students at school. The 'Sianting' game was implemented through limited tests on small groups and extensive tests on large groups. This stage aims to obtain data on students' responses and attractiveness of the 'Sianting' game and the post-test results of literacy materials and anti-bullying education. At this stage, students were given a

questionnaire containing responses and the attractiveness of the 'Sianting' game, such as the appearance and content of the game, the use of animation, images, colours, and games in the game. Then, students were given a post-test of literacy materials and anti-bullying education to obtain data on literacy skills and understanding of anti-bullying education. The fifth stage is evaluation, which is to make the final revision of the 'Sianting' game according to the suggestions and input at the previous stage. At this stage, the results of the pretest and post-test were also analyzed.

Results and Discussion

The research was conducted using the ADDIE model R&D method. There are five stages in the research. The product developed is the 'Sianting' game to improve students' literacy skills and anti-bullying education.

Analysis Stage

The activities carried out were needs and performance analyses of the principal, teachers and students at SDN Gogodeso 2. The analysis was conducted to obtain data on literacy learning activities and implementing anti-bullying education at school, including the various obstacles and challenges faced. Based on the analysis results, the researchers determined that literacy learning media and anti-bullying education meet the needs of students at school. In addition, based on interviews with teachers and students, it is known that there are still students who do not understand the impact of bullying on victims, perpetrators, and witnesses. Bullying still occurs among students; examples include friends making fun of them, calling their parents' names, and making fun of their appearance. The student awareness of not committing these acts is still lacking, and it is considered normal. The school has implemented bullying prevention activities through socialization and habituation. The researcher gave an initial assessment questionnaire of bullying behaviour to 5th-grade students, and the results showed that there were still students who experienced bullying. One of the significant problems experienced by students at school is bullying, such as physical and verbal bullying. Bullying hurts students with both inner psychological and academic impacts ([Stan & Beldean, 2014](#)).

At this stage, a pretest of grade 5 students' literacy skills was also conducted, and the results showed that there were still students with low literacy skills. The average pretest score was 69. The school has implemented literacy programmes such as reading before learning and during recess, facilitating reading corners in the classroom. However, these efforts have yet to maximize the results.

The results of interviews with students show that most students are interested in participating in teaching and learning activities about literacy and anti-bullying education with educational game media. Learning activities are carried out through fun and engaging digital educational games. In digital educational games, animations, pictures, and sounds interest students. So, educational game media becomes media that students like. School students are more interested in learning implemented using computer (digital) games than conventional approaches ([Hooshyar et al., 2021](#)). Digital games have various advantages, such as animation, attractive images, and interactive videos that can create an interactive learning experience. The use of digital games can not only increase students' interest in learning but can facilitate active participation during learning. Students will be more actively involved, motivated, and excited in learning the learning material ([Yu et al., 2021](#)).

Design Stage

The second stage is the design of the game 'Sianting'. Game design includes a) designing game characters, script, sound, effects, and backgrounds, along with game

activity stages, b) determining game development applications, and c) preparing materials and questions. In addition, the integration of game activity stages designed with the problem-solving approach was also carried out. Problem-solving ability is one of the basic cognitive abilities, including critical thinking, creativity, and problem-solving. Problem-solving ability is identifying problems, finding alternative solutions, and implementing solutions in various situations. So, problem-solving is crucial in classroom learning ([Araiza-Alba et al., 2021](#)).

The material developed in the 'Sianting' game uses educational materials on anti-bullying published by the Directorate General of PAUD, Dikdas, and Dikmen at the primary school level. The activities in the 'Sianting' educational game adopt the activities of the primary school literacy module published by the Research and Development and Bookkeeping Agency, Centre for Assessment and Learning ([Pusmenjar, 2020](#)), which includes five activities, namely: (a) Let's Observe, (b) Let's Read, (c) Let's Write, (d) Let's Practice, and (e) My Reflection. The following is a picture of the activity in the 'Sianting' game.



Figure 2. Learning Activity

The 'Sianting' game was built to improve problem-solving skills. Through the 'Sianting' game, students can explore and develop their abilities and potentials, such as critical and systematic thinking skills. The following is the button menu in the 'Sianting' game.

Table 1. 'Sianting' Game Button Menu

Nama Tombol	Tampilan
Home	
Play	
Back	
Next	
Sound on	
Sound off	
Pause	
Score	SCORE
Instruction	

Several important factors must be considered when creating an educational game to produce a successful and entertaining learning environment. The selection

of visuals, animations and other interactive components should be well thought out to capture student interest and encourage innovation. Proper selection of elements will make it easier for students to understand the subject matter. A student-centred approach should also be used in educational game design. The main factor is student engagement. As a result, educational games are more than just aesthetically pleasing. However, they can also give students the freedom to express and engage in a way that suits their interests and preferences. Students can learn in a fun way and are encouraged to actively participate in their education with a design that considers their motivations and interests (Behnamnia et al., 2020).

Development Stage

The "Sianting" game was built using the SAC application. Furthermore, the "Sianting" game is saved in HTML, Excel, and APK file formats and can be installed on laptops/computers/PCs and Android smartphones. The appearance of the "Sianting" game is presented in the following figure.



Figure 3. Initial view



Figure 4. Initial view



Figure 5. Main menu



Figure 6. Instructions



Figure 7. Game Material



Figure 8. Learning Activity



Figure 9. Evaluation



Figure 10. Evaluation



Figure 11. Evaluation (If the answer is correct)

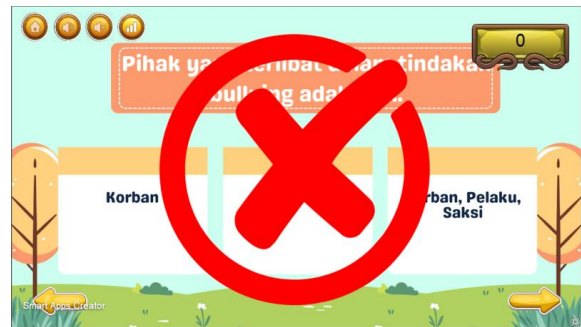


Figure 12. Evaluation (If the answer is wrong)



Figure 13. Reflection



Figure 14. Reflection



Figure 15. Learning Resources



Figure 16. End of Work

After completion, media and subject matter specialists verified the "Sianting" game. The outcomes of the experts' validation are listed below.

Table 2: Expert and User Validation Results

No	Assessment	%	Validity
1.	Material Expert	95	Very High
2.	Media Expert	93,75	Very High
3.	User	92,5	Very High

The data from the validation results showed that the 'Sianting' game obtained an average score/value of 93.75%, so it was included in the 'very high' or very valid category. Input from the material expert that the stages of game activities in the 'Sianting' game are adjusted to the stages in the literacy module. Furthermore, the media expert suggested adding animations and game activities to make it more exciting and varied. The size of the button menu was made more proportional so that it was explicit. The research team made improvements according to the input and suggestions from the experts.

Serious games are effective as learning media in preventing bullying issues in schools. Detection and prevention of bullying can be done through anti-bullying education programmes using various video games (Calvo-Morata et al., 2020). The digital educational games developed must be designed with a student-centred learning approach. According to Coleman and Money (2020), each stage of the game needs to be designed with attention to the active involvement of students so that they can engage in learning that triggers critical and exploratory thinking skills. Various components of student-centred learning, such as active learning, deep understanding, and a sense of responsibility, also need to be considered to create meaningful learning. In addition, it is essential to consider the value of mutual respect between teachers and students in the digital context and the reflective aspects of learning carried out in digital games. Collaborative aspects can be integrated into developing digital educational games to encourage cooperation between students, discussion, and sharing ideas with students and teachers.

Implementation Stage

Researchers tested the 'Sianting' game on students in the next stage. The trial was conducted through a limited test on a small group and a broad test on a large group.

Table 3. 'Sianting' Game Trial Results

No	Assessment	%	Validity
1.	Limited test (small group)	89,37	Very High
2.	Extensive test (large group)	91,47	Very High

From the data in the table, the small group limited trial results obtained a score of 89.37%, categorized as 'very high' or very valid. These results show that the 'Sianting' game is exciting and readable. The results of the large group extensive trial obtained a score of 91.47%, which was categorized as 'very high' or very valid. The score shows that the 'Sianting' game is exciting and can be applied as a medium for learning literacy and anti-bullying education in schools.

A post-test on literacy materials and anti-bullying education was also conducted at this stage. The results of the pretest and post-test showed a change in the learning outcomes of literacy and anti-bullying education materials for students. According to research results from (Razzaq et al., 2023; Rogojan and Turda, 2023; Suriah et al., 2024), interactive media can improve literacy understanding and prevent bullying behaviour. In the pretest, there were still students who scored less. While the post-test results were given after using the game 'Sianting', all students got

a complete score. The average student's pretest results get a score of 69, while the average student's post-test results score 86.

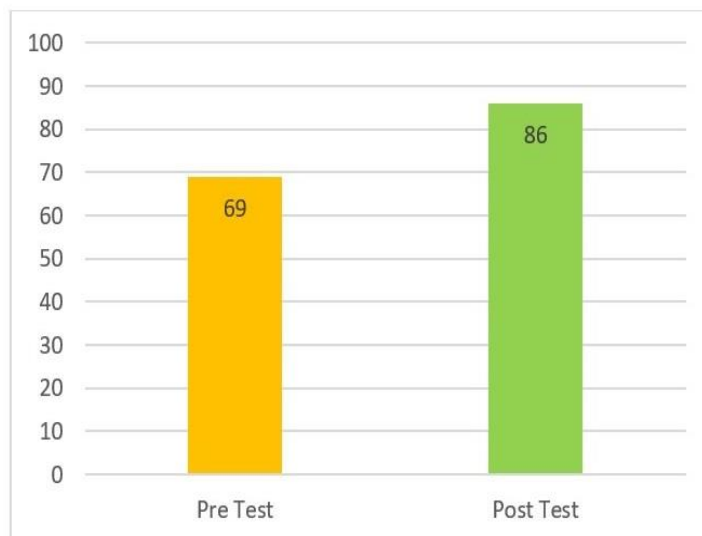


Figure 17. Diagram of Average Pretest and Posttest Results

The diagram above shows an increase in the average student learning outcomes using the 'Sianting' educational game media. From the average student score of 69 to 86. The educational game 'Sianting' can improve learning outcomes of literacy materials and anti-bullying education in students because this educational game was developed in interactive learning media in the form of digital games. Each stage in the educational game is designed for active student involvement that triggers explorative and critical thinking skills. This educational game applies stages based on the literacy module at the primary school level from the Centre for Assessment and Learning (Pusmenjar, 2020). The anti-bullying educational material adopts the Directorate General of PAUD, Dikdas and Dikmen's anti-bullying educational material so that its content has been validated. Educational games include interactive learning media that positively create learning that affects learning outcomes (Afify, 2020). Educational games can also include various elements of educational value. The advantages of educational games over conventional ones are that they are more interesting with the use of images, animations and other interactive media so that they can improve students' memory related to learning material. Educational games can also develop social, cognitive, and physical motor skills (Yu et al., 2021).

The results of the student questionnaire showed a positive response to the 'Sianting' game. Students responded positively, especially in learning, using the educational game 'Sianting', which was exciting and fun. The game display is fascinating, with animations, images, and attractive colour choices. Using educational games increases students' understanding of the material and enthusiasm for learning.

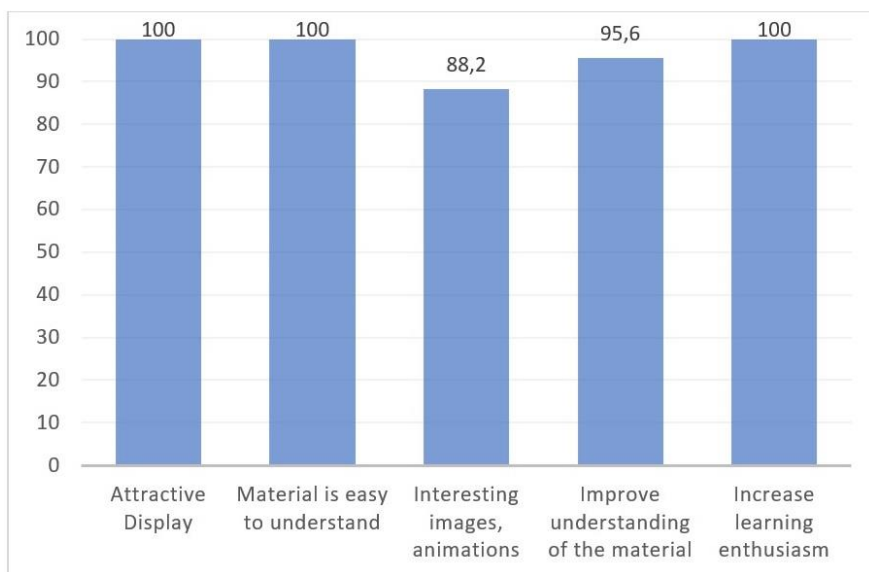


Figure 18: Diagram of Average Student Response

The diagram above shows the students' positive response to the "Sianting" game. The average questionnaire score/value is 96.76%, which means that students responded very positively. In the aspect of game appearance, all students stated that the 'Sianting' game was beautiful. The 'Sianting' game was designed according to the students' characteristics. The game display is designed to interact with various exciting images and animations. Various aspects must be considered when designing educational games, such as selecting images, animations, and other interactive elements to be attractive and foster student creativity. Using the right components can have a positive effect so that students understand more easily ([Behnamnia et al., 2020](#)).

The 'Sianting' game makes it easier for students to understand the learning material because it is designed with stages that pay attention to the active involvement of students so that it can bring out explorative and critical abilities. In designing educational games, paying attention to the student-centred learning approach is necessary. Every activity in the game needs to pay attention to student involvement so that students can be actively involved in learning activities ([Coleman & Money, 2020](#)). The 'Sianting' game increases students' enthusiasm for learning because the game is developed in the form of interactive media by paying attention to the active involvement of students. This educational game was developed by creating a practical and fun learning experience. The selection of interactive elements, such as images and animations combined with the material, is chosen to be intriguing to foster student interest and creativity. The development of educational games needs to pay attention to student motivation and interest so that students can be actively involved in learning. The selection of appropriate components can improve students' understanding of the material. Student involvement is central, so participating in educational games can increase students' enthusiasm for learning ([Behnamnia et al., 2020](#); [Fuadiy et al., 2024](#)).

According to [Crompton \(2018\)](#), students understand the material more easily through educational games. Educational games are more varied regarding material presentation, more challenging activity stages, and attractive displays to increase student enthusiasm. The positive impacts of using educational games include increasing interest in participating in learning activities, facilitating students to learn as needed, and supporting critical thinking skills.

Digital educational games positively affect students' cognitive and non-cognitive reading skills. Based on reading post-test results, students who played educational games scored better ([Vanbecelaere et al., 2020](#)). Serious games effectively increased awareness, understanding, and empathy in overcoming bullying and cyberbullying. In addition, serious games are effective for increasing understanding of positive behaviour in society, avoiding discrimination, violence, positive lifestyle choices and other environmental issues ([Calvo-Morata et al., 2020](#)).

Evaluation Stage

At the evaluation stage, the final revision of the 'Sianting' game was carried out according to the suggestions and input of experts and users. At this stage, the validity results, pretest and post-test results, student responses, and the impact of the 'Sianting' game were also followed up. The evaluation results showed an increase in the average student learning outcomes using the 'Sianting' educational game media, which can be seen in the results of the pretest and post-test. The average student's pretest results get a score of 69, while the average post-test score is 86. So, there is an increase in the average student score when using the 'Sianting' educational game media. Most students gave positive responses to the 'Sianting' game, which can be known based on the results of the questionnaire, such as exciting and fun learning, varied presentation of material so that it is easy to learn, the appearance of the 'Sianting' game is attractive, equipped with pictures and animations with appropriate colour choices. The game presentation is challenging. Learning using digital games positively impacts students' ability to develop creative skills, critical thinking, and digital skills. In addition, digital games increase student interest in learning and potentially improve student learning outcomes ([All et al., 2021](#)).

The findings of this study are: (a) students are enthusiastic and happy to take part in learning with the 'Sianting' game because it is varied and fun, which is known based on the results of the student response questionnaire; (b) students' understanding of literacy and anti-bullying education material is better with the "Sianting" game media which can be seen based on the results of the pretest and post-test. The average pretest score is 69, while the average post-test score is 86, so there is an increase. (c) Most students responded positively to the 'Sianting' game because it was varied, not dull, challenging, and fun, which is known based on the results of the student response questionnaire. (d) Based on expert, user, and field test results, the 'Sianting' game is effective and practical in learning literacy and anti-bullying education.

Bullying behaviour/actions have entered the school environment. Handling and preventing bullying must be done. Prevention programmes through anti-bullying education need to be carried out effectively. Teachers can use various media, such as interactive images, to create a safe, comfortable, and respectful environment ([Wee et al., 2022](#)). Literacy learning activities and anti-bullying education can be applied to various media, such as educational games. Educational games aim to increase interest in learning and training systematic, critical, and logical thinking ([Yu et al., 2021](#)).

The "Sianting" game was built using a problem-solving approach. Learning with a problem-solving approach can realize student-centred learning activities ([Saputra & Elfia, 2022](#)). Learning activities are directed at a particular problem or issue; then, the problem is analyzed and solved to obtain a conclusion. Learning using a problem-solving approach positively affects students' intellectual abilities in problem-solving ([Djarwo & Handasah, 2022](#)).

Learning media can reduce student boredom. Students can more quickly understand the material with the use of learning media. The use of learning media

will increase learning motivation and creativity in students. The selection of learning media needs to consider the characteristics and needs of students. If there is a mismatch, it can help in understanding the learning material (Kirom & Rofiq, 2024).

Conclusion

The research concludes that the 'Sianting' game is a valid and effective learning media for literacy and anti-bullying education. Based on the assessment results from experts and users, the 'Sianting' game has excellent practicality. The 'Sianting' game received positive responses from students because learning literacy and anti-bullying education is more interesting and fun, and the material is easier to understand. The pretest results showed that the average student score was 69 while the post-test average score was 86, so there was an increase in the average score of students after using the 'Sianting' educational game. Thus, the 'Sianting' game has met the criteria of being valid, practical, and adequate to be implemented as a medium for learning literacy and anti-bullying education.

The educational game 'Sianting' can be used by other schools and stakeholders, especially in the world of education, as an anti-bullying educational media platform so that the prevention of bullying behaviour in schools can be implemented optimally and with broad implications. Recommendations for further research need to pay attention to the needs and characteristics of students in developing learning media, especially educational games. Aspects of students' cognitive development also need to be considered so that the educational game media developed can be effectively used.

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