The exploitation of robotic intervention in the organization of educational drama and its role as a means of developing social skills of pupils with learning difficulties

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Abstract

Education has become an evolving and challenging field for every researcher. Focusing in the growing importance given to the intergration of children with various learning difficulties, in general education, there is the need and responsibility for developing new teaching methods and techniques, regarding specific learning assistance to these students. Educational robotics, as compared to other educational and teaching tools, is characterized by the naturalness of the media, the innovational educational possibilities and the cooperative dynamics. Moreover, the theatrical drama contributes in a positive manner regarding students' social development and facilitates an experiential approach in learning. The scope of the present program was to investigate the impact of a holistic robotic intervention in the group function, by not focusing on individual teaching, so as to observe the grade of development and evolving of social skills of students with learning difficulties, with use of the organization and directing of an educational drama.

Key words: *educational robotics, educational drama, learning difficulties, social skills*

I. Introduction

1. Theoretical background

Educational robotics consists an important territory of informational technologies in education. Its main tool is the programmable robot. It is an autonomously equipped singularity , capable of fulfilling specified in advance action in a transforming environment. Lately, researchers have focused in robotic applications in education, because if properly used, it can provide an innovative environment for education and learning (Komis, B.,2013). Educational robotics, based on the piaget constructivism theory of learning, and following the path of Papert's construciontistic learning

approach (1991), proves that learning does not depend on data collecting neither on the discovering of a reality, but rather on organizing internal beliefs and experiences by the students. Students construct new ideas and knowledge, based on their previous knowledge, when they participate and get involved in authentic activities, regarding problem solving in real-life situations (Dimitriou, A. & Hatzikraniotis, E., 2003). The growing emphasis given in the field of intergrating children with various learning difficulties in general education produces the need and responsibility for planning and creating new educational methods and techniques, aiming at assisting learning for these students. The present research lies on this context (Bauminger, N., Edelsztein, H. S., & Morash, J., 2005, Heathcote, D. & Bolton, G.,1995, Deli. G., 2011, Goumenakis, G. & co., 2010).

2. Necessity and timeliness of the reseach

Literary researching indicates that studies on educational drama, sometimes focus on the theory of educational drama, emphasizing terminology, the appropriate use and the delimitation of meanings, and at other times focus on the practical part, suggesting a series of exercises and activities with children, or try to assimilate theory and practice. Moreover, applicating robotic construction in educational process, as a tool for developing social skills for students with learning difficulties, was used personally and not during team cooperative activities (Davis, D. & Lawrence, C.,1986).
A basis for the present article was the study of theories that connect and support the practical part, assuming that the valuable part is creative integration of the theory and practice (Fragou, S.,2009).

3. Purpose, aim and researching questions

The basic objective of the present research is to validate that the application of a robotic intervation educational drama programme can improve the social skills of children with learning difficulties. It aims at presenting basic parameters that the teacher has to calculate, so as to organize and apply any intervention in an educational environment which includes students in need for social support. In order to apply a contemporary intervention that is aligned with new educational principles, children experiences are exploited. The aim of this research is to pinpoint the potential contribution of educational robotics as an educational tool, so that students with learning difficulties can, as members of a team, plan, construct and program, while at the same time improve their self appreciation, self control, self confidence, responsibility and empathy, and at the same time resolve communication problems by making decisions and resolving conflict via educational drama (Tsovolas, S. , Komis,

B., 2008, Anagnostakis, S., Margetousaki, A. & Michailidis, P.G., 2008). The study of the organization of the educational drama was chosen as an object, because while it is an attractive environment for the majority of students, at the same time it consists of a field for sidelining students with low developed social skills (Baum, D. D., Duffelmeyer, F., & Greenlan, M.,2001; DeGeorge, K. L.,1998).

II. Research framework

The research method chosen in this study is action research which has the active participation of pupils and researchers in order to achieve a gradual change in their communication skills (Sarris, 2002, 2003; Cox, A., 2006), as an essential prerequisite for conducting a program of organizing and implementing educational drama (Haager, D., Watson, C., & Willows, D. M.,1995; Govas N. & Kakoudaki, G. & Miholic, D., 2007). The research tools used are the sociogram for student group separation and the study of social relations of students, pre-screening and post-control questionnaire, observation, diary, interview and results from the work of the pupils. In order to achieve the validity and reliability of the data, we followed the method of triangulation, by collecting data from three different sources using three different data collection methods (Bolton, G., 1984, 1997; Cohen, L., & Manion, L. 1997).

1. Sample

The social skills development program, through the organization of educational drama supported by robotic constructions, was implemented in two semi-urban elementary schools. In the process of selecting the sample, the students selected were attending the school in which the teacher-animator was working, in order to facilitate the implementation of the program. The participants were students of the 5th grade of two elementary schools. In the present study, a control group was selected at a different school, far from the place where the research process took place, so that pupils and teachers would not be affected by what was taking place with the children of the experimental team. At the place where the control team worked, the educator-researcher had access, so as to complete the research without problems.

Among the selected participants, there were 11 students with official reports from the Diagnostic and Differential Diagnostic Testing Center (KEDDY) regarding the identification of special educational needs. All children were given the opportunity to attend the comprehensive specialized social learning curriculum that was first implemented in these schools

2. Tools

Informatics and Robotics can be a useful tool for the active participation of students in the learning process, to develop construction and programming skills, and to contribute to the development of social skills even for students with learning difficulties. Robotics is used in information technology for observation, analysis, modeling and control of various physical processes (Depover, Karsenti & Komis, 2007). The goal is not simply to learn technologies, but to change the whole perception of education through it.

In the present study, 5 Lego Mindstorms robots, 5 laptops and a dictation device were used.

3. Methodology

3.1. Motivation

In the first stage of the survey, the question that was considered crucial for the improvement of social relations, was identified. The groups selected were students of a semi-urban area of restricted stimuli with a large percentage of students with certified learning difficulties. Discussions between teachers-researchers who have participated in research have started from the question that appears to evolve in the field of education and focus on the extent to which it is possible to ensure a type and form of robotic social support that is based on the principles of social interaction and attempts to provide to students who have communication needs, with skills that will ensure their prospects of developing satisfactorily in the community (Lloyd, 2002: 2002).

3.2. Clarification of the situation

Assumptions were made to organize a first round of action by systematically collecting data from specific groups. Techniques such as: a) the completion of sociograms by the students of both groups in order to record the social relations between the students; b) the observation and recording of educational and social needs within the classroom group (Papadopoulou, 1999); difficulties in social skills and behaviors during breaks, c) collecting social data to determine the profile of students focusing on the socio-cultural level of the family (Tsinarelis, 2011) and c) use of a test robot by Professor N. Fahantidis. The experimental group used five robots as actors.

3.3. Intervention planning

The method chosen and followed was the robotic social support method aimed at developing and enhancing the social skills of students and addressing the communication weaknesses of students with learning difficulties, by trying to teach specific strategies of social interaction and communication. Throughout the course of the intervention teachers-researchers completed a daily diary where students' actions and behaviors were recorded.

4. Description of teaching intervention

Two teaching interventions took place over three months through fifteen-two-hour meetings during the Language course, from March to June. After the fifth meeting, the experimental team was differentiated from the control group regarding the organizing of the educational drama as it followed robotic support with the use of five robot actors that they themselves constructed, dressed and recorded. The control group continued the organization of theatrical drama with the students, as actors themselves.

4.1. First teaching intervention

In the first five meetings, students of both groups, got familiar with educational drama development activities. The first two meetings constituted the preparatory phase where the focus of activities was the body itself, as movement and free expression were the means of expressing emotion. In this first phase of the drama games, children had the opportunity to diversify their behavior, release themselves from strict rules and act freely. At the next two meetings the students were invited to join the five formed groups, in order to process the text of the introduction of the book which they had written themselves and the roles they would present at the next stage through their collective work. Children playing a role, discovering a theme and shaping an environment, actively participated in the creation of an action as they were given the opportunity to self-act, create and present their ideas by initiating, communicating through conciliation among themselves and deciding the context within which improvisation would take place. At the last meeting of the first stage, the students, exercising their imagination in a constructive and specific manner, shaped in a theatrical performance as many wishes and ideas as they did in previous encounters.

4.2. Second teaching intervention

During the second stage of the research the control team continued the stage improvisation of the educational drama without robotic support. With movement or speech, they presented a stage improvisation, composing the roles, scenes and themes they dealt with. The children formed the scene with the appropriate objects for the theme they chose and proceeded to a performance that was either directed exclusively by the children themselves, or with the assistance of the animator-educator, when this was deemed necessary. The experimental group was called to shape improvising theatrical performance, by setting the role of the actors five robots that they themselves constructed, edited, dressed, made the voices recording the texts they made, formed the scene with appropriate objects and organized the robot movements in a preset space.

III. Results

Throughout the action, all pupils, especially students with learning difficulties, gradually experienced positive reactions either towards their classmates or towards themselves. Remarkable behaviors of admiration, joy and enthusiasm have been observed. The structure of the action was such that it allowed and strengthened the social interaction among students. Interpersonal relationships have thus been developed to a great extend, by expressing and understanding the feelings of themselves and their classmates. During the robotic intervention they showed compatibility respect, share and help towards the other members of their groups. They developed social skills as members of a group. From the first meetings, they have improved their adaptive behavior through understanding social situations by recognizing and implementing social conventions or following social norms. When the action war complete, even students with learning difficulties who were more hesitant about their passive attitude improved their critical attitude towards technological media perceiving events as a virtual reality. Through the improvement of self-esteem, self-image and self-confidence, they succeed in acquiring self-improvement.
Robotic support has been a means of treating students' interpersonal conflicts by improving the whole social environment within the classroom. Focusing more on students with learning difficulties, the skills were developed based on five axes. On the axis of interpersonal relationships students with learning difficulties were able to freely express their thoughts and feelings by having an active role within the group and thus making all students understand the feelings of others and appreciate the

value of help and supply by sharing responsibilities, thoughts and feelings with their classmates. Regarding the adaptive behavior axis, all students, especially students with learning difficulties improved their ability to understand social situations and social conventions respecting the rules of conduct when robotic intervention was completed. In terms of teamwork, students developed cooperation skills as members of a group, and at the same time, in the context of improving their self-esteem and self-understanding, they learned to enact laws and endeavor to implement them by recognizing the value of this effort. Finally, with regard to the communication axis, students were able to recognize non-verbal communication expressions of their classmates, develop oral communication skills and developed remarkable improvement in managing interpersonal conflicts.

The above results were recorded in the experimental group by including robotic presence in teaching, which was proved to be an attractive and constructive media.

IV. Discussion

Based on the above research findings and the observations as they were recorded, the specially designed robotic intervention program implemented in the framework of the organization of educational drama has had a positive impact on the social skills of the experimental group and its role has been strengthened in enhancing the active participation of students with learning difficulties.

During the action, students gained freedom of movement with an active role in supporting cooperation and interaction. It was observed that robotic intervention managed to improve social skills. The role of the teacher for the first time was distanced as he only needed to intervene at the level of coordination. The nature of the activity due to its attractiveness was the main reason for students' participation as it was enhanced by the presence of robots. Their participation was particularly active especially when they were to recall memories and events from their everyday life and to integrate them into the organization of educational drama. The students developed communication strategies that helped them to work together. During the last sessions, pupils with learning difficulties familiar with the presence of robots were motivated by themselves and took the initiative to participate and collaborate with the other students and their classmates were always positive about them within the organization of the educational drama they were studying.

The main disadvantage of the method was the number of robotic constructions, because of the lack of resources they borrowed. Moreover, the lack of time in school reality was a factor limiting and straining the whole research process.

V. Conclusions

The results of this research give a complete picture of the achievement of the objectives regarding the research process that is reflected in the degree of development of social skills of students with learning disabilities. The choice of robots and their integration into the educational process has been attempted by calculating the students' interests in technology and play with the aim of developing strategies that promote the autonomous activation of social interaction by actively involving children in the process.

The students responded flexibly and adapted them according to their possibilities and interaction rate, so the choice of the method of integration of robotic structures shows that it is effective. It is a differentiated intervention of robotic social support, a dynamic process that refers, in its entirety, to an innovative action with clear research results. A targeted robotic intervention, such as the one discussed in this research, has mobilized learners with learning difficulties more actively in the process of communication and has given opportunities for social interaction and collaboration within the group. It was an alternative way of observing and controlling the degree of acquisition of the communication strategies and gave the educator-researcher the opportunity to better understand the needs of pupils with learning disabilities so as to intervene with flexibility and enhance their active participation in school or outschool reality.

VI. Future work

At the conclusion of this article it is proposed to further explore issues of particular pedagogical value such as the following assumptions:

a) A robotic intervention program in the theatrical drama organization can effectively enhance the social skills of pupils with disabilities such as blindness or children of migrants or refugees (Dockrell, J., & McShane, J.,1993).

b) A robotic intervention program in the theatrical drama organization can effectively enhance cognitive or emotional skills (De la Cruz, R. E.,1995).

c) A robotic intervention program in the context of the theatrical drama organization with the participation of parents or teachers of other specialties would be highly beneficial (Day, C. & Norman, J., Davis, D. & Lawrence, C.,1986).

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Περίληψη

Η εκπαίδευση αποτελεί ένα δυναμικό πεδίο πρόκλησης για κάθε ερευνητή που έχει στόχο να κινηθεί σε αυτό. Εστιάζοντας στην συνεχώς αυξανόμενη έμφαση που δίνεται στον τομέα της ένταξης παιδιών με διαφόρων τύπων μαθησιακές δυσκολίες στη γενική εκπαίδευση γεννιέται η ανάγκη και η ευθύνη για το σχεδιασμό και τη δημιουργία νέων διδακτικών μέσων και τεχνικών με στόχο την υποβοήθηση της μάθησης των ατόμων αυτών. Η εκπαιδευτική ρομποτική σε σύγκριση με άλλα παιδαγωγικά και διδακτικά εργαλεία διακρίνεται για την φυσικότητα του μέσου, την καινοτομία των εκπαιδευτικών δράσεων που δύναται να επιτευχθούν και τις συνεργατικές δυνατότητες. Συγχρόνως, η συμβολή του θεατρικού δράματος επιδρά στην κοινωνική ανάπτυξη των μαθητών και επιτρέπει τη βιωματική προσέγγιση της μάθησης. Η παρούσα δράση επιχείρησε να διερευνήσει την επιρροή μιας ολοκληρωμένης ρομποτικής παρέμβασης στο πλαίσιο της λειτουργίας της ομάδας και όχι εστιάζοντας στην εξατομικευμένη διδασκαλία προκειμένου να παρατηρηθεί ο βαθμός ανάπτυξης και εξέλιξης των κοινωνικών δεξιοτήτων μαθητών με μαθησιακές δυσκολίες αξιοποιώντας την οργάνωση – σκηνοθεσία ενός εκπαιδευτικού δράματος.

Λέξεις κλειδιά: *εκπαιδευτική ρομποτική, εκπαιδευτικό δράμα, μαθησιακές δυσκολίες, κοινωνικές δεξιότητες*