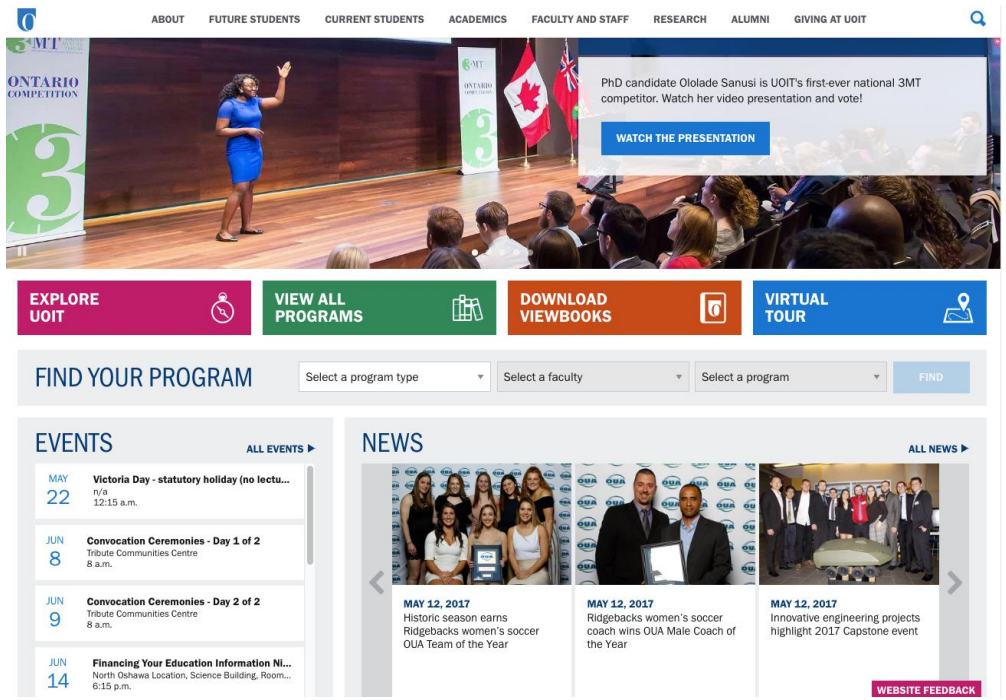
Measuring digital competence: Our experience in Canada, Ukraine and Georgia

Olena Mykhailenko

University of Ontario Institute of Technology



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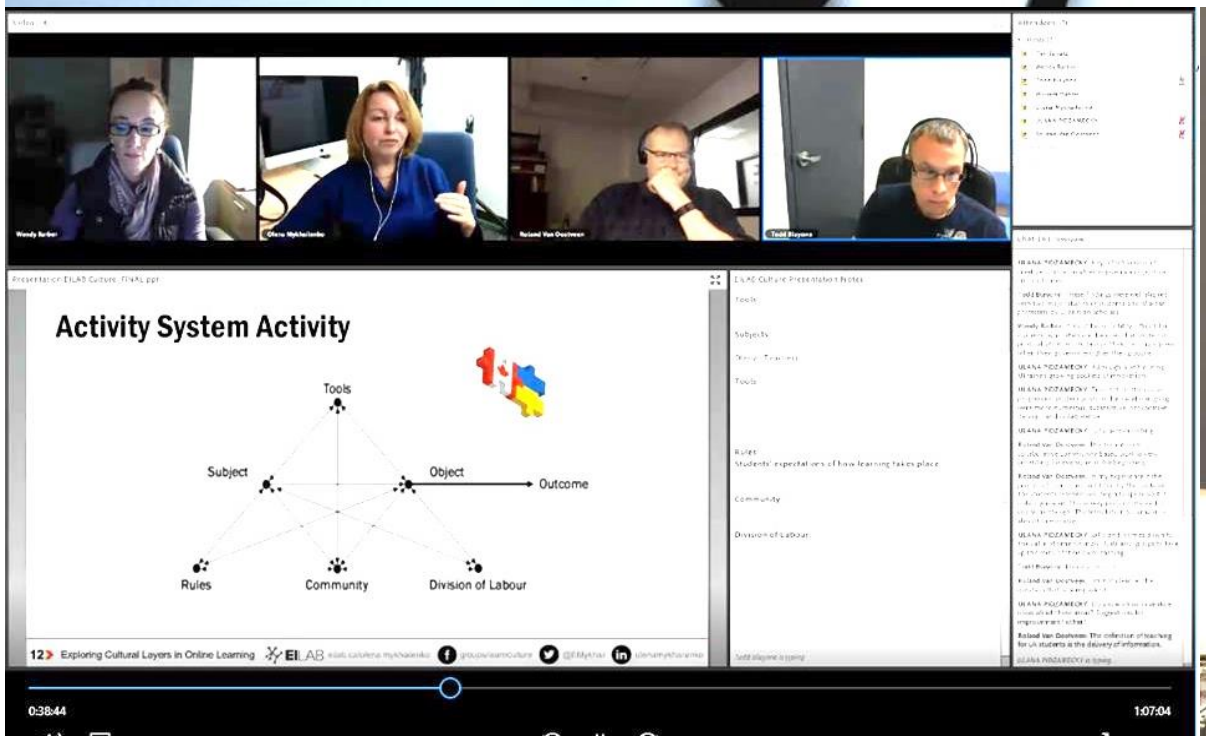
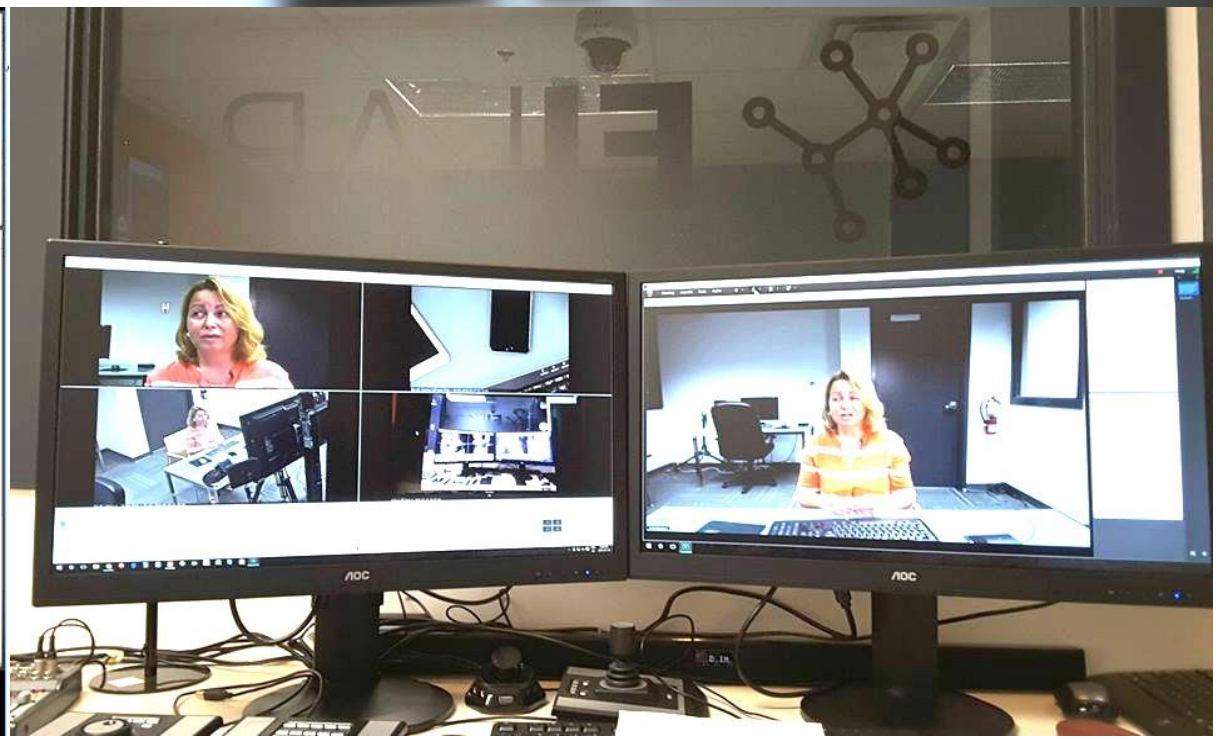




Post-Industrial Digital Learning Transformation Framework

- **digital**
- **collaborative**
- **authentic**
- **globalized**
- **democratized**

Mykhailenko, O., & Blayone, T. J. B., 2017

digital

- Mode: fully online, mixed, mobile, etc.
- Readiness: digital competencies

GENERAL TECHNOLOGICAL COMPETENCY AND USE

François J. Desjardins, Ph.D.
Ann-Louise Davidson, Ph.D.
Todd Blayone, M.A.
Roland vanOostveen, Ph.D.
Elizabeth Childs, Ph.D.

UNIVERSITY OF ONTARIO INSTITUTE OF TECHNOLOGY

EILAB

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.

Other Models

(ISTE; Pisa; B2i/C2i;)

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?

Competency Theories

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

Based on the works of scholars such as McClellan (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 new situation and context. Although training may provide foundational knowledge and skills, individual competency is considered to develop with diverse experience and and with the ability and confidence of the individual to adapt.

4 Orders of Technological Competency

(Desjardins, Lacasse, Bélair, 2001; Desjardins, 2005)

The three basic categories of **uses of digital technology** both require and lead to 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, use, interpretation and repurposing 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.

Uses of Digital Technology

(Desjardins, 2007)

Given the three basic functions that can be performed by the underlying computerized hardware, users can exploit digital technology to:

- 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)

Nature of Digital Technology

All digital technology is fundamentally comprised of a great variety of computerized 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).

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**.

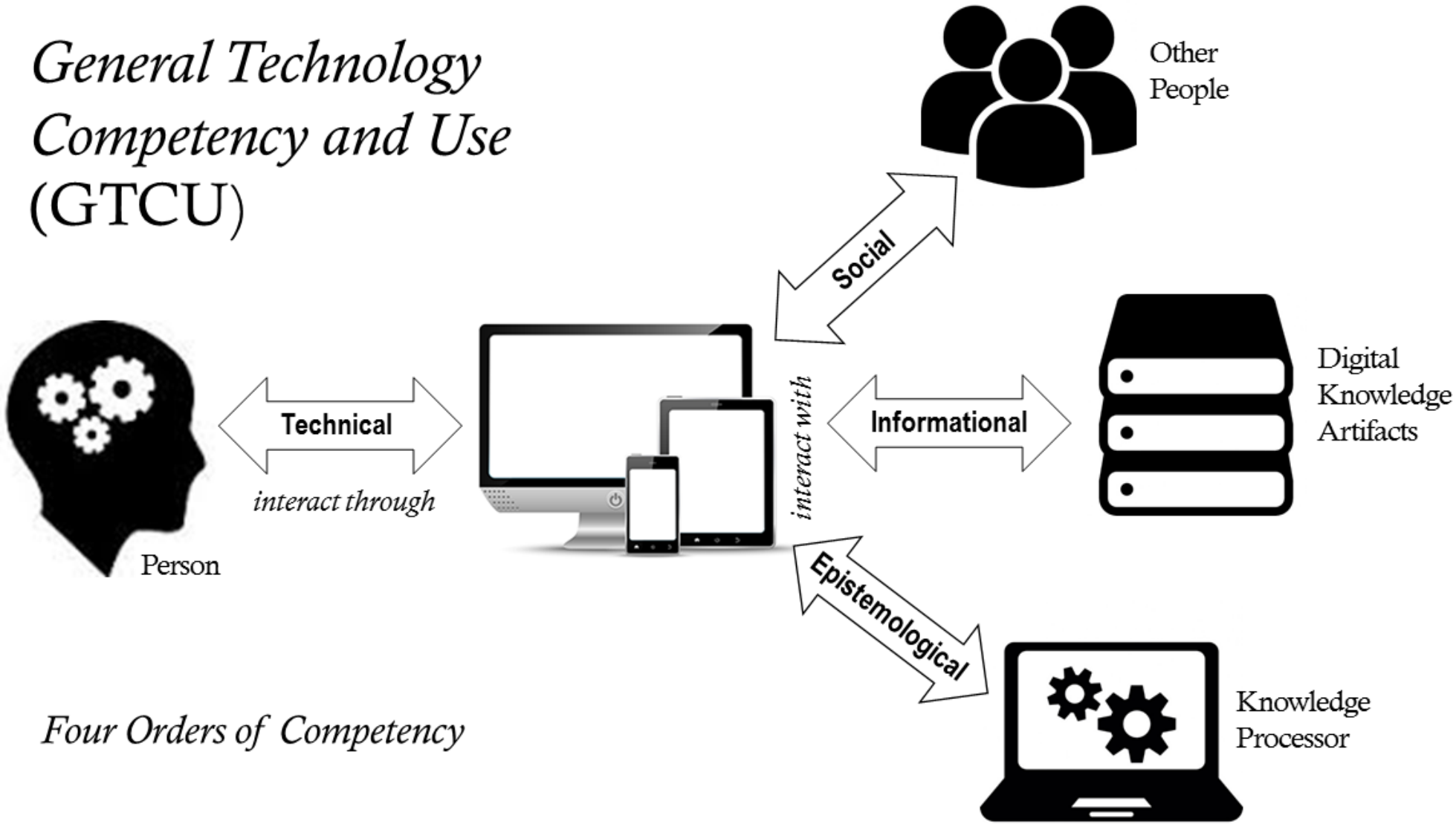
Confidence of use

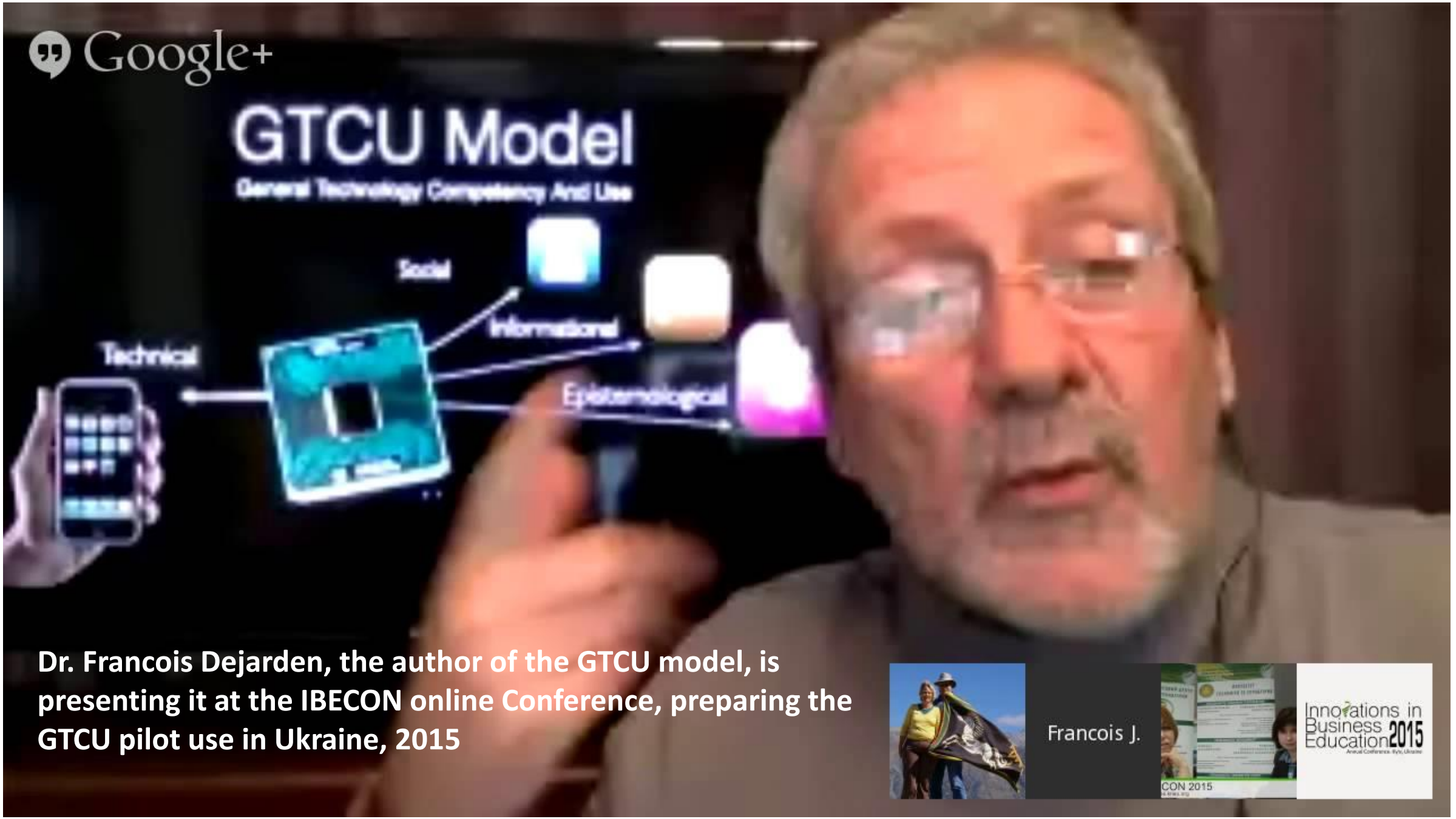
Confidence in one's ability to perform a certain task has been has been widely demonstrated to directly affect the actual behaviour and performance. In addition, it is thought to influence not only the personal motivation to act, but also the motivation to improve. As Albert Bandura (1977, 1989, 1994)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

Frequency of use

Making frequent use of knowledge or skills in different situations to address problems or complete tasks provides us with an evolving set of scenarios where solutions may work or not. It is the breadth of that experience that will proportionally develop possibilities for recalling an appropriate behaviour or of adapting known solutions to new problems. In addition, as we gain experience using a variety of tools, our practical knowledge, a major facet of general problem-solving and task-completion ability, increases. The relative competency of a user, therefore, grows along with the breadth and frequency of experience.

GTCU model for measuring digital competencies



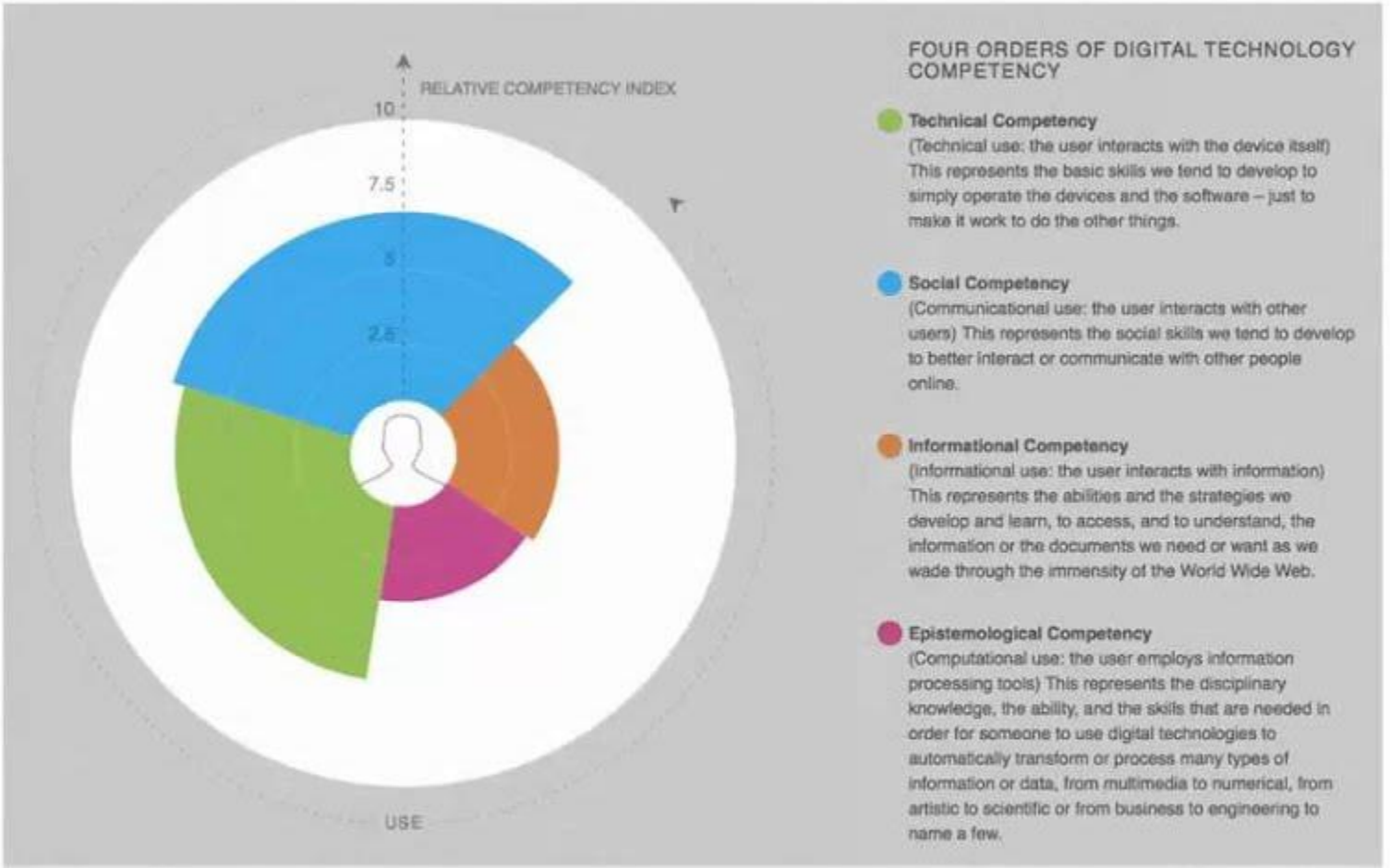

Google+
GTCU Model
General Technology Competency And Use
Social
Informational
Technical
Epistemological
Dr. Francois Dejarden, the author of the GTCU model, is presenting it at the IBECON online Conference, preparing the GTCU pilot use in Ukraine, 2015
Francois J.
CON 2015
Innovations in Business Education 2015

Relative competency index

- *Maximum **(10)** living exclusively in the digital world with some technology that does not exist yet!!*
- Median **(5)** Very confident and experienced technology user
- **(2.5)** Occasional technology users with a life in the real world!

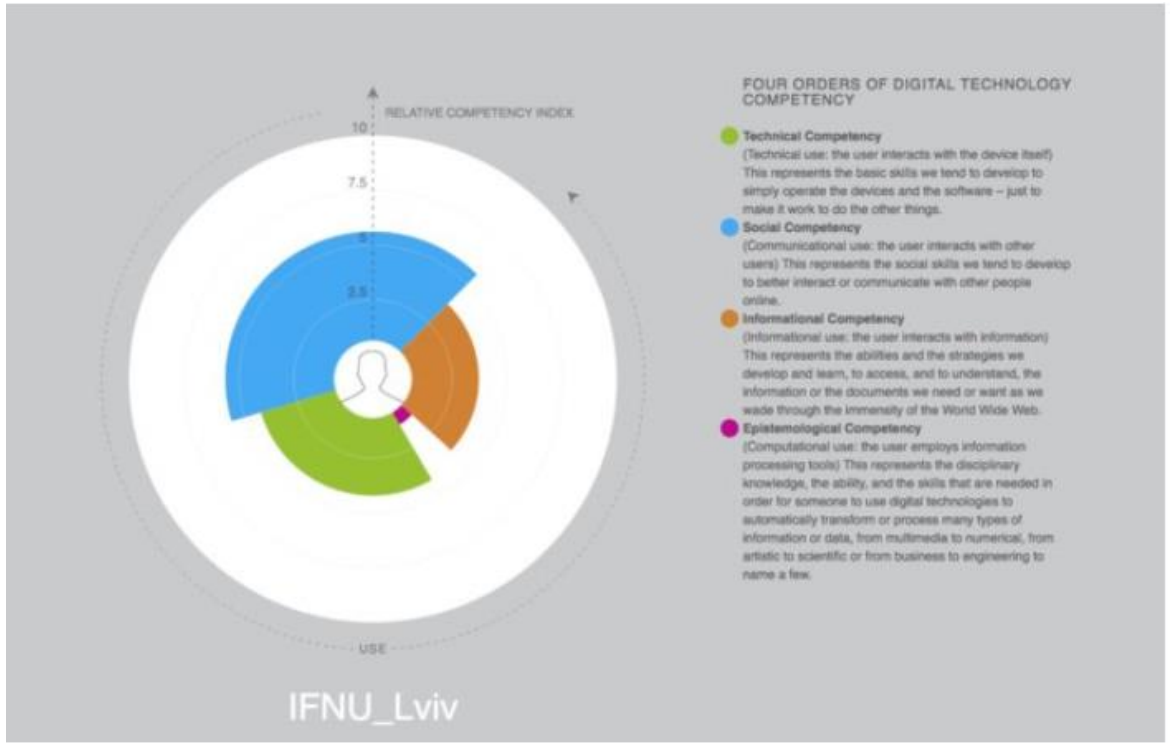
Use

- relative amount of time spent using technology for each purpose

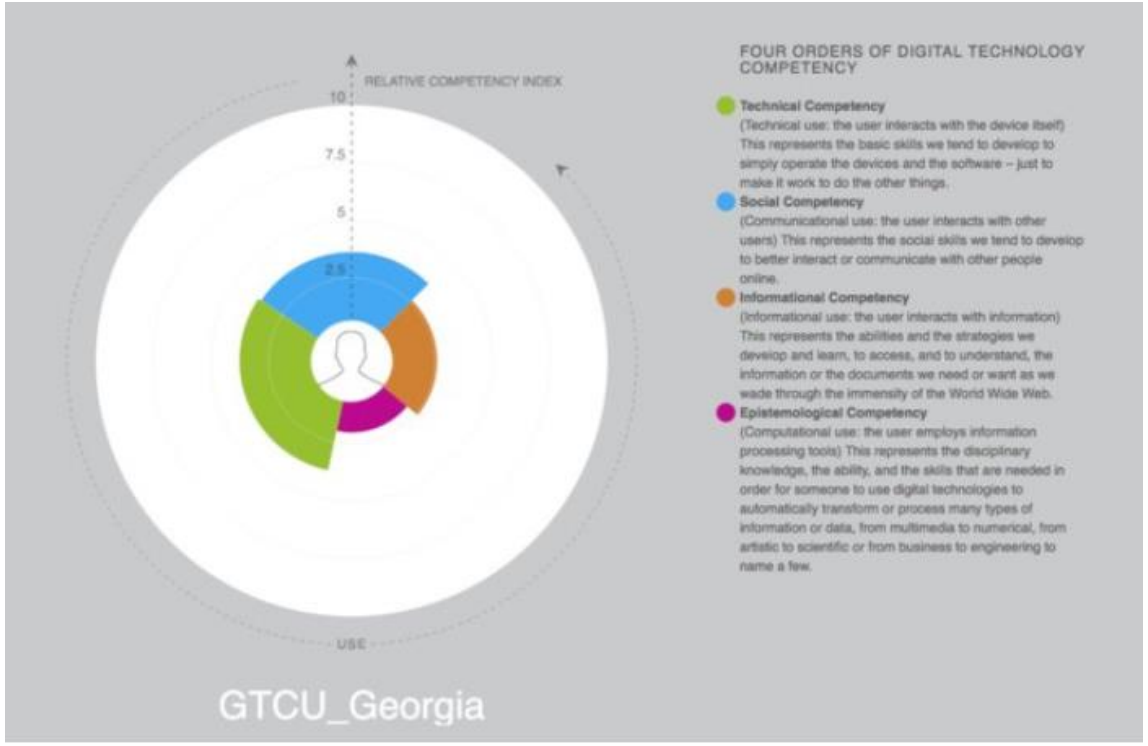


Ukrainian students are getting surveyed on their digital competencies (using GTCU), 2015-2016

Ukraine-Georgia digital competency comparative study, 2017
Digital competency profiler (DCP)



Profile of **Ukrainian** participants as produced by the DCP (Ivan Franko University of Lviv, N=232)



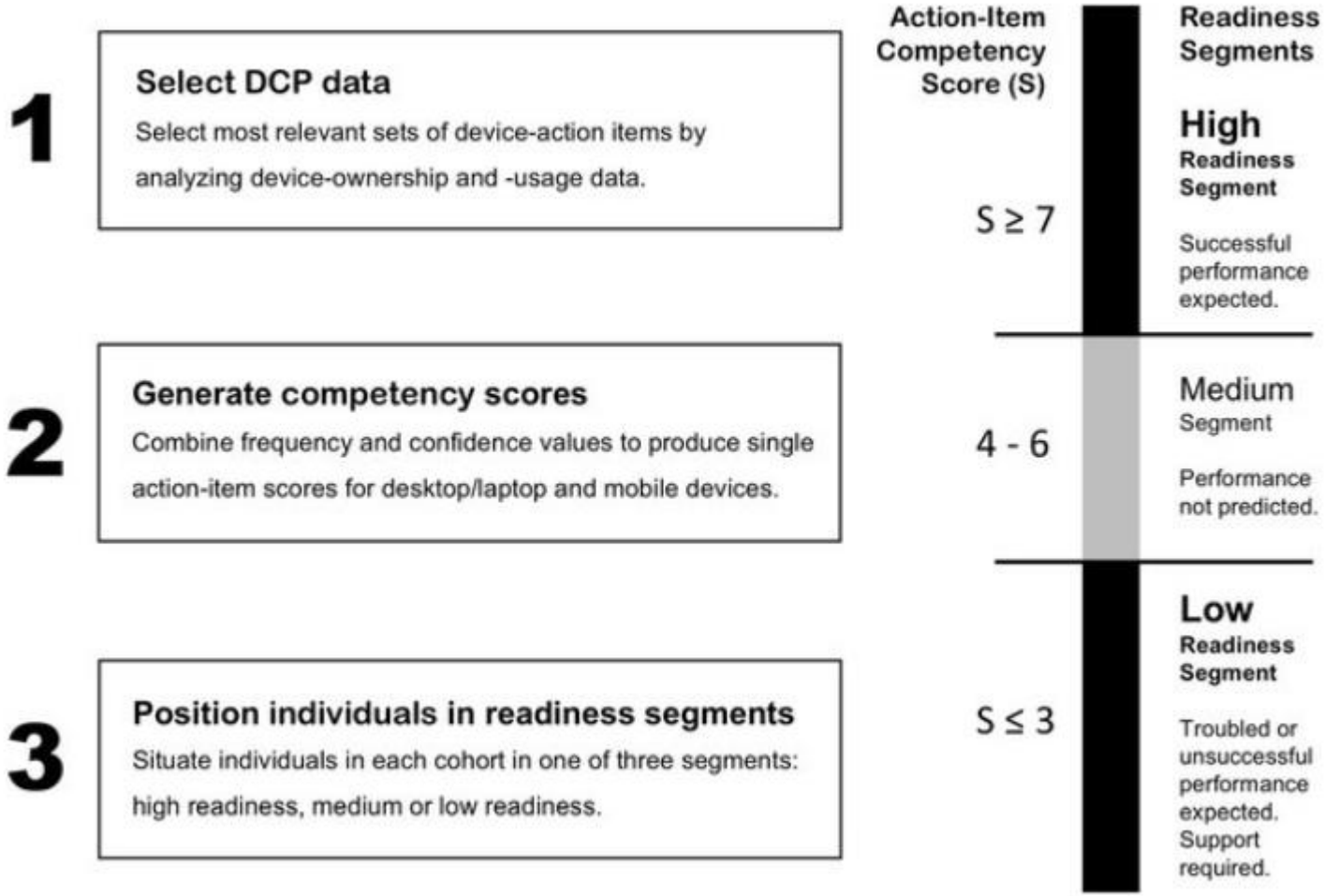
Profile of **Georgian** participants as produced by the DCP (Batumi State Maritime Academy, N=213)

Performance-based method of measuring digital skills (author - T.Blayone)

Performance Activity Recording Station in EILAB UOIT

An example of a participant's performance timeline

DCP data-analysis methodology



Our publications on digital competency instruments, and its assessment in Ukraine and Georgia

T. Blayone, O. Mykhailenko, M. Kokhan, M. Kavtaradze, R. vanOostveen, and W. Barber, "Profiling the digital readiness of higher education students for transformative online learning in the post-soviet nations of Georgia and Ukraine," *International Journal of Educational Technology in Higher Education, pp. x-xx, 2018.*

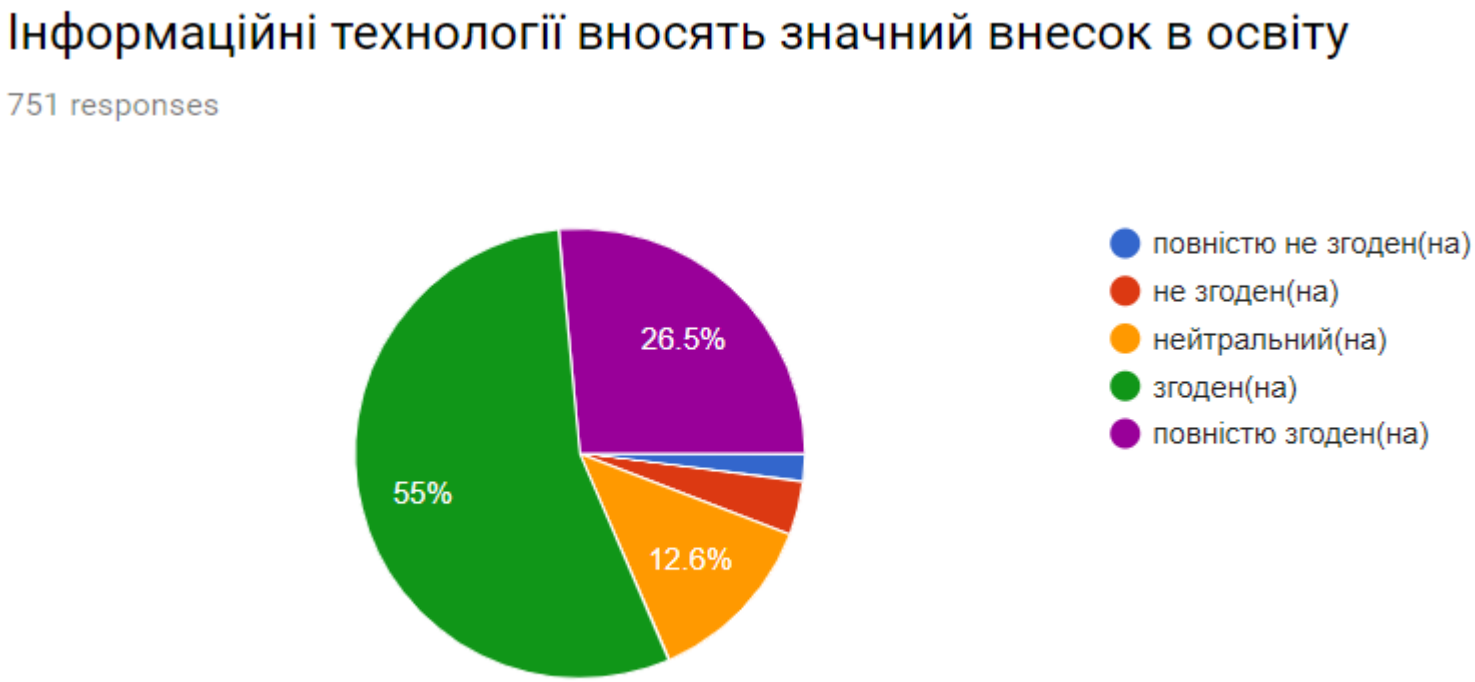
T. Blayone, O. Mykhailenko, R. VanOostveen, O. Grebeshkov, O. Hrebeshkova, and O. Vostryakov, "Surveying digital competencies of university students and professors in Ukraine for fully online collaborative learning," Technology, Pedagogy and Education, vol. 27, no. 3, pp. 1-18, 2017.

T. Blayone, "Readiness for digital learning: Examining self-reported and observed mobile competencies as steps toward more effective learner readiness assessment," Masters Thesis, Faculty of Education, University of Ontario Institute of Technology, Oshawa, Canada, 2017.

T. Blayone, "Reexamining digital-learning readiness in higher education: Positioning digital competencies as key factors and a profile application as a readiness tool," *International Journal on E-Learning, vol. 17, no. 4, pp. 425-451, 2018.*

O. Mykhailenko and T. Blayone, "Post-industrial learning: Where are we going?," in *Weekly Mirror vol. 43-44, ed. Kyiv, Ukraine, 2016.*

Current data collection on Attitude toward IT: Ukrainian students and professors



About 1/5 are still not sure if digital technology significantly contribute in education.

Not a good sign!


A lot of work ahead!