

Education in a Smart City: Future Impacts on Education?

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Keywords: these are the keywords, these are the keywords, these are the keywords.

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1. Editorial

The concept of a “Smart City” is a natural evolution of the use of technology in today’s densely populated areas. While the term can have many different meanings, many would agree that a Smart City is a forward thinking city that uses technology to improve its infrastructure, capital, and quality of life for its citizens, while emphasizing sustainability. Often it is characterized by the seamless integration of ICTs into the many facets of daily life. This may include the use of communication devices in cars to track and coordinate traffic patterns, having reactive smart grids to adapt to changing power consumption and even having publicly available free Wi-Fi to promote digital inclusion. Chourabi et al [1], have compiled a list of various definitions of “Smart Cities” in order to understand what it is to be in this category. One particular definition that stands out is by Hall et al [2], which describe a smart city as:

“A city that monitors and integrates conditions of all of its critical infrastructures, including roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens.” (pg. 2290)

The idea of a smart city is also something that we are already a part of, even if on a very small scale. It involves a reactive city framework and exchange of large amounts of information that can be used to enhance productivity, safety and efficiency. It could even involve improved civic engagement through expanded Web 2.0

technologies, or enhanced technology driven public safety systems [3]. While there are many initiatives and pilot projects towards making cities “smarter”, there is still much to be accomplished. However, as we make this transition with deeper integration of technology, there are certain aspects where we should consider its impact, specifically in education.

What of education in the context of a smarter city? With the increase in student enrolment and demand for quality content, coupled with increased population growth, certain elements of the education system will need to be changed. We will need to make better use of resources while improving the system overall, all while balancing increases in demand. Through technologies and improved key infrastructures this may be possible, but not without some complications. One shift may be the classroom concept itself, by making more content available online. While there is certainly more colleges and universities offering additional online courses, this trend would have to continue to meet demand. Limited physical space and resources in schools, along with newer generations of learners more comfortable with technology would be a driving force. As interactive media has improved the ways in which we can communicate with each other and share knowledge, more online education seems to be a natural progression. The quality of these online courses would need to be addressed. While there is still much to be improved over current online teaching models, many educators have dedicated themselves to make these improvements. Solutions would be needed to make sure that all learners would have equal access. Even in a technology driven city, not all would be able to afford the associated costs, potentially widening the digital divide. Continued community support for open access, libraries

and accessible public schools would be essential. All the added technology would increase access for some, provide additional flexibility for others, but would greatly restrict many students. Additionally, with the amount of data that could be collected on each learner, the possibilities are great for enhanced learning. Information can be collected on each student throughout their entire educational experience, through elementary school, to high school and beyond. This information can be used to track learned competencies and also could be used to adapt to a student's particular learning style in a more personal way. Educators can track trends and changes in a way, never before possible to identify strengths and weaknesses. This could also address some of the previous issues of quality and also identify students who are having problems with accessing content. Since the likelihood of additional demands on educators would be quite high, automated adaptable systems could be used to make recommendations to help students practice some topics further, and challenge them in other topics. This would also allow students to move more at their own pace.

In an article by IBM Global Education [4], a future view of education as changing by technology, discusses many of these ideas in a similar context. Five key "signposts" are discussed which include:

1. Technology Immersion,
2. Personal Learning Paths,
3. Knowledge Skills,
4. Global Integration and,
5. Economic Alignment.

In the article it's argued that since students are more conformable with technology and have grown up immersed, expectations will be different for future generations; this is discussed as part of *Technology Immersion*. Students will want to be able to access information on various devices and be able to access information at any time. As part of *Personal Learning Paths*, information will be custom tailored and relevant for living in "today's world". The article also discusses the benefits of portable student educational records that could be transferred across institutions, allowing for more consistent education. As related to *Knowledge Skills*, the article emphasizes collaboration and improvement of knowledge of educators and educational delivery systems. This would allow for better curriculum design, methodologies and planning. *Global Integration* deals with the sharing of resources on a wider scale as the educational systems are forced to do more with fewer resources. Having global integration and connectedness, would allow for the sharing of best practices and knowledge, but also key resources when one educational system may need assistance or need the expertise of another. The last signpost, *Economic Alignment* discusses education as an integral part of the entire system, as an element that supports many areas of society. Since educating members of society is important for

advancement and growth of that society, this aspect emphasises investing in the future.

It is difficult to even speculate what the future will hold for education, other than we know technology will play a role, and it will have a great impact. I'm hopeful that with the multitude of educators and researchers pressing forward with many projects and initiatives, that the impact will be positive. At each turn, where we are making cities "Smarter", we must face the ever increasing deluge of data, costs of the technology, back-up plans and other social issues that it creates. Having all of this technology is one thing, but using it well to really live up to the expectations is another. If smart cities are supposed to help create a new level of efficiency and maximized services for its citizens, it must also then include the educational system. Just as the transportation system and its scheduling adapts to traffic jams and road construction, so too should the educational system adapt to informational needs, quality gaps and learning. Can we imagine a system that would adapt to provide additional time in class, extra assignments or additional challenges for students on an as-needed basis? Could a school schedule change, if a class needed more time systematically? This update would propagate through the system automatically, alerting parents, adjusting other schedules and systems. Or in more realistic approach, a computerized system could help a teacher flip some of the materials for continued at-home sessions. While some of these ideas could be useful, the practicality of others would be greatly problematic. We must realize that as technologies change, they will impact education (for good or bad). We should be mindful of these changes and to mold them in the direction that will have the best outcome for us all.

2. Organization of the issue

The articles published in this issue belong to two different initiatives. The first articles are submissions that authors have sent us directly, while the articles titled "Adoption Concerns for the Deployment of Interactive Public Displays at Schools" and "Design of learning activities – Pedagogy, Technology and Delivery Trends" are invited from the conference WorldCIST 2014. The "Letter to the Editors" in this issue reports an overview of the conference from the General Chair, Álvaro Rocha. We look forward to continuing our collaboration with Dr. Rocha and his conference, with a Special Issue completely dedicated to WorldCIST 2015 next year.

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