EDUCATIONAL INNOVATION AND TECHNOLOGY

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Abstract. *The purpose of this article is to discuss why and how pedagogical practices and technologies need to be integrated at all levels in order to improve meaningful student learning. The first attempt to define pedagogical innovations with reference to the Creative Class Room (CCR) structure is presented. Within the CCR, innovation is seen as a deliberate activity taking place in a specific social, economic, technological, organizational and cultural context, designed to solve unresolved problems, and involving complex interactions between different actors who actively seek to learn from each other. From this perspective, pedagogical innovation, given the technological and digital learning environment, is a matter of integrating different levels of analysis, from the individual to the social and from traditional to the most innovative teaching and learning practices. It also discusses the need for a better understanding of how people learn and how technology should be used to enhance that learning, and concludes with a discussion of how creativity and innovation should face the "mundane" everyday challenges in the educational environment.*

Key words: *Educational innovation, technology, learning, teaching, creative class.*

ОБРАЗОВАТЕЛЬНЫЕ ИННОВАЦИИ И ТЕХНОЛОГИИ

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Аннотация. *Цель этой статьи — обсудить, почему и как необходимо интегрировать педагогические практики и технологии на всех уровнях, чтобы улучшить осмысленное обучение учащихся. Представлена первая попытка дать определение педагогическим инновациям применительно к структуре Креотивного Класса (СТК). В СТК инновация рассматривается как преднамеренная деятельность, происходящая в конкретном социальном, экономическом, технологическом, организационном и культурном контексте, предназначенная для решения нерешенных проблем и включающая сложные взаимодействия между различными участниками, которые активно стремятся учиться друг у друга. С этой точки зрения педагогические инновации, учитывая технологическую и цифровую среду обучения, представляют собой вопрос интеграции различных уровней анализа, от индивидуального до социального и от традиционных до самых инновационных практик преподавания и обучения.*

В нем также обсуждается необходимость лучшего понимания того, как люди учатся и как следует использовать технологии для улучшения этого обучения, и завершается обсуждением того, как творчество и инновации должны решать «приземленные» повседневные проблемы в образовательной среде.

Ключевые слова: *Образовательные инновации, технологии, обучение, преподавание, креативный класс.*

Introduction. The presence of technology in the learning environment (school, university, vocational training, refresher courses, etc.) does not necessarily entail a direct change in pedagogical vision or pedagogical practice. Simply placing computers, video projectors, and interactive whiteboards in classrooms is not the ultimate achievement of pedagogical innovation. For this reason, we consider it important to discuss the concept of technology-based pedagogical innovation, link this concept to learning theory, clarify the role of technology in relation to teachers and learning outcomes, and thus reflect at different levels of analysis in the study of the relationship between technology and outcomes.

Referring to a recent study from the European Creative Class Project (Bocconi, Campilis & Puni 2012), we can define pedagogical innovation as a collection of products, processes, strategies and approaches that significantly improve the state of affairs by becoming landmarks (Bocconi, Campilis & Pugni 2012). Puni, 2012). According to the Center for Educational Research and Innovation (CERI), promoting innovation in the learning environment is not easy at all. This is a task that requires a lot of commitment, it usually requires the ability to cope with numerous obstacles (CIS, 2009) and often leads to a slow pace of change. For example, Fullan (2011) argues that while laptops and video projectors are replacing blackboards and chalk in some countries, most students continue to fulfill their traditional role of “information consumers” rather than problem solvers, information producers, and innovators.

Innovative technology-assisted learning processes involve a complete overhaul of how we use and produce information and knowledge (Bocconi, Campilis and Puni 2012). This vision runs counter to the use of technology to replicate traditional teaching methods. It can be extended to formal and informal learning environments, adult learning, school and university.

However, the potential for innovation created by technology requires organizational, institutional and pedagogical changes. On a strictly pedagogical level, we believe that a good starting point is the "How People Learn" approach (Donovan and Bransford, 2005), recently mentioned in the Digital Classroom Project (Lopez, 2010). The approach puts forward five general principles:

learners learn better when knowledge merges with and/or develops from what they already know;

learners learn better when they work with others in the learning process, ask questions and reflect on what they have learned and how they learned it;

learners learn better when the information offered and the context are adapted to their cognitive needs;

learners learn better if what they are learning is fundamental and deep, and if individual competencies/capabilities are strongly tied to a principle/general concept, and if what they have learned has multiple applications;

students learn better when they are given feedback and/or given the opportunity to evaluate their own learning.

The five principles offer a framework that is useful in designing learning solutions to integrate technology into learning (Gentile, 2012).

An example of an interactive whiteboard

Interactive whiteboards can be an important resource for student engagement during lessons (Armstrongetal., 2005; Gentile, Pisanu, 2012; Greiffenhagen, 2000; Schmid, 2006; Wall, Higgnis, and Smith, 2005). However, problems of a different nature materialize around them:

one can observe an increase in the central role of the teacher and a decrease in collaborative interaction between students (Latane, 2002; Jonesand Tanner, 2002; Maor, 2003);

you can observe the acceleration of the pace in the lessons (Gloverand Miller, 2001) to the detriment of the quality of cognitive interaction between teachers and students (Smith, Hardman, and Higgins, 2006).

When used as a static technology, the interactive whiteboard does not lead to any noticeable change in teaching practices (Beauchamp, 2004; Glover, Miller, 20–09). In other words, technology alone does not encourage the use of more effective ways of learning.

Technology, computers and learning.

Technology can increase the likelihood of learning. However, we cannot unequivocally state that there is a direct relationship between technology and learning outcomes. Evidence in this regard is conflicting.

Hattie (2009), in reviewing a meta-analysis of different types of technology, found effects that ranged from 0.09 standard deviation2 for distance learning to a maximum standard deviation of 0.52 associated with interactive video-based learning methods. More specifically, meta-analysis shows that computers are used effectively:

when teachers use them as part of various teaching strategies;

with preliminary training in the use of a computer as a teaching aid;

when there are multiple learning opportunities;

when the student, and not the teacher, controls learning in terms of time, pace, material, task selection, etc.;

when teachers are attentive to the conditions of mutual learning;

when teachers are attentive to feedback.

Despite some conditions of use, technologies can influence the teaching/learning process, especially when they are aimed at students. Unfortunately, it is equally clear that the impact of technology on learning outcomes has produced conflicting results. One of the main reasons for this outcome may be related to methodological problems. For example, in a significant proportion of research, the main effect of technologies is not separated from other possible effects related to context and individual variables (CERI, 2010; Cox, Marshall, 2007). In our opinion, the levels to be considered should include the following:

school level: organization of the learning environment, presence and leadership from the school principal, peer support, etc.;

technological level: devices (computers, interactive computers, tablets, video projectors, software, etc.);

teacher level: competence in the use of technology, training in the use of technology, methods of teaching and classroom management, goals for using technology, etc.;

student level: competence and frequency of technology use, gender, socioeconomic status or marital status, psychosocial concepts such as motivation or self-efficacy, etc.

By limiting our findings to the content of this article, the overview above tells us that research follows a one-level logic and that it is still difficult for researchers to access the

undergraduate level, especially in Italy. Student data seems relevant and necessary to test technological innovation through measuring learning outcomes and learning outcomes. We hope that in the future attempts to consider more levels of analysis will be made more frequently, primarily in order to guide schools and teachers in technological integration in education.

This article also considers "creative classes", which emphasize the pedagogical, technological and organizational aspects of innovation. Conclusions taken from the European research project "Expanding Creative Classes in Europe" conducted by the ECJRC - IPTS December 2011 to June 2013 (SCALECCR). The aim of the study is to provide a better understanding of innovations for ICT-assisted learning and to identify policy recommendations for the further inclusion of ICTs in education and training (EandT) in Europe. In addition to the desk research, a number of existing cases were analyzed (eTwinning, Hellerup Skole and Notschool.net) that provide insight into the main factors and barriers to CCR implementation in the real world. The main results of the project highlight the multidimensional and holistic nature of Creative Classrooms as an innovative learning environment that fully realizes the potential of ICT for learning. The model consists of eight overarching and interrelated dimensions that capture the core nature of these educational ecosystems: content and curricula, assessment, learning methods, teaching methods, organization, leadership and values, interconnectedness, and infrastructure. A set of benchmarks has been developed for policy makers and practitioners to reflect the systematic approach needed to sustainably implement and progressively expand the creative classes in Europe.

Conclusions. In the history of technology, there has been a constant tendency to focus on the technical innovations of new tools at the expense of pedagogical reflection and sustainability assessment. It is the concept of innovation that is ambiguous. We are conditioned by the legacy of enlightenment that innovation = progress = improvement. If we bring technology to schools or other social environments, we are certainly making a difference, so we can say that we are innovating. The problem is to establish whether this innovation leads to a significant pedagogical "improvement" or not (Calvani, 2012). In a recent work in the Italian context, Gentile and colleagues (2013) have proposed a so-called learning problem solving approach (LSA). LSA involves the development of learning activities that are intentionally oriented towards achieving cognitive goals in accordance with the national curriculum. During the LSA (LSAA), students recall knowledge, interact with software, perform tasks on paper and pencil (writing, reading, calculation), collaborate with classmates, reflect on how and what they study. In this context, technology is one of the learning mediation tools, not the only one. The LSAA has five components: content, technology, collaborative assignments, formative assessment, feedback in terms of peer assessment, and teacher feedback.

In this article, I introduced technology as learning support tools (Walletal., 2005). For this reason, I think it is difficult to offer guidance to teachers on how to use them without a clear understanding of how students learn (Howlandetal., 2012). The LSA approach may be an attempt to support ICT-based integrated pedagogical innovation, starting from a gradual rather than a radical point of view (Cooper, 1998).

I believe that an innovation project based on the LSA can reach the level of educational innovation both locally and nationally if it helps to develop a key focus on the following points. First, the development and implementation of classroom-based solutions that help teachers integrate technology into subject-based teaching and learning. Second, encourage the open use of

hardware and software devices; provide students with many learning opportunities. Last but not least, provide ongoing support to teachers during the learning process.

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