Tassos Anastasios Mikropoulos *Editor*

Research on e-Learning and ICT in Education

Technological, Pedagogical and Instructional Perspectives

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Introduction

Information and communication technologies (ICTs) have their unique characteristics and thus afford specific actions. ICTs have certain affordances, defined by Michaels as "goal-directed … actions permitted an animal by environmental objects, events, places, surfaces, people, and so forth." Affordances "exist independent of being perceived" and "are specified by information and may be perceived" (2003). The affordances of ICTs are their characteristics to record, store, and process data and information. In general, the affordances of ICTs are their potentialities, i.e., (1) to represent information in multimodal, dynamic, and interactive ways and (2) to support synchronous or asynchronous communication. These affordances get specific forms in various ICTs configurations. Thus, the affordances of mobile devices include ubiquity and pervasiveness, geolocation, sensing, and finger control. The affordances of multiuser virtual environments (MUVEs) are multisensory intuitive and real-time interaction, immersion, presence, autonomy, natural semantics for the representation of objects and facts inside the virtual environments and worlds, users' representation through avatars, first-person user point of view, first-order experiences, size in space and time, transduction, and reification (Mantziou, Papachristos, & Mikropoulos, 2018).

In the field of education, the unique features of ICTs "afford actions that may be used in teaching and learning and consequently lead to learning benefits" (Mantziou et al., 2018). Thus, the learning affordances of mobiles include creation, multichannel communication, collaboration and cooperation, experimentation, real-time/anytime/anywhere information, and content delivery. In the same vein, MUVEs' learning affordances are free navigation, modeling and simulation, creation, multichannel communication, collaboration and cooperation, and content delivery. The potential of ICTs in teaching and learning is the perception and enactment of learning affordances of the environment by designing and implementing meaningful learning activities that can lead to learning outcomes (Dalgarno & Lee, 2012; Mantziou et al., 2018). These learning activities implement a series of instructional strategies that are based on certain didactic models and learning theories (Fig. 1).

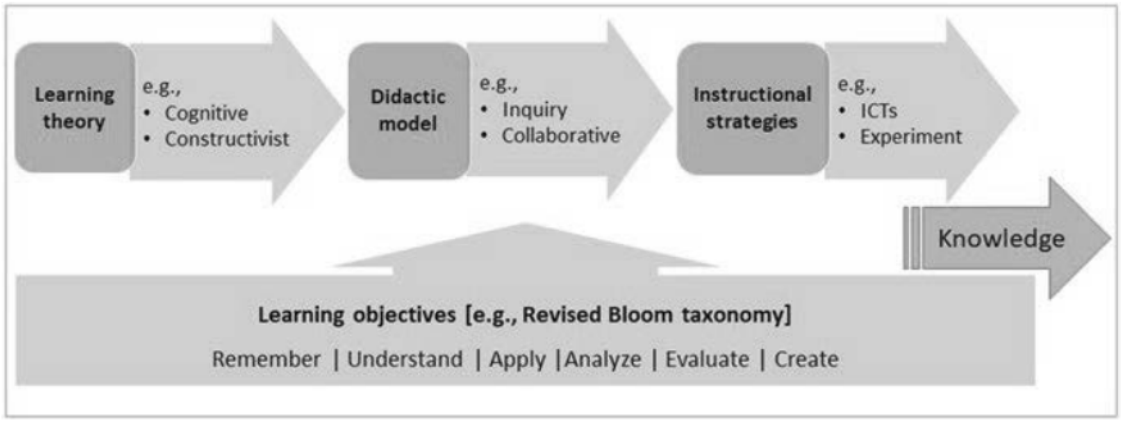

Fig. 1 Implementing meaningful learning activities with ICTs

Therefore, the introduction of ICTs in education has two sides, that of the technologies and the other of the pedagogical approach. There are different approaches to the pedagogical use of ICTs and in particular for each one of the different technologies. Nowadays, researchers propose theoretical approaches, develop ICTs tools, design e-Learning environments, conduct instructional interventions, and evaluate both the approaches and the tools.

This book reflects the above considerations and the current trends in ICTs. It comprises 23 chapters from researchers in Canada, Greece, Portugal, Norway, and Cyprus. Their work was presented at the 10th Pan-Hellenic and International Conference on ICTs in Education—HICICTE 2016, organized by the School of Education and the Department of Computer Science and Engineering at the University of Ioannina in Greece, in collaboration with the Hellenic Association of ICT in Education—HAICTE. Initially, the articles were positively peer-reviewed by at least two reviewers. The chapters of this volume are extended articles of the originals presented at the conference or were invited for this purpose and underwent an additional review process.

The 23 chapters constitute two main categories. The first category of the chapters concerns ICT approaches to the teaching and learning process, while the second one pertains to ICT interventions in the teaching process. The chapters relevant to the approaches of ICT in education and e-Learning concern (a) creativity and collaboration, (b) higher education, and (c) educational organization and professional development. The chapters regarding the interventions in the teaching process cover (a) digital educational games, (b) physics, computer science, and mathematics education, (c) educational robotics, and (d) vocational training.

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