Challenging technologies: the Virtual Show & Tell in Design Inspired Learning Processes

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Abstract

The design inspired learning (DIL) processes, and in particular the P\(^2\)BL (problem-project-process based learning) processes, are usually very time consuming and because of their flexible and complex nature are rarely implemented as on-line processes, at least not as full processes. The P\(^2\)BL is thus a learning domain in which the pedagogy is deeply challenging the technology.

In this paper we present the implementation of a Virtual version of the Show & Tell (VS&T) method, that represents the first step toward the realization of a full co-design lab, at present under development as part of the open-source project Life (Learning in an Interactive Framework to Experience). The S&T is a well-known and very powerful collaborative method that can be profitably used to speed up the problem setting of a design process. Its porting from the reality to the virtuality allowed the technology to challenge back the pedagogy and to iteratively transform and improve the VS&T method. A case history will demonstrate the positive effect of the mutual challenge between pedagogy and technology, at least as P\(^2\)BL is concerned.

1. Introduction

During the last years the Design became more and more a source of inspiration for many educational activities [1]. Leaving the discussion about all the possible meanings and practices that maybe included within what appears to be the big family of the "design inspired learning process" (DIL) [2], we shall deal here with those learning processes that are intrinsically design processes, that is those processes whose main goal is the design of what we may call at large an artifact (product, space, service, process, etc.). In other words we intend to focus on those learning processes that are intended to teach how to design (i.e. to practice and learn interaction design, product design and, also, TEL design). We may define such subfamily of processes as problem-project-process based learning (PcubeBL or P\(^2\)BL). Why P\(^2\)BL? Because: a) these processes include, usually, a very intense phase of exploration of the operational context and an equivalently intense phase of problem settings; these activities, of course, can be more or less time confined and their intensity may depend on the characteristics of the specific process, that can be organized in phases, in layers, etc. [7]; b) they have to produce very concrete and tangible deliverables that requires the elaboration of a project; c) to ensure a successful outcome all the activities have to be carried on according to a carefully designed process.

It is worthwhile to stress that the P\(^2\)BL represents a very fertile domain of exploration also for the design based research [3]. In fact, being the educative goal of the P\(^2\)BL the learning of the design skills, the actors of the process are led, naturally, to reflect on possible process improvements (meta-design activity).

As well known P\(^2\)BL processes are usually quite time-consuming and may last for a whole term or semester, depending on the boundary conditions and on the goals of the specific process. Normally they include periodic brainstorming and revisions and a lot of team-working done by groups of two-four persons. P\(^2\)BL are rarely implemented on-line, also because there are few tools designed to support them. On the other hand the full implementation of DIL processes, or of a consistent part of them, would be very beneficial because of the expected increase of the social interaction and of the possibility to stratify the design experiences. Actually the recent development of the so called web 2.0 made available to everybody a lot of tools/services that could be profitably used to implement portions of any design process on-line. However they are not intended to produce a satisfactory stratification of the design experiences. The outcomes of all the processes risk always to get loss within the digital content of many anonymous blogs, websites and services.

Multipurpose Virtual Learning Places (VLP) are certainly more suitable to record and stratify the outcomes of the learning experiences and, if well designed, may satisfy almost all the expectations and
needs of a typical learning community. In fact, when a VLP is built around the idea of community it usually offers all the tools needed to develop a dense social interaction. Up to now, however, there are no VLP optimized to support at the best the activities of a collaborative P^3BL. For this reason we decided to start, as a part of the open-source project Life [4], the development of a co-design area. The first module we decided to implement was a Virtual version of the "Show&Tell" (S&T) method. As well known the S&T [5] is a method very useful to perform the problem setting and implies a quite dense social interaction. Actually, a simple version of a Virtual S&T could be put in practice also by means of a forum [6] but it requires a huge efforts to manage the interaction and to analyze the outcomes of all the working groups. Due to the dense social interaction the working-load increases super-linearly with the increase of the participants.

In the next paragraphs, thus, we will briefly present the S&T method, the problems that one may encounter to run it by means of a "simple" forum, the gradual improvement of the method generated by the development of the Virtual S&T and, briefly, the perspective for further optimizations.

2. The problem setting and the S&T

In the P^3BL the phase devoted to the problem setting and re-setting is one of the most delicate one, because the smooth development of any project depends on it. It is very important to explore in depth the design domain, especially when one has to do with very complex places and not well focused requests like: how to make a visit to a given museum more attractive by using interactive technologies? How to favor the aging well by means of interactive, easy to use and affective technologies? How to make an educational process a worth living experience with the aid of technologies? These are, indeed, the kind of problems that one has usually to address during most of the processes of Interaction-Experience design and/or Learning Design [1,6,7].

The collection of the data necessary to problem setting can be performed using various methods that can be grouped under two main categories: a) on-field ethnographic observations to search for relevant clues; b) enquires, based on the use of any sort of probes (from very "open" ones like the cultural probes [8] to very "closed" one like multiple choices questionnaires). Among those belonging to the first category one may include also the S&T that is based on a collaborative analysis of the characteristics of a set of artifacts chosen as representative of a given context (each member of the design teams has to collect independently some of such artifacts) [5]. The goal of the S&T is to favor the emergence of the most relevant peculiarities and criticalities of the design place, from which to derive possible directions for action. The attractiveness of this relatively simple method of analysis lies in the following: a) does not make use of any default mental model of the context; b) can lead to remarkable results with a small effort; c) is suitable for an on-line activity.

3. The Virtual S&T (VS&T) method

As test-bed, we tried first to implement a virtual version of the S&T method with the aid of a very simple tool like a forum. The students have been asked a) to take a picture of six different items among all those elements (i.e. artifacts, spaces, actors, services....) that contribute to characterize a given place - three of them having a positive value and the other three having a negative value; b) to publish the pictures on the forum accompanied by a brief description of the elements and a justification for their choice (see fig. 1).

![Fig. 1 - Snapshoo from a Virtual Show&Tell's session that took place with the aid of the Life's forum](image)

The descriptions, then, have been used to extrapolate a set of meaningful keywords. Once that the rough materials have been accurately inspected and listed, an expert tutor was charged to work out a representation of the context. Inspired by the lists of the elements and of the selected keywords s/he had to identify a possible set of axis, the extremes of which had to represent the highest level of opposite qualities (i.e. functional/objective - emotional, traditional - technological, social - private, etc...) and to plot the data on a 2D plane identified by two of those axis, see as example fig. 2 (cohort I). The result is a highly significant representation of the place and show the emergence of useful indications, both positive and negative, for the whole design process.
After having run the method several times in several contexts we came to the identification of a set of three axis of representation that appears to be relevant for most of the design domains: functional-emotional, social-personal and physical-abstract.

According to this findings we worked out a different version of the method, to make it more quantitative. In this second version of the VS&T, the students were asked not only to publish the pictures of the chosen items, the motivation of their choice and the items' description, but also to assign to each item three values (between -10 and +10) to be used as coordinates to locate the item in the space of representation identified by the axis functional-emotional, social-personal and physical-abstract. It is worthwhile to note that any default choice of the axis is equivalent to restrict the data representation to one of the infinite possible subspaces of representation, but this is the price one has to pay to make the method more quantitative.

By plotting the rough data on any of the possible 2D space of representation it was possible to observe the emergence and superposition of different mental models of the place under investigation. A fact that forced the students to open a discussion to find out a shared perspective. Incidentally such a debate is also very useful to work out possible prejudices or particularly innovative and interesting points of view.

As an example of the outcomes of this version of the Virtual Show&Tell we would like to discuss the data shown in fig. 2 obtained during an on-line Master in “E-learning: methods, technologies and applications”, academic year 2006. The students, most of them high school teachers, attended the master to acquire skills in TEL design. The Show&Tell method was used to explore the initial perception of their own learning place of origin (the places examined were located all around the Italian national territory).

The method has been used in its initial version with the first student cohort, and in the semi-quantitative version with the second student cohort. In this latter case the axis of representation that have been used were those that outcropped as the most significant ones during the S&T sessions held with the previous student cohort. The upper plot of fig. 2 shows that the first cohort identified as very critical both the design and the management of the educational processes traditionally held in junior high school and high school. The perception of the quality of social relationships established on a personal level among the actors in the aforementioned places was also negative. The perception associated with the physical spaces and the infrastructure appears to be heterogeneous. On the other hand, there seems to be a reasonable trust in the ability of the technologies to improve the situation and solve some of the problems. It follows that the school could be a fertile design domain for interaction.
The second plot of fig. 2 shows the row representation that comes out when one uses the quantitative version of the “Show&Tell” method. The first evident result is that the data representation, as stated above, derives from an overlapping of different mental models. The different positions taken by similar elements are outlined in the plot by the use of the same kind of dashed line. Starting from this situation the group had to construct a shared representation (bottom plot). It was achieved thanks to the tutor’s intervention and a debriefing session with the students. It shows features similar to those of upper plot, but also some differences: still negative is the perception towards the management of the educational processes; even more negative is the perception towards the physical infrastructures; more positive, on the other hand, results the perception towards people, but such an improvement corresponds to a parallel shift from the personal dimension to a more social dimension; the attitude towards new technologies still remains positive. By examining data more accurately one could obtain more detailed and useful information for the design process, but this aspect overcomes the aim of this paper.

4. The Virtual S&T module

As shown in the previous paragraph the VS&T method can be put in practice with the aid of very simple technologies but it last the problem of the relevant amount of time that it is required to the students and to the tutor to analyze the data, to work out a list of relevant keywords and meaningful representations. The obvious consequence is the demand for better technologies to improve the working/learning flow and, thus, to help people to concentrate on their main goals, i.e.: the problem setting, the design process and the acquisition of the design skills. This is certainly an example of technologies challenged by the pedagogy. On the other hand the request for more powerful and suitable technologies challenges in turn the pedagogy and the didactic, and force people to rethink/readapt the methods in order to make their technological implementation easier. According to that we have slightly re-designed the Virtual S&T method to favor an easier implementation of the VS&T module. In the following we shall discuss briefly how, by illustrating the admin, student and tutor view of the module.

A snapshot of administrator view of the VS&T module is shown in fig. 3. This view of the application allows to create new VS&T sessions and to define: their context and sub-context, the number of elements to be inserted, the duration of the session, the dimension of the space of representation, the name and the extension of the scale of each axis.

Fig. 4 shows the quick insertion form available to the students. It allows to insert in a database all data necessary for the VS&T: the name, the picture and the description of the chosen elements, the tags that describe the elements, the coordinates needed to place the items on the space of representation, a short justification of the choice. It is worthwhile to point out that in this variant of the VS&T method, to avoid reciprocal influences, the students have no access to the description of the elements inserted by their colleagues till the end of the session.

Fig. 3 - Show&Tell embedded in the LIFE environment: snapshot of the administrator-view

Fig. 4 - Snapshot of the student view: insertion form.

The control board is shown in fig. 5. It allows to keep under control the development of the S&T session. Through such board the tutor have access to the list of people that made the insertions and to the full list of the elements that have been inserted. Each element of the list can be expanded to view the details of the inserted data, see bottom part of fig. 5. If needed the tutor has the possibility to re-open the insertion form closed by the students. Once that the deadline for data insertion has expired the admin/tutor can modify the status of the VS&T visibility to make the data available to everyone. A survey can be exported in an excel format for off-line data manipulation. Since the goal of the VS&T method is, as written above, the emergence of the most relevant peculiarities
and criticalities of the design setting we have tried to improve further the working-flow by speeding up the data representation. Indeed we have realized also a simple graphic tool that allows to visualize immediately the plots shown in fig.2, also in 3D. The VS&T module, thus, allows to limit the use of the forum only to the debriefing and to the discussion of the results. As stated above, brainstorming on the S&T results usually lead to a mediation, that is to the redefinition of the coordinates of some of the elements. Because of this we provided the control panel of the VS&T with the possibility to insert a modified set of coordinates for each element, without overwriting the original one (so that, in principle, one has also the possibility to "measure" the distance between the original and the final representations; up to now, however, we have not yet explored such possibility). The final part of the analysis - that is the extrapolation of the recommendations for the problem solving and the design phase of the process - is left, of course, to the learners. In the close future we are planning to technology enhance also this part of the problem setting by offering a module that help to produce short summaries in the form of SWOT analysis.

5. Conclusions
We have given a concrete example of how the pedagogy may challenge the technology. In particular we have shown that technologies could, in principle, strongly support the P’BL in various phases of the educative experience and of the design process. Of course many activities can be carried on by means of simpler tools usually available in the standard Virtual Learning Places but often the time needed to put the methods in practice is too long to encourage their use (as it is for the case of the Show&Tell method discussed here).
Since didactic challenging technologies we answered by developing an e-version of the S&T that through successive iterations led to the realization of the VS&T module described in the body of the paper and, thus, to a consistent reduction of the working-load and working time. It is important to stress that without such improvements it would not be possible to run the S&T method with classes of some tens of students, as in the case of our P’BL processes.
Challenging technology, however, does not result exclusively in a more efficient process but also in new possibilities. Indeed we have seen that thank to technologies the VS&T method can be run in a double-blind configuration and that one could, in principle, easily measure the distances among different representations. Moreover, as a side effect of the increasing number of students that can take part to a VS&T session, one obtains more reliable analysis and a strong amplification of the social interaction, mediation and collaboration. This latter is the key factor to increase the quality of the creative outcomes of any process of design.
Being the realization of the VS&T module part of a bigger project - the development of a virtual co-design lab - the future directions this work can go are many, among them: a) the support for SWOT analysis; b) the support for the realization of mood-boards (starting from the pictures that have been uploaded); and, on a longer period, the development of a module that would allow to design and manage the full process of design.

6. References
[1] see for example the papers published in the Proceedings of the HCIEd (Human Computer Interaction Educators) series of conferences, and references therein