Chang, M. et al. (Eds.) (2019). Proceedings of the 27th International Conference on Computers in Education. Taiwan: Asia-Pacific Society for Computers in Education

Digital Learning Transformation for One-room Schoolhouses in Rural Pakistan

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Abstract: Despite extensive global efforts to make education accessible for all, one out of every five children are out-of-school. The situation demands re-thinking of learning strategies particularly in underprivileged contexts. Continued advancements in learning technologies may offer novel solutions and this paper reports on a study that explores such opportunities. Opportunities to think laterally also reveal that the centuries old one-room schoolhouse is a proven educational system that has yielded promising results for rural areas all around the world. Using a contemporary multi-grade teaching method, the one-room schoolhouse provides a resilient model educating children at locations, which lack quality teachers and resources. This paper reports a case study of an integrated approach to teach out-of-school children in rural Pakistan using education technology in a one-room schoolhouse. A synthesis of knowledge and practices associated with one-room schoolhouses is presented together with an analysis of education technology developments that look promising. A digital transformation roadmap to implement and scale this method to educate out-of-school children in other underprivileged communities is summarised.

Keywords: rural education, out-of-school, educational technology, ICT, one-room schoolhouses, multi-grade teaching, underprivileged

1. Introduction

At the change of millennium, global initiatives such as 'Education for All' (EFA) and the 'Millennium Development Goals' (MDGs) enlisted the support of many nations in pursuing the provision of primary education to all children of the world (UNESCO, 2015). In 2015, the member states of the UN renewed and reframed the commitment into 17 Sustainable Development Goals (SDGs), as part of the UN's sustainable development agenda 2030, in which SDG 4 refers to inclusive and equitable education lifelong learning opportunities for all. Despite such initiatives, global statistics show that one out of five children is out-of-school. Furthermore, due to a decline in efforts from participating governments, progress in decreasing the number of out-of-school children, adolescents, and youth has significantly reduced in recent years (UNESCO Institute of Statistics [UIS], 2018).

Meanwhile, mobile and wireless based Information and Communication Technologies (ICT) have enabled new ways to teach and learn where learners are not as dependent on specific time, place, or teachers (Hussain, Wang, & Rahim, 2013). Innovative e-learning solutions are also emerging in remote and rural areas in developing countries; however, sustainability of these disruptive innovations creates a challenge for governments and policy makers (Badar, Mason, & Khan, 2018). Within this complex environment, the one-room schoolhouse offers a practical and adaptable approach for 21st century learning where student centric learning is focused within a multi-grade student class (Goodlad, 1996).

This paper highlights key aspects of a study that examines the effectiveness of Raunaq-e-Islam Neighbourhood Schools (RINHS), operating as digital one-room schoolhouses in underprivileged communities in Sindh, Pakistan. It also proposes a draft roadmap to transform learning in these schools using ICT tools in education for these underprivileged communities. Data for the study was collected during field visits and transcribed from notes gathered from on-site observations and unstructured interviews with the RINHS stakeholders. Thus, the aim of this study is to explore the learning effectiveness of

one-room schoolhouses in underprivileged contexts and to present digital transformation of school learning strategies for implementation and improving quality of education with a focus towards development of innovative learning environment.

2. Out-of-school children and role of ICT in education

263 million children and youth of the world are out-of-school (UIS, 2017). Moreover, "the world's poorest children are four times more likely not to go to school than the world's richest ones" (UNESCO, 2015). Systemic integration of ICT in education is an opportunity for improving the quality of teaching and learning as well as expanding access to learning opportunities (Mitra, 2005). The main reasons behind out-of-school secondary level children are poverty, location, and gender; learning models based on mobile technology can provide access to people living in a remote location where there are no schools, teachers and libraries (Porter, 2016).

2.1 Pakistan; education and out-of-school children's status

Pakistan is the sixth most populated country in the world, having the fourth largest pool of out-of-school children (UNESCO, 2017). Most of the out-of-school children are residing in remote, rural or underprivileged city areas with prevailing challenges in providing quality education including shortage of good teachers, the hidden child labour challenge, affordability and cultural barriers to pursue educational goals (Titola-Meskanen, 2014). Education quality and standards are also declining in rural areas and increasing urban/rural disparities and inequalities, which is creating a learning crisis in low-income rural areas (Agarwal, 2014).

There is a serious inequality in educational attainment levels in Pakistan where more than twice individuals aged 15 years or above are illiterate in rural areas compared to that in urban areas (61.2% in rural areas and 29.74% in urban areas) (Pakistan Bureau of Statistics [PBS], 2015). In Karachi alone, there is huge disparity in education between the urban and rural areas. The Gini index of Education in Karachi shows the value of 0.611 in rural areas and 0.346 in urban areas (Saeed & Fatima, 2017).

2.2 Role of ICT in spreading education

Education in developing countries could be transformed by and benefit from e-learning through effective and innovative application of ICT (Badar, et al., 2018). Contemporary educational technology approaches such as distance learning, Open Educational Resources (OERs), Massive Open Online Courses (MOOCs), and open Learning Management Systems (LMS) like Moodle have all transformed learning environments (Ali, 2011). With mobile/ubiquitous learning, learners have more flexibility and opportunity for individualized, personalized and highly interactive learning (Cobcraft, Towers, Smith, & Bruns, 2006). Mobile phones are widely considered as the optimal solution for delivering education in developing countries, because of their usability, accessibility, and affordability (Grimus, et al., 2013; Ford & Leinonen, 2009). Mobile technology has the natural affordance to shift the teaching focus to the learner (Grimus, et al., 2013).

Distance education is a well-established methodology where students and teachers are separated physically or by time domain. The learning and assessment content is also designed specifically to suit the ease of distant learners. Research revealed a positive association among students engaged in distance learning in terms of self-regulation, self-efficacy and interaction (Yu,2015; Garrison, 2011; Harasim, 2012). Studies surfaced other advantages such as reduced travel cost and time, access to wider community of experts and flexible learning approach (Finch & Jacobs, 2012).

3. One-room Schoolhouses in rural Pakistan

3.1 History of One-room Schoolhouses

One-room schoolhouses have been common all around the world and operating for at least the last 300 years (Williams, 2005). Parents considered these schoolhouses a proper place for their children's education. After completing the school year, students were examined orally covering their spelling, arithmetic problem-solving competence, and other subjects, based on which teachers determine the students' future level of studies (America's one-room schools of the 1890s, 2005).

The one-room schoolhouse has traditionally provided a means for an integrated approach to the curriculum, often mixing age and aptitude. As a 'method' for 21st century education, it is distinguished from conventional curriculum design because it 'revisits' this older integrated approach. Interestingly, recent research indicates it improves the non-cognitive abilities of the students, giving them opportunity to mentor relatively less advanced students in that domain (Cundra, Benzel, & Schwebach, 2017). This pedagogical approach helps students to access challenging course material and research methodologies when someone among them have more relevant knowledge and provided the opportunity to educate the less knowledgeable ones (Bhuiyan, Supe, & Rege, 2015).

3.2 One-room Schoolhouses in rural Pakistan (RINH Schools)

One-room schoolhouses in rural Pakistan have been adopted by Raunaq-e-Islam Neighbourhood Schools (RINHS) that utilise centuries old practices to educate rural and remote communities. RINHS are operated by the Pakistan Memon Women Educational Society and serving out-of-school children in underprivileged communities since 2010. Demographically, RINHS are operating in rural and low-socio economic areas with limited access to educational institutions. Most households in these areas live below the poverty line and cannot afford to send their children to the private schools in the vicinity. Moreover, cultural and traditional norms also restrict transportation of female students to far-away areas for educational purposes.

RINHS utilise the multi-grade one-room schoolhouse practices in all their 20 schools. Students from pre-primary to grade 7 are taught by locally developed teachers. Many teachers are also owners of the houses where these schools are established. These schools are equipped with basic necessities such as ventilation, electricity, course books and writing material, make-shift arrangement for digital learning environment, drinking water and access to clean toilets.

RINHS represent an alternative learning environment with suitable hygienic conditions for students not going to schools elsewhere. Students are taught in a multi-grade environment with considerable range of age cohorts within one classroom. Instructions in these classrooms follow weekly plans developed using government curriculum and books. However, extra-curricular activities are also regularly conducted to develop these students' cognitive, non-cognitive and social skills and abilities. The learning atmosphere also sits well with the local socio-cultural context. Parents are happy with the dedication of teachers and the outcomes for children with varied capacities and needs.

Teachers are trained to handle multi-age students in their classrooms and use instructional formats which combine learning for the whole class, individualized/small group learning, and peer mentoring by advanced students. Weak students are given additional instructions so they may get along with the pace of other students. Daily homework is also required.

Despite the best efforts of RINHS management, they have observed that they are unable to reach beyond a certain limit in terms of scaling up and improving the quality of teaching in their schools.

4. Roadmap to Digital learning transformation at RINH One-room Schools

RINHS has successfully penetrated the isolated communities in rural and remote areas around the Karachi region through their one-room schoolhouse educational model. The model offers a sense of security to these communities as their own community member/s teach the children. Moreover, RINHS provides financial support to interested students through philanthropic activities where appropriate. However, quality of teachers is the weakest link. As these schools are in far-away remote areas, good quality teachers from urban areas do not prefer to join these schools. Locally trained teachers have limitations in terms of their educational backgrounds, exposure to latest teaching techniques and technology related developments. To overcome these issues, RINHS are exploring the possibility of technology based-learning solutions for these neighbourhood schools. Digital transformation of RINHS

according to the 21st learning techniques which shift the role of local teacher to a trained facilitator supported by remote qualified academic teams looks promising.

4.1 Moodle-Learning Management System and e-learning policies development

A Learning Management System is now typically a cloud service that provides a teaching and learning environment independent of time and location. An LMS now plays a pivotal role in online and distance learning as it enables a mix of teacher-led courses, and interaction between the teachers and students. (Sharma, 2013).

Because it is freely available with a proven capability to enhance learning, Moodle was selected as the LMS for the digital transformation process at RINHS (Stanley, 2014). Due to its open source architecture, Moodle can be utilized in many environments, which can help developers to create and edit the features according to RINHS needs and desires. A basic framework of e-learning policies for RINHS was developed involving all stakeholders.

4.2 Digital content development, teachers training, and use of OERs and MOOCs

Digital learning transformation of RINHS needs a complete revival of learning strategies, where the traditional learning pedagogies needs to be augmented with digitally suitable pedagogies. Similarly, the traditional learning content also needs to become digitally compatible for seamless delivery at the school's level. Moreover, teachers and facilitators' training was also a major challenge, as without motivated and capable teaching team, the digital transformation may not bring the desired outcomes.

Another challenge for the digital transformation team at RINHS was to gain confidence of the stakeholders about the myths related to e-learning environments such as digital learning is not effective learning method particularly for underprivileged population due to their lack of technology adoption; implementing ICT systems in the underprivileged areas will not bring positive outcomes as these tools suit to the tech-savvy children; teachers' training in digital environment is similar as of traditional classroom teaching; digital pedagogies may distract children from real learning towards technology fascination. Series of awareness forums were conducted with RINHS stakeholders to discuss these myths and address their concerns.

The project team comprising members from RINHS academic team, RINHS Technology team and consultant's team members having expertise on digital learning content, pedagogies and training., and was responsible to study the existing learning content in use at RINHS, and analyse the possibility of using it in digital environment. The team also studied the OERs and MOOCs available and the possibility to utilise them in place of, or in conjunction with the existing content, in the new environment.

The team emphasised on minimising the teachers, facilitators and learners' discomfort during the digital transition period and proposed blended digital content for the learners comprising digitised version of existing content augmented with OERs. The aim was to provide smooth adoption of existing content in digital environment among the learners in the beginning, and subsequently exposing to improved quality OERs based learning content developed after extensive global efforts. A sample blended learning material on selected topics was developed to be implemented during the pilot testing phase.

In the next step, the project team studied the existing pedagogies implemented at RINHS campuses, their effectiveness and possibility of using same pedagogies in digital environment. The team also researched on the contemporary learning strategies in use in various digital environments. Furthermore, the team also deliberated the capacity of present in-school staff to adopt new learning pedagogies, to provide a fairly challenging but realistically implementable pedagogical solution for these underprivileged areas. The team developed a pedagogical approach where the in-school staff will facilitate the learning process, and qualified and well-trained teachers will control remotely the learning environment of the classrooms with the help of pre-selected learning material and activities. The facilitators and remotely operating teachers will be provided the learning material and pedagogical details reasonably before the class activity so they are well-aware of the learning content and strategies before engaging the learners. Moreover, certain activities will also be designed to be conducted for the learners by the in-class facilitators to keep their effective control and authority on the learners. A fine

balance between remotely operating teachers and in-class facilitators was foreseen to bring optimum and most effective learning outcomes.

The digital transformation roadmap proposed redefining the role of local teachers into in-class facilitators as defined in 21st century teaching and learning methods and digital learning environments. This transformation will overcome the continued challenge faced by RINH management to provide well-qualified and experienced teaching resource for their school, as most of these schools are situated in remote locations, far away from the urban areas of the city.

To implement this transformation effectively, strong and comprehensive in-class and remotely operating teachers' technological, motivational and academic training is considered prudential. The team designed sample trainings to cover all the three aspects for the pilot project. In addition to the face-to-face lectures, online training component is also added including video lecture, digitally executed assessments, and online academic and communication activities, to make the training participants realise the real online learning atmosphere as students, and to prepare them understand empathetically in real-class digital environment.

A complete package of sample digital learning content, digital pedagogies and training components was provided to RINHS management to be implemented during the pilot project.

4.3 Project pilot testing and future roadmap for digital learning at RINHS

The project's pilot testing was planned on a selected sample of teachers and student for the duration of six months, starting from Jan 2020. During the pilot testing phase, the implementation of developed digital content will be taught to the selected group of students in a controlled environment through the developed pedagogical approach. The basic one-week teachers' professional development training initiated the pilot project which will be followed by subsequent one-day sessions every fortnight during the whole testing phase. The feedback from the teachers in the initial and subsequent trainings will help the designers understand the real-life learning dynamics and challenges in the digital environment, and amend the digital learning structure before implementing on the complete RINHS educational system.

5. Conclusion

Because the global efforts to educate children of the world have not yet been able to yield desired outcomes in many parts of the world and one out of every five children are out of school, there is a need to re-think strategies for teaching and learning for disadvantaged children. This study has investigated the centuries old one-room schoolhouses practices as a key part of a new solution. Together with the use of contemporary educational technology, a proposed roadmap to transform learning underprivileged context is discussed. The proposed approach is generic enough to also be implemented in other communities or in similar contexts. Several steps towards digital transformation of one-room schoolhouses operating in underprivileged communities discussed here are at the institutional level rather than at the level of individual learning unit or course to provide a bird's eye views of the digital transformation implementation roadmap. Keeping in view the urgency to effectively handle the need to educate these out-of-school children and the inability of traditional efforts to bring desired results, adopting the concept of Digital One-room Schoolhouses for the rural and remote communities around the world may create a positive and meaningful impact in the global arena in near future.

Acknowledgements

We would like to thank Mr Shoaib Ghaziani along with RINHS management and staff, Ms Ambreen Qureshi from Daabhoy Institute of Higher Education (DIHE) and FBTC team for their out of the way efforts to facilitate the research process.

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