DESIGN AND CREATIVITY ENHANCING INNOVATIVE EDUCATIONAL PROCESSES

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ABSTRACT
The 'Innovative Design in academic contexts' project addressed how learning and teaching changes after the introduction of digital technology in schools and how can design support this.
The paper addresses aspects of the creative process and problem solving used to change the academic process and developing an innovative method that redefines the role of a teacher. The project involved 100 teachers at all grades across Italy, who contributed to the implementation of a formerly developed methodology (called IDEActivity) enabling the delivery of innovation across different contexts. The methodology and its toolkit has been applied into the project and eventually shared online with other teachers in Italy. The final outcome is a co-designed guide that takes inspiration from design approach and techniques to be used for planning and implementing learning activities in class.

Keywords: Creativity, education, toolkit, learning process.

1 THE CHALLENGES OF MODERN EDUCATION

The fast paced cultural-social, economic and technological changes in contemporary society push citizens, workers and students to challenges for which new or up-to-date skills may be needed. Gardner [1] points out that these changes in society require new ways of thinking about learning, school, work, public life. According to him, the key cognitive skills necessary for this purpose include intelligence discipline, concise, ethical, and respectful creative. Illeris [2] highlights the importance for the learner to interact with the social, cultural and material environment, and therefore to develop a social dimension of communication and cooperation. The modern concept of competence is expanding from its more established interpretation of mere possession of domain-related knowledge to a wider range of personal qualities and the ability to perform effectively and flexibly in well-known and unknown situations.

The educational system is expected to adapt to new training requirements and faces the challenge of meeting transversal knowledge and different skills in order to educate the future citizens adequately. Learning goes beyond the mere acquisition of a syllabus or curriculum and embraces a complex system of both traditional and up-to-date competence.

Technological development plays a key role in the overall changing contents, especially in terms of knowledge creation and access amplified by the Internet. Contemporary technology allows for information to be explored according to a student's disinterest or curiosity; it can be morphologically multifarious (e.g. through text, images, videos), interactive and multi-sensorial, thus facilitating a deeper understanding of information.

Wikipedia is emblematic of the contemporary way of creating and sharing knowledge through bottom-up (rather than top-down) approach, building on distributed collective knowledge instead of the more conventional experts' one. As a consequence, new knowledge is no longer dominantly imparted by the teacher, but spread through technology. The organization of information is evolving from a logical-linear structure – where the teacher was the pivotal holder of knowledge – to a more transversal-emotional approach – where the students become the focal point when accessing to information.

This changes the role of the teacher. She could represent the facilitator of the learning process, a guide throughout the students' process of analyzing, understanding and gauging the heightened quantity of information that they may reach on their own.

However, changing one's own way of teaching, pedagogic paradigm and thinking process and the self-perception of being professionals may be demanding for teachers. Therefore, major support to them is advocated.

Our research questions were: how can teachers develop abilities of sound reasoning and decision-making, practicing reflective thinking, inspiring curiosity and creativity, as well as effectively managing complexities and navigating ambiguities?

The objective of this paper is reporting our research experience on how can Design inform and support teachers in the contemporary complex context and to answer the research question as described above. Specifically, section 2 introduces Design approaches, tools and guidelines as strategic for teaching activities. Section 3 describes the IDEActivity toolkit formerly developed by the authors and used for this purpose; finally, section 4 reports how this toolkit has been applied with teachers.

2   DESIGN FOR INNOVATING SCHOOLS

In our view, the teachers' challenge of engaging students in the process of effective knowledge acquisition may be inspired by and integrated with tools developed by research in the participatory design field, which is intended to involve final users in the process of product development.

Over the last decades design has been increasingly involving final users of products and services in the whole design process, enabling their proactive participation [3]. Final users become 'designers' of their own products, as they may be better aware of their needs and how to satisfy them.

Similarly, teachers could involve the final users of the teaching activity, i.e. students, in the process of knowledge creation. To this end, design – and in particular co-design – can help teachers in developing both their own and students' creativity needed to create and adapt engaging experiences of learning.

Designing with the user requires specific tools enabling professionals in stimulating, identifying and gathering ideas generated by non-professional designers. The project 'Innovazione in classe' (i.e. the Italian for 'innovation in the classroom'), here described, aimed at providing design-driven guidance for teachers at all levels and grades in Italy intending to engage their students in knowledge acquisition.

Our contribution intended to facilitate teachers approach to innovative educational systems by levering on creativity. Poincaré [4] refers to creativity as the ability to merge pre-existing elements in new combinations in a useful fashion. In our opinion, creative thinking is about facing problems building on foundational knowledge to finding innovative and effective solutions whenever it is applied.

We believe that everyone can be creative. Creativity can be learned and trained through appropriate techniques, to break out preconceived notions, stimulate the imagination and improve the conditions in which an idea is born.

This process can be fostered by 'design thinking', which is "a human-centred approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success." [5] This combination of thinking and design offers the opportunity to use design tools to diverse contexts such as business, services and processes [6]. Beyond business innovation, Design thinking offers new models of processes and tools for creative process improvement, acceleration and visualization. As a result, creativity becomes accessible to multidisciplinary teams and all kinds of organizations, including education.

We attempted to train the teachers with design-driven tools which could stimulate their own creativity first (when setting up learning experiences) and secondly their students' creativity (while learning).

We explored ways of fostering teachers' creativity collaboratively drawing on design thinking. We first modelled a possible process reflecting how teachers could develop such knowledge co-creation experience (presented in the next section) and eventually we developed and applied a supporting toolkit (presented in section 4).

3   THE IDEACTIVITY METHODOLOGY

In order to achieve our objective, we used IDEActivity for the project, i.e. a human-centred participatory methodology formerly developed by some of the authors and applied in contexts where innovation is pursued (e.g. companies, institutions and organizations), using the potential of creativity and Design Thinking while co-creating with the people involved in a project.

The methodology is structured on phases and integrates diverse techniques (see figure 1).
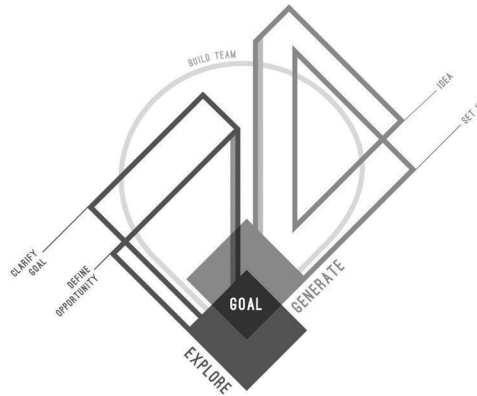
Figure 1. The process of the IDEActivity methodology, with the three phases: Explore (in blue), Generate (in orange) and Build Team (in grey)

Collected in a toolkit, the IDEActivity techniques (e.g. brainstorming, mind mapping, energizers) consist of a series of descriptive cards, necessary tools and guidelines, which enable the application of the methodology (see an example in Figure 2).

Such toolkit is used throughout the creative process and is structured on three main phases – Explore, Generate, Build team – described in the following paragraphs.

The first phase – Explore – aims at the identification of a significant objective and its possible development in relation to a given context. Users are supposed to structure a common vision in relation to a problem or theme with the actors involved in the creative process. Reciprocal understanding of needs, hopes and the aspirations is crucial, and an analytical process of information interpretation is fundamental to identify opportunities. In this phase, people are invited to analyze and organize the material by visualizing the information through diagrams, images, photos and key-words.

The second phase – Generate – aims at delivering and prototyping ideas, through creative sessions based on a series of tools designed to stimulate people creativity and generate solutions in line with the given context and the objective (see figure 2).

The third phase – Build Team – aims at creating a strong sense of empathy between the design team and the people involved in the project. They are introduced with the goal of facing the research phase, understanding the final users' needs and building a creative and united team. In this phase people will learn techniques which will remove many barriers to creativity during the creative session.

These three phases are adaptable in order to meet specificities and replicable in different contexts.

Figure 2. 'Brainstorming', one of the IDEActivity toolkit card

4   IDEACTIVITY METHODOLOGY APPLIED TO EDUCATION

The IDEActivity methodology has been used and adapted for the 'Innovazione in classe' project to train teachers facing the educational challenges described above. The strategy was to train an initial group of 100 teachers covering as many academic subjects as possible from all over Italy, working at all levels of education. Eventually, the initial group was supposed to spread the approach through their network, thus making them independent after the conclusion of the project.

An initial group of 100 teachers was introduced to the potential and importance of using innovative methods and techniques in classrooms, as a means to stimulate their curiosity and willing to experiment. Eventually, they were involved as co-creators for the implementation of the IDEActivity method according to their experience and needs.

Twenty workshops were set up in main cities across the country, attended by twenty teachers each. Each group partook in four workshops addressing a specific theme:

1.   de-codifying
2.   co-projecting
3.   evaluation
4.   re-elaboration

The de-codify workshop aimed at a profound examination of the multiplicity and complexity of sources of information. In the second workshop, 'co-projecting', fundamental elements for a new and efficient academic approach were explored through a co-design/participatory approach. We constructed a common ground by defining and sharing our vocabulary, by translating Design language into the educational one. We adapted guidelines and tools from the IDEActivity toolkit collaboratively to meet the educational needs.

During the third workshop, 'evaluation', the creative activity and reflections generated in the preceding sessions led to a '*Guide to design thinking for teachers*', i.e. the main tangible outcome of the whole project intended to support teachers step-by-step during the development of the learning experiences for their students. The guide is described in more detail in section 5.

The last workshop, 're-elaboration', has been carried out by the teachers on their own in their classrooms, in order to test the validity of the guide in their working environment.

5   THE GUIDE TO DESIGN THINKING FOR TEACHERS

The *Guide to design thinking for teachers* represents the main support for teachers while self- and collaborative developing activities for their students, which has been developed in our project.

The guide reinterprets the creative process experienced through the project and adapt its contents for the educational environment. First of all, the guide helps both the teacher and the students in the creative journey of knowledge acquisition through four main steps, firmly interconnected and described below:

1.   exploration
2.   ideation
3.   development
4.   experimentation

The guide is complemented with cards suggesting tools to be used across these phases, ensuring correct performance and work process in the classroom.

5.1 Exploration

During this phase the conventional relationship teacher-student is broken; students are consulted and invited to be involved directly in the critical analysis/research of sources of information, in the definition of the problem and in the search for alternative solutions. The teacher serves as the organizer of the length of the activities and then as a facilitator, by proposing other sources of information and moderating classroom discussions.

5.2 Ideation

In this phase direct experience, use of multimedia, implementation of academic methods to enhance student participation and their learning process and making them the focus is nurtured. Students have to decide the source to privilege for the next phase. This phase provides the chance to develop lateral thinking.

5.3 Development

The third phase is built on the collaborative creation of knowledge through interaction, lab work and simulations: classic methods of cooperative learning are used to highlight what has been learnt. In this phase development of creativity as well as a critical thinking and an ability to self-evaluate come into play because the finished product is merely a sort of prototype that must be experimented with and validated before becoming definitive.

5.4 Experimentation

This phase introduces a notable innovation in the field of learning/teaching, where usually a student is evaluated by the teacher and at most presents their work.

Here students ask for feedback within a real context that goes beyond a classroom and understand whether the product meets the brief and the desired objectives were reached. In this last phase we understand responsible learning, developed through participating students where comparisons and feedback even from outside in real time and critical self-evaluation serves the purpose of validating a product, and the purpose is not simply to achieve a grade.

Figure 3. The 4 phases of Creative process defined in the Guide to design thinking for teachers with related steps and tools

6   FUTURE DEVELOPMENTS

The final step of the project addresses the scalability of its impact on a wider scale. To this purpose, an online platform and an observatory have been set up.

The online platform (www.innovazioneinclasse.it) is the place where the *Guide to design thinking for teachers* described above was made available.

Since its inception, the online platform has held an important role as it was created to be a hub for design projects and a place where teaching/learning activities could be documented. There teachers

uploaded also video-tutorials on how to use the tools in order to take inspiration for class activities and upload material of their own experiments. This guide is supposed to be a collaborative means for producing and sharing practice between teachers.

The guide is a project in progress, initiated by the pilot experiments conducted in the classrooms of innovative teachers and subsequently used by other teachers who started using the information was the method was spread. As an online-based means, the guide can be enriched over time with additional technical information and tools.

The project Observatory was born with the task of monitoring the training process with the aim of paying close attention to the entire process from its first experimental stages, and leaving plenty of room for quality assessing techniques such participatory observation and gathering life stories.

The techniques used (observation, interviews, questionnaires) have brought forth the following considerations:

- empathy with regards to the project (involvement, fun, innovation, etc)
- difficulties encountered in the application
- the quality of individual work and team work
- satisfaction for results achieved.

7   CONCLUSION

In conclusion we investigated the role of design for educators and delivered a co-designed guide that takes inspiration from design approach and techniques to be used for planning and implementing learning activities in class.

It is a new method of conceiving class work. The formative path becomes a project for the development of skills through participatory work which allows for: concentrating on content, develop competence in teaching and education, change habits, use problem solving in classrooms, play games and develop creativity as explained by Salman Kahn, founder of the Khan Academy. The method has found a natural compendium in the methodological guide. This guide is a support for all teachers who want to identify and experiment with new approaches of teaching students and want to keep an ongoing dialogue with teaching staff and between teachers and parents.

A collaborative environment was created for the Italian teachers who can build their own method of teaching and learning through a shared online course.

In conclusion, it appears that innovation in teaching methods does not consist solely of the use of technology, but rather of opening up to the requirements of contemporary education that will shape students to be the protagonists of their own lives in a complex society. Above all, it is about changing students' approach to classroom, where they can be the lead actors. The method enhances the acquisition of key skills, which will be fundamental for their future life.

With innovative design's approach the traditional methods of evaluation change so that it is not an isolated moment of grading but becomes the expression of inclusive teaching and responsible self-evaluation where all students can express themselves and are the stars of their own learning process.

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