
THE EFFECT OF ELECTRONIC GAMES ON CHILDREN'S INTELLIGENCE

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ABSTRACT

Playing is one of the most important activities in childhood generally. The child begins his contact with the outside world through playing, and it is the first way of learning and experience for the child. Since the end of the last century, specifically with the technological and digital development that humanity has witnessed, the concept of playing for children has witnessed a fundamental transformation with the entry of electronic games as part of the children's play system. The current paper aims to explore the effect of electronic games on children's intelligence. Several studies have been discussed that dealt with the effect of electronic games on various aspects of intelligence such as emotional, social, bodily-kinesthetic, logical-mathematical and linguistic intelligence. There are positive effects of electronic games that have been achieved such as developing thinking, problem solving and arithmetic skills. But on the other hand, there are many negative effects of electronic games that directly affect children's intelligence such as social effectiveness, physical fitness and language abilities. In this paper, both positive and negative effects of electronic games on the multiple intelligences of the child are discussed.

KEYWORDS

Electronic games, video games, playing, multiple intelligences, children

INTRODUCTION

During the twenty-first century, the world witnessed a great development in the field of technology. This prompted some researchers to call it the era of the digital revolution. Especially when looking at the effects of technology on public and private human life. Today, there is hardly a home without computers, tablets or smart phones as a result of the development that life has witnessed. Electronic devices have become an integral part of the basic needs in the life of the individual and society (Abuelgaseem & Mohmed, 2020).

Those who contemplate these changes will find that they have affected all groups and

social segments in society, whether they are young or old, male or female. However, the children have enjoyed a large share of this development, which is reflected in the concept of childhood generally in the modern era (Tayyib & Akram, 2021).

The first years of a child's life represent the focus of attention and interest by psychologists and researchers, due to their awareness of the importance of this stage and its danger at the same time on the child's personality. The experiences of the child at this stage affect his behavior, intelligence and composition in various aspects. This means that this stage represents the formation and structure of the future personality of the child. Children learn and acquire concepts, ideas and beliefs through games that they play in childhood. Children's lives are directly or indirectly linked to play of all kinds. Play also leaves clear imprints on a child's personality in the future (Belkacem et al., 2021; Shahrory & Rimawi, 2011).

LITERATURE REVIEW

Playing in Children's Lives

Playing is the process that through it the basic building blocks of a child's life and future personality are laid. Play is one of the way of self-expression in children, as well as it is a manifestation of human behavior associated with childhood (Almofty, 2020). The rapid change that the world witnessed at the beginning of the third millennium was accompanied by a change in the concept of play among children. In the past, children's games were associated with their collective shouts and laughter in the garden or the yard. But new generations came to be associated with electronic games as an inevitable result of the technological and digital boom that affected life in all its details (Shahrory & Rimawi, 2011). Traditional games no longer attract children's attention today, but children are attracted to games that are on computers or smart devices that are available in most homes. These games are characterized by suspense, adventure, and attention, which fulfills the needs of the child in the childhood stage (Almofty, 2020).

Electronic Games

Since the eighties of the last century, many forms of games have emerged that were not known before due to the technological development and the development of computer uses. This new type of games is known as electronic games or video games or digital games as some researchers call them (Shahrory, 2007). Electronic games are a type of games shown on a TV screen, on a computer screen or on smart devices that provide the individual with fun through his interaction and response to the content of the game. They are characterized by many audio-visual effects that create a kind of virtual interaction between the player and the game (Hasan, 2017). Sometimes the term video games or digital games is used to refer to the same idea, although there are some differences depending on the type of media used and the method of playing (Errity et

al., 2016; Shahreri, 2007). For the sake of simplicity, in this paper we will use the term electronic games to refer to any game that a child plays on any kind of media, whether it is computers, televisions or smart devices.

These games have spread widely and found an expanding market due to their attractive features, graphics, colors and accessibility. All these features made it capture the minds and interests of children (Almofty, 2020), which makes the child spend many hours playing it (Shahreri, 2007). According to the economic impact report of video game industry 2020, video games contribute to the United States' GDP by approximately \$12.6 billion. McCain et al. (2019) add that electronic games represent 65% of household activities in the United States, which means that they are superior to traditional games.

The role of games is no longer limited to traditional entertainment, but also leads to drastic changes in the behavior of individuals outside the game. These changes are moving in a negative and positive way together in the health, behavioral and mental fields. In addition, it represents an unprecedented environment for shaping the behavior of individuals for the purpose of education, training, rehabilitation and motivation (McCain et al., 2019).

Multiple Intelligences

Gardner developed his theory of intelligence, which is called Multiple Intelligences Theory (MIT) in 1983. He defined intelligence as a latent inter-psychic ability to process information and solve problems. It includes the ability to analyze specific patterns of information by specific methods in a specific context (Gardner & Hatch, 1989).

Gardner's theory is based on the existence of multiple types of intelligences. Gardner pointed out that every human has multiple intelligences, and each intelligence plays a specific role (Taha, 2020). He rejects the prevailing belief at that time that intelligence is a single mental ability, expressed in the degree of intelligence or the profile of intelligence (Gardner & Moran, 2006). Gardner also added that intelligences represent relatively independent mental abilities, and the individual can develop and adapt them within his cultural and social environment (Gardner & Hatch, 1989). In the same context, He stresses the importance of providing adequate environmental opportunities in order to enhance and revitalize these intelligences (Taha, 2020; White, 2008).

RESEARCH OBJECTIVES

1. The current paper aims to examine the effect of electronic games on children's intelligence, with a focus on the effect of electronic games on the multiple intelligences of children.

RESEARCH METHODOLOGY

The current paper belongs to literature review research. Therefore, the method followed in this paper is limited to a review of studies that dealt with the relationship between electronic games and children's intelligence. This paper also seeks to review the most important results of those studies and compare them to form a more comprehensive picture of the effect of electronic games on children's intelligence.

RESULTS

Games and Intelligence

Playing is a necessary activity for a child's maturity and development in all aspects. It is also an important factor in the child's compatibility with his outside world (Ambeeh, 2020). Children explore their world through play, but it is also one of the most important ways of learning for the child. In addition, playing helps the child discover the world and life around him (Yuan & Hu, 2018).

Playing is one of the most important factors in the social, emotional, and mental development of the child. The child plays different roles in the game, and each role increase his skills and intelligence (Al-Hileh & Ibrahim, 2018). The more exciting and interesting of games the child plays, the more increases his growth and abilities (Hasan, 2017). Playing is the best way to increase a child's intelligence in various fields in the early stages of childhood; Being the largest and main activity in child's life, and the child hardly does anything in his early years except playing (Quiroga et al., 2009).

Today, with the technological development, electronic games have become more prevalent, and they are crowding out traditional games. The popularity of their spread, ease of use, and increase in the hours spent playing them have sparked controversy among researchers about the impact of these games on the child's abilities and intelligence (Belkacem et al., 2021; Hasan, 2017; Shahreri & Rimawi, 2011). The researchers were divided into two teams, one team that is optimistic about the integration of children into electronic games, and the other team that warns against them. Each group has a basis of arguments and assumptions that cannot be ignored. So, these games have a role in the child's intelligence, development and personality. In this paper, we try to explore the most important positive and negative effects of electronic games on the multiple intelligences of the child. Our attention will be limited to five types of intelligence: linguistic intelligence, logical-mathematical intelligence, social intelligence, emotional intelligence, and bodily-kinesthetic intelligence.

The Effect of Electronic Games on Social Intelligence

Social intelligence is one of the important skills that help the individual in interaction with the surrounding environment (Sinani, 2021). Social intelligence is related to an individual's ability to interact with others and form successful social relationships. That

is, the more a person has the ability to interact socially and establish relationships with others, the more he is socially intelligent (Deeb, 2004).

Sinani (2021) believes that electronic games, in the tremendous technical progress, have become a source of socialization. Some studies indicate that electronic games contribute to the weakening of social intelligence and reduce it. They also contribute to more social separation of the child (Lynch, 2012; Sinani, 2021). The child's preoccupation with electronic games leads to decrease his interaction and integration with his peers.

Zoyoodi (2015) sees that electronic games create an antisocial child. Because the child spends hours playing electronic games not communicating with others around him. This makes him a socially isolated child. Unlike traditional games that are characterized by social communication and teach the child social skills and social roles that he can play in his future life (Sinani, 2021). Qahtani (2020) believes that electronic games negatively affect the child's social relationships through introversion and isolation. They also reduce the exchange of visits with parents and talking to them about the details of daily life. This, in turn, is reflected in the child's ability to socialize with others. Although 67% of mothers believe that electronic games encourage the spirit of competition of their children, 58% of them have admitted that playing electronic games has left their children isolated and socially withdrawn (Qahtani, 2020).

On the other hand, some studies have indicated that electronic games have provided the child with an unprecedented opportunity to form friendships and develop social intelligence, and they opened a new field for family dialogue between the child and parents in a new way (Abdulrahman, 2011). For example, the study of Hasan (2017) revealed that playing electronic games had a statistically significant positive effect on children's social intelligence. She adds that electronic games are not without social interaction. The child, while playing electronic games, engages in interactive activities with the contents of the game, and he or she is not satisfied with just watching without any interaction (Hasan, 2017).

In the same context, Shahreri and Rimawi (2011) believe that electronic games give the child an opportunity to practice a number of social skills such as leadership, responsibility and decision-making. All these skills develop the social intelligence of the child. In addition, success in electronic games requires research on how to use computer keys. This prompts the child to ask his colleagues and discuss with them about the details of the game as well as sharing a lot of information about the game with his colleagues. This means that the child is socializing with his friends by new way.

In some studies, parents have reported that electronic games produce positive effects on their children. They add that their children become more active and easier to integrate into society because of electronic games. Their children also made new friends through electronic games (Abdulrahman, 2011; McGonigal, 2011).

The Effect of Electronic Games on Logical-Mathematical Intelligence

Logical-mathematical intelligence is defined as the ability to classify and recognize symbols, deductive and inductive reasoning, and organize (Lestarinigrum, 2018). According to Gouws and Dicker (2011), logical-mathematical intelligence includes the ability to understand math and science concepts and apply them to problem solving. It also includes categorizing different contents, asking logical questions, and thinking critically about the individual's problems.

Shahrori (2007) pointed out that electronic games have an impact on the cognitive processes of the child, especially attention to stimuli in the environment. Also, electronic games have a role in improving the decision-making process of children. Kafai (2001) added that electronic games encourage logical thinking and gain the skills and knowledge by a fun way. This is consistent with the study of Al-Hileh and Ibrahim (2018) that found that electronic games develop mental skills of children. They also increase their ability to organize thinking, help them to think abstractly, and make them more aware of how they think and learn.

Betz (1995) emphasized that electronic games explain the interaction of cognitive systems as a whole and organize and integrate the complex skills to the child. In the same context, the study of Kathiri (2021) and Kebritchi et al. (2010) indicated that the importance of electronic games lies in strengthening the mathematical and arithmetic concepts of the child. Electronic games are important in increasing the level of remembering, understanding and achievement in mathematics, and improving children's level of understanding the meaning and value of numbers and the effect of arithmetic operations on numbers. Electronic games develop the speed of thinking, planning and organization in the child (Shahrori & Rimawi, 2011). All these are manifestations of logical-mathematical intelligence.

Based on the foregoing, it can be said that electronic games play on improving and developing skills related to logical and mathematical abilities and problem solving. This means that electronic games have a positive overall effect on logical-mathematical intelligence. This can be explained that electronic games in essence are a number of problems that the child solves, and these problems range in complexity from easy to difficult, and this represents a strategy for teaching logical and mathematical skills in an indirect way.

The Effect of Electronic Games on Linguistic Intelligence

Linguistic intelligence is one of the important intelligences of human. The individual who has a high linguistic intelligence is able to communicate socially with others through language (Hasan, 2017). Linguistic intelligence helps the child to remember information, and it plays a pivotal role in many learning and teaching processes that occur within the game. The explanatory role of language helps the child to understand the rules of the game, the method and procedures for operating the electronic devices used in playing (Qahtani, 2020).

Because the child is characterized by rapid language acquisition, electronic games help the child to acquire many concepts and terms in an enjoyable way while interacting with the game (Qahtani, 2020). Also, electronic games give the child the opportunity to learn a foreign language or some vocabulary that is used in games. In addition, electronic games help the child to remember some words that are related to playing (Hasan, 2017).

Ali (2017) pointed out that electronic games have a role in developing the skills of auditory discrimination of similar letters and sounds. The electronic games that she used in her study had positive effects on children's oral expression skills. Youssef (2015) added that electronic games contribute to the development of receptive and expressive language skills in children. In addition, computer games play a role in developing reading skills in children.

On the other hand, despite the language skills that the child can acquire through electronic games, the interaction of children through electronic games is not the same as their interaction in traditional games. Traditional games have a greater ability to maintain linguistic communication. Linguistic interaction in its verbal and expressive form is no longer what brings players together in electronic games. This in turn, the child loses one of the skills of linguistic intelligence, which is the child's ability to process and use language and meanings in the context of self-expression or in addressing others (Mamout, 2008).

Hassan (2017) concluded that playing electronic games does not have any statistically significant effect on the linguistic intelligence of children. This means that children who play electronic games and those who do not play electronic games have a similar level of linguistic intelligence.

The Effect of Electronic Games on Emotional Intelligence

Bar-On defined emotional intelligence as a set of emotional capabilities and skills that affect an individual's ability to adapt to the requirements of the surrounding environment. It is a set of non-cognitive abilities that help the individual in controlling

emotions and feelings in different situations (Bar-On & Parker, 2000). Emotionally intelligent individuals are those who have the ability to understand, express oneself, control emotions, and empathize with others (Shahrory, 2007).

Studies show that video games are related to the emotional side of humans. Playing violent games increases the physiological arousal of the body (Anderson & Bushman, 2001). Also, some electronic games lead to an increase in heart rate and blood pressure in humans while playing (Lynch, 2012). Even worse, violent electronic games increase the aggressive tendencies of children (Anderson & Dill, 2000).

The interactive feature of electronic games gives the child the opportunity to express himself. The child chooses the character in the game, merges with it intellectually and emotionally, and the child acts as if he is the same character in the game. The child sympathizes with the character at times and gets angry with it at other times. That is why the child tries to adapt to the situation imposed on him in the game. Child makes an effort to control his emotions according to the interaction with the game. The child may also like or hate some virtual characters because of their performance in the game (Juul, 2005).

The results of Shahrory's study (2007) revealed that children who played electronic games had a higher level of emotional intelligence than other children. They showed higher levels of empathy and understanding the feelings of others compared to other children. Also, electronic games helped children in managing stress and controlling emotions. This may be due to the laws imposed by the game and the way of playing, which makes the child accept the outcome of the game, whatever it is.

On the other side, some studies (AlRiahneh, 2021; Sawaliha et al., 2016) indicated that electronic games made children more susceptible to emotional arousal. In addition, electronic games reinforce the aggressive tendencies of the child. Sawaliha et al. (2016) also confirmed that teachers had noticed an increase in anxiety and tension rates among children who play electronic games.

We can conclude that electronic games enhance some aspects of emotional intelligence in children during play, such as emotional control, emotional integration and empathy. But these effects quickly disappear once the child returns to real life. The child cannot control his emotions outside the game, and he or she may transfer some violent emotions to his colleagues outside the game without his awareness.

The Effect of Electronic Games on Bodily-Kinesthetic Intelligence

Bodily-kinesthetic intelligence refers to the ability of the individual to use the body or part of it, such as the hand or fingers, to solve a problem or perform a productive

process. It is the ability to use the body well for self-expression (Tayyib & Akram, 2021). It also includes the individual's ability to use his mental abilities to coordinate his body movements well to express his thoughts and feelings and solve his problems (Seitz, 1992).

Bodily-kinesthetic intelligence has been associated with sports activities, exercise and body language, as well as motor activities such as dancing and acting. Children who have a high level of bodily-kinesthetic intelligence are described as dynamic and undisciplined in the classroom (Tayyib & Akram, 2021). Abuelgasem and Mohmed (2020) conducted an experiment on primary school children using electronic games. The results revealed a positive effect of playing electronic games on the bodily-kinesthetic intelligence of children. The results also showed that electronic games enhance the coordination of movement between hands and eyes and increase the skill of using the fingers. In addition to that, the motor response of children was higher in the experimental group compared to the control group.

The child's use of electronic devices during playing, such as the keyboard or joystick, enhances the motor coordination of the child. The transition from one level to another within the game gives child the skill to interact with the movement complexities presented by the game. All of these enhance the speed and movement of the child's physical response (Tayyib & Akram, 2021). Abuelgasem and Mohmed (2020) add that electronic games can give the child some motor skills in self-defense, especially for children who are over ten years old.

In one of the early studies about electronic games, Griffiths and Hunt (1998) found that people who played video games were faster in the visual and motor responses that depend on the movement of hand and eyes. This means that players are able to control the keyboard and the buttons, which may reach to nine buttons in one game.

On the other hand, Mansi (2012) concluded that electronic games have a negative effect on the child's body. The child who plays video games a lot often uses the eyes excessively, which affects the nerves of the eye and leads to the strain of the eye muscle. Moreover, Shahreri (2007) confirmed that electronic games lead to an effect on some muscles of the body. Although electronic games activate the movement of hand eyes and the motor synergy between them, they affect the shoulder muscles and the muscles of the legs as a result of the frequent sitting in front of electronic devices.

In the same context, Tayyib and Akram (2021) emphasized that playing electronic games leads to a reduction in the child's physical and sports activity. This in turn affects the physical health of the child. This is confirmed by Hosni (2002) that found that electronic games have led to the emergence of new diseases related to the skeletal and

muscular system, especially in the neck and lower back areas. All these studies lead us to say that electronic games help the child to enhance some motor skills, especially those related to visual motor coordination. However, at the same time, if they are used too much, they can lead to physical damage to the child's body. This, in turn, affects his bodily-kinesthetic intelligence.

DISCUSSION

Based on our presentation of the studies that dealt with the effect of electronic games on the intelligence of children in various fields, we can say that there is a real effect of electronic games on the intelligence of children. There are conflicting results from studies about the direction of this effect, whether it is negative or positive. This difference in results is due to the nature of the method used in each study. The studies that used the experimental method mostly had positive effects. Because the hypotheses from which the studies were launched were positive. In addition, the duration of the experiments was not very long (one semester at most). There is also confusion in the interpretation of the effect of electronic games on the child. Although the time that child spends playing cannot determine the impact of play on a child's intelligence, some of the studies relied on the number of hours that child spends as a criterion for judging the effect of electronic games. In our opinion, a child may spend an hour daily playing electronic games, but the effect of this hour on a child's intelligence is greater than three hours for another child.

There is a very important point that we emphasize here, which is that the type of electronic games plays a role in determining the nature of the effect that games have on children's intelligence. There are many types of electronic games such as sports, violent, adventure, educational and puzzle games. Violent electronic games were often associated with negative effects on intelligence, while educational electronic games were associated with improving the child's intelligence. Directing the child to specific games is also different from leaving it up to the child to choose the game. The majority of studies used certain games for experimental manipulation, and this may influence the effect the game has.

The effect of electronic games on children's intelligence varies according to time, place, type of game and player alike. Children under six years old are often positively affected by electronic games, but the older the child, the different the matter. Moreover, we cannot neglect the role of the place where children play. Children who play electronic games at home are affected differently from children who play them in entertainment venues dedicated to electronic games.

Finally, the issue of the effect of electronic games on children's intelligence remains a hot topic of discussion, and cannot be resolved easily. Just as there are positive effects that cannot be ignored, there are negative effects that their effect is not hidden. Therefore, there is a need for more studies about this subject. In addition, studying the

long-term effect will be useful in deciding whether the benefits of electronic games are greater than their harm or vice versa.

RECOMMENDATIONS

At the end of this review of the effect of electronic games on children's intelligence, it is recommended to conduct more in-depth studies on the subject. It is also recommended to use more than one approach together to study the effect of electronic games on children. Moreover, it is suggested that using the longitudinal approach will give results that are more useful. It is good to conduct a study on the impact of electronic games on children's intelligence using neuropsychological techniques and the impact of that on children's mental health.

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