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Abstract

Through this paper there is an attempt to present the most significant outcomes of a research project designed for Emotional Education in young children with autism spectrum disorders. The role of ICT was essential not only for the design of the project but also for its effectiveness. The sample of the research consisted of 5 participants who unsuccessfully struggled to identify emotional expressions in their everyday life. Their mental age ranged between 5 and 7 years. The program's duration was 10 weeks (October 2014 – December 2015). Two, 30 minutes, sessions were conducted during each week. The assessment included differentiated teaching through drawing emotions, recognizing emotions from photographs, choosing the emotion according to the situation depicted and the use of the open access software Mood Maker. Results depict a clear improvement in children’s social skills. Both educators and parents, stated a clear differentiation in children’s reactions in specific emotional situations. They were also more capable to understand basic expressions such as crying or laughing.

1. Introduction – Theoretical Background

Autism is a developmental disorder diagnosed on the basis of early-emerging social and communication impairments and rigid and repetitive patterns of behavior and interests. The manifestation of these varies greatly with age and ability, and the notion of an autism spectrum has been introduced to recognize this diversity [1]. In this research, we intend to investigate the impact of ICT in Emotional Education and Development of children with Pervasive Developmental Disorders – Autism Spectrum Disorder. Salovey and Mayer [2] defined Emotional
Intelligence as “the subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions”.

More specifically, Goleman [3] mentions that Emotional Education could be categorized into the five above branches:

1. Perception of Emotion. Three subtests are included in this branch—perception of emotion in faces, in landscapes, and in abstract designs.
2. Emotional Facilitation. Expression of emotions as an opportunity for intimacy and teaching.
3. Take notice with empathy and recognition of children's emotions.
4. Understanding Emotion. Encourage the child not only to express verbally its feelings but also to identify them.
5. Managing Emotion. Setting limits and encouraging the child to find solutions to its problems.

Basic prerequisite for the transition in each level is conquest of the previous level. For children who participated in this research project the aim was to conquer the 3rd level so as to gradually move on to the next levels.

The existence of information and communication technologies (ICT) in our everyday life is an undoubted evident phenomenon. Recently, the constant development has an immediate effect on education and educational contexts [4] (Selwyn & Gouseti, 2009).

Boucenna et al [5] mention characteristically that “recently, there have been considerable advances in the research on innovative information communication technology (ICT) for the education of people with autism. Their review main objective was to provide an overview of the recent ICT applications used in the treatment of autism and to focus on the early development of imitation and joint attention in the context of children with autism as well as robotics”. They highlighted the fact that there is profusion of ICT applications developed for autism. Interactive environments, virtual environments, avatars and serious games as well as telerehabilitation have been used in numerous studies in order to develop emotional skills in children with Autism Spectrum Disorder. However, contrary to the remarkable evolution of these applications their use is still restricted.

Mitchel et al [6] attempted to demonstrate the efficacy of using Virtual Environments in teaching social skills to children with Autism Spectrum Disorder. They used a sample of six teenagers. They used a Virtual Environment of real cafés and buses so as to learn where they would sit and why.

Miranda et al [7] used real-time facial synthesis of 3D characters to teach autistic people to emotional recognition based on facial expression. Communication skills in people with Autism Spectrum Disorder are impaired and as a direct result they are unable to recognize emotions in real life. They also stress the need of creating a solution to solve this problem which requires a joint effort from many research fields, such as computer vision, computer graphics, human computer interaction and facial behavior and emotions.

2. Research objective

Young children with Autism Spectrum Disorder have difficulty not only in recognizing emotions but also in expressing them. According to Brady et al [8], “research in the neurosciences has identified distinctions between neural structures that subserve cognitive intelligence and those subserving emotional intelligence. Despite high average cognitive abilities, young adults with Autism Spectrum Disorder (without an accompanying intellectual or language disorder) relatively to typically-developing peers, reported lower levels of emotional intelligence. Importantly, they did not find any statistically significant correlation between cognitive intelligence and emotional intelligence in either group. These findings also highlight the need to address not only the intellectual aspects of cognition, but also the emotional components to increase understanding of, and improve treatment for individuals on the autism spectrum. This understanding would enhance our ability to assess and support young adults, and ultimately ease their transition into adulthood”. The main objective of this research is to highlight the effect of ICT
in emotional education and development of children with Autism Spectrum Disorder. Improvement of emotional education of young children with Autism Spectrum Disorder is highly correlated with their level of living. We also intend to express an optimistic view and form higher expectations for their emotional development.

3. Methodology

3.1. Research Design

The research is an intervention program designed in order to improve social skills of young children with Autism Spectrum Disorder. We used a group of 5 children, so as to examine the effect of ICT in improving participants’ social and emotional skills. At the beginning, the students were evaluated in relation to their levels of social and emotional skills through peer observation and interviews with parents and educators. Each student was taught with a differentiated assessment which was defined from each student’s own characteristics. It also should be mentioned that despite the different level of social and emotional attainments, the context of the training was the same. All students attended 2 sessions per week. The duration was approximately 30-minutes and the entire program lasted for 10 weeks (October 2014-December 2014). Afterwards there was a reassessment for each student in order to discover the existence of improvements in children’s social and emotional skills.

3.2. Research participants

The participants in this study (N = 5), were children with Autism Spectrum Disorder enrolled in special school programs aged between 9;02 (y;m) and 14;07 (M = 10.07, SD = 2.06). Their mental age ranged between 5;00 (y;m) and 7;00 (M = 5.36, SD = 0.35). The estimation of their mental age was done via WISC III. According to educators and parents, all children had difficulty in expressing and recognizing emotions.

3.3. Data collection instruments

Apparently, emotional education and development is complex and requires multisensory intervention. The use of ICT facilitates the purposes of emotional education. Below are listed in details the research tools (Software “Mood Maker”, Semi-structured Interviews and Worksheets), which were used in the context of this individualized intervention program.

3.3.1. Software “Mood Maker”

The software used is designed in order to teach young children basic emotions such as happiness, sadness, amazement and feeling sleepy. It contained three different places (a forest, a castle and a farm) in which it can be added the character of our preference (from the offered ones). We can also choose the emotion that we want to represent. The basic role of the software is to visualize the chosen emotion. This game can be the beginning of a differentiated intervention in emotional education. Images and sounds can trigger further discussion with the student to revoke such situations and to link them with the corresponding emotion. However, it seems to be easier to explain to each child that all these emotions can be felt by every man, as each character appears to feel each emotion in different situations. Basically, each character seems to feel four different emotions in three different places in order to avoid any connection of feeling to the specific place or person.

3.3.2. Interview Guide

Semi-structured interviews with educators and parents were used to discover both the initial level of social and emotional attainment and the level of their attainment after the intervention program. Clearly the views not only of parents, but also of educators can provide us with substantial information on the level of emotional attainments of children. Individual assessments could not enable us to have access in such information. And so it is important to
explore the views of parents and educators on the subject. The Semi-structured was based on the Emotion Awareness Questionnaire (EAQ-30) [9]. The questions are summarized in the Appendix A.1.

3.3.3. Worksheets

In addition, worksheets as shown in Fig.1 were used. In such tasks the main objective was to match eyes, nose and mouth on the face and then to recognize the feeling that was depicted. At the same time we can ask each child whether the face that he or she made is happy or sad? Is it angry or sleepy? The combinations that can be made are numerous and provide children with the opportunity to discover different feelings by a simple alternation of a look or a mouth expression.

![Fig. 1. Worksheets for differentiated instruction.](image)

Pictures of separate situations were also used so as to discuss and lead students to discover the appropriate feeling.

4. Results

The results validate the beneficiary role of both differentiated intervention and ICT use in emotional education and development of students with Autism Spectrum Disorders. Below you will see in detail the observed improvement in emotional performance by sector of intervention.

4.1. Drawing Emotions

In each session the students were requested to draw a particular emotion (eg sadness). Specifically, the students painted the feeling that they had been taught in the current session. Despite the fact that they could not accomplish the task without assistance dealing with colors was an enjoyable pastime for all children. They were excited with the fact that they could make a painting with just two markers to express feelings and therefore sometimes feel the same feeling with them. In Fig.2 & 3, we can see the faces that were used for drawing emotions.

![Fig. 2. Patterns for Drawing tasks.](image)
4.2. Recognizing Emotions

Almost all pupils were able to recognize, with some kind of help, elementary emotions like happiness, sadness, etc. Both parents and educators seemed to observe changes not only in how students recognize emotions, but also in their reactions when they had to react appropriately to each emotion. All parents and educators declared that the children seemed to have a better level of understanding in the way that other people are feeling.

4.3. Matching Emotion with Situation

Both with and without the use of software Mood Maker, we discussed about situations in order to understand the matching feelings. Students were shown images that depicted a particular situation so as the students identify the emotions felt by the characters of the situation. For example, in occasion to a picture of a child's birthday while opening gifts, we can match feelings such as happiness and surprise.

4.4. Respond Time

Even though the students could not recognize the correct feeling each time, it is remarkable the fact that they could identify easier specific feelings such as happiness and sadness. Remarkably, their response time was reducing continuously. The diagram below (Fig.2) provides us with information for the average respond time in face recognition tasks of happiness. It should also be mentioned that all children need help to answer recognition tasks. They also need much time to give the correct answer.
4.5. **Software’s Helping Context**

The software created generally a helping context. Apart from the faces’ expressions of the characters, there were other auxiliary stimuli such as music. Also, the image of the place changed depending on the feeling. As an example, to illustrate the happiness the weather was sunny (Fig. 7), but for the feeling of sadness the weather was rainy (Fig. 8). To illustrate the feeling of sleepiness in each image was night (Fig. 10).
5. Discussion - Conclusion

Through this research several issues are highlighted such as the fact that children with Autism Spectrum Disorder are able to gain a deeper conceptual understanding of the emotions and also to recognize and develop their level of emotional attainments. We have evidence that continuous reinforcement both in school and home will enable the child to express his or her feelings in a better way. The role of ICT proved to be fundamental prerequisite for personal development in the teaching of pupils with Autism Spectrum Disorder [10].

Secondly, educational software is designed to encourage emotional education and development while simultaneously it is open access (it doesn’t prerequisite any cost) and easily applicable. Through Mood Maker individualized instruction can easily be realized. Mood maker can also assist students’ autonomous development, since they can more efficiently accomplish emotional education tasks on their own.

Moreover, parents and educators feedback for the effectiveness of the entire differentiated intervention program allows us to claim that the children were less confused or puzzled about what they were feeling, particularly with simple emotions like happiness or sadness. It should also be mentioned that when children were upset, the parents could not discriminate if they felt sad, scared or angry both before and after the intervention. Finally, all parents mentioned that the children could more easily explain how they felt.

Finally, it should be mentioned that early intervention is decisive for emotional education and development. Both parents and educators should not form low expectations for emotional attainments of children with Autism Spectrum Disorder. The continuous, well designed and individualized intervention could be beneficiary for children in this population.

Acknowledgements

This study would not have been possible without the contribution of numerous people. We would like to thank
the educational staff who took part in the research. We are also grateful to the parents for their willingness to allow their children to participate in the study.

Appendix A. An example appendix

A.1. Semi-structured Interview

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neither agree nor disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
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<tbody>
<tr>
<td>Your child is often confused or puzzled about what he/she is feeling</td>
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<td>It is difficult to know whether your child feel sad or angry or something else</td>
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<td>I never know exactly what kind of feeling my child is having</td>
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<tr>
<td>When my child is upset, I don’t know if he or she is sad, scared or angry</td>
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<td>Sometimes, my child feels upset and I have no idea why</td>
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<td>I often don’t know why my child is angry</td>
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<td>I don’t know when something will upset my child or not</td>
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<td>My child finds it difficult to explain to a friend how he or she feels</td>
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<td>My child finds it hard to talk to anyone about how he or she feels</td>
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<td>My child can easily explain to a friend how he or she feels inside</td>
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<td>My child doesn’t understand how other people are feeling</td>
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<td>My child's feelings help him or her to understand what has happened</td>
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<td>My child always wants to know why he or she feels bad about something</td>
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References