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THE USE OF VIRTUAL INTERACTIVE GAME IN
KINETOTHERAPY ACTIVITY

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Abstract

The theme of the paper is part of a preliminary research that follows several aspects regarding the education of psychomotricity for the child with mental deficiency, aiming at introducing new elements of modern technology, namely virtual interactive game, in the therapeutic-educational act using the Kinect sensor. Purpose of the research: To study the possibility of including virtual interactive game in the kinotherapy activity for the child with mental deficiency. The research was carried out at Special School no. 8, Bucharest, between February 2017 and April 2017, the group of subjects being made up of 5 pupils with mild and moderate mental deficiency, from primary education. The research was based on the experimental method for the verification of work tools and introduction of virtual interactive game in kinotherapy activity. Results: Children demonstrated better concentration of attention and an increase in motivation to accomplish their work tasks in the kinotherapy activities performed using virtual interactive games, associated with classical didactic means, the development of the spirit of competition and/or an improvement in the collaboration relationship with the partner (when there were more participants in the game). Conclusions: The purpose of the research was achieved, the children being very pleased with the inclusion of virtual interactive game in kinotherapy activity. The inclusion of computerised didactic means, offers of modern technology, in motor activities could contribute to improving the quality of life of children with mental deficiency, because they are, like all children, attracted to such devices specific to contemporary life.

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Keywords: Virtual interactive game, Kinect sensor, kinotherapy



1. Introduction

Kinetherapy uses movement as a specific means, aiming at the somato-functional, motor and psychomotor rehabilitation, and in the case of partially reversible or irreversible deficiencies, the re-education of compensatory functions (MECT, 2008, p. 2).

Psychomotricity education occupies an important place in educational therapy, considering that mental deficiency is often associated with motor deficiencies (Gherguț, 2005, p. 171).

Epuran and Stănescu (2010) say that the game fulfils the “complex function of stimulating movements, the formative-educational function, the balancing and toning function, the therapeutic function. These functions highlight the role of the game in the formation of the individual” (p. 188).

The child finds in play “a favourable environment for motor, affective, cognitive involvement” (Negulescu, 2006, p. 26).

The more the materials used in the game are varied, dynamic and modern, the more the playful activity becomes enjoyable, attracting the child into the learning process. Modern education techniques, resulting from the association of certain information-carrying materials (software), with devices specially designed to value such materials (hardware) (Cerghit, 1988), have also begun to put their mark on game activities for children with special educational needs (Griffiths, 2002; Karal, Kokoç, & Ayyıldız, 2010).

Modern technology allows the creation of educational systems that include modalities of multiple interactions designed to meet the various needs of the user. One of the technological advances refers to movement interaction devices, which help create learning systems where users are able to interact with them in a continuous and active way (Garrido, Penichet, Lozano, & Sanchez, 2012, p. 883).

Movement interaction devices include Kinect (a 21st century invention), its name coming from ‘kinetic’ (movement) and ‘connect’ (the direct person-to-device link) (Melgar, Diez, & Jaworski, 2012, p. 25). Due to the Kinect device, users have the opportunity to interact with the virtual environment through natural gestures.

Kinect has been shown to be useful in the activity with children with special educational needs to improve eye-hand coordination, visual memory, attention concentration (Altanis, Boloudakis, Retalis, & Nikou, 2013).

2. Problem Statement

The theme of the paper is part of a preliminary research that analyses several aspects of psychomotricity education for the child with mental deficiency, aiming at introducing new elements of modern technology, namely virtual interactive game, in the therapeutic-educational act using the Kinect sensor.

3. Research Questions

The research hypothesis: children with mental deficiency are attracted, in their game, by modern technology devices used in ameliorative intervention programs.

4. Purpose of the Study

The research aims to examine the possibility of including virtual interactive game in the kinethotherapy activity performed with the child with mental deficiency, by observing their interest in participating in such activities.

5. Research Methods

The research methods used were: the bibliographic study method, the observation method, the conversation method, the recording method and technique, the experimental method, the statistical-mathematical method, the computerised graphical method and technique.

The experimental method for verifying work tools and introducing virtual interactive game in kinethotherapy activity was the basic method of research.

The bibliographic study method was used throughout the research period, but especially in February 2017, and consisted in searching and reading the bibliography on the use, in the education and therapy of children with special educational needs, of the game in general and the virtual interactive game, in particular.




The observation was experimental, caused by the researcher by organizing the virtual interactive game.

The conversation method consisted in a dialogue between the researcher and subjects to clarify some concerns about the rules of virtual interactive game.

The recording method and technique were used through the Questionnaire on the subject's opinion at the end of the virtual interactive game.

After playing the first virtual interactive game (*Golf – Ocean Driver* from *Kinect Sports, Season 2*), a game based on simulation of movements, we applied a questionnaire with 7 items (adaptation after Bossavit, 2016, p. 260) to get feedback about the child's joy to participate in the game, understanding of the rules of the game, ease of playing, desire for competition, progress and participation in other games of this kind. Responses to the items of the questionnaire (Table 01) were coded with the letters A, B, C, where A = 1 point, B = 2 points, C = 3 points, the maximum final score being 21 points. The children had the following task: to circle the letter that corresponded to their response to each question.

Table 01. Questionnaire on the subject's opinion at the end of the virtual interactive game

| Item | No | So-and-so | Yes |
|--|--|---|---|
| |  |  |  |
| 1. Did you enjoy the game? | A | B | C |
| 2. Was the game easy for you? | A | B | C |
| 3. Did you get used to the game quickly? | A | B | C |
| 4. Did you feel comfortable during the game? | A | B | C |
| 5. Did you like to come in competition with another child? | A | B | C |
| 6. Would you like to play the game again? | A | B | C |
| 7. Would you like to participate in other games like this? | A | B | C |

The experimental method was used to verify the hypothesis and purpose of the research. In this preliminary experimental research, we used the Kinect sensor. Among the advantages of virtual interactive game using the Kinect sensor, we mention:

- attractive design;
- relatively short duration and immediate assessment of the results;
- rewards: score/ranking; verbal and gestural appreciations from virtual supporters (sports) or stars (dance);
- constantly prompts attention;
- stimulates the desire to succeed;
- develops the spirit of competition (if there are more players in the game);
- the variety of movements required by the game can be used to educate motor skills and psychomotricity.

The statistical-mathematical method was used for summarising, processing and comparing the data obtained from the application of the questionnaire.

The computerised graphical method and technique were used to interpret suggestively the problems studied. The calculated indicators were represented by charts, using the Microsoft Excel application from the Microsoft Office software package.

6. Findings

6.1. Description and conduct of research

The research was carried out at Special School no. 8, sector 1, Bucharest, between February 2017 and April 2017, the group of subjects being made up of 5 pupils with mild and moderate mental deficiency, from primary education.

The materials used were: Kinect XBOX 360, XBOX 360 console, TV monitor, virtual interactive games from the *Kinect Sports, Season 2* collection, and the *Nickelodeon Dance 2* collection.

One of the types of virtual interactive game used in the preliminary research was the sports game in the *Kinect Sports, Season 2* collection, a game based on movement simulation.

Before the game, we made a brief presentation of its rules, followed by the demonstration of the game, after which we guided and helped the children play the game.

The subject is guided step by step in choosing menu items, the control being held by hand action. Thus, in selecting one of the six sports, the subject will go through the following steps: raises a hand with the palm facing the screen, moving it until the hand on the screen moves, and then directing the hand to the desired game. Once the game has been selected, the subject will raise a hand above the head, a sign that the game can start. The next steps depend on the nature of the game. For example, in the *Golf – Ocean Driver* game (Figure 01), the subject will be positioned sideways, with the preferred hand on the outside and the non-preferred hand towards the screen.



Figure 01. Sequences from the virtual interactive game *Golf – Ocean Driver*

During the game, before each “hit” executed with the hands together, the child will adjust his/her position moving forward or backward, so as to hit the target on an island.

The score is set as follows: 1 point for a hit in the green area, 2 points for the purple area and 3 points for the red area. If the ball does not reach the island, but falls into the water, the child does not receive any point for that hit. The subject is entitled to 10 “kicks”, receiving the score at the end of the game and being congratulated.

This game contributes in particular to the education of spatial orientation, body schema and management of actions.

Also from the sports game category, we used the virtual interactive game *Skiing* (Figure 02). At the beginning of this game, children receive the necessary instructions from a virtual player on the screen: to let their body down to gain speed, tilt their trunk to the left/right to pass (make slalom) among flags of the same colour, jump over obstacles to send the skier into the air. Thus, this game contributes to the education of balance, coordination of the lower limbs (jumping over obstacles), body orientation in space (by tilting the trunk to the left or right). This game also has a special role in keeping the attention of participants throughout its course.



Figure 02. Sequences from the virtual interactive game *Skiing*

Another type of virtual interactive game was the dance-rhythm game, using the *Nickelodeon Dance 2* collection, a game based on movement imitation. We chose the *Freeze Dance* game. The child dances imitating the movements of the child on the screen. During the dance, the element of maximum attention is when, at certain moments of the dance, the child must remain motionless. This game contributes to improving intersegmental and general coordination (jumping from one foot to the other simultaneously with various movements of the arms on the same side), spatial orientation (turning the body to the right-left, left-right lateral movements of the lower and upper limbs, down-up and forward-backward hand movements like a windmill) and attention, as well as educating balance (moments when the body must remain motionless). This game can be played by a single child (Figure 03) or two children (Figure 04) as a team, thus helping to improve the relationship with the partner.



Figure 03. Sequences from the virtual interactive game *Freeze Dance* – Individual



Figure 04. Sequences from the virtual interactive game *Freeze Dance* – Team

6.2. Results

The results obtained in the Questionnaire on the subject's opinion at the end of the virtual interactive game were summarised in Table 02.

Table 02. Scores obtained in the questionnaire applied after a virtual interactive game

| Subject | Number of points/item | | | | | | | Total points/ subject | Satisfaction level |
|----------------------|-----------------------|--------|--------|--------|--------|--------|--------|--------------------------|-----------------------|
| | Item 1 | Item 2 | Item 3 | Item 4 | Item 5 | Item 6 | Item 7 | | |
| Subject 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 21 | 100% |
| Subject 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 21 | 100% |
| Subject 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 19 | 90.47% |
| Subject 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 21 | 100% |
| Subject 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 21 | 100% |
| Total points/item | 15 | 15 | 15 | 15 | 13 | 15 | 15 | 103 | 98.09% |

According to Table 02, following the application of the questionnaire after the first virtual interactive game (*Golf – Ocean Driver*), the children’s responses obtained very high scores, indicating a high level of satisfaction with the participation in a virtual interactive game. The results obtained in the questionnaire reflect that children are attracted by this virtual interactive game; thus, we can see the possibility of also including in kinetherapy activity other virtual interactive games in which children can participate with pleasure.

The level of children’s satisfaction with the participation in a virtual interactive game is illustrated in Figure 05.

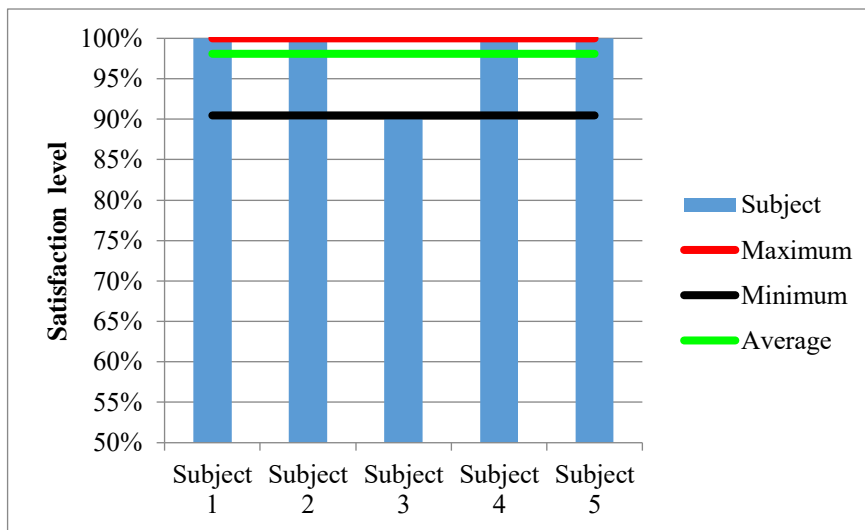


Figure 05. Children’s level of satisfaction with the participation in a virtual interactive game

From Graph 01, we can deduce the children’s joy to participate in a virtual interactive game (*Golf – Ocean Driver*).

In the kinetherapy activities performed using virtual interactive games (*Golf – Ocean Driver*, *Skiing* and *Freeze Dance*), children in the group of subjects showed better concentration of attention and an increase in motivation to accomplish their work tasks, the development of the spirit of competition and/or an improvement in the collaboration relationship with the partner (when there were more participants in the game).

7. Conclusion

The research hypothesis was verified, and the research purpose was reached, the children being very pleased with the inclusion of virtual interactive game in kinetotherapy activity. The inclusion of computerised didactic means, offers of modern technology, in motor activities could contribute to improving the quality of life of children with mental deficiency, because they are, like all children, attracted to such devices specific to contemporary life.

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