



# Serious Games in Special Education. A Practitioner's Experience Review

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**Abstract.** In this paper we present the experiences with serious games used in a special education school. Particularly, these games provides a engagement context to motivate students with special needs and introduce them basic instrumental skills. The paper summarises the intervention blocks and the games used for each. Finally, an outline of the key ideas to do a successful intervention are presented.

**Keywords:** Special education · Serious games · Edutainment

## 1 Introduction

The inclusion of technologies in the classroom is becoming a popular practice in both mainstream and special education [1]. The adapted learning features and the use of playful or fun resources make these technologies very attractive for students, increasing acceptance rates [3].

In order to provide an effective learning experience in the special education context, accessibility and simple interfaces are critical aspects for practitioners to decide whether to use a technology approach with children and teenagers with different capabilities. Moreover, in order to be successful, technologies should be included as routines and be arranged as the rest of activities in the class: setup times and spaces, select the most appropriate applications and customised them according to the intervention objectives for each student.

Another factor that may determine the selection of any software or hardware is based on the methodology employed in the educational intervention. For example, in the case of people with autism spectrum disorders (ASD), it is mandatory that the applications or games follow a learning without error approach, have a clear start and end and fit to the interests of the user.

These pre-requisites may help to a successful intervention. However not all the applications or games need to be specifically designed for people with disabilities, but they need to be customised enough to fit them.

In this paper we present the experience of including serious games in a special education school. Particularly, we present the set of most used applications in the school to help in the development of instrumental skills, such as reading, writing and calculus.

## 2 Experiences in the Classroom

Alenta is a special education school located in Madrid (Spain)<sup>1</sup>. In this school they teach students with cognitive disabilities and/or Autism Spectrum Disorders during the whole education process, as they are from 6 to 21 years old. Regarding the academic curriculum, they address all the necessary skills to provide an independent and autonomous life, ranging from reading, behaviour control and motor skills for the youngest students, to job-related and social skills for the adults.

For the last 5 years the school staff have been including iPads as part of their in-class materials. These devices are very motivating for the students and, thanks to the increasing number of applications available, they open new possibilities to work on many specific areas. These technological resources are widely used in the classes in the following three intervention blocks:

1. Augmentative and Alternative Communication (AAC).
2. Support to improve personal autonomy.
3. Resources for school learning.

Serious games are more present in the third block, as they support and contribute to different class activities. Particularly, they are used in the development of instrumental abilities, cognitive competences as well as other academic abilities related to the curriculum.

Basic instrumental skills are related to the acquisition of reading and writing skills as well as calculus. These areas have a great impact on people's lives and therefore, they are included as mandatory contents in the curriculum. The set of serious games that are actually in use in the Alenta is summarised in Tables 1 (reading), 2 (writing) and 3 (calculus).

In general, all the games used in class share a set of features: they focus clearly in an area to work, provide a wide variety of customisation options and adapt to user progress. Regarding the price, some of them are free but they usually include in-app purchases or ads. This last option is the worst in terms of design, as these ads are very flashy and animated, and may distract the user.

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<sup>1</sup> <https://www.alenta.org/>.

**Table 1.** Summary of reading games

Name	Description	Suitability
Leo con Lula [2]	Based on global reading methods. The player has to connect words (and syllables in higher levels) to words	Full configuration options and adaptation. Personalised vocabulary
Leo con Grin	Focus on reading and writing (including motricity). Look and feel like game and based on levels	Two levels of difficulty. Very motivating thanks to the prizes and diplomas reward system
Ya leo	A reading comprehension game. Starts at the sentence level, moving on to short texts. Includes linking activities and short questions about the texts	The difficult increases as the player advances. Caregiver portal to manage users, etc.

**Table 2.** Summary of writing games

Name	Description	Suitability
Dexteria Jr.	A game to stimulate fine psychomotor abilities. It trains movements such as press or drag and drop	Includes different levels to train the different movements, by means of attractive and animated interfaces
See me draw	A digital version of the “link the dots” game. The user has to draw the connections between the different numbers in order to reveal the hidden figure. Visual - motor abilities are deeply trained	Very simple and attractive, with a visual support to guide the user
Trazos y letras	Game that improves manual dexterity by a set of activities (increasing difficulty) with strong visual and audio motivational feedback	It includes different levels of assistance and feedback. Player can draw with a finger or a stylus

**Table 3.** Summary of calculus games

Name	Description	Suitability
Cuenta con tus dedos	The game makes use of the multitouch capabilities of the device to “count with the fingers”	Provides visual support (hands drawings) and a natural way to learn
Números especiales	A set of six activities to work with the numbers (1 to 20) in different ways	It is highly customizable to fit users’ needs, either in terms of interface and gameplay (rewards)
Math Fight	Multiplayer game in which the two players compete to solve the operation as fast as possible	Contextualises mental calculus and social interaction

### 3 Conclusions

Applications and serious games are becoming a powerful tools in schools. Many students, and particularly those with special needs, benefit from their interactive and multimedia capabilities that current developments offer, as well as the motivational effect and ease of use.

XXI century teachers must know the different resources available and value their suitability regarding the special needs of the students. This way, the learning process could be more functional and the inclusion of technology in class may be successful. Thus, the student should be the main point of focus. Her objectives and needs should be defined in order to select the most appropriate games. However, the teacher support should be also present, providing any additional resource and valuations to guarantee the comprehension and proper use of the resources.

From Alenta teaching staff’s experience, this is the only way for serious games to success, teaching abilities (in an engagement way) that will allow students to keep on building and acquire knowledge at a higher level.

Besides the review and the experience summarised in this paper, a systematic review of the applications in the market should be carried out, in order to extract the most common features as guidelines to design new serious games for special education students.

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## References

1. Dicheva, D., Dichev, C., Agre, G., Angelova, G.: Gamification in education: a systematic mapping study. *J. Educ. Technol. Soc.* **18**(3), 75 (2015)
2. Gomez, J., Jaccheri, L., Torrado, J.C., Montoro, G.: Leo con lula, introducing global reading methods to children with ASD. In: *Proceedings of the 17th ACM Conference on Interaction Design and Children*, pp. 420–426. ACM (2018)
3. Korn, O., Funk, M., Schmidt, A.: Design approaches for the gamification of production environments: a study focusing on acceptance. In: *Proceedings of the 8th ACM International Conference on PErvasive Technologies Related to Assistive Environments*, p. 6. ACM (2015)