

GENERAL TECHNOLOGICAL COMPETENCY AND USE

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Foundations

Research Problem

Digital technology has permeated all aspects of human activity and, as such, is requiring everyone to constantly adapt to this evolving reality. As education is always attempting to remain relevant, digital technology has been adopted, or at least introduced in classrooms in many fashions and for a great variety of purposes. Again, this required everyone in this field to adapt. What was unclear were the specifics of the needs to adapt. What should learners learn? What should teachers teach? What should teachers know? These basic questions gave rise to the development of many models and lists of learning objectives, skills and competencies from within the field of education, for every group of people involved in the educational process. The original objective of this particular project was, and remains, to develop a model of technological competencies that is to be consistent with other current educational theories as well as be completely applicable in any discipline or area of human activity outside of education, and therefore not limited to an pedagogical perspective. The premise is simple: if education is a social project, then it should be consistent with all other human activity - outside of education and so should our view of digital technology.

Many existing models and inventories or sets of standards were consulted both in french and in english literature, (i.e.: ISTE Standards; B2i and the C2i certification, [France]) to explore the overall validity of the model. So far, it appears that although there are some variations, all major models are converging on a very similar set of groupings as no matter what the starting perspective was, inevitably the basic designed functions of the technology itself tend to emerge as framing the general purposes or uses we can make of them. What remains to be seen of course, is with the development of ever newer and different digital technologies, will this model of four orders remain relevant?

Based on the works of scholars such as McClelland (1973), Gillet, (1986) and LeBoterf (1999), **A Competency** is considered here to be a set or an array of theoretical and practical knowledge, skills and values that can be readily called upon and put into action in a situation and context that is different from prior situations. Although training may provide initial necessary elements, such competency is considered to develop with varied experience and with the ability and confidence of the individual to adapt.

The **uses of digital technology** described below imply the development of **Four Orders of Competency**, either as a prerequisite to making effective and efficient use of the technology or as a result of using the technology for said purposes.

- Technical Order of Competency:** An array of practical knowledge generally developed through experience with the technology and applied as usable methods to interact effectively and efficiently with the technological object itself. This language and these commands and skills constitute the knowledge that the user will select from, using specific criteria derived from the analysis of a situation, to plan and use the technological object. It should be noted that although these Technical competencies are defined separately in this model, they are essential in any use of the technology, regardless of the intent.
- Social Order of Competency:** An array of practical knowledge generally developed by reflecting on results of a variety of communications experiences and centered on a genuine concern for the needs of others, in order to develop and use a strategy of thinking about, and acting with, others online, that would be safe, respectful, viable and ethical.
- Informational Order of Competency:** An array of theoretical and practical knowledge generally developed by reflecting on results of a variety of document gathering activities in order to extract usable methods for the aggregation, identification, selection, organization and interpretation of information.
- Epistemological Order of Competency:** An array of theoretical and practical knowledge about a specific discipline or domain, generally developed through formal studies or experience and applied as usable methods to use domain specific digital tools effectively and efficiently. This knowledge, translated into operational methods or schemas is required to assign information processing tasks (computational use) to a digital tool (such as a spreadsheet, a database, a photo or music editing system or any other information processing software, including programming languages and authoring systems), for identifying and solving of problems or for the accomplishment of specified tasks.

All digital technology is fundamentally comprised of a great variety of computerised hardware that is interconnected in broad networks. IEEE defines (computer) hardware as "physical equipment used to process, store or transmit computer programs or data" (ISO/IEC 24765:2009 Systems and software engineering vocabulary)

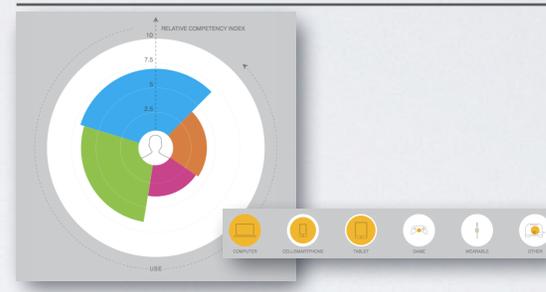
Other Models
 (ISTE; Pisa; B2i/C2i)

Competency Theories
 (McClelland, 1973; Gillet, 1986; Le Boterf, 1999)

4 Orders of Technological Competency
 (Desjardins, Lacasse, Bélair, 2001; Desjardins, 2005)

Uses of Digital Technology
 (Desjardins, 2007)

Nature of Digital Technology



GTCU Profile

Everything we do with digital technology is a reflection of the combination of our intent and the technical possibilities of the tools themselves. In other words, digital technology allows us to basically interact or communicate with people, store and access information and use the technology as tools to automate virtual or physical processes. As we do this, we develop new skills, new knowledge and new competencies.

The **GTCU Profile** instrument asks questions regarding these Technical, Communicational, Informational and Computational uses of digital technology and then groups the results along the same lines giving us the following four orders of competency: Technical, Social, Informational and Epistemological.

As we all tend to use technology for different purposes and in different ways, we develop skills and competencies that vary along these four orders. Some of this results from our professional environment, training and work requirements while some of this results from personal interests. The generated graphs using **Frequency of Use** and **Confidence of Use** as major indicators of competency, reflect these variations and thus illustrate our individual **General Technological Competency and Use Profile**.

Confidence of use

The whole notion of self-confidence in one's ability to perform a certain task being a direct influence not only on the personal motivation to act, but also on the motivation to improve, has been widely demonstrated to directly affect the actual behaviour and performance. As Albert Bandura (1977, 1989, 1994) suggested, this general concept of self-efficacy draws on past experience and performance as well as vicarious experience, social persuasion and emotional state to predispose an individual to perform a task. Confidence of use is therefore considered here to affect motivation that in turn will affect the potential for learning and for improving competency.

Frequency of use

As anyone makes frequent use of any knowledge or skill in response or a variety of problems or to complete different tasks, the different situations encountered will provide a constantly richer set of possible scenarios where solutions may work, or not. It is the breadth of this body of experience that will proportionally develop the possibilities of recalling an appropriate behaviour or of adapting known solutions for new problems. In addition, it should be noted that as the variety of tools used to perform certain tasks increases, the differences in experiences also increases the level of practical knowledge developed by the user. The relative competency of a user is therefore considered to grow with the breadth and frequency of experience.

- interact with other users (**Communicational Use:** transmit/receive)
- interact with documents (**Informational Use:** store/retrieve)
- assign and interact with processes (**Computational Use:** process programs or data)

