

# Multimedia of Educational Game for Disability Intellectual Learning Process: A Systematic Review

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**Abstract**—Learning through play is an activity that is widely practiced in the current era. Educational or computer-based educational games in the learning process are not only entertaining but can also deepen relationships and enable greater learning processes. Multimedia educational games can help students to understand the material as long as the learning process looks more concrete and fun. Multimedia educational games in teaching and learning activities is also able to improve cognitive abilities possessed by individual intellectual disabilities, but their use is still rarely found. In this paper we conduct research in a systematic review of multimedia educational games as an aid in the implementation of the learning process for individuals with intellectual disabilities. The results of the study obtained from several literature indicate that multimedia educational game can be aimed at increasing the ability of individual intellectual disabilities in various ways not only in the academic field. The time needed during the use of multimedia educational games ranges from 20-60 minutes which is carried out in one full learning. The form of the game presented must be adapted to the real life of an intellectual disability individual in daily life and adapted to the abilities and obstacles that are possessed. The features provided must be able to support the ability of individual intellectual disabilities and can be used as material for improvement in the next learning process.

**Keywords**—educational games, video games, multimedia learning, cognitive development, intellectual disability

## I. INTRODUCTION

Intellectual disability is an individual who has below average intellectual abilities. These conditions result in limitations in cognitive development and the function of adaptive behavior (corresponding behavior), which includes: communication, self-care, social skills, health and safety, academic functions and others. Piaget & Inhelder in [1] argue that cognitive development is a genetic process, which is a process based on the biological mechanism of the development of the nervous system. The more a person ages, the more complex the neuronal cells and their ability to increase. The learning process of a person will follow the pattern and stages of cognitive development according to his age. Cognitive development has an important role for the success of individual intellectual disabilities in learning because some activities in learning are always related to the problem of thinking [2].

The process of developing individual intellectual disabilities will be slower, or it can be said that they cannot reach all stages of cognitive development. In individuals with intellectual disabilities, changes in primary sensory processes

are largely related to dysfunction in the central nervous system [3]. Disabled intellectual individuals are usually only able to reach development levels at the concrete stage, and are achieved at a higher age than other children of their age. Kaulina in [3], states that the most significant aspect of intellectual development of individual intellectual disability is in abstract thinking. Cognitive development possessed by individuals with intellectual disabilities has the characteristics of low understanding of numbers and numbers, and it is difficult to relate abstract meanings from one meaning to another. Disability intellectuals have difficulty analyzing various social and academic situations, are unable to fully use the information they have, sometimes passive and show low ability. General cognitive impairment manifests in all physical processes, perceptions, memories, thoughts and imagination.

Disability intellectual cognitive development can develop through the learning process through special or regular schools. Based on the condition of cognitive abilities possessed by individual intellectual disabilities in helping the learning process one that can be used in the form of educational game learning media based on informatics or computer technology, with the advantage of being able to improve the cognitive abilities possessed. The educational game is a kind of video game designed to develop skills or implemented as a learning exercise, not just for play and entertainment [4]. Some examples of educational games that are often used include Prime Climb, which aims to teach number factorization [5] or Magalú, a game where players practice language and communication skills, and mathematical [6]. The use of educational games has been developing for several years, but for individuals intellectual disabilities are still not used too much [7], including in Indonesia. This educational game is a game that not only entertains but also deepens relationships and allows greater learning [8]. Hence, far the use of educational games aimed at education has been widely reported on various subjects, such as geography, computer science, health education, and mathematics and science. The use of educational games can also influence student motivation and learning [9]. For this reason, some studies consider that the use of educational game media is a good way to practice cognitive skills in individuals with atypical development [10], including intellectual disability.

### A. Multimedia in Learning

Multimedia is one part of the media that contains a combination or combination of text, images, sound, video, and

so on [11]. Multimedia is compiled by digitally manipulating computers. The use of multimedia in learning is expected to provide a new nuance during learning where there are several media used in supporting the learning process, its proper use is also able to succeed psychomotor development and strengthen the user visual process. Multimedia provides opportunities for students to develop learning techniques, so as to obtain maximum results. Surjono [12], states that the use of multimedia in a computer-based learning system is expected to improve students' understanding. He also shows that multimedia must be used only when students have low prior knowledge, when students have low motivation, so that multimedia can be used effectively.

### *B. Educational Games and Disability Intellectual Individuals*

Revealed that the game is a context for interacting between players with rules that have been set to achieve a goal. New and up-to-date digital games, psychological and artistic techniques are being applied to complement information processing technologies including artificial intelligence [13]. This process is intended to attract attention and increase the emotional satisfaction of players by maximizing interactive elements. Educational game as a game that combines the principles of playing with learning theory by integrating learning content of certain subjects to enrich learning aimed at students [14]. Games designed with educational goals have the value of effectiveness so that they can be accepted by the stakeholder. In terms of game pedagogy, it is designed based on learning outcomes to be achieved, and is an operational part of learning that can send information through communication operators and at each layer can interact with others [15].

With individual intellectual disability abilities, multimedia educational games are very appropriate to be used in the learning process. Today information technology has been widely used as a learning tool evidence also supports the use of computer-based activities for people with increasing intellectual disabilities [16]. Information technology for students is a means to achieve familiarity with new technologies and become a tool for inquiry, communication and understanding throughout the curriculum range. The use of multimedia in education and training has significantly changed educators' perceptions of the learning process. The results of a number of studies show that appropriate multimedia instruction improves student learning performance in science, mathematics, and literacy. Studies show that computer-aided instruction programs have important factors that can motivate, challenge, enhance curiosity and control, and promote fantasy in children [17]. Recently, the presence and popularity of computer-based video games has grown a lot, and has begun to investigate the impact of video games on students' cognitive development [18], [19].

The choice of computer-based educational games in learning must look at several criteria, including first, use video games that are effective in enhancing intellectual abilities of individual intellectual disabilities; second, educational video games must be appropriate for mentally retarded individuals, so the game must follow individual criteria such as easy to understand, adopt easy-to-follow instructions to activate programs, simple movements, combine icon sizes etc. [10].

All of this must be considered because of the obstacles that individuals have intellectual disabilities. The main purpose of the educational game is not only to play and entertainment, but to convey some types of knowledge to students. The type of game that is applied must be able to describe simulations from real world environments, where players must solve problems that are often encountered. Students learn and develop the best approach to problems presented in the game and as a consequence, when faced with the same thing in real situations they have the ability to solve the problem.

The advantages of computer use for individuals with intellectual disabilities include: increased independence, increased self-determination, greater self-esteem and increased opportunities for training [20], computer games can facilitate acquisition and transfer of knowledge to new situations through feedback and self-assessment mechanisms [21], able to develop skills in problem solving and memorization, McFarlane in [22], helping students familiarize themselves with technology, programming and computer science [23] games are social activities, contribute to the development of players' social and emotional skills [18]; [24], [21]. Some authors have used special computerized training programs for students with intellectual disabilities that show their usefulness in improving cognitive abilities, such as non-verbal [25] working memory [26], metacognition [27], in improving the learning of basic mathematical concepts [28]. In addition, the use of computer-based educational games is also able to stimulate real-life situations and provide direct feedback [10].

Gagné's Five Categories of Learning Theory [29] or Gardner's Theory of Multiple Intelligences is very consistent with the principles of educational game design [30]. Educational game design can combine support for various learning styles [31], including the various types or levels of learning mentioned in Gagné's analysis, including:

- Verbal information, provided in the form of digital games both verbally and textually;
- Intellectual skills, such as the use of concepts and rules to solve problems, form the basis of strategy games;
- Cognitive strategies, it is very important to complete game tasks;
- Attitude, is important cardinal for role-playing games; and
- Most games require the use of some kind of controller or keypad, which helps develop fine motor skills [31].

The technology system in the form of computer-based devices or software has the potential that can be used to help individual intellectual disability learning where they have cognitive impairments [32]. Some results of research on the use of computer-based educational games are stated appropriate to be applied to individual intellectual disabilities, for example by using VirtualMat games the ability of individual intellectual disabilities for three months increased compared to the previous time when teachers only used traditional methods [33], the use of FLYTM Pen results shows that students show an increase in the percentage of multiplication problems resolved correctly from the beginning rather than before [34].

This systematic review journal is conducted to obtain answers to questions, in the form of: (a) What characteristics should be applied to educational multimedia games that will

be used in learning for intellectual disability students ?; (b) What are the benefits of using multimedia in the learning process for intellectual students with disabilities?

The rest of this paper is organized as follow: Section II describes the material and proposed methodology. Section III presents the obtained results and following by discussion. Finally, Section IV concludes this work.

## II. MATERIAL & METHODOLOGY

This section presents the material used and the proposed methodology.

### A. Data Collection

Research in this journal was carried out using systematic review method. The search was conducted in July 2018 from the electronic database (Indonesia One Search by PERPUSNAS, PubMed) searched for by the keywords used: "video games" AND "intellectual disabilities", "computer games" AND "intellectual disabilities". In addition, the keyword "educational multimedia learning" and "intellectual disability" are used to expand the search. The search was

limited to papers in English and Indonesian, in 2013-2018 and produced 10 journals.

### B. Data Analysis

The analysis carried out in this systematic review study uses qualitative methods. The research results obtained are presented descriptively based on the research questions that have been determined.

## III. RESULTS AND DISCUSSION

This section presents the results obtained and following by discussion.

### A. Result

The results of the reference search obtained in the focus of the discussion on the use of multimedia educational games for students with intellectual disabilities were then carried out in order to get answers to the research questions that were presented in the previous points. The results of the review of the references obtained in this journal writing are presented as follows the Table I below:

TABLE I. RESULTS OF SYSTEMATIC REVIEW OF THE USE OF MULTIMEDIA EDUCATIONAL GAMES IN THE LEARNING PROCESS OF INTELLECTUAL STUDENTS WITH DISABILITIES

Study	Type of Multimedia and Learning	Participants	Multimedia Characteristics	Result
Chang, <i>et al</i> [35]	Augmented Reality, using a computer device	<ul style="list-style-type: none"> <li>3 moderate intellectual disability participants with ages 21, 20 and 25 years</li> <li>Entering working age, have never had experience with a computer device before.</li> </ul>	<p><b>Aim</b> Improving the ability of vocational fields, namely identifying used goods for recycling.</p> <p><b>Time</b> The game is done around 25-40 minutes.</p> <p><b>Game Shape</b> Augmented reality. Students play on a bicycle, and there are 16 items of recycled objects &amp; 4 bins. Students must be able to distinguish 16 items into 4 types of suitable trash, namely plastic, metal, paper, and glass. The time needed for each item is 3 seconds.</p> <p><b>Feature</b></p> <ul style="list-style-type: none"> <li>Presented according to the real picture in the real world.</li> <li>Accompanied by error corrector</li> <li>Load text, sound, image / combination</li> </ul>	<ul style="list-style-type: none"> <li>The skills of recycling students are increased and can be maintained</li> <li>Students can engage in cognitive demanding tasks</li> <li>Increases self-confidence and motivation to work.</li> </ul>
Basterretxe a, <i>et al</i> [36]	iPad, using a mobile device. Consists of 3 types of games	<ul style="list-style-type: none"> <li>12 intellectual disability participants aged 12-15 years.</li> <li>Able to communicate verbally do not have physical coordination problems</li> <li>Ever or have experience using iPad or cellphone.</li> <li>Being at the preparation stage for independent living</li> </ul>	<p><b>Aim</b> Train to be able to use money in everyday life, which can manage money and differentiate coins.</p> <p><b>Time</b> Played in 30-45 minutes.</p> <p><b>Game Shape</b> There are three forms of games, including: Payment:</p> <ul style="list-style-type: none"> <li>choose the number of coins according to the price of the item</li> <li>Coin discrimination: distinguishes Euro and other currencies</li> <li>Coin discrimination: differentiates Euro from penny.</li> </ul> <p><b>Feature</b></p> <ul style="list-style-type: none"> <li>Save activities that have been done during the game</li> <li>Displays the time that has been used</li> <li>Contains a corrector in the form of an error</li> <li>Make a report in the form of activities carried out in the game</li> <li>There are examples of each activity that will be played</li> <li>Increased font usage, voice accompaniment to guide users</li> </ul>	<ul style="list-style-type: none"> <li>Game 1 is most often played because it is more challenging and complex, and results in better habituation of money management.</li> <li>provides participants with a sense of joy and positivity during learning.</li> </ul>

Siberski, <i>et al</i> [37]	CogniFit, computer-based online web cognitive training	<ul style="list-style-type: none"> <li>▪ Of the 145 participants only 33 who agreed to follow the research action, it was an intellectual disability of adults aged 21 or over</li> <li>▪ Having an interest in computer use, there is a willingness to focus on activities ± 30 minutes, able to see images on the computer clearly</li> </ul>	<p><b>Aim</b> Train students' cognitive abilities in the form of attention, eye-hand coordination, inhibition, monitoring, naming, planning, response time, recognition, shifting, spatial perception, renewal, visual memory, visual perception, visual scanning, and working memory.</p> <p><b>Time</b> 25-30 minutes per session</p> <p><b>Game Shape</b> Students play 21 tasks in the game which consist of easy, medium and difficult level levels.</p> <p><b>Feature</b></p> <ul style="list-style-type: none"> <li>• Consists of tasks from easy, medium, and difficult levels</li> <li>• Continue to measure the performance performed by players</li> <li>• Task difficulties are in accordance with the player's abilities</li> <li>• Member feedback on each task played</li> <li>• Consists of voice, animation and video recording features</li> </ul>	<ul style="list-style-type: none"> <li>▪ The use of computers is proven safe for individuals with intellectual disabilities</li> <li>▪ Does not cause frustration and does not encourage negative behavior due to stress</li> <li>▪ Obtain skills in problem solving</li> <li>▪ Improvement in various cognitive abilities</li> </ul>
Cooney, <i>et al</i> [38]	Gnats Pesky, a computer-based online.	<ul style="list-style-type: none"> <li>▪ 52 individual intellectual disabilities.</li> <li>▪ Age 18 / over mild &amp; moderate classification, &gt; 18 th weight classification. Having depression, repeated anxiety</li> <li>▪ Having bipolar, schizophrenia</li> </ul>	<p><b>Aim</b> As a therapy for depression and anxiety</p> <p><b>Time</b> 7 sessions per week with 1 hour / session</p> <p><b>Game Shape</b></p> <ul style="list-style-type: none"> <li>• There are 6 different game characters with 7 levels.</li> <li>• There is a 3D world called "Gnats Island", there are 5 wild explorers who each represent the CBT concept, and there are examples played by karakkter "Shona".</li> <li>• Players choose characters and fill the mood that is being felt at that time, must speak with other characters to get the key, there are pictures of anxiety disorders that are often experienced and must be solved with the help of 5 explorers.</li> <li>• During the game accompanied by a therapist to observe and direct.</li> </ul> <p><b>Feature</b></p> <ul style="list-style-type: none"> <li>• 3D display</li> <li>• There are different characters</li> <li>• There is audio</li> <li>• Consists of several levels</li> <li>• Games are based on everyday life</li> </ul>	<ul style="list-style-type: none"> <li>▪ Does not show a significant reduction in symptoms of depression, but the resulting effect is better than the control group without the help of technology.</li> </ul>
Bakker, <i>et al</i> [39]	Mini-games, computer-based online web	81 students with mild intellectual disabilities, learning difficulties and behavioral problems in primary education from 11 schools.	<p><b>Aim</b> Improve math ability multiplication and division.</p> <p><b>Time</b> 55 minutes with allocations: 20 minutes for game recognition and examples given by one student, 10 minutes for all students to play games, 10 minutes for discussing other strategies that can be used in the game, 15 minutes for the strategies discussed. Dissertation game with learning and discussion in class so that it must be accompanied by the teacher</p> <p><b>Game Shape</b> Not explained in this research journal</p> <p><b>Feature</b></p> <ul style="list-style-type: none"> <li>• Adapted student needs</li> <li>• Presented with simple graphics so that it is easy to learn</li> <li>• The use of minimalist sound</li> <li>• Rewarding additional points</li> <li>• Game content is integrated with learning</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increased from pre-test to post-test</li> <li>▪ However, there is no difference with the results of the control group</li> </ul>
Silva, <i>et al</i> [40]	Exergame, in the form of Wii-based video games that demand physical activity	25 Down syndrome adults aged 18 to 60 years.	<p><b>Aim</b> Train physical fitness, motor skills, and functional mobility.</p>	<ul style="list-style-type: none"> <li>• There is an increase in all aspects of the experimental group, while the control group does not change</li> <li>• Increases functional mobility, aerobic resistance, running speed</li> </ul>

		<ul style="list-style-type: none"> <li>▪ Does not have neuromusculoskeletal disorders or severe sensory disturbances.</li> </ul>	<p><b>Time</b> 22 sessions with an allocation of 3 sessions / week and each session for 1 hour.</p> <p><b>Game Shape</b> Students are presented with a game with wii devices, so students have to do activities that are presented in real terms, including free running, headings, tilt tablets, snowboard, tension, hola hoop, balance, penguin slide.</p> <p><b>Feature</b></p> <ul style="list-style-type: none"> <li>• 3D display</li> <li>• There is audio, visual animation.</li> <li>• Detects the time needed during the game.</li> <li>• Save the activities that have been done</li> <li>• Save data on capability enhancements in the game</li> </ul>	and agility, abdominal strength, flexibility.
Astorgano, <i>et al</i> [41]	The Magic Stone, a computer-based video game	Players usually have a language deficit.	<p><b>Aim</b> Train communication skills in pronunciation aspects.</p> <p><b>Time</b> Not mentioned in this journal</p> <p><b>Game Shape</b> The game is performed by students who are accompanied by a teacher / trainer who helps students in using the correct sound. In this game players must use sound and visual to play the sound of a virtual assistant in the form of a parrot. Member assistants know the scenario that the player must do</p> <p><b>Feature</b></p> <ul style="list-style-type: none"> <li>• Has a graphic adventure structure</li> <li>• Has a multimodal interface that is the existence of conversations with characters</li> <li>• Players must take several actions</li> <li>• The use of bright colors, simple text fonts and larger sizes</li> <li>• Games based on the real world that are often experienced.</li> <li>• There is a feature to store user interactions in audio recordings as analytical material.</li> <li>• Offer feedback according to the results obtained</li> </ul>	<ul style="list-style-type: none"> <li>▪ Players can identify everyday situations and transfer game lessons to the real world.</li> <li>▪ Generates a high level of satisfaction</li> <li>▪ Production of oral abilities increases with usage</li> </ul>
Mosito, <i>et al</i> [42]	Computer-based Text-to-Speech	<ul style="list-style-type: none"> <li>▪ 35 students consist of 5 middle classes, at the age of 10 and 14 years with mental ages of 4 and 7 years.</li> </ul>	<p><b>Aim</b> Train and improve reading skills</p> <p><b>Time</b> 20 minutes and done for 3x a week</p> <p><b>Game Shape</b> Listen to the text of the story that is displayed and follow the words specified. There are three activities: the teacher reads the story several times and the students follow the story on the computer, the students listen, follow, and read the story, and the teacher explains and rereads the parts that are not read correctly by students.</p> <p><b>Feature</b></p> <ul style="list-style-type: none"> <li>• There is feedback to correct errors</li> <li>• Modify font size and color to make it clear</li> <li>• Using images, sounds, animations and interactive activities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increases ability in number of words</li> <li>▪ Increases enthusiasm and motivation in learning</li> </ul>
Buzzi, <i>et al</i> [43]	Cognitive Learning Game (CLG), a computer-based web platform	<ul style="list-style-type: none"> <li>▪ 2 Down Syndromes, 32 years old female, 28 years old male</li> </ul>	<p><b>Aim</b> Train cognitive abilities, such as: logic, puzzles, memory games.</p> <p><b>Time</b> Not explained</p> <p><b>Game Shape</b></p> <ul style="list-style-type: none"> <li>• Logic Sequence: students must reconstruct the logical sequence of images by sorting them out.</li> <li>• Puzzle: division of the image into four then increases</li> <li>• Memory: find and find pairs of images</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increases enthusiasm, attracts attention, and challenges.</li> <li>▪ Increased cognitive abilities</li> </ul>

			<ul style="list-style-type: none"> <li>Family: players must drag elements to complete the proposed family</li> <li>Video modeling: arranging daily activities</li> </ul> <p>Each game has a different level of difficulty.</p> <p><b>Feature</b></p> <ul style="list-style-type: none"> <li>There are pictures, videos, other movements / forms</li> <li>Emphasis on visual aspects</li> <li>Adapted to the needs of the player</li> <li>Difficulty leveling up</li> <li>Based on the description of activities every day</li> <li>Action data is stored for review</li> <li>Produce statistical interpretation data</li> </ul>	
Main, <i>et al</i> [44]	The Nintendo DS is based on software and touch screens	<ul style="list-style-type: none"> <li>10 students with mild disabilities 6-10 years of age, 1 class teacher, and 4 education assistants.</li> <li>Does not have impaired motor function</li> </ul>	<p><b>Aim</b> Train students' mathematical abilities.</p> <p><b>Time</b> Students are given time and play speed to complete the sequence within 20 minutes.</p> <p><b>Game Shape</b> It involves a math calculation game that focuses on the speed and accuracy that students respond by writing on the DS screen with the stylus. The teacher accompanies students to be well involved during the game</p> <p><b>Feature</b> There are physical, verbal and modeling instructions</p>	<ul style="list-style-type: none"> <li>With the use of technology students are positively involved during learning</li> <li>There is a significant increase in reduction</li> <li>The sum shows improvement but not significant.</li> </ul>

*a) Characteristics of Educational Multimedia Games that can be Applied to Intellectual Disability*

As a multimedia that is used for mentally retarded individual learning, it will certainly be different from what is commonly used by individuals in general. From the results of the studies of several studies above it was found that some of the characteristics of educational multimedia games applied were as follows:

- Purpose Aspect

The planned goals must be in accordance with the needs of intellectual students with disabilities. Those who have a young age can be more focused on improving their academic and language skills, while for adults they can focus on improving vocational skills as a means to enter the workforce and face challenges in everyday life. That way the use of multimedia learning game education can be useful as expected and able to improve the ability of intellectual students with disabilities.

- Time Aspects

The time used in the use of educational learning multimedia games based on the results of the exposure in the table shows different times. The shortest time is 20 minutes while the longest is around 1 hour, and all of that is done in one full lesson. Hence, it can also be said that the use of multimedia educational games can range from 20 to 60 minutes adjusted to the ability of students.

- Aspects of Game Forms

Judging from the results of the exposure in the table it is found that the game used must be presented with real-life images that are often experienced by students, so that later students are able to maintain what they have learned and are

able to apply it to real life. In addition, the game presented also more in challenging games. During the game students are not released independently. The teacher or companion must always accompany to see the progress that is passed by the students and provide the right direction to do during the game.

- Feature Aspects

The aspects provided in the game must include everything needed in the learning process and be able to facilitate individual intellectual disabilities to use them. Therefore, the features contained in educational multimedia learning games are as follows based on the results of several literature studies in the Table I above:

- Games or activities are presented based on an overview of real life or daily life that is often experienced;
- The game content presented is directly related to the learning material that will be given;
- Adapted to the abilities of individuals with intellectual disabilities;
- There is a corrector to detect errors that occur during the game;
- Contains text, sounds, images, animated characters or combinations;
- There is a feature that can store every activity that has been carried out, as material for later analysis;
- Displays the time that has been used;
- There are examples in each activity that will be carried out;
- The use of a simple but increased font, as well as bright colors to make it easier for players to understand;
- Giving rewards can be in the form of points in every activity that is properly implemented;
- There is a feature of providing feedback based on the results obtained during the activity;

- Presented with activities that have levels of light, medium, and heavy;

The above points can be used as guidelines that must be in a game that is used as a learning media for mentally disabled individuals. With these characteristics several studies that have been reviewed, obtained positive results in research for mentally disabled individuals.

#### *b) Benefits of Using Learning Multimedia Educational Games for Mentally Disabled*

The results obtained from several studies, the use of multimedia game learning produces positive results compared to traditional learning without using multimedia learning. Disability intellectual individuals are also able to involve themselves in tasks that demand cognitively, increase self-confidence and better motivation during the learning process. It can be said that not only can improve learning abilities, but the use of multimedia learning is also able to improve other abilities. They are better able to face the challenges that exist in real life according to what they have learned, give a sense of joy and joy, do not cause frustration or negative behavior due to stress during the learning process, and have skills in solving problems faced.

#### *B. Discussion*

Individuals with intellectual disabilities have some difficulties in understanding learning and handling activities in their daily lives. This situation can cause difficulties that result in the independence of life in the future. The objectives of the above research are in line with the opinion of which states that appropriate multimedia instruction improves student learning performance in science, mathematics, and literacy. All results show improvement compared to before or when still using traditional methods without the use of multimedia educational games and show differences with the control group. In addition, individual intellectual disability cognitive abilities are also developing, in line with what has been described [18], [19]. Choosing the goals to be conveyed also must see how individual conditions are, what is needed, and what the benefits will be for their lives later. Some things that can be used are in terms of increasing independence, increasing self-determination, greater self-esteem and increasing opportunities for training Davies in [20], able to develop problem solving skills and memorize McFarlane *et al.*, in [22], all of these things have been included in journals that are used as a source of systematic review.

Some of the studies obtained also show that the use of multimedia provides benefits and can improve the abilities of individuals with intellectual disabilities. However, it is still necessary to conduct research on other effects in the form of strengths and weaknesses that may occur in individuals with intellectual disabilities with the use of multimedia learning. The results of the research described above show that individuals with intellectual disabilities who can use multimedia educational games are limited to those who do not have motoric impairments, are able to operate computers or mobile phones, so that not all types of intellectual disabilities are able to take part in the learning process using the game learning multimedia. This is not in line with the opinion Becker in [31], that with game play motor skills can

develop, helping students familiarize themselves with technology, programming and computer science Kafai *et al.*, [23], so that so there needs to be an exception for educational game users, because later their motor skills and knowledge about information technology will increase over time.

The usefulness of a multimedia game learning also needs to be considered in the future, whether it can be maintained and practiced well in the real life of the player. During learning using multimedia games, not fully individual intellectual disabilities can be released to carry out the activities. The teacher must always monitor and help participants to later be able to know the feedback and evaluation that must be done for the next. Worksheets can also be used as a method that can be used to measure the extent to which the ability of the participants to improve after participating in the learning process using multimedia game learning.

Using multimedia games is not only for participants who need to be identified whether they are able to follow or are able to play technological devices, but schools, institutions, or others also need to pay attention to several things in the form of availability of facilities and infrastructure in the implementation of learning processes using multimedia learning, namely whether they have the necessary equipment, financial problems are fulfilled because the game used can also be a paid web platform.

The features provided also include what is needed in the learning process for mentally disabled students. With the features as mentioned in the results, the teacher is able to identify the extent to which students are able to walk through and can be used as a reference for determining the next program. Disability intellectual individuals can also easily understand what is instructed during the game if the features provided are in accordance with what is needed. This is in line with what has been described [10]. Hence, that the teachers or other stakeholders need to be considered carefully if they want to develop a learning media for individuals with intellectual disabilities in the future. The use of the right multimedia educational games can bring benefits that are important in addition to cognitive fields. But it can also cause self-confidence, happiness, and high motivation.

#### IV. CONCLUSION

The use of multimedia game learning can be used as a good strategy to improve the ability of individual intellectual disabilities in various ages and various classifications in both academic and non-academic fields. Also, able to increase motivation, confidence, excitement, and courage during the learning program provided so that they can get positive results.

The characteristics of the game that will be used also need to be considered because the user is an individual with intellectual disability, it cannot be compared to games in general. Games must be able to describe reality events that are often encountered in everyday life, and in accordance with individual abilities. Long-term benefits need to be considered, so that later individuals with intellectual disabilities are able to face challenges that actually occur in their lives.

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