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Rethinking ICT literacy: From computer skills to social network settings

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ABSTRACT

This paper starts from the perspective that the current conceptualization of educational assessment is out of date, but particularly with regard to conception of information and communication (ICT) literacy.

We initially provide a brief summary of the idea of a 21st century skill, then trace the conceptual changes in the idea of ICT literacy in four main steps:

First, we briefly describe a concentration of knowledge about computers and their use, coalescing into the concept of ICT literacy in the early years of the field.

Second, we describe the transition to a view of ICT literacy as a broad set of skills that have links to many traditional and non-traditional school subjects, and the move to technology integration in education.

Third, we see the next transition for ICT literacy expressed as progress variables that are essential tools for the design of curriculum and assessments.

Fourth, we discuss the impact of the "social network" perspective on ICT literacy—the critical need for building the power of virtual skills through proficiency with networks of people, information, tools, and resources.

In summary, we offer a new framework for assessing student ICT learning, based on a learning progression and social networking point of view. Throughout, we use extensive examples to help illustrate our review of the broad sweep of this development, and, as a part of the conclusion, we speculate about the coming next steps.

1. Introduction

Information and communication technology (ICT) literacy has been seen as one of the key educational goals for the 21st Century. For example, consider this joint statement from three information technology companies:

> The economy of leading countries is now based more on the manufacture and delivery of information products and services than on the manufacture of material goods. Even many aspects of the manufacturing of material goods are strongly dependent on innovative uses of technologies. The start of the 21st century also has witnessed significant social trends in which people access, use, and create information and knowledge very differently than they did in previous decades, again due in many ways to the ubiquitous availability of ICT. (CIM, 2008, p.1)

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One can assume that this broad change will contribute to large effects on the personal and working lives of many people, and thus will also have large effects on the educational systems that prepare people for their lives and careers. This will include the characteristics and labels of the subjects that are taught in schools, the instruction for those new subjects (and the traditional subjects), and how education is structured. Current changes in educational policies, such as in the U.S. Common Core Standards (e.g., CCSSI, 2010) and the Next Generation Science Standards (NGSS Lead States, 2013), are examples of efforts to cope with these broad changes. We see the movement toward 21st Century skills (Binkley et al., 2012), in general, and toward new forms of ICT literacy in particular, as further examples of the same. We will begin with an initial broad definition of information and communication technology literacy (although this will, of course, deepen and change as our account progresses): information and communication technology literacy is a set of skills associated with the use of contemporary technologies for information processing and communications. The definition is deliberately variable with respect to technological developments over time—this will involve changes both in the technologies themselves (both hardware and software), and also in the range of human activities that are facilitated by those technologies. In fact, it reaches back in historical time, and hence can be seen to include the use of Morse-code on telegraphs, handwritten letters, glyphs carved in stone, and even ancient Greek on shaven heads[1]!

The perspective of schooling and assessment that this paper starts with is that the current conceptualization of educational assessment is out of date in some respects. First, in business, knowledge is applied across disciplinary boundaries in the process of dealing with real problems, but in schools the subjects are based on traditional disciplines. Second, in business, people work both alone and in groups to share complementary knowledge and skills and attain common goals—this is in contrast with the usual situation in schools and assessments where students are required to work on projects and take tests individually. Third, in business, workers have access to large amounts of information and to technological tools, where the task is to craft an efficient and satisfying solution, which differs strongly with the typical practice of "closed book" standardized assessment. Fourth, in business, problems are contextualized in particular situations, which are not structured to be addressed by simply recalling knowledge or working through simple algorithms, which differs from a great deal of typical education in schools, but most strongly the context of standardized testing (CIM, 2008, for all four points). We see that these changes in the nature of work in the workplace have led to changes in the concept of ICT literacy, and, in this paper, we trace the steps of those changes.

The efforts described in this paper were grounded in the Assessment and Teaching of Twenty-First Century Skills project (ATC21S—Griffin, McGaw, & Care, 2012), which was launched in 2009 as a response to these transitions in the world economy due to developments in information and communication technologies. It was founded, in an unusual collaborative effort, by three information technology companies (Cisco, Intel, Microsoft—CIM) with a broad group of academics from relevant disciplines (Griffin et al., 2012).

In this paper, we provide a narrative review of the developments in the concept of ICT literacy over the last 25 years or so. We see that the concept of ICT literacy has changed a great deal during these years: from a conceptualization as a specific domain of knowledge about computers to an understanding of it as a domain-general or transversal 21st century skill. In doing so, we initially provide a brief summary of the idea of a 21st century skill (in Section 2), then trace the conceptual changes in the idea of ICT literacy in four main steps:

In Section 3, we describe a concentration of core knowledge and skills about computers and their use, coalescing into the concept of ICT literacy in the early years of the field.

In Section 4, we describe the transition to a view of ICT literacy as a broad set of skills that have links to many traditional and non-traditional school subjects, and the move to technology integration in education.

In Section 5, we see the next transition for ICT literacy expressed as progress variables that are essential tools for the design of curriculum and assessments. The "progress" view depicts the need to understand initial ICT knowledge likely to emerge followed by a developing picture of mastery.

In Section 6, we discuss the impact of the "network" perspective into ICT—the critical need for building the power of virtual skills through proficiency with networks of people, information, tools, and resources. We offer a new framework for assessing student ICT learning, based on a learning progression point of view.

Throughout, we use concrete examples to review the broad sweep of this development. Finally, we review these changes in a Conclusion section, and briefly speculate on developments for the future.

2. Connections between 21st century skills and ICT literacy

In this section, we provide a brief summary of the idea of a 21st century skill, and relate it to ICT literacy. For the ATC21S project mentioned above, sets of 21st century skills were identified based on an analysis of twelve relevant prior 21st Century skill frameworks drawn from a number of countries and international organizations (Binkley et al., 2012). These included the OECD and countries in Europe, North America, and Asia/Oceania. In the new framework, called "KSAVE," the ten components of the framework encompass not only skills, but as the acronym implies, knowledge (K), skills (S), attitudes (A), values (V), and ethics (E). KSAVE organizes the ten components into four conceptual groupings, ways of thinking, ways of working, tools for working, and living in the world, as shown in Fig. 1.

[1] As was used by Histiaeus, the tyrant of Miletus (late 6th century BC).