

# THE UTILIZATION OF AUGMENTED REALITY IN PRACTICAL/COMPLEMENTARY ACTIVITIES AS A MEANS OF MOTIVATION FOR PRESCHOOL, ELEMENTARY AND MIDDLE SCHOOL STUDENTS

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Daniela Zinn S. Gonçalves - NT Educação - [daniela.goncalves@grupont.com.br](mailto:daniela.goncalves@grupont.com.br)

Daniel da Cunha Lima - NT Educação [daniel.lima@grupont.com.br](mailto:daniel.lima@grupont.com.br)

Vitor Farias Correia - NT Educação [vitor.correia@grupont.com.br](mailto:vitor.correia@grupont.com.br)

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**Category C (Methods and Technologies)**

**Educational Sector 1 (P-12 Education)**

**Nature B (Description of the Ongoing Project)**

**Class 2 (Account of an Innovative Experience)**

## **SUMMARY**

*The main challenge in education today is to defeat the barrier that exists between traditional education (passive) and education which makes use of the new technologies available (active). Much research on visual perception and education indicate that visual stimulus helps retain content, and that the use of games with practical applications provide a better understanding of the content being studied. Magister was built based on these premises, with playful and interactive activities that are complementary to the content presented in the classroom. Recently, with Augmented Reality - technology that has been delighting children, youth and adults around the world with its virtual interfaces - we will be able to further increase the stimulation and interest of students. In this project, software resources and a webcam will be used to upgrade some of the activities of Magister with Augmented Reality, seeking a first step towards the Education of the Future in Brazil.*

**Key words: augmented reality; motivation in learning; Magister; education of the future.**

## 1. Introduction

The Internet, the emergence of new Technologies, globalization and the speed in which information is presently made available are elements indicative of a period of cultural transformation. Transformation is interfering, inclusively and directly, in the current educational systems.

The great challenge for education today is to accept and unite the traditional teaching and learning methodologies to the new culture of digital media, aiming mainly to motivate students and increase their retention of knowledge.

Many initiatives to achieve this goal are found in Brazil, such as the experiments using *games* in education, mentioned by João Mattar in his blog (1). Meanwhile, government incentives are scarce and insufficient enough to make our production of *games* self-sustainable.

Joining this innovative spirit searching to increase the motivation of students, the work being presented brings a proposal to upgrade Magister (item 4), utilizing a new and exiting technology: Augmented Reality.

## 2. Augmented Reality

As defined in *Wikipedia* (2), “Augmented Reality (AR) is a line of research within the realm of computer science dealing with the integration of the real world and virtual elements or computer generated data.”

Already known from countless studies, videos, and testimonials found in the vast world of the Internet, the impact that AR has on its users is evident, as is the beginning of a new era in various areas of information technology due to the popularization of this new way of interacting with the virtual world. This is exactly what the AR represents: a new way of doing what we best possess, and thus obtain new and impressive results without the fear of making mistakes.

## 3. Applicability of AR

### 3.1. In the world

There are currently in Japan, Malaysia and the United States projects of high relevance toward the application of Augmented Reality in education, of

which a good example is the HARP project at Harvard University (3), whose experiment involves the use of GPS and cell phone devices in student researches.

AR is also widely used in medical studies, architectural and urban projects, product design and technology, whose virtual interfaces offer less risky opportunities to test and refine the techniques and skills of students, as demonstrated by the research from New Horizons for Learning (4).

### **In Brazil**

There are still no important applications of Augmented Reality in the educational field in Brazil. There are but a few projects from teachers who, through their own initiative, apply this technology in classes teaching Mathematics and Geography.

For now, this new technology has been used most prominently in the advertising arena.

#### **4. Magister Project**

Magister is a project developed by NT Educação in order to promote a methodology for digital inclusion, social inclusion and pedagogic mediation integrated to the educational infrastructure and technology, with regionalized educational content which has already served students of Preschool and Elementary School within the public school system in cities in Pernambuco and Minas Gerais states.

The project uses new technologies coupled with pedagogical innovations as instruments of cognitive learning, and currently has more than 200 interactive activities mediated by computer in its portfolio. These activities were developed in accordance with NCP (National Curriculum Parameters), using as a pedagogical base that education throughout life is based upon the 4 Pillars of Education set by the UNESCO: Learning to Know, Learning to Do, Learning to Live Together, and Learning to Be (5).

Magister was conceived after 10 years of research done by a technical-pedagogical team comprised of specialists and researchers from the University of Brasilia (UnB).

##### **4.1. Magister today**

Aiming to rethink the teaching method, and bringing fun closer to the learning process, the interactive activities of Magister use visual and audio resources, such as: animation, illustrations, photographs, music, narration and games (6), applied in school laboratories with guidance from the teacher.

**Figure 1** represents a Science activity on Volcanism, geared towards the last years of Elementary School. In this activity the student observes the animation of a volcano erupting and then, according to what he or she learned in the classroom with the teacher, the student will move to a screen where he or she will have to associate the names to the corresponding parts of the volcano.



**Figure 1.** Activity on Earth Structure and Volcanism – Science – Elementary School

**Figure 2** displays a Preschool activity which asks the student to draw an object whose name starts with the letter that he or she has previously chosen. All student drawings are stored on a screen with all the letters of the alphabet, so that he or she can later reference it.

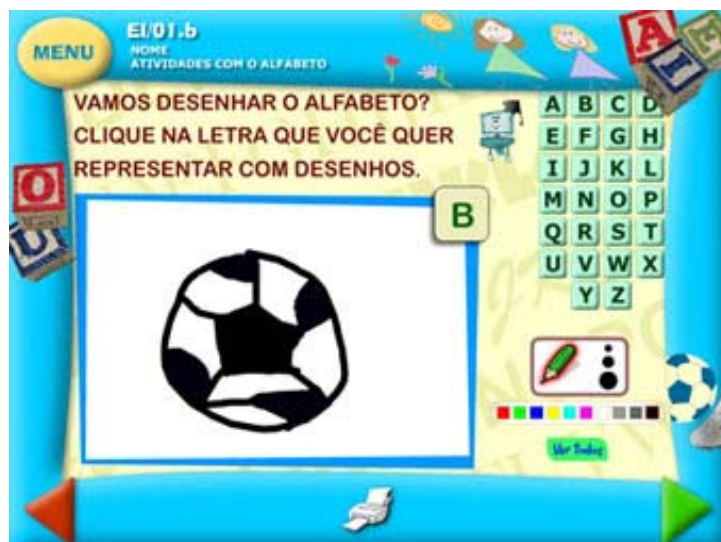


Figure 2. Activities using the Alphabet - Preschool

#### 4.2. Magister tomorrow

Some activities from Magister were selected to be upgraded with the inclusion of Augmented Reality, aiming to further increase the interest of students in the contents addressed.

The required resources for the development of this research are:

- A common *webcam*;
- *Adobe Flash*;
- *Papervision 3D*;
- *FlarToolkit* (Free for the creation of an open code);
- *ArToolkit Maker Generator* (Free).

Following are the activities selected for this *upgrade*, which are presently already found in the prototype phase.

- Mathematics – Multiplication Table – Project involving multiplication tables utilizing multiple markers in order to manipulate the numbers and make the student combine numbers and symbols (+ - x /) to be able to achieve results;
- Geography – Solar System – Project involving a solar system where students can explore information about all the planets and

envision themselves with an entire system at the palm of their hands (Figure 3);

- Science – Geology – Project showing the geological structure of planet Earth and the functioning of volcanoes;
- Literacy – Construction of Words – Project involves various markers represented by letters. Once a specific word is built, the image representing that word appears in the computer screen.

Aside from these examples there are infinite possibilities in various other fields such as History, Languages, Biology and Art, amongst others.



**Figure 3.** Prototype of Activity regarding the Solar System - Geography

## 5. Final considerations

With the inclusion of Augmented Reality in the activities of Magister we intend to accelerate student learning, create additional motivation for them to study and increase the retention level of the content addressed, promoting continuity in the subjects studied, inclusive of comments during breaks or recess and at home with family and friends.

The attractiveness of teaching is the principal advantage that can be attained with this new technology. Many already consider Augmented Reality to be the future of education, since when there is student interest and attention focused on a particular objective, the results are very positive.

We conclude that it is quite possible and inexpensive to develop a small initial project using the resources mentioned in this article, leveraging the results

of this project to pave the way for greater and new opportunities in long distance education in Brazil, “and who knows we may even be taking the first step towards the Education of the Future in Brazil.”

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