21st Century Skills = 3Rs + 4Cs

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There is widespread agreement amongst educators and the general public about the importance of the traditional fundamental building blocks that underpin learning. These skills are often referred to as the 3Rs – reading, writing and arithmetic. However, for success in the 21st century, mastery of the 3Rs is not sufficient in itself. The American Management Association, a leading body that provides services to businesses and government agencies, commissioned the Critical Skills Survey in 2010 and identified that employers want their employees to have more than the basic 3Rs. In fact, for workforce readiness in the 21st century, employers want their employees to have developed skills in the 4Cs, which are: critical thinking and problem solving; effective communication; collaboration and team building; and, creativity and innovation.

Developing a workforce which has competence in the 4Cs is clearly a challenge in itself. There are those groups like Partnership For 21st Century Skills - a national American organisation - that promotes the importance of 21st century readiness for every US student by fusing the 3Rs and the 4Cs and providing resources and tools for these skills.

Technology is an important component for the development of the 4Cs. Students in the 21st century live in a technology and media rich environment where they have access to a plethora of information, new, powerful digital tools, and the ability to collaborate and communicate with others. To be effective in the 21st century, students need to be able to demonstrate the 4Cs in relation to an online world. It is tempting, then, to believe that the simple way to address the development of the 4Cs is by providing students with computer devices. Certainly there has been a good deal of government policy that has been based on the assumption that access to technology is the key to achieving success and there is no doubt that access is an important precondition. However, there is now abundant evidence that simply providing students with mobile devices such as netbooks, iPads, tablets, and laptops will not develop these skills. Providing students with these devices in a classroom will not enhance their learning, but rather their engagement in learning. Therefore how these devices are used in the classroom is important.

According to Rueben R. Puentedura, who developed the SAMR Model for technology adoption, technology usage is divided into four distinct categories as seen in Figure 1 below.



FIGURE 1 SAMR Model for technology adaption

In this model, *substitution* is the lowest level of technology usage and occurs when technology is used to simply replace whatever was being done without technology. For example, a word processor – without the use of enhanced features for editing - is used as a substitute for pen and paper. At the next level is *augmentation* where the technology acts as a direct tool with some functional improvement. The difference between *substitution* and *augmentation* is the use of features to improve the product such as the use of, to follow the previous example, basic functions of the word processor such as cut, paste and spell checker. These two levels of technology use are defined as the *enhancement* stage.

It is at the next level of *modification* that there are the more significant effects on learning. Whereas, at the previous stages, the task could have been completed perfectly satisfactorily without using technology, at the *modification* stage the task becomes something quite different. So that rather than complete a word processed piece to be printed out, the writing becomes part of a blog, wiki or social network exchange. The final stage of *redefinition* is where the technology allows for the creation of new tasks previously inconceivable. This final stage is hard to describe as we are constantly redefining what is possible through technology. These two levels of technology use are defined as the *transformative* stage.

While the use of technology in the *enhancement* phase can be useful, student mastery of the 4Cs is really only going to happen through technology when we are operating in the *transformative* space. The danger is that so much of what occurs with technology usage in schools is at the enhancement rather than transformative levels. Therefore we are not providing the appropriate technological conditions that will allow our students to develop a mastery of the 4Cs.

The task for schools is to cultivate the professional learning of their teachers to further extend their students' development of these 4Cs. There is still much to do with respect to professional development, especially in the use of educational technologies for learning, and teaching in this area remains underdeveloped.

Clearly, there are limitations in how teachers in schools use educational technologies. If teachers' personal use of digital tools doesn't generally extend beyond the use of word processing, emailing and researching the Internet, it is little wonder that students do not have a broader skill set. The limited use of technology by teachers can often be explained by the functional nature of the skill set obtained. Teachers might well acquire the necessary skills to execute their duties in terms of writing reports, preparing worksheets or answering emails, but, too often, do not learn what might be necessary to develop teaching and learning with technology in the classroom.

The challenge is, then, not to ask teachers what professional development they think they need to improve their own skills but rather to focus on professional development they need to do in order to improve classroom practice. Hattie (2009, p. 35) argues that "It is what teachers get the students to do in the class that emerged as the strongest component of the accomplished teachers' repertoire, rather than what the teacher, specifically, does. Students must be actively involved in their learning, with a focus on multiple paths to problem solving." Professional development needs to focus on what teachers can get their pupils to do so that the use of technology can help students to master the 4Cs.

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