

GUIDED PLAY: FROM INSTRUCTIONS TO CREATIVITY WHEN CONSTRUCTING AUTOMATA

G. Bidarra¹, O. Thiel², I. Silva³, P. Vaz-Rebello¹, V. Alferes¹, C. Barreira¹, A. Santos¹, J. Almeida¹, I. Machado¹, A. Conceição¹, C. Bartolletti⁴, F. Ferrini⁴, J. Josephson⁵, N. Kostova⁶

¹ Faculdade de Psicologia e de Ciências da Educação, Universidade de Coimbra, Portugal ² Queen Maud University College, Norway ³ Agrupamento de Escolas Eugénio de Castro, Portugal ⁴ Eureka, Italy ⁵ Kindersite, UK ⁶ 32 School "St. Kliment Ohridski", Bulgaria

AutoSTEM Project

This work describes a workshop developed in the scope of the **AutoSTEM** project, which aims to **investigate how automata can enrich young children's play to promote a better understanding of Science, Technology, Engineering, and Mathematics (STEM)** and to promote motivation for STEM and the development of creative thinking, problem-solving, and comprehension ability.

Guided play

Guided play is a **middle ground term between play and learning**. In the AutoSTEM project the use of guided play is done through the combination of its two aspects: the **adult instructions** and the **child's autonomy**. The implementation of this strategy in the AutoSTEM project is extremely pertinent, as the concepts of STEM areas, in addition to being important, can be extremely complex, being essential the mentoring of an adult to achieve their full learning.

The Workshop

In this workshop was presented the **JellyBird automata** which is a prototype with a sliding mechanism. This toy is made of paper and cardboard that makes bird like movements when constructed. In this case, learning about physics and mechanisms will be enhanced, as well as engineering competences of analysis and construction, it also develop soft-learning goals as problem solving and creativity

Considering the guided play concept, the workshop also aimed to analyse the relation between the instructions given by teacher and children creativity.

Structure of the activity and processes.

- 21 children, 7 and 8 years old.
- **Presentation of the JellyBird** followed by **the instructions to build one**. All children were working at the same time and following the strict instructions to assemble their toy.
- Total **freedom to decorate and paint their toy** but also to **create a narrative around it**.

Learning outcomes

The children should be able:

- to know the sliding mechanism
- to construct the mechanism
- to solve problems and develop creativity

Evaluation

- Participant observation
- Evaluation questionnaire
- Analysis of products developed (toys and their narratives)

→ Took into account:

- The interest and motivation to learn
- The experienced difficulties
- Creativity.

Results

Interest and motivation

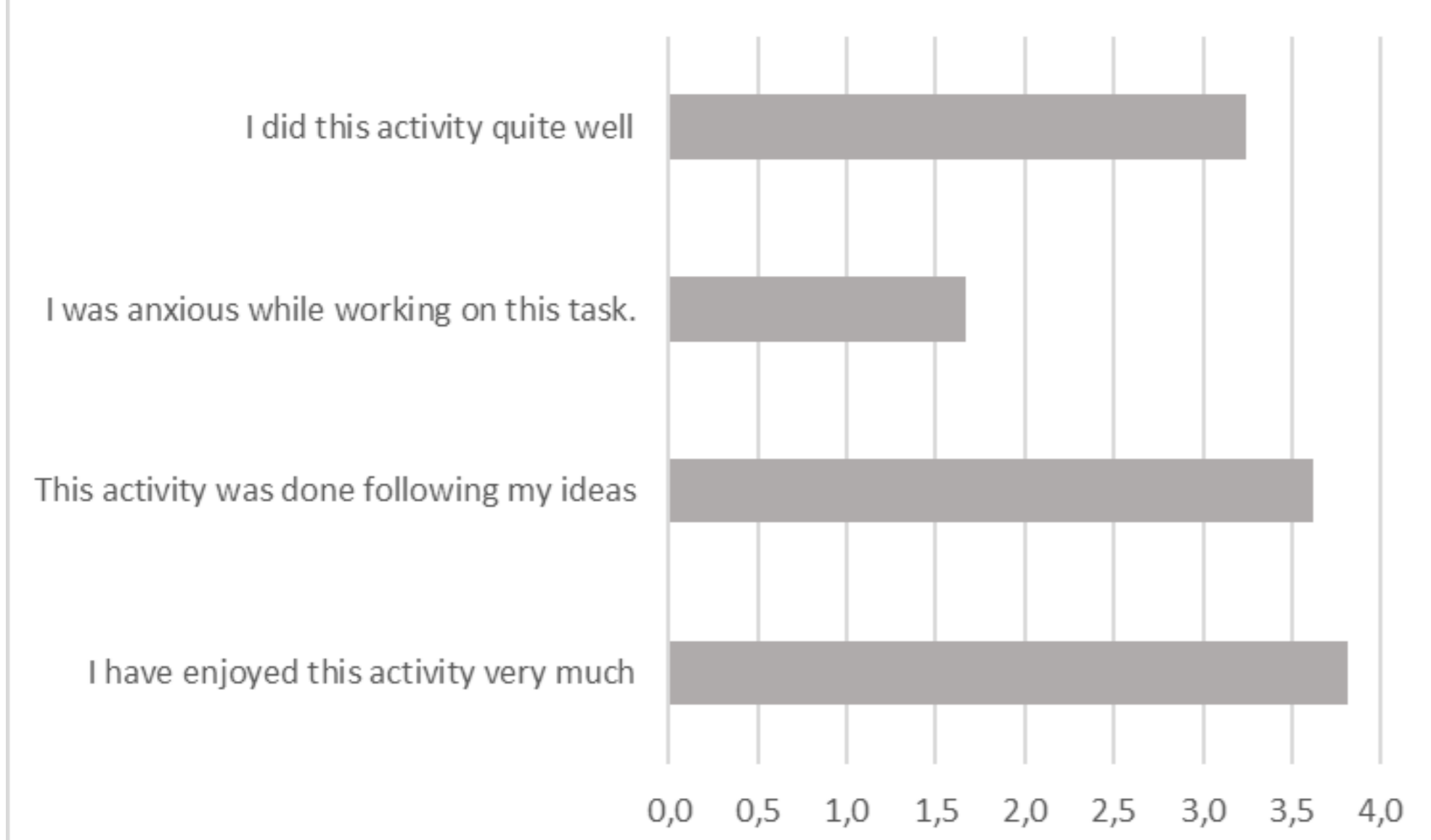


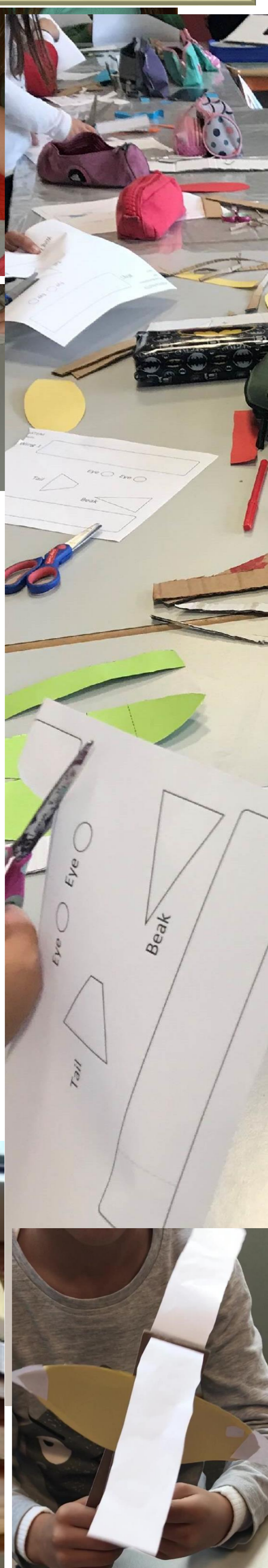
Figure 1. Results to the questions of the questionnaire.

As shown in Figure 1. the **satisfaction with the activity was elevated** as also was the perception of the **possibility of expressing their own ideas** and the **sense of effectiveness**. In a **lower percentage**, which is a good indicator was the degree of **nervousness** during the session.

Learning and difficulties

At the end of the workshop **every child had a built and functioning toy**, which show us the activity was successfully carried out. These results show that the **established learning objectives were achieved**. There were some **difficulties** mentioned as the **assembling of the mechanism and gluing all the parts** together, even though the reference to difficulties is not contradictory to learning.

Even **though the activity was started equally for all children, there was space for their creativity to emerge**. By analyzing the produced automata it were evident the **differences in the decorative parts but also in the narratives** associated to the toys. This fact agrees with the responses to the questionnaire, in which it's evident that the activity was done according to the children's ideas. The **stories produced by each child about the built automaton also show a high degree of creativity since they are all different**, namely in terms of characters, plot, problematic, duration of the story.



Conclusions

Thus, we can see that the middle ground between the child's autonomy and the adult's instructions have no impact on the child's creativity.