DESIGN OF RESOURCES FOR AN INFORMAL LEARNING

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Abstract

Autonomous learning is a reality, which is being supported in different technologies and spread out in all areas of knowledge with a wide and accessible repertory of good practices. This paper presents a project focussed in gathering hands-on learning, exploring and producing representations of some relevant architecture sites using new technologies.

The set of models designed propose the user a learning by doing approach, to create shapes producing simple elements, which allows informal learning about these buildings. Using and blending technologies available nowadays it is possible to create different models that, not only can be build and touched, but also convey a range of spatial concepts, proportions and *wayfinding* information.

Building your own prototypes maintain high level of interest, incorporate tangible interactions encouraging learners in the content.

We undertook our first formative module designing initial prototypes experimenting with different methods and technologies that could stimulate creative purposes. The idea is to define some space equivalents in terms of landscape, sections and blueprints to make understandable the main features of the building, while the different supports or stimuli are developed. In order to give more chance to an informal and autonomous learning model, these files will be available on line to be used with laser cutting machines to produce tactile pictures and pop ups, and 3D printers to get volumes and moving parts. We will bring these prototypes to schools and other different potential groups of users in educational and interpretation contexts.

Keywords: Informal learning, resources technologies, tactile objects, hands-on learning.

1 INTRODUCTION

New methodologies for competence education imply a greater emphasis on the development and joint coordination of practical skills, knowledge, motivation, attitudes, emotions, etc. This is an important change because implies a pragmatic vision of the learning and, logically, new tools are needed to facilitate the autonomy. In this context it is necessary to answer to the question of how can we learn in today's world characterize for being Volatile, Unrest, Complex and Ambiguous and with global challenges & opportunities that are multidisciplinary & that will take multiple technologies & stakeholders to solve [1].

The learning by Doing paradigm takes precedence over the traditional mastery of theoretical content and the result becomes the process itself. Vanguard Educational centers bet on another way to learn: examples are Vittra Centres in Finland where each student has their individual learning plan, or the Waldorf School in Cincinnati experiential approach to education which ignites and inspires life-long learning in an environment that cultivates freedom to act and think. The heart of those concepts is the conviction that education must provide students become uniquely-qualified creators, thinkers and innovators.

A differentiating aspect of the new model is that it proposes a customized education where it reinforces the sharing of experiences to solve problems and challenges. In fact, a dissemination channel of general content like YouTube, "has been positioned as a quick way to learn to the unimaginable and has been validated as a learning channel" [2]. "People seem to prefer to be shown how to do things and not read a manual... It's easier, more direct and takes less time" and so, while the instruction manuals are being used less and less, the digital versions through the web are increasing. Users prefer fresh forms of learning, intuitive, trial-error, or shorter forms of learning, such as the specific tutorials mentioned above [3].

Evidently, these technologies have a main role in learning [4] and that they are producing a disruptive effect in the learning mode [5]. This new technological approach for teaching and learning opens

extensive opportunities for inclusion and accessibility because it is available to produce more solutions combining different stimuli including audio techniques to increase the follow-up of the contents presented, tactile media of different types and procedures and so on... each one with its own specific contribution. Creating information involving non-visual sensory communication channels feature multiple options, which may range from simple analogical applications (Fig. 1) to integrations with major complexity in relation to interaction in a learning environment [6].

It is a fact, that although tactile maps and graphics have been traditional resources for blind persons; at present, they spread in multiple areas such as education, signage, leisure, etc. as communication media and they are more prevalent and central in our daily experience [7], because the different materials and different procedures. The use of these sorts of models, encourage interests into the contents shown and also into the way they are developed or presented.

Figure 1. Signs in relief and Braille in different environments enhanced auditory experience as well as "situated learning" in context.

Furthermore, the advance of the ‘‘maker’’ culture in which many people have become users of 3D printing designs, is also an opportunity form a technical perspective [8]. This approach favors the design of more adapted resources, which are more available and demanded by potential users. The possibility of self-producing our learning contents adds a value in the emotional scope for the stimulation of curiosity, focusing attention on the object to be learned and even enthusiasm [9].

All these questions about learning, interaction and "knowing how to do", open up a broad field to “Informal learning”, giving importance to flexible resources at the service of characteristics, of the subjects, as well as of the different students. In these models, the student must be able to decide on the competences he learns and how to do it. Students learn from experience and the resources seek to develop the abilities that each student has.

From this perspective, this project on contents of cultural interpretation and architecture, tries to surprise the user with what he is able to do and understand through different ways of representing and constructing. INDICO is a learning project focussed in gathering hands-on instruction exploring and producing representations of some relevant architecture sites using new technologies. Learning and teaching methodologies are blending when “learning by doing” so, the aim of these creations will be stimulating creative activity building simple elements about the buildings. They can be related with the stages of the place, the map or the shape but always offering tangible interactions and movable pictures mostly paper-based. Through such interactions, user will be able to connect kinetic experiences with visual experiences [10].

This paper shows one of the cases in process of development. The paper is organized in two parts: In first place, the method is explained and discussed to define what technologies and what deliveries will be essential in this learning object. In second, some simple models easily available are presented as part and result of the learning process, and how they contribute to knowledge. Finally, some conclusions obtained from this proposal.

2 METHODOLOGY

When we think in a “learning by doing” method for learning a particular topic, such as in this case architecture, it is necessary to develop a strategy to focus the topic. Bearing in mind that it was

interesting to achieve tangible models for a diverse audience, some production techniques were selected that are currently affordable and involve digitalized methods to produce them. So, the focus of our work has been to use and blend these technologies available nowadays in order to facilitate different models that have to be produced by the user himself. With this proposal, not only is possible build and touch, but also convey a range of spatial concepts, proportions and also, *wayfinding* information.

We undertook our first formative module designing initial prototypes exploring them with different methods and technologies that could be shared easily with learners, such as laser cutting and 3D printing. At this stage of the project, it has been defined some space equivalents in terms of landscape, sections and blueprints of different views, to make understandable the main features of the building, while the different supports or stimuli are developed. We further developed the specifications for each model or content explaining the technology and the building process and providing the files in an open online source.

A pilot experience was conducted as an informal testing on sighted, with a small group of teachers in order to gain understanding about the challenges people may face during the creation process. We evaluate our approach by recording the time spent in making one of these models, the attitude when doing it and their comments about this “experiential learning”.

Authors of this paper are working on creating a universal interface proposal, using some graphic technologies, and producing a result with a self-descriptive structure, based on one’s own experience [11]. The design and development of the different planned contents constitute a projective challenge which is making us to learn from our immediate experience.

3 RESULTS

In this “learning module” we develop a set of models designed as foldable representations and building blocks for creating different approaches to the buildings. The set of models designed propose the user a learning by doing approach, to create shapes producing simple elements, which allows informal learning about two buildings: Peñíscola Castle and the Central Market in Valencia.

Using and blending technologies available nowadays we created different models that, not only can be build and touched, but also convey a range of spatial concepts, proportions and wayfinding information.

Table 1. Approaches to the buildings and stimuli to create. Peñiscola Castle (Spain).

			
Landscape	panoramic reliefs	3D blocks	descriptions
Indoors/Outdoors	areas	cutting/folding	descriptions
Floor plan	wayfinding	areas	descriptions

Additive and subtractive manufacturing production tools facilitate creating new devices, as well as tinkering with existing ones. That means new opportunities for new teaching practices in a range of subjects and educational settings, from primary education to interpretation and to higher education [12], [13].

3.1 Creating and experiencing different models

All the activities proposed have been developed previously by the authors of this paper. Similar elements have been applied in other areas of knowledge, such as 3D maps, tactile models, and distributed in learning object repositories.

3.1.1 Cutting and folding models

We explored and prepared different sorts of models to be produced by the user. They are folding images based on a plan, to produce them with a conventional printer or cutting technologies and assemble them with folded pop-up elements (Fig 2). Practitioners can obtain kinetic experiences of the space when they flip, pull or fold the paper in different directions.

These models challenge the user's capacity to understand the place and the way to produce the model at the same time, conveying a range of spatial concepts, such as in/out, up/down, and high/low.

3.1.2 Using 3D models

When people are unable to see, the visual experiences are inaccessible and 3D printing techniques are a promising method to make images through tactile experiences. In this case different 3D printed models allow other approaches to the buildings. It is possible to touch and feel the proportions and shape in context (Fig 3, 1), to move some parts and compose the different volumes that compose the building (Fig 3, 2).

In Fig 3, 3, the model displays the changes made along the history showing how was it transformed at the tree main interventions till nowadays and even more, the overall project of this site actually never finished.

4 CONCLUSIONS

As formal education loses interest, more versatile learning supports are needed in line with new media and technologies. The latest insights about learning enhance the ability to understand and overcome poor memory problems with a variety of hands on experiences. These experiences create a sort of sets of links that enhance the capability to study and change from errors.

Figure 2. Design of pop ups representing indoors and outdoors images of Peñíscola Castle.

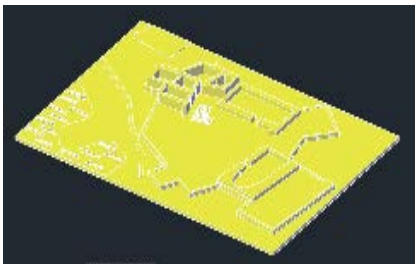
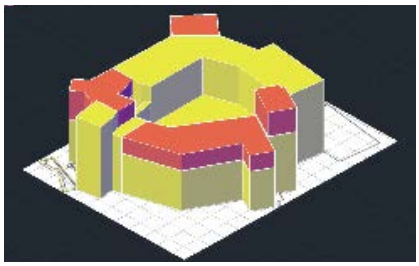
1  2  3 

Figure 3. Own Elaboration

From the perspective of accessibility and inclusion the new technological approach for teaching and learning opens extensive opportunities for both, in traditional and distance education [14], [15]. It is necessary to work step by step producing flexible developments that needs time and research in their effectivity.

Finally, in this project pedagogical innovation in education is linked to the motivation of the people interested in these buildings and also in doing things, as a way to stimulate creativity and motivate learning. Autonomous learning is not a teaching model, but a necessary way of active, experiential learning, which communicate with today's world.

Next step will be to evaluate our approach by conducting interviews on teachers, learners and visually impaired users.

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