

***Media IQ Interactive Games Assessment Using a Contextual Teaching Learning (CTL) Approach to Improve Primary School Students' Critical Thinking Ability***

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***Abstract***

*Primary school students' critical thinking skills currently face significant obstacles, mainly due to constraints on teachers' pedagogical skills, which include the use of learning methods and models, classroom practice. The aim of this research is to utilize industry 4.0 technology, one of which is an educational game based on IQ Interactive. The important urgency in developing this media is based on research by that educational games can improve students' cognitive abilities. The benefit of learning using the CTL method is changing the conventional learning system to a modern one. This research is development research (Research and Development), the development of IQ Interactive Games was carried out using the CTL Approach using the ADDIE development model. The results of the IQ Games Interactive research showed that the majority of respondents responded positively to the use of IQ Games Interactive, including ease of use, layout, access to information, effectiveness, text presentation, use of QR, color composition, systematics and efficiency. Aspects of readability and understanding of concepts are very important in assessing the quality of media, including IQ Interactive Games.*

***Keywords:*** *Critical Thinking, Contextual Teaching Learning (CTL), Development of IQ Interactive Games.*

***Abstrak***

Kemampuan berpikir kritis siswa sekolah dasar saat ini menghadapi hambatan yang signifikan, terutama karena keterbatasan keterampilan pedagogis guru, yang meliputi penggunaan metode dan model pembelajaran, serta praktik di kelas. Tujuan penelitian ini adalah untuk memanfaatkan teknologi industri 4.0, salah satunya adalah permainan edukatif berbasis IQ Interactive. Pentingnya urgensi dalam pengembangan media ini didasarkan pada penelitian bahwa permainan edukatif dapat meningkatkan kemampuan kognitif siswa. Manfaat pembelajaran menggunakan metode CTL adalah mengubah sistem pembelajaran konvensional menjadi sistem pembelajaran modern. Penelitian ini merupakan penelitian pengembangan (Research and Development), pengembangan IQ Interactive Games dilakukan dengan menggunakan Pendekatan CTL menggunakan model pengembangan ADDIE. Hasil penelitian IQ Games Interactive menunjukkan bahwa mayoritas responden memberikan respons positif terhadap penggunaan IQ Games Interactive, termasuk kemudahan penggunaan, tata letak, akses informasi, efektivitas, penyajian teks, penggunaan QR, komposisi warna, sistematisasi, dan efisiensi. Aspek keterbacaan dan pemahaman konsep sangat penting dalam menilai kualitas media, termasuk IQ Interactive Games.

***Kata Kunci:*** *Berpikir Kritis, Pembelajaran dan Pengajaran Kontekstual (CTL), Pengembangan Permainan Interaktif IQ.*

## A. Introduction

The critical thinking abilities of elementary-level students currently appear to still experience significant obstacles, which are largely caused by obstacles in teachers' pedagogical competence, which includes the use of learning approaches and learning models in the classroom. Teachers' ability to create teaching materials using various approaches is still inadequate, apart from that, development based on metacognition is still not understood so learning is less effective.<sup>1</sup> So this needs to be pursued by implementing effective learning strategies, by utilizing electronic technology, to stimulate and strengthen basic-level students' critical thinking abilities.<sup>2</sup>

The results of previous research and current research have consistently depicted that students' critical thinking abilities are at a low level.<sup>3</sup> Meanwhile, critical thinking is very important for students' success in education. Knowing students' critical thinking abilities helps educators adapt the curriculum to improve critical thinking.<sup>4</sup> This finding is supported by a series of previous studies which characterized this pattern in depth. It was still found that students had not been able to improve their critical thinking skills in thematic subjects so they had not been able to explore various information, develop personal character, and draw conclusions.<sup>5</sup> The ability to answer questions based on high-level thinking cannot be answered optimally by students, so there is a need for models and approaches that can improve students' critical thinking abilities.<sup>6</sup>

Thematic subjects are the most difficult for students' critical thinking skills, especially numeracy material with students' low ability to focus on problems, determine solution strategies and choose the right arguments in solving them.<sup>7</sup> Apart from the low ability to think critically in science material, there is a need for an appropriate learning approach to improve these skills,

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<sup>1</sup> Wildan, W., Laksmiwati, D., Loka, I.N., & Supriadi, S. (2021). Socialization and Mentoring of Metacognition-Based Science Learning Materials for Master of Science Education Students at Mataram University. *Rengganis Journal of Community Service*, 1(2), 191–199

<sup>2</sup> Wijayadi, A.W., Fitriyah, L.A., & Manaksia, O.A. (2021). Analysis of the Need for Inquiry-based E-Module Development to Improve Critical Thinking Ability. *5th National Seminar on SAINSTEKNOPAK LPPM UNHAS TEBUIRENG JOMBANG 2021*, 1–4

<sup>3</sup> Mahanal, S., Zubaidah, S., Sumiati, I.D., Sari, T.M., & Ismirawati, N. (2019). RICOSRE: A Learning Model to Develop Critical Thinking Skills for Students with Different Academic Abilities. *International Journal of Instruction*, 12(2), 417–434.

<sup>4</sup> Burns, S., Mendel, S., Fisher, R., Cooper, K., & Fisher, M. (2013). Critical Thinking in Nurse Anesthesia Education: A Pilot Study. *Journal of Curriculum and Teaching*, 2(1), 83–90

<sup>5</sup> Khosiah, N., Fadilah, Y., Nizrina Sofiani, R., & Milla, I. (2022). Thematic Learning Model Using the Storytelling Method to Improve Critical Thinking in Elementary School Students. *Al-Muaddib-Journal of Educational Studies*, 4(2).

<sup>6</sup> Cahyo, Nur, A., Daulay, S., Novita, S., Simamora, & Dita, Y. (2021). Ability to Do HOTS-Based Questions for Class X Students of SMKN 1 Percut Sei Tuan. *Proceedings of the National Seminar on Learning Indonesian Language and Literature (SemNas PBSI)*, 279–288

<sup>7</sup> Puspita, V., & Dewi, I.P. (2021). Effectiveness of E-LKPD based on an Investigative Approach on Primary School Students' Critical Thinking Abilities. *Scholar's Journal: Journal of Mathematics Education*, 5(1), 86–96.

so this reason is the basis for researchers in selecting materials and learning approaches that can improve students' critical thinking skills.<sup>8</sup>

The aim of this research is to utilize industry 4.0 technology, one of which is an educational game based on IQ Interactive. The important urgency in developing this media is based on research that educational games are able to improve students' cognitive abilities,<sup>9</sup> increase students' interest in learning,<sup>10</sup> hone students' skills,<sup>11</sup> increase effectiveness,<sup>12</sup> are more interesting,<sup>13</sup> and become a learning medium in the future. Apart from that, audio-visual media based on the Contextual Teaching Learning (CTL) approach is able to improve students' cognitive abilities, so the researchers made IQ Interactive Games based on the CTL Approach into the development of the chosen media. Media development is innovation considered as the soul of a nation and the basic driving force of a country's sustainable development.<sup>14</sup> The benefit of learning using the CTL method is changing the conventional learning system to modernized CTL which makes it possible to connect real world situations to help students understand and solve problems. This is also supported by other research, where CTL-based learning provides students with the opportunity to speak and think critically in front of their classmates to discuss real-world problems. With the support of previous research, CTL can improve the Minimum Completeness Criteria (KKM), work more effectively, obtain real information, and improve student learning outcomes.<sup>15</sup>

Based on this description, the aim of this research is to produce IQ Interactive Games media with a Contextual Teaching Learning Approach to Improve Primary School Students' Critical Thinking Abilities, thereby producing a real contribution in the form of Games media

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<sup>8</sup> Aprilia, T. (2021). Effectiveness of Using Contextually Based Flipbook Science Media to Improve Students' Critical Thinking Abilities. *Journal of Educational Science Research*, 14(1), 10–21

<sup>9</sup> Citra, C.A., & Rosy, B. (2020). Effectiveness of Using Quizizz Educational Game-Based Learning Media on Office Technology Learning Outcomes for Class X Students at Ketintang Vocational School, Surabaya. *Journal of Office Administration Education (JPAP)*, 8(2), 261–272.

<sup>10</sup> Sintaro, S. (2020). Design and Development of Educational Games for Historical Places in Indonesia. *Journal of Informatics and Software Engineering*, 1(1), 51–57.

<sup>11</sup> Arpiansah, R., Fernando, Y., & Fakhrurozi, J. (2021). VR Educational Game Introduction and Prevention of the COVID-19 Virus Using the MDLC Method for Early Childhood. *Journal of Information Technology and Systems*, 2(2), 88–93.

<sup>12</sup> Simanjuntak, M. (2020). Increasing Student Activeness in Online Learning Through the Educational Game Media Quiziz During the Period of Preventing the Spread of COVID-19. *Prima Indonesian Journal (BIP)*, 2(2), 103–112

<sup>13</sup> Pratama, L.D., Lestari, W., & Bahauddin, A. (2019). Educational Games: Do make learning more interesting. *At-Ta'lim: Journal of Education*, 5(1), 39–50.

<sup>14</sup> Trung, N.S., & Van, V.H. (2020). Vietnamese cultural identity in the process of international integration. *Journal of Advances in Education and Philosophy*, 4(6), 220–225

<sup>15</sup> Mandasari, D.S. (2019). Development of Class V Civics Teaching Materials Oriented to the CTL (Contextual Teaching and Learning) Approach to Improve Primary School Student Learning Outcomes at Sdn Lerpak 3 Bangkalan. *Review Journal of Elementary Education: Journal of Educational Studies and Research Results*, 5(2), 1003–1008.

integrated with a synchronized barcode system based on a website to support Internet of Things (IoT) learning.

## B. Research Methods

This research is development research (*Research and Development*) aimed at producing IQ Interactive Games products using the Contextual Teaching Learning (CTL) Approach. The development model used is the ADDIE model developed by Dick Walter and Lou Carey, which includes five main stages: Analysis, Design, Develop, Implementation, and Evaluation.<sup>16</sup> In the analysis stage, a process of analyzing content structure, concepts, procedural information processing, learning theory, and formulation of student needs was carried out based on literature review results indicating a low level of critical thinking skills, especially in thematic subjects. The design stage continued with the preparation of a blueprint or initial product design, including preparation of tools and materials, as well as the design of IQ Interactive Games media according to student needs. Furthermore, in the development stage, the product was validated by media experts, and research instruments were prepared to measure the validity and quality of the product.<sup>17</sup>

The subjects in this research were elementary school level teachers and students, and involved lecturers as media experts to validate the IQ Interactive Games with the CTL Approach. The research instruments used included needs analysis questionnaires, user response questionnaires, and student critical thinking instruments. Data analysis was performed using Richardson 20 and 21 standard analysis with the help of Anates V4 software, as well as Cronbach Alpha analysis using SPSS 25 and SEM. Assessment of product development was carried out through formative and summative assessments by experts and teachers. Effectiveness and practicality testing were conducted through field simulations, and attitude questionnaires were also distributed to determine changes after using the IQ Interactive Games development program with the CTL Approach.

## C. Discussion

### 1. The Role of Interactive Games in Enhancing Critical Thinking and Problem-Solving Skills

Interactive games have a very important role in improving students' critical thinking skills. In interactive games, students can learn in a fun and challenging way. They must use their logic, problem-solving, and analytical skills to achieve the goals in the game.

This makes students actively involved in the learning process and helps them develop

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<sup>16</sup> Dousay, T., & Logan, R. (2011). Analyzing and evaluating the phases of ADDIE. Proceedings from Design, Development and Research Conference, 32–43

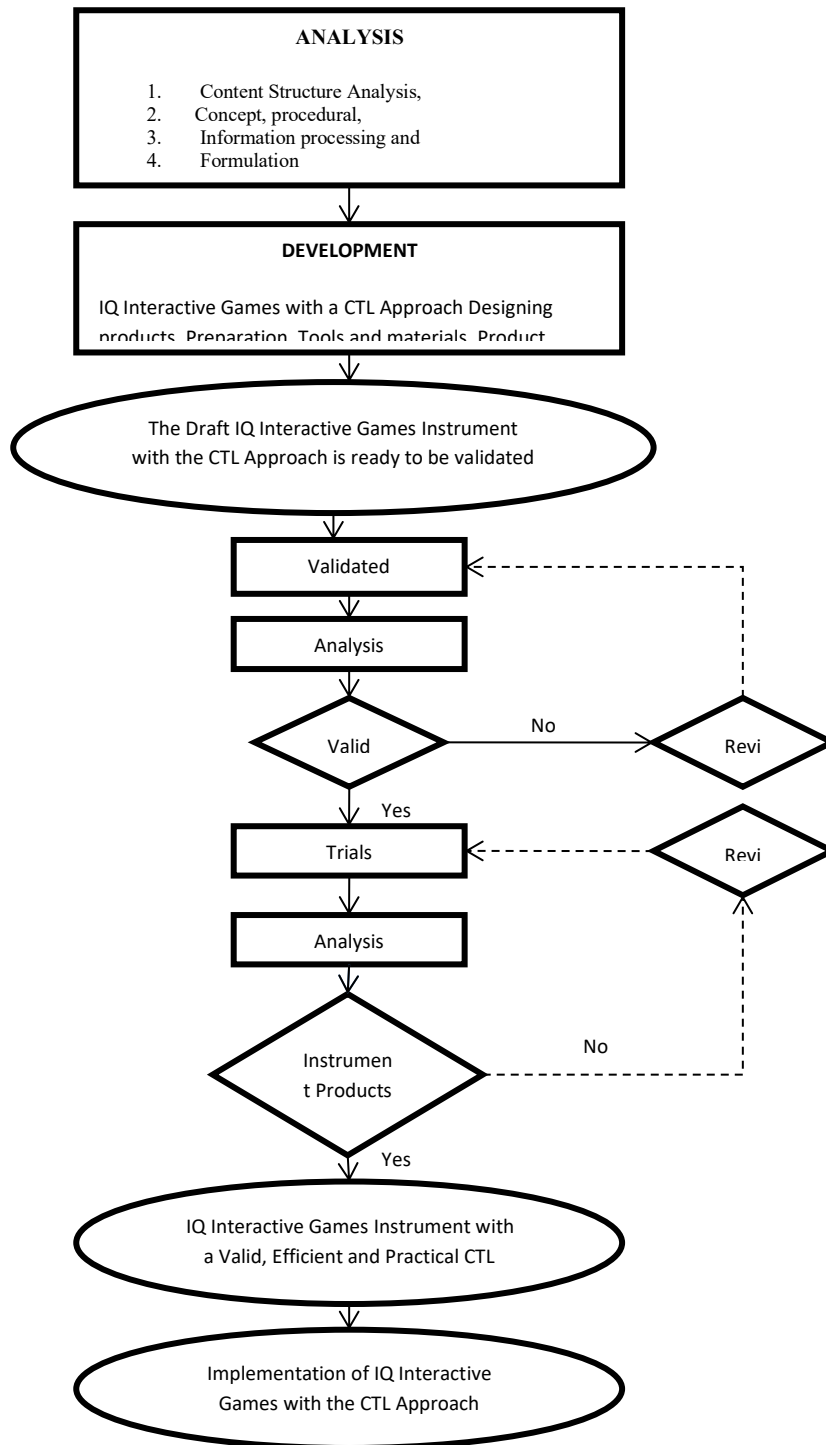
<sup>17</sup> Widyastuti, E. (2019). Using the ADDIE model to develop learning material for actuarial mathematics. *Journal of Physics: Conference Series*, 1188(1), 12052.

critical thinking skills. Apart from that, interactive games also encourage students to explore. They are faced with situations that require critical thinking to find the right solution. Students must try different approaches and strategies to achieve goals in the game. This encourages students to think creatively, try new things, and develop their critical thinking skills. The direct feedback provided in interactive games is also very helpful in improving students' critical thinking skills. Students can see the consequences of their decisions and actions, and learn from their mistakes. This helps students develop critical thinking skills by improving their strategies and making better decisions in the future. Apart from that, interactive games can also broaden students' understanding of the concepts taught in certain subjects. In the game, students are faced with challenges that require critical thinking to understand and apply these concepts. This helps students deepen their understanding and develop their critical thinking skills. Interactive games also train students' problem-solving abilities. In these games, students are often faced with complex problems and require critical problem-solving. Students must analyze the problem, identify alternative solutions, and select the most effective solution. This process helps students develop critical thinking and problem-solving skills that are useful in everyday life. By providing a fun and challenging learning experience, interactive games can help students develop critical thinking skills that are important for their future success.

This research is development research (Research and Development), the development of IQ Interactive Games was carried out with the CTL Approach using the ADDIE (Analysis, Design, Develop, Implementation, Evaluation) development model by Dick Walter and Lou Carey (2005). The research was carried out on elementary school level teachers with the time according to the attachment. The subjects in this research are teachers and students and involve lecturers as media experts for IQ Interactive Games with the CTL Approach. IQ Interactive Games Media Design with a CTL Approach by carrying out Analysis, Design and Development activities.<sup>18</sup> The following is the flow of the ADDIE development model at each stage, briefly explained in Figure 1 below:

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<sup>18</sup> Dousay, T., & Logan, R. (2011). Analyzing and evaluating the phases of ADDIE. *Proceedings from Design, Development and Research Conference*, 32–43



**Picture 1.** Development flow IQ Interactive Games with a CTL Approach

From the picture of the IQ Interactive Games development flow using the CTL Approach, the steps in ADDIE can be explained as follows:

a. Analysis

At this stage, the process of analyzing content structure, concepts, procedural information processing learning theory, and formulation of what students need is carried out. This is known based on the results of the literature review, it is known that there is a low level of understanding of critical thinking skills, especially

thematic material, because the teaching system is carried out in a monotonous manner, disinterested and unmotivated because the material is passive, so this is a strong argument for selecting the material that will be taught. choose.

b. Design

At this stage, the researcher carried out an initial design as a roadmap or blueprint regarding how IQ Interactive Games with the CTL Approach would be designed according to the needs of students. Here the researcher carries out product design, preparation, tools and materials as well as the design of the IQ Interactive Games using the CTL Approach that will be produced.

c. Develop

At this stage, after the results of the IQ Interactive Games prototype with the CTL Approach are ready, the media assessment instrument will also be prepared as a suitable tool for measuring the validity and quality of a product produced. Here, apart from the IQ Interactive Games media using the CTL Approach, it is validated, of course the instruments used are also validated by experts. This means that if the media has received validation from experts, the IQ Interactive Games media product with the CTL Approach is ready to be implemented on a small scale.

d. Implementation

At this implementation stage, a project plot is carried out to find out how practical and effective it is for teachers and students. Where this will provide input and suggestions for improvements and improvements to the resulting IQ Interactive Games products with the CTL Approach, then revised according to the suggestions given.

e. Evaluation

In the final stage, the results obtained from the project plot carried out can be used as prototype material which has been made from the first step by step, so that you always get effective and efficient results in producing IQ Interactive Games products with the CTL Approach as an alternative learning media that is appropriate to the times.

In this research, of course, a needs analysis instrument was created to find out exactly what needs to be developed and what the level of teacher ability is in producing media, especially related to IQ Interactive Games with the CTL Approach. Validity will be carried out by experts, namely lecturers and teachers who have been accredited, then effectiveness will be carried out in the MGMP subject teachers, while practicality will be carried out by users, namely students, as well as questionnaires related to students' critical

thinking instruments. Apart from using questionnaires, researchers also used deep interviews to obtain comprehensive, complete and in-depth data.

Research instrument development, validation and testing using Richardson 20 and 21 standard analysis using Anates V4 and questionnaire analysis using Cronbach Alpha analysis using SPSS 2 5 and SEM. The results of data analysis were used as the basis for developing the IQ Interactive Games design using the CTL Approach. Assessment of product development is carried out using formative and summative assessments by experts and teachers. The results of the analysis are used as a basis for revising the resulting prototype (product prototype) which is evaluated based on effectiveness and practicality using field simulations and an attitude questionnaire is also distributed to determine changes from the use of the IQ Interactive Games development program with the CTL Approach.

## 2. Results : IQ Games Interactive Media Design

Interactive IQ Games, one of the media used in this research, has been proven to be an effective tool in learning.<sup>19</sup> Interactive IQ Games are a form of visual media that allows presenting information in an interesting and informative way.<sup>20</sup> The majority of respondents in this study showed interest and support for the use of Interactive IQ Games as a learning tool. The home page contains IQ Games Interactive. The initial page design for developing interactive IQ Games-based learning media can be seen in Figure 2..



**Figure 2.** *Interactive IQ Games Design*

<sup>19</sup> Golan, O., & Baron-Cohen, S. (2006). Systemizing empathy: Teaching adults with Asperger syndrome or high-functioning autism to recognize complex emotions using interactive multimedia. *Development and Psychopathology*, 18(2), 591–617

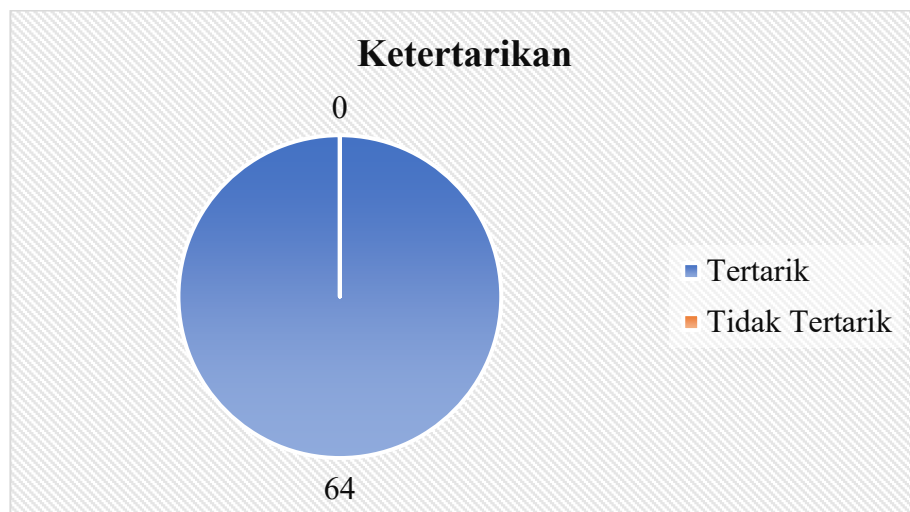
<sup>20</sup> Bačić, D., & Fadlalla, A. (2016). Business information visualization intellectual contributions: An integrative framework of visualization capabilities and dimensions of visual intelligence. *Decision Support Systems*, 89, 77–86

The Guidelines for Using Interactive IQ Games section contains instructions on how to use learning media for respondents. The design of learning guidelines for learning media can be seen in Figure 3.



**Figure 3.** Guidelines for Using Interactive IQ Games

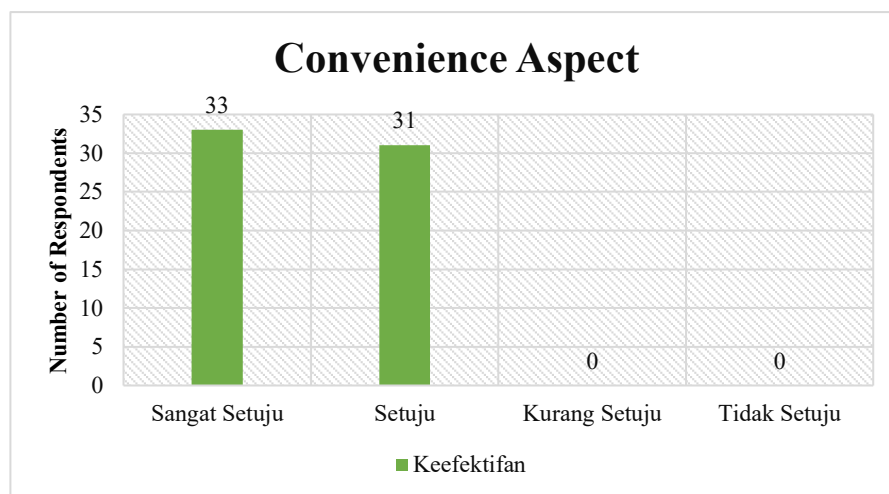
Active involvement in the conservation of Critical Thinking is important because this plant has a strategic role in maintaining plant genetic diversity which is vital for world food security. Below is presented data on user interest in IQ games media:



**Figure 4.** IQ Games Media User Interest Diagram

If we look at the data depicted in Figure 4, it can be concluded that the majority of respondents, namely 64 people, showed a high interest in using Interactive IQ Games as an educational medium. Interactive IQ Games media attracts the interest of many people because it has several significant advantages. One of the main advantages of IQ Games Interactive is its ability to present information interestingly and interactively. In addition, IQ Games Interactive also allows the integration of various types of media, such as text, images,

video and audio, to provide a richer and deeper learning experience.<sup>21</sup> Another advantage is its high accessibility because it can be accessed via various digital devices, making it easier for users to get the information they need. The following is a diagram of the effectiveness of using IQ Games Interactive media::



**Figure 4.5.** *Ease of Effectiveness Respondent Diagram*

Based on Figure 4.5, it can be seen that the majority of respondents, namely 31 people, stated "Agree" regarding the ease and effectiveness of using IQ Interactive Games. Furthermore, 33 respondents answered "Strongly Agree". Thus, it can be concluded that Interactive IQ Games is considered very effective in use based on positive responses from the majority of respondents.

Interactive games also train students' problem-solving abilities.<sup>22</sup> In these games, students are often faced with complex problems and require critical problem-solving.<sup>23</sup> Students must analyze the problem, identify alternative solutions, and select the most effective solution. This process helps students develop critical thinking and problem-solving skills that are useful in everyday life.

#### **D. Conclusion**

Conceptual reasoning is the respondent's ability to follow and understand the thoughts or concepts presented in Interactive IQ Games well. Good text comprehension includes ease in reading and understanding the information presented in existing texts. Good language understanding in this media includes the respondent's ability to easily understand and interpret information conveyed in language that is easy to understand. By providing a fun and

<sup>21</sup> Yip, F.W.M., & Kwan, A.C.M. (2006). Online vocabulary games as a tool for teaching and learning English vocabulary. *Educational Media International*, 43(3), 233–249.

<sup>22</sup> Asfar, A., Asfar, A., & Sulastri, S. (2021). Improving students' complex problem-solving through LAPS-Talk-Ball learning integrated with interactive games. *Journal of Physics: Conference Series*, 1722(1), 12105.

<sup>23</sup> Liu, C.-C., Cheng, Y.-B., & Huang, C.-W. (2011). The effect of simulation games on the learning of computational problem-solving. *Computers & Education*, 57(3), 1907–1918.

challenging learning experience, interactive games can help students develop critical thinking skills that are important for their future success.

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