21st century skills: the tools students need

by Juliana Lapek

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introduction

We live in a world where everything moves and changes very quickly. This is because technology is developing and improving at a rapid pace. It sometimes seems like a new device or application is available to us every day. To be clear, this rapid technological development is not limited to personal communication devices like phones and computers. Transportation, medical, manufacturing, and other technologies are being developed and implemented at a faster pace as well. While many adults struggle to keep up with the flood of new technologies that the turn of the 21st century has brought, what does this rapid technological advancement mean for our students and children?

If the world continues to change at its current rate, many of our students will need education and training for careers that do not yet exist (ISTE, 2016). As a result, education needs to shift from teaching students how to acquire knowledge, to teaching students how to use knowledge so they are prepared for new and innovative careers (ISTE, 2016). If today's students are expected to survive and thrive in a technology-driven world, they must be given opportunities to "[develop] adequate life and career skills" that differ from those we—parents and teachers—were taught as children (Morrison, et al., 2015, p. 245). It is no longer enough for students to be proficient in math, reading, and writing; today's students need to have more tools at the ready. These tools generally come in the form of 21st century skills.

21st century skills

21st century skills are a "broad set of knowledge, skills, work habits, and character traits," that many people believe are necessary for success in a technological world (21st Century Skills, 2015). Although 21st century skills can be hard to define, critical thinking, problem solving, collaboration, communication, and creativity are often included in lists of essential modern skills (Dickstein). Students with these abilities are better able to adapt to new situations, solve their own problems, share their ideas, and reflect on how their actions affect others. All 21st century skills allow students to adapt and be more responsive as the world around them changes. Once developed and mastered, these skills will go with the students for the rest of their lives. As adults, they will be able to react positively to inevitable changes in the world around them and solve problems that arise as a result of these changes.

Another emerging 21st century skill is the idea of technological literacy. Often stressed in technology and engineering education curricula, technological literacy is the "ability to use, manage, assess, and understand technology" (as cited in Ward, 2015, p. 18). That being said, technological literacy goes beyond being able to operate a computer; it also involves understanding the implications, consequences, and trade-offs of using technology in order to make "informed and responsible decisions" about the development and use of technology (Strimel, 2014, p. 16). With technology playing an increasingly significant role in society, it is more important than ever that our students are technologically literate. Not only do they need to be able to efficiently and effectively use the technology available to them, but they must also make decisions about technology that could impact generations to come.

preparing students with problem-based learning

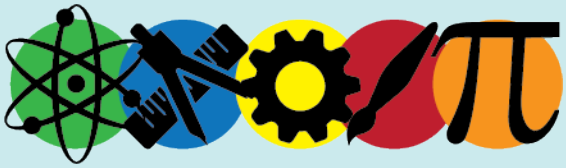
As teachers, we are the people responsible for preparing our students for life in the real world. Clearly, teaching 21st century skills is of the utmost importance if we wish our students to be successful in the current, technology-driven society. As educators we must ask ourselves, "What is the best way to instill these important skills in our students and prepare them for the future?" Traditional teacher-centered lecturing is not going to be enough. The

essence of teaching 21st century skills is for students to "learn to develop their own ideas," test and share those ideas, and use input from their teachers and peers to further develop their ideas (Prettyman, et al., 2012, p. 11). This active and student-centered type of teaching and learning is best reflected in the problem-based learning method. Problem-based learning is an educational approach that provides students with authentic, hands-on learning opportunities in which to work together to solve real-world problems.

The reason problem-based learning is so crucial to the development of 21st century skills is that problem-based learning "emphasizes higher-order skills" like critical thinking, creativity, and problem solving, instead of "lower level skills...[like] memorizing facts and repeating procedures" (Morrison, Roth McDuffie, & French, 2015, p. 245). In other words, instead of teaching students one right solution to a single given problem (as is often seen in traditional teacher-centered techniques), problem-based learning teaches students how to go about solving any problem with which they are faced. Problem-based learning teaches students how to think for themselves and become better at finding the resources—information, tools, and materials—that they need in order to successfully solve problems.

problem-based learning in technology and engineering education

As technology and engineering teachers, we are best positioned to implement problem-based learning in our schools and foster 21st century skills in our students. Participating in engineer-



ing activities—like those often seen in technology and engineering education classrooms—allows students to develop 21st century skills in a meaningful way through hands-on activities (Meyer & Tauer, 2015). The authentic and problem-based activities found within many technology and engineering education curricula provide students with opportunities to think critically and creatively, collaborate with others, and communicate their results verbally or in writing. In essence, the activities we do every day in technology and engineering education already incorporate problem-based learning practices. In addition, with a focus on technological literacy already prevalent in technology and engineering education, much of our problem-based learning is centered on the use, development, and effects of technology. As a result, our students can develop their entire 21st century skill set in a single technology and engineering activity.

Students who have had opportunities to exercise their 21st century skills in school through technology and engineering education or with other teachers who embrace and integrate problem-based learning in their classrooms, are better prepared to face the ever-changing world around them. Unfortunately, we don't know what the future holds. As educational reformer, John Dewey, once said:

> It is impossible to foretell definitely just what civilization will be twenty years from now. Hence, it is impossible to prepare the child for any precise set of conditions. To prepare them for the future means to give them command of [themselves]; it means to train them so that they will have the full and ready use of all their capacities; that their eye and ear and hand may be tools ready to command, that their judgment may be capable of grasping the conditions under which it has to work, and the executive forces be trained to act economically and efficiently (as cited in Gomez & Albrecht, 2014, p. 15).

As Dewey pointed out, we do not know how society will change over time. Today the world is shifting more rapidly than ever before, so the future is even more unclear. As a result, if we want our children and students to flourish in the modern world, it is important to equip them with not only academic content knowledge, but also with general skills, like those classified as 21st century skills. If properly equipped with the skills they need, our students will be able to face any situation with confidence and be successful regardless of the uncertain future.

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