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## THE ROLE OF PUBLIC LIBRARIES TO SUPPORT FORMAL EDUCATION USING SMART TECHNOLOGIES

*Sara Al Marzooqi, Abtar Darshan Singh, Hamdan bin Mohammed Smart University, United Arab Emirates, Edward Robeck, Salisbury University, United States of America*

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### Abstract

The Ministry of Education (MOE) in the United Arab Emirates (UAE) is facing a challenge to develop the 21<sup>st</sup> century skills of learners as well as knowledge in the five domain areas of Science, Technology, Engineering, Arts and Mathematics (STEAM) and high achievement of international standardised examinations such as PISA and TIMSS. The challenge could be due to time, space, monetary and probably expert limitations within schools. As such, there is a role for librarians to play to assist curriculum needs in schools and the national education agenda of the UAE. Elements of this role include immersive learning, personalised learning, community partnerships and collaborative leadership to meet educational priorities. The increasing need for the librarian to assume the role of a collaborator to support the above is becoming more apparent as noted in a few emergent studies (Greef, 2017; Hovious & van Eck, 2015). Libraries play a fundamental role in public life; they are more than just a place stacked with books that are read for recreation or by researchers who have a mission to accomplish (McMenemy, 2012). Public libraries nowadays have specialised instructional and project-focused spaces that are hubs for life-long-learning, social interactions and professional development. The shift in vision took place after the development of smart technologies that made learning through electronic devices much easier, impactful and accessible. Digital books are now available to read anytime anywhere without having to worry about the number of heavy books one should carry on the way to work or leisure. Public libraries have adopted this innovative digital wave by using smart technologies to provide electronic databases and social activities that merge fun with learning. However, the role could be extended further to work closely with schools in systemic ways that enable both entities to reach higher goals. By partnering with libraries, schools can extend the supportive educational system in terms of location and time (e.g., when schools are typically closed), which will work to empower teachers and students. There have been some spontaneous attempts in this regard by teachers themselves. However, these efforts tend to be isolated and limited in scope. A more extensive and rigorous as well as controlled system that could be shared by all stakeholders, including students, teachers and parents. Such a coordinated approach, with the ultimate goal of providing the opportunity for students to be effective knowledge-contributors, is shared in this paper with an emphasis on STREAM education (i.e. Science, Technology, Reading, Entrepreneurship, Arts and Mathematics). These are skills and competencies that are appropriate for students in the UAE. The proposed program also

emphasizes collaborative leadership skills among teachers as instructional leaders that can be capitalised upon by establishing school-library partnerships.

## **Introduction**

There is a general dissatisfaction towards the school education outcomes in the UAE that at times are considered to not meet above average international standards and UAE MOE expectations. This dissatisfaction can be addressed through innovative and collaborative projects and research. One such endeavour has been discussed among leaders of the Sharjah Public Libraries and MOE representatives in the UAE since 2017. What has emerged is a collaborative project that will capitalise of the strengths of each organization. The Sharjah Libraries have 10,000 members, which is a good record. However, the libraries face the issues of low library usage by these members, whereby only 3,000 are active members, which is defined as Members who are using library's service on regular basis. Thus, there is a gap in the mission attainment of both the schools and the libraries that could be further addressed through this collaboration. A project has been conceptualized to create innovative instructional spaces in libraries that support formal education in schools. The project is in line with the UAE's vision to focus on the 21<sup>st</sup> century skills and is flexible enough to be altered and modified for different school and community priorities, since it combines both virtual and physical spaces and will re-conceptualize libraries as supportive entities to schools. This means that there is no intent on changing the formal curriculum, school hours or other elements of formal education. The whole system is planned to be implemented as an informal after school program to further enhance the 21<sup>st</sup> century skills of learners, as well as their creative and higher thinking skills. This paper will present a conceptual framework of the project with the aim of sharing initial thoughts and plans, and to gain input on these plans. The project goals are to address the following research questions to varying degrees, with a primary focus on the first research question.

- What is a model/framework for 21<sup>st</sup> century Libraries that positions them as partners to school systems?
- What are standards/criteria for success that can be proposed for the UAE Ministry of Education to be used in collaboration with public libraries?
- What are the current levels of 21<sup>st</sup> century skills among high school students in the UAE?
- Was there a significant difference between high, mid and low ability students who used the program for the enhancement of 21<sup>st</sup> century skills when compared across the different learning environments?
- What were UAE high school students' perceptions on the use of the program in enhancing their 21<sup>st</sup> century skills?

## **Problem Statement**

Libraries can support the formal educational system in many ways. However, in the UAE there is no evidence so far of a systematic approach that can serve the mission of both types of organizations. So far, the educational system in the UAE is not achieving the stakeholders' ambitions, and the libraries are considered to be a dull place where people visit to finish certain

tasks and are unlikely to return as part a process of life-long-learning. In the Sharjah Libraries for example, there are 10,000 members registered. However, only 3,000 are active, defined as members who are using library's service on regular basis. Both schools and libraries are learning environments, and both have gaps in the attainment of their missions.

Both schools and libraries are going through transitions in terms of approach and public perception. In particular, schools are generally adopting more technological approaches with respect to instruction, and libraries are starting to be perceived increasingly as social centres in many parts of the worlds. A plan for enhancing learner opportunities could be constructed to take advantage of both of these and other positive trends. Specifically, the Sharjah Libraries propose a set of school-library interactions that can enrich students learning experiences by providing *phenomena-based* education, which is based on real-life experiences that students encounter themselves. These experiments might not be able to be implemented in schools due to many restrictions in time and/or space. Therefore, libraries can offer an after school program that is linked to the formal curriculum, yet in a fun and engaging way to ensure students' commitment.

### Literature Review

Libraries have always been the source of enlightenment in the communities they serve, as well as being much more. They can serve as parliament halls, science laboratories and social spaces for exhibitions, book clubs, wedding parties and fashion shows. However, the primary value of the library still remains in its role as a stimulating environment for knowledge reception and creation.

But how can libraries play a more effective and expanded role in knowledge sharing and creation? Combining efforts and resources with other public service organizations could be a good start. For example, "in the late 1800s and early 1900s, libraries and museums shared space, resources, and personnel" (Given & McTavish, 2010; p.7). Since that early time, the said sharing is still active, which means that both informal learning entities have successfully worked together to deliver knowledge. This informal learning could be connected further to the formal learning process (i.e. in schools) through a systematic approach, as is presented in this paper.

An advantage of establishing such a system in libraries is that as informal learning sites, they have fewer limitations than are applied in schools. A joint effort between the Association for Library Service to Children and the Public Library Association, identified five practices which are crucial to children's early literacy development. These are talking, singing, reading, writing and playing (Nespeca, 2012). Those five practices, especially playing could be imbedded in the proposed school-library collaboration through the integration of emerging technologies such as augmented reality, computer games, photogrammetry, virtual reality and others.

In conceptualizing this project, we have been employing constructivism as the base of our theoretical framework. In general terms, constructivism posits that acquiring new knowledge based on accumulating experiences and building concepts and principles based on them. Learners can also develop ideas that are more or less independent of experience by reasoning

in ways that extends beyond direct experience (i.e. abstract reasoning). Learners apply and revise their ideas on a regular basis, and it is this process that improves conceptual understanding. Constructivism has been used as a theoretical justification for active learning models, which have been demonstrated to improve learning. For example, a study of physics teachers indicated that students demonstrated improved students' performance through a 38% increase in a conceptual assessment after a shift from traditional learning to active learning model (Stone, 2012). Active learning can be implemented in a library due to the inherent flexibility of the setting, whereas at times teachers find such approaches more difficult to implement due to having to follow certain timelines and curriculum guidance. What this suggests is that, when programs are developed in coordination with schools, the library can compensate for elements of active learning that are missing in the formal-learning process. Or, it could emphasize active learning further by providing different ways of reaching the same objectives as are set as formal learning goals (i.e. those established by the MOE and UAE vision).

Libraries could be turned into learning laboratories by offering interactive, participatory, production-centred programming that incorporates the principles of what is known as connected learning (Ito et al., 2013). The features of connected learning are that it is social, equitable and participatory. This means that librarians could assist teachers in their core mission, and that students would have experiences in the library through which they would develop knowledge that serves the formal education requirement and needs. In addition, librarians can help learners in developing self-confidence and trust by listening to their feedback. Such relational attributes will upgrade the level of the learners to be advisors and designers. It is anticipated that this type of comprehensive engagement process among all parties (especially teachers, librarians and learners) will result in institutional transformation; a rethinking of the vision for libraries and new partnership opportunities for the future (Mills, Campana, & Goldsmith, 2017). Dresang, Gross, and Holt (2006) proposed a model that can also assist in the overall strategy for a library-school support partnership (as cited in Mills, Campana, & Goldsmith, 2017; p.29). This is the Outcome-Based Planning and Evaluation (OBPE) model which, among other attributes, invites librarians to "incorporate learning outcomes when designing, delivering and evaluating programs that factor in community need and relevance" (p.29). As seen in Figure 1, the OBPE process consist of 4 phases, namely gathering information; determining outcomes; developing programs and services; and conducting evaluations. It combines a number of important resources and areas of expertise. The enhancement of 21<sup>st</sup> century skills, entrepreneurship skills, and reading skills are important apart from the existing STEM skills. Thus, the proposed set of skills that can be addressed through an OBPE model will include those within what can be referred to as STREAM education (i.e. science, technology, reading, entrepreneurship, arts and mathematics) instead of the more limited STEM model.

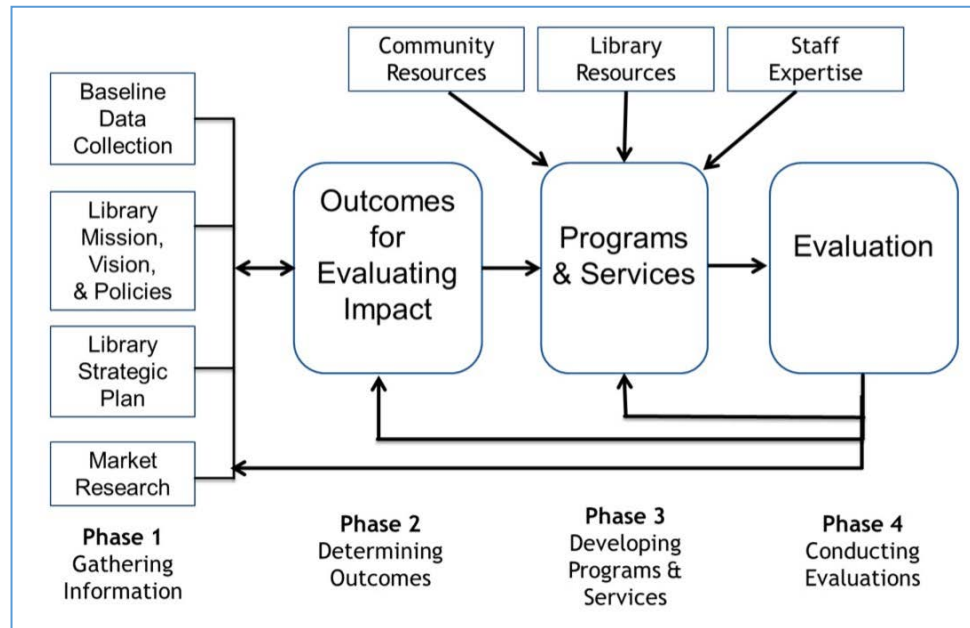


Figure 1. Outcome-Based Planning and Evaluation (OBPE) Model (Dresang, Gross, & Holt, 2006)

The radical change theory by Dresang (2008) emphasizes the creation of knowledge rather than consumption of knowledge. This is an important aspect to be considered in planning the approach for new learning systems. The aim of this theory is to understand the ever-changing behaviour of learners in the digital age. The theory was based on the digital-age principles of interactivity, connectivity and access. Radical change theory revolutionized the use of media – both print and digital – by young people through three classifications: (a) changing forms and formats, (b) changing perspectives and (c) changing boundaries. Diversity, access, collaboration and innovation are themes at the heart of this theory by referring to other research-based theories and findings into practice and pedagogy (Mills, Campana, & Goldsmith, 2017; p.29). Koh (2015) has offered a potential way that radical change theory can guide future research. Figure 2 illustrates the digital age principles, which are interactivity, connectivity and access, in a way that connects them to radical change resources and behaviours. The theory, as improved by Koh (2015), can be also be applied to explore the effectiveness of radical change resources in promoting the 21<sup>st</sup> century skills among youth who are familiar with digital technologies. Since the diagram calls for future research to explore how the interaction between changing resources and youth, it suggests that such research may have an impact on youth obtaining twenty-first century skills. The proposed system in this article will be using some of the related principles from this theory.

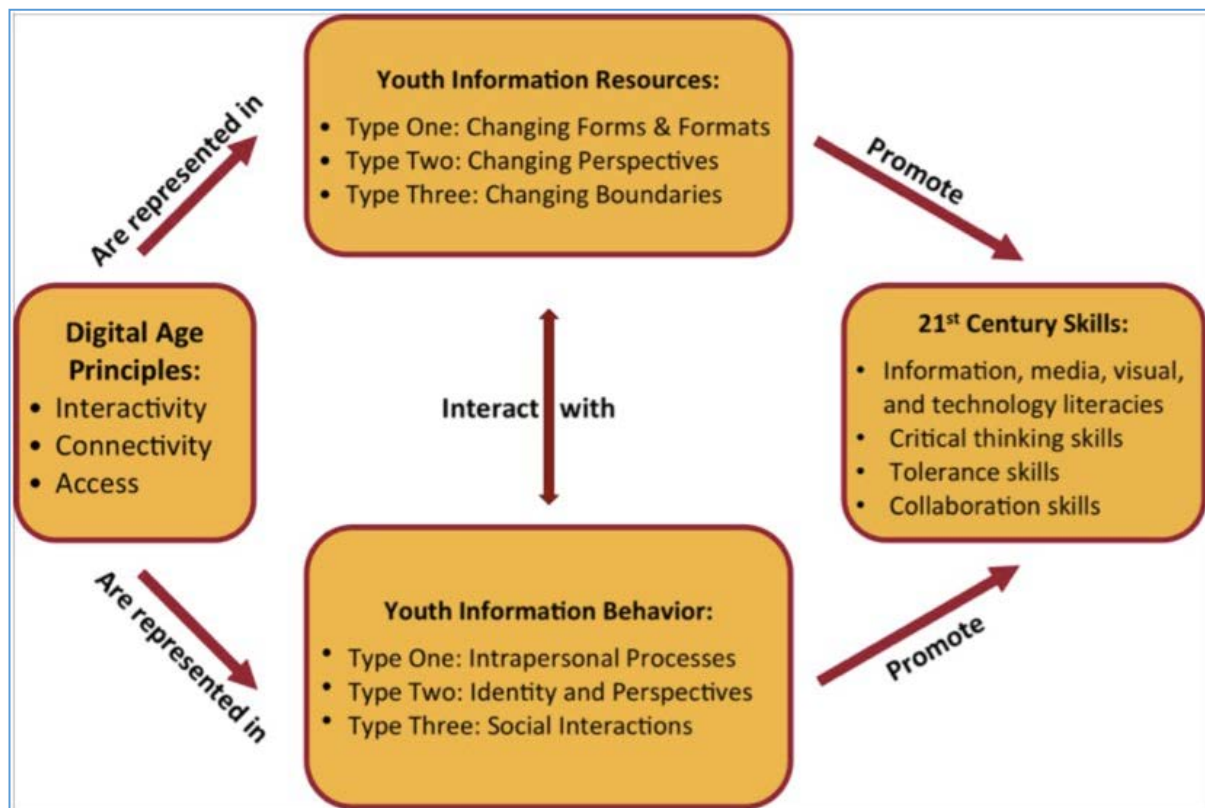


Figure 2. Radical Change Theory Improved Model (Koh, 2015)

Fullan and Stiegelbauer (1991) have proposed a theory of First and Second Order Educational Change. In this theory, the first order of change is external and incremental (systems and processes), and the second order of change is internal and transformational (beliefs). These orders of change can also be integrated with the proposed system in this paper. Brickner (1995) extends this idea to teaching innovation by proposing first-and-second-order barriers. Ertmer (1999) built upon this by elucidating barriers to technology integration practices.

While, the literature in this area indicates a need for change, it is important to consider the necessary conditions for a successful change process for both libraries and schools. For example, ideas related to change are rather pointless if there is lack of support from the educational leaders. A collaborative leadership approach from libraries and schools should be adopted to transform the way we learn and teach. Transformational leadership requires creative mentalities that can be flexible enough to adopt the change or, at least, try it. Mavrinac (2005) argues that “transformational leadership requires enthusiasm, creativity and risk-taking from individual leaders; all of which an organization must possess to achieve success in the change process” (p.394) Combining all these elements resulted in a conceptual framework represented and discussed below.

## Conceptual Framework

A conceptual framework for the project “Sa’ai Smart Library Learning Lab: Disruptive Learning” is drawn from the work done by several scholars, including Dresang (1999), Dresang, Gross, and Holt (2006), Fullan and Stiegelbauer (1991) and Ito et al. (2013). The framework is

represented below as a what will be referred to as a *disruptive space*, which connects both the actual and virtual environments in which learners function. The disruptive space will work under conditions that include access to new digital media, participation that is driven by interest, a desire to create knowledge, collaboration between participants (e.g., librarians, teachers, and innovation leaders), partnerships between schools and libraries, willingness to engage with diverse audiences, and innovative ideas. In addition, the disruptive learning model will call for teams to willingly accept changes that evolved during their learning process. As well, the model implies that the methods for assessing learning should be in line with new assessment practices like projects, simulations, audio/video tapes, graphics and posters, presentations, etc. It is anticipated that this framework will result in the following outcomes: knowledge creation, 21<sup>st</sup> century skills, lifelong learning habits, positive beliefs and behaviours, knowledge and skills related to STREAM and a holistic personality.

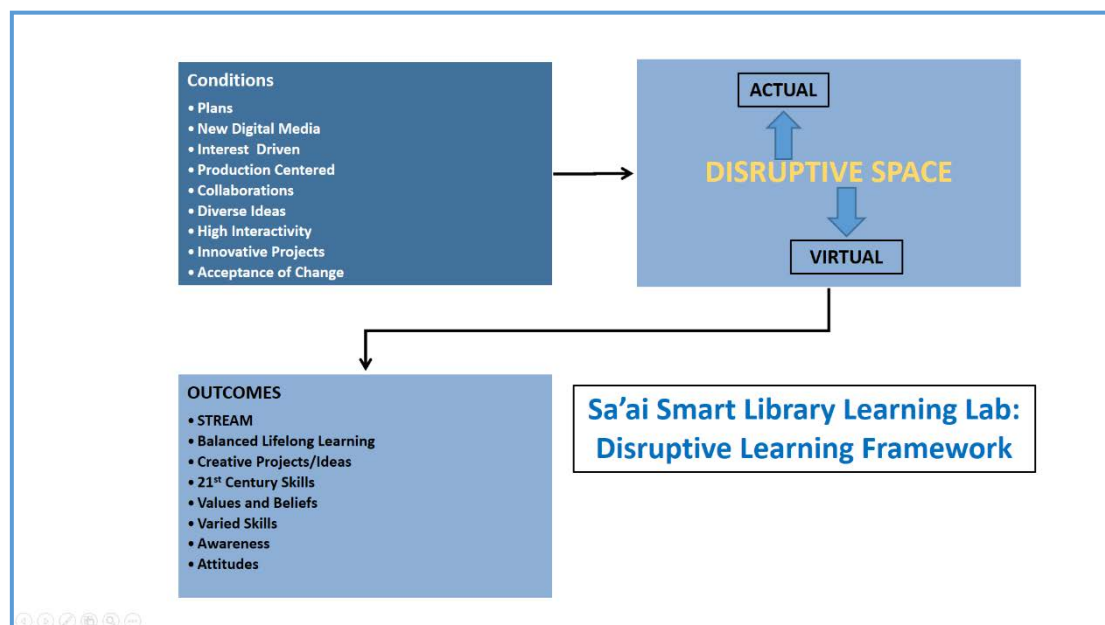


Figure 3. Sa'ai Smart Library Learning Lab: Disruptive Learning Framework

## Proposed Implementation Plan

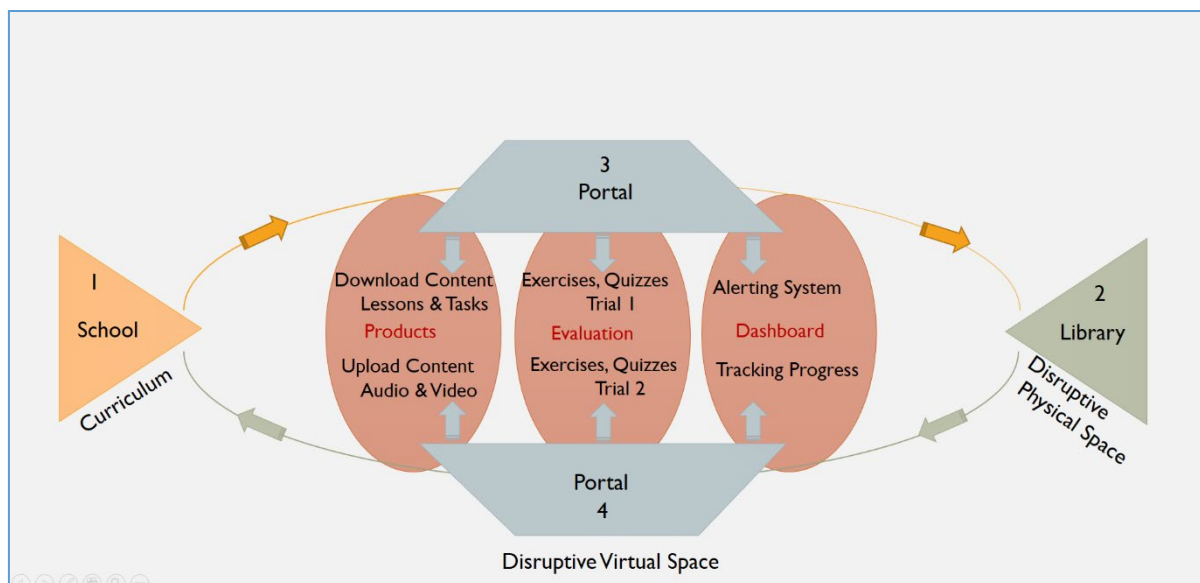


Figure 4. Sa'ai Smart Library Learning Lab: Implementation Plan

The above figure articulates how high schools and libraries could work together in a systematic way that encourages sustainable learning and bridges the gaps in both entities. Since the students get to study the curriculum at high school and there is no time nor facilities to explore learning components through more innovative spaces, libraries could fill this gap by offering two innovative spaces: virtual and physical. The virtual space is basically a digital hub and an archive of all teachers' and students' curriculum as well as other e-resources that will be useful for the transformational learning process to happen. This is the *Products section*, in which teachers can upload all the educational materials for students' references. There is also the *Evaluation section* which contains quizzes, peer feedback, scenario evaluation and so on, that are either taken before and after the library visit or suited to the needs of the evaluation/assessment process. There is also a *Dashboard*, which contains communication tools for students, parents, librarians and teachers to interact, share feedback and get notifications or alerts.

High school students (Grade 10-12) who are ready to visit the library can choose which facilities they will use to create a product. In the library environment, they can enjoy freedom regarding what to create and how to create on their own pace. They can work individually or within groups under the librarians' supervision and guidance. The innovative physical spaces in the library will include the *Creative Lab*: where students can create their audio and video works. There will also be *Interactive Workshops* that students are free to attend if they want in order to strengthen their knowledge and write a report about what they learned. There will also be a *Research Centre* that will enable students to expand on their curiosity by researching a particular area under the guidance and support of librarians. After filling certain hours and meeting projects deadlines, students will visit the virtual space again to track progress/grades and see how they can improve themselves. To self-assess their learning, they can take quizzes, by which teachers can track their before-and-after performances. Finally, and most importantly, the



students are able to be knowledge-contributors since they can upload their products and share them with their peers.

The power of this model can be summarized in the following:

- The informal involvement of teachers, parents, students and librarians is very high. This involvement will reflect on the formal education at school.
- It saves time and effort on teacher's end in terms of what else to do to make the lesson more engaging, since student will be able to practice what they have learnt with a gamification style after the school hours.
- The model is learner-centred in that it provides freedom to the learner to choose the facility and project they would like to work on based on their capabilities and pace.
- The model empowers the learner to be a knowledge-generator.
- The model is making libraries part of the learners' life-style, so when they grow up they will continue to use different facilities for life-long-learning processes.

The model is focusing on enhancing 21<sup>st</sup> century skills and improving STREAM areas through adopting smart technological tools within an innovative environment that is learner-centred.

## Conclusion

Libraries nowadays can play a bigger role than just promoting reading. They can work hand-in-hand with the schools to improve students' 21<sup>st</sup> century skills and other educational objectives. The proposed framework in this paper opens the door for a more systematic collaboration between formal and informal educational entities. The after school time could be spent at the library to finish a set of school plans under the support and supervision of librarians. It can also provide an electronic portal that offers to bridge the communication gap between students, families, teachers and librarians.

The power of the proposed model is that it prepares the students to be knowledge-generators and ambassadors of libraries that promote reading as a lifestyle. Both goals would be well-achieved if a unified vision, plan and implementation take place to create a powerful educational process that is dynamic and sustainable.

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