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# Analysis of the dyscalculia with the implementation of a design workshop in CATIA in a primary school in Puebla

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***Abstract*— *In a rural context primary school where a pilot program of full-time schools was promoted and taking into account the component of the new curricular autonomy model 2017. A design and automation workshop was implemented using CATIA software, with the aim of demonstrating that primary students can overcome deficiencies in mathematical skills such as dyscalculia. The workshop was conducted with ten students between six and twelve years' old who, due to their rural context, have little contact with technology. For the realization of this workshop, a survey was carried out for the parents and for the children where the full acceptance of the workshop was manifested. In the same way, the participation of the Technological University of Puebla (UTP) was carried out through mechatronic engineering, which was in charge of teaching the workshop, through the management according to the new educational model. The CATIA software visibly favored students' mathematical skills when designing a march, in addition to reducing school absenteeism and generating a product (wooden tractor) that has more significant benefits than the famous Japanese toy. The evaluation of the project was registered in rubrics in a span of three phases. The end of the whole process we concluded that, due to its low cost, it is possible to implement this workshop in all federal and state primaries regardless of their context and also that any child can operate the calculation using CATIA. With this last observation, we demonstrate that dyscalculia is a myth.*

***Keywords*— *CATIA, Dyscalculia, design workshop.***

## I. INTRODUCTION

Dyscalculia is not a reality [1]. CATIA guarantees and promotes continual learning as well as the handling of information and the resolution of problems that are three disciplinary competencies indicated in the plans and programs of the SEP [2, 3]. CATIA encourages the acquisition of patterns systematizing the thought of taking the child's mind in a logical order. [4] Social change is observed in the aspirations expressed by children when making use of this computational tool. Children show greater optimism in school participation, improving their social-emotional skills. We use CATIA to prove that dyscalculia in children does not exist.

## II. METHODOLOGY

The construction of this new knowledge begins from scratch; because the child acquires instructions from outside for their internal thought processes. This acquisition of knowledge is motivated by the new tool and the technological trends of the environment. [5-7]

One of the qualities of the CATIA software is that the imagination of the child takes shape and measure with mathematical approaches. In addition, the facilitator adjusts the cognitive processes of the child for ages 6 years to 12 years; however, the process to understand the software happened in the same way for everyone. We achieved a coincidence of CATIA's understanding in contrast to the stages of Piaget's thinking. Based on this coincidence, we structure the course, in the stage we call the sensorimotor. The course was started from a general knowledge of the platform and from the process of

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turning on the computer to achieve the first simpler piece (figure 1).

*Fig. 1:The students of the Santos Degollado primary school of the Atotonilco community in the first evaluation of the gear design.*

In the sensorimotor stage, the child forms the mental representation of the automaton, which is the external objective that must be modeled in the software. In the pre-operational stage, Piaget locates her from 2 to 7 years old, where the egocentric stage helps the child to reflect internally on the process of using the tools. This is the stage where the infant must show an ability to operate the tools. Socially, children interact more with the use of the platform; this helps the concrete stage to manipulate the tools take more seriousness.

## III. RESULTS AND DISCUSSIONS

We observed that at this stage the children begin to use each part of the design in a specific way. In this phase, the first (figure 2) evaluation that is the transmitter was implemented.

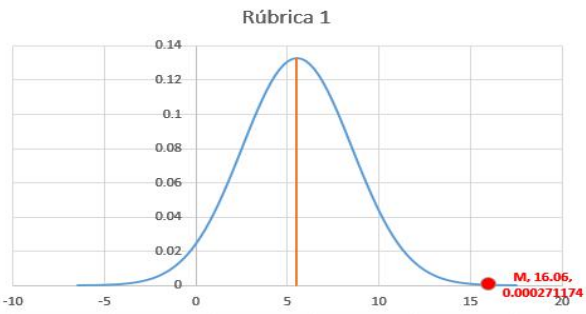


*Fig.2: Results of the first evaluation. Average 5.2. It can be noticed that the students still do not know the tool.*

It was observed in this evaluation that mental representations become more defined. In the last stage the evaluation of the design of the major gear was applied (Piaget locates this stage a mental age between 11 and 15 years). It was observed in this final stage that the child finally summarized all the possibilities of the software (figure 3). For Piaget, in this last stage, reversibility occurs, which is why at these stage children are already aware of the errors that may arise in the misuse of the platform. We show that dyscalculia exists because the logical reasoning of the child helps him to better understand the usefulness of the abstract concepts of mathematics and scientific thought.

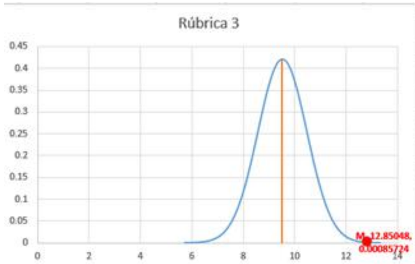


*Fig.3: Results of the final evaluation. Average 9.2. You can see that the student's hand acquired excellent knowledge.*

The manipulation of software requires knowledge in mathematics; here the adaptation of the mathematical concepts must adapt to the contents that the child must know.

That is why, within the planning of the sessions, complex mathematical ideas must be modified. Within the Japanese educational model is the so-called "Japanese Toy", [8-10] where children are evaluated with the creation of a toy, the final product (figure 4) of the course was a robot tractor that works with gears, we dare to say that we have surpassed the Japanese toy, since our product displays an entire engineering applied to children. In addition to the CATIA program offers the child the possibility that their imagination takes measure and physical form.

Regularly the implementation of a robotics course within primary classrooms, requires a high monetary cost, which is why in many cases the implementation of these workshops does not reach public schools, well CATIA is totally profitable and that has no cost since the course is achieved with the linking of the technological universities, as a social service that the students provide within the final project of the systems integrator subject of the faculty of mechatronics of said universities.

A civilized people is measured by the number of happy children it generates, the CATIA course, also gives the opportunity for Mexican children to be happy within public schools, improving their optimism about life, which is definitely necessary to in the future develop resilience, as part of the social-emotional skills that every individual must possess.

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*Fig.4: Final product*

## IV. CONCLUSIONS

Children can manipulate the software; the facilitator's teaching is essential. As well as the excellent use of the time allocated to the sessions, it is easy to implement; it is the children's taste; It has no cost, because the components are the most important. The pieces that are used for the assembly are cut in MDF wood format. With these pieces, the automaton is assembled.

The primary school presented constant absenteeism with a third-year boy and girl as well as a fifth-year girl, from the implementation of the CATIA design course this absenteeism disappeared, due to the interest children give to the software, the implementation of the software meets the contents of the container and the context. [11, 12]

Two weeks after the beginning of the course, a survey was conducted to parents and students to know the degree of acceptance and taste for the new workshop. The following graphs show the results obtained in the first evaluation utilizing the rubrics and the contrast made in the annotations in the observation journal. [13-16]

## REFERENCES

[1] Castaldi, E., Mirassou, A., Dehaene, S., Piazza, M., & Eger, E. (2018). Asymmetrical interference between number and item size perception provide evidence for a domain specific impairment in dyscalculia. bioRxiv, 332155.

[2] Pacheco Figueiredo, M., Gomes, H., & Rodrigues, C. (2018). Mathematical pedagogical content knowledge in Early Childhood Education: tales from the 'great unknown'in teacher education in Portugal. European Early Childhood Education Research Journal, 1-12.

[3] Capellini, S. A., dos Santos Liporaci, G. F., Sellin, L., Cardoso, M. H., Giaconi, C., & Del Bianco, N. (2018). Inclusion and New Technology for Students with Learning Disorders and Attention Deficit with Hiperativity Disorder. Education Sciences & Society-Open Access Journal, 9(1). Cognition.(2008). In Oxford reference online premium dictionary. Retrieved from http://www.oxfordreference.com

[4] Merino, E., Cañadas, M. C., & Molina, M. (2013). Uso de representaciones y patrones por alumnos de quinto de educación primaria en una tarea de generalización. Edma 0-6: Educación Matemática en la Infancia, 2(1), 24-40.

[5] Schunk, D. H. (2012). Learning theories an educational perspective sixth edition. Pearson.

[6] Zimmerman, B. J., & Schunk, D. H. (Eds.). (2012). Self-regulated learning and academic achievement: Theory, research, and practice. Springer Science & Business Media.

[7] Schunk, D. H., & Zimmerman, B. J. (Eds.). (2012). Motivation and self-regulated learning: Theory, research, and applications. Routledge.

[8] Allison, A. (2006). Millennial monsters: Japanese toys and the global imagination (Vol. 13). Univ of California Press.

[9] Phoenix, W. (2006). Plastic culture: how Japanese toys conquered the world. Kodansha International.

[10] Rendell, J. (2018). Bridge builders, world makers: Transcultural Studio Ghibli fan crafting. East Asian Journal of Popular Culture, 4(1), 93-109.

[11] Inamorato dos Santos, A., Cobo, C., & Costa, C. (2018). COMPENDIO Recursos Educativos Abiertos: Casos de América Latina y Europa en la Educación Superior.

[12] Cobo, C., Villar-Onrubia, D., & Burgos Aguilar, J. V. (2018). Agenda Regional de Prácticas Educativas Abiertas (PEA).

[13] Smardon, R. C., & Reiter, M. A. (2018). 13 Program evaluation and assessment. Education for Sustainable Human and Environmental Systems: From Theory to Practice, 37.

[14] Velasquez Duran, A., & RAMIREZ-MONTOYA, M. S. (2018). Research Management Systems: Systematic Mapping of Literature (2007-2017). Engineering and Information Technology.

[15] Gilmour, A. F., Majeika, C. E., Sheaffer, A. W., & Wehby, J. H. (2018). The Coverage of Classroom Management in Teacher Evaluation Rubrics. Teacher Education and Special Education, 0888406418781918.

[16] Gauthier, L. (2018). Comparative and International Education: Issues for Teachers. Canadian Journal of Educational Administration and Policy, (186).