Dimensions of Tools Used for Distance Learning in Rural Areas

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Abstract

The purpose of this literature review is to provide a summary of the current state of the dimensions of tools being used to support learning in four rural areas around the globe. Access to a quality education has been identified as a means to bridging the equality gap between the rural populace and those living in urban areas. The review provides a working definition for the terms rural communities and distance learning for their inclusion in this document. The review focused upon global literacy outreach mandates for literacy attainment for all, the methods used to provide access to rural areas, and the strengths and weaknesses of the approaches chosen to reach rural citizens in four defined areas, Africa, China, India, and the United States. The four covered areas were addressed based on their prevalence in the research reviewed. Distance learning has been investigated as a means of delivering educational options to those living in rural areas. The variety of tools used in the process are subject to infrastructure, political, and social concerns.

Keywords: rural, distance education, e-learning, m-learning, tools, technology

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Literacy is a worldwide issue that has a far reaching effect on the stability of the global economy. The World Conference for Education for All (1990) saw the formation of an international assortment of global participants including the United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Development Programme (UNDP), United Nations Children's Fund (UNICEF), The World Bank, and the United Nations Population Fund (UNFPA) outlining the importance of a literate society through the formation of the Education for All by the year 2015 initiative. A major push to reach those in remote and rural areas was mandated within the initiative. Access to education in many rural areas around the world has had a considerable number of challenges that must be addressed by nations preparing to take their citizenship into the 21st century global market. This review of the literature is designed to identify the dimensions of tools being used to deliver educational content to these rural communities. More than 50% of the world's population belongs to rural areas (Banco Mundial, 2014). Providing educational outlets in these areas has been an ongoing struggle. The dimensions of tools utilized range from face to face options to distance learning in a mixture of methods.

The use of distance learning in its various forms has impacted the delivery of educational content in the past three decades. The selection of the medium and method for its supportive delivery has been reviewed and dissected for value as defined by the receiving community. " The trend toward distance education is largely related to the increased diffusion of technology into society (Bryant, 2005)." Chunling (2015) stated "People are especially focused on the problem of urban-rural inequalities in educational opportunities, and there have been disputes in the media and among scholars whether urban-rural inequality in educational opportunities is

expanding and whether it is getting harder for rural children to attend college". Understanding what has been proven effective and the dimensions supporting its use would be valuable for those attempting to replicate similar results.

EDUCATION IN RURAL AREAS

Distinguishing the challenges facing the delivery of instructional information to rural areas required the identification of the characteristic that are unique to the setting. Rios (1988) in an attempt to define the term found rural to be difficult to classify under a singular definition. The large body of research on topics concerning rural education lacks a clear source that can be cited as the definitive definition yet, those who consider themselves as members of rural communities distinguish themselves by more than their location in relationship to urban centers and population size. The US Census (2015) identified rural communities by selecting to characterize what was not considered urban as being rural.

Categorizing rural from a global view necessitates a broad interpretation of the diverse nevertheless, similarities of those communities that perceive themselves as rural. In their research Coca, Valero Matas, Torres Cubeiro, Casado Neiro, and y Leon Guerrero (2012) distinguished urban space and rural space through a review of the literature using the consensus to define rural. Their cumulative definition of rural was selected using a "Fuzzy" representation of terms that allows for the value shift of the defined areas to better meet the description of the selected model. This reviewer has selected to base her definition for rural upon their findings. "Therefore, the fuzzy model definition of rurality…is based on each regional specific geographic and social characteristics at the same time that takes in account quantitative and qualitative factors; only that now such dual differentiation rural/urban would have an useful pragmatic utilization (Coca, 2012)." The complexity of the distinction of the separation between urban and

rural warrants an examination of the differentiation of the tools used to meet the educational needs of global rural communities.

The relevance of a quality rural education as it effects the global perspective has been connected to the attended improvement to quality of life for members of the rural community. Over the past two decades, The World Bank has designated access to education and quality educational programs for underserved populations as a major concern in the global arena (Rivera, 2015). Mathews and Rama Krishna Rao (2012) attributed limited accessibility, and challenges to education in rural areas mainly to political, economic and social issues of these underdeveloped countries. Possible solutions have been suggested as an answer to the delivery of quality educational program to rural areas around the globe, among which are face to face options, tele- communication, and varied technologies. Schools with Information Communication Technology (ICT) infrastructures have been expanding rapidly with the innovations in technology and cloud computing.

Selected rural areas for this review where identified in the Rivera, et al., (2015) study based upon an analysis of the 100 most cited articles between the years 2004-2014 within the ISI Web of Science data base that included the words “rural” and “education” in the title. On a global perspective, the most commonly researched countries were China with India second in the Asian continent. Ghana and South Africa tied within the African continent, Peru in Latin America, the United States in North America, the United Kingdom in Europe and Australia in Oceania. The quantity of research supports the inclusion for the purpose of this review of rural areas in China, India, Africa, and the United States as the selected focus.

The allocation of educational resources in rural communities has been hindered due to lack of materials, financial support, and politics. Responding to the need for quality educational

options in rural communities, distance learning has been tapped as an economical responsive possible solution. Simonson (2011) in his review of the literature on Distance Education (DE), posed that DE has manifested the most important change in education in the past decade. Defining Distance Education (DE) has been attempted by numerous researchers, (Anderson, & Dron, 2011; Benson, 2004; Bryant, Kahle, & Shafer, 2005; Simonson, Schlosser, & Orellana, 2011). The inability to reach a consensus in these early attempts were pointed out to bring attention to the lack of an acceptable definition in research conducted by Shale (1990) and Moore (1993) (as cites in Benson, 2004, p. 51). He further relates the range of definitions surrounding the field of distance education.

Identifying the similarities and differences in their focus being related to the population served and the technology used. The importance of the synchronous activities employed in DE had become a major factor in more recent definitions with the improvement of high speed internet. The definition devised by the Association for Educational Communication and Technology (AECT, 2003), "institution-based, formal education where the learning group is separated and where interactive telecommunications systems are used to connect learners, resources, and instructors" (as cited in Benson, 2004, p.51) has provided a working definition for the purpose of this review.

Distance Education has a multigenerational pedagogy that has been affected by the speed and growth of the technological revelation. Anderson (2011) defines the generational attributes that distinguish the different distance learning models as being determined by the pedagogy that supports its use, cognitive- behaviorist, social constructivist, and connectivist. The importance of the technology tools utilized in this definition is not diminished but distinguished by the attributes it offers to the pedagogy it promotes. Anderson (2011) identifies these tools by

category from Mass media: Print, TV, radio, one-to-one communication, conferencing: audio, video, and Web, many-to many communication, Web 2.0: Social networks, aggregation and recommender systems. The explosion of cloud computing has once again aligned pedagogy with tools to make student centered, self-directed learning more readily attainable on a global level.

Tools in Use

The range of tools used to deliver educational content varies in rural areas around the globe. Reavy, Hereford, and Connor (2011) describe the use of delivery systems in rural areas of the United States. At the time of the study, the most common form of distance education instructional delivery was asynchronous computer programs. They defined asynchronous technology as the ability of the user to communicate via internet programs at different or irregular, intermittent times. The authors in their review of delivery systems also address synchronous or real time interactions The use of web-based tools such as video and or web conferencing have increased not only student use but as a means for teacher professional development. Similar though they may be in concept, the cost of production in the differing delivery options has an impact on the quality of the finished product that is distributed to the rural distance learner.

A major shift in the distance learning or e-learning delivery method erupted with the expansion of Cloud Computing. Kumar and Ara (2014) define Cloud Computing (CC) as "an evolving term or paradigm, implying the use of configurable computing resources (hardware, software, and network) with its purpose to offer a service to a consumer." An aspect of the e-learning movement that has quickly grown in the last decade is the use of Blended Learning (BL) as identified by Swan, Coulombe-Quach, Huang, Godek, Becker and Zhou (2015). Blended learning has multiple descriptions from blended program, Flip instruction, Mixed instruction to

blended instruction the connecting concept being that delivery of instruction takes place part of the time away from the brick and mortar building that traditionally represents the designated place of learning. (Bernard, 2009) in their meta-analysis of the data on distance learning attempted to shift the research focus from the comparison of distance learning and online learning versus computer instruction to the methods and supports provided during instruction.

China in an attempt to alleviate the disparity in educational options in urban and rural areas in 1998 begun its Modern Distance Education project. This three model approach utilized CD/DVD- equipped teaching centers, building satellite-receiving stations and building computer classrooms to provide instruction delivery. The network-based distance education stemming from university programs covered over 150 majors. China utilizes satellite and broadband networks as a means of access for many in the country, including the western rural areas. Provided with CD players and CD-ROM instructional materials, 5.1 million students in rural settings received "high-quality" instruction in the first five years of the study (Yu, 2006).

Globally, distance learning has increased the access of rural communities to educational programing. Yu and Wang (2006) identified the digital divide occurring in China, as having a negative impact on the country's ability to advance into the information age. Lu, Tsai and Wu (2014) in a study of Information and Communication Technology (ICT) in Chinese middle and primary schools acknowledged Yu and Wang's earlier findings continued to be an issue in rural areas. The recommendation was made for the expenditure of the appropriate funding to increase multimedia classrooms in those areas. The lack of investment in educational resources has triggered a domino effect of low product development and demand in relation to the use of technology in rural areas.

The issue of inequality in the education of school age children found in rural areas in India remains problematic. India does not have a compulsory education system. The family determines who, when, where, how, and even if a child receives education outside of the home. Serving the rural areas of such a large nation requires an interpretation of the communities needs and available resources presented to meet them. Ramamoorthy, Balakumaran, and Karthikeyani (2013) identify multimedia tools as a means of reaching the underserved population in rural communities in Southern India. The authors added to the list of issues impacting the quality of rural student education the competence and commitment level of teachers providing instruction as well as inadequate teaching and learning materials. As a solution to the observed issues the development of an ICT based education tool to equip teachers with evolving technologies and methods to support positive student education attainment was proposed. Similar to China's approach India selected a multimedia computer centered model of delivery.

The issues surrounding education of the rural populace in Africa are the same but dissimilar to those expressed in the research for the US, China and India. Africa has the added concerns of continued arm conflict that has displaced and disrupted a generation of rural and underserved people. As explained by Roberts (2011) the educational focus in much of Africa is on sustainability. Yet, early access to distance learning in rural areas in Africa has grown through the growth of Mobile learning (M-Learning) unlike the early push for E-learning systems utilized in the previous three nations. M-learning as described by Brown (2005) is the delivery of e-learning via a mobile platform. The ability to furnish informational transference at a low cost over a wide range made m-learning a cost effective method for a country with a poorly designed and maintained wired infrastructure. The wireless aspect of m-learning systems has brought e-learning to a wider population then previously possible.

Strengths and Weaknesses

Selection of an educational learning model for instruction in rural areas have proven problematic for many. Approaches used centered mostly around E-Learning and M-Learning options. The advantages and disadvantages of the models and tools used for distance learning arguably are reflective of the social, economic and political environment supporting their adoption. Fiscal support for the development of the infrastructure necessary to deploy, maintain and expand E-Learning to rural communities for many countries has not matched the mandates and promises governments have attempted with educational reforms (Enhancing Education Through Technology Act 2001, 2004). The United States in the revamping of No Child Left Behind passed Every Child Act of 2015, which addresses the concerns of rural education in Act IV and Act VI through the return of local control to states in policy and expenditure matters. These changes propose to provide states with the freedom to determine how to best address the educational needs of their respective local populace based on a needs assessment of stakeholders not based on federal mandates that may parallel closer to those of a more urban environment.

E-Learning has made education to rural areas of the US and other global nations more accessible than ever before. A U.S. 2010 report of a meta-analysis of the research on online learning found earlier research on distance learning established support for its use based on findings that its impact was equivalent to that of face to face instruction (U.S. Department of Education, Office of Planning, Evaluation and Policy Devlopment, 2010). Subsequent, major finding from the 2010 report showed “Few rigorous research studies of the effectiveness of online learning for K–12 students have been published.” The study determined that the included research uncovered, in a comparison between face-to-face instruction, online instruction, and blended instruction, quality blended instruction proved more effective. Reaching rural

environments with a quality blended program has the potential to be an active means of equalizing instruction.

Africa has shown interest in utilizing e-learning with a look to the ability to reach the rural areas for such a widely spread nation. Williams and Eyo (2011), identified issues to the implementation of e-learning in Africa, key were the availability of hardware, internet connectivity speeds, quality of software, policy supporting e-learning, financial provisions supporting e-learning, reliable electricity, multi-language content, stakeholder acceptance of e-learning as a valued tool and appropriately trained instructors in the use of e-learning. Cloud computing, wireless network systems, and mobile devices may offer more cost effective options for establishing e-learning in Africa than possible just five years prior.

Having access to e-learning has been proven to not automatically equate to its widespread usage in Africa and other developing areas. Social acceptance of technology and cultural norms play a large part in the favorable reception of any new disruptive medium. Muhammad and Abdulrahman (2015) suggested the need for a cloud based e-learning platform to address the lack of availability of higher education facilities currently prepared to meet the population requirements provided by the 79 public universities in Africa. With the ability to offer instruction and access on the user's schedule to remote areas e-learning utilizes collaboration, flexibility, a learner controlled paced to learning, and worldwide knowledge and learner productivity. Kumar and Ara (2014) describe "cloud computing as the next stage of internet's evolution providing solutions from computing power to computing infrastructure, applications, business processes to education.

Innovations, such as cloud computing, in technology have speared a shift in the delivery method used for educational content in many rural areas. The strengths of implementing a cloud

based informational storage and deployment system can be assessed in cost benefits for many institutions. Reduction in man power, infrastructure support, hardware and housing requirements allows for expenditures in IT budgets to be shifted to other areas to support growth. Yet, relying on cloud computing comes with a set of concerns that must also be weighed. Primary, the risk of loss of private information and or misuse of intellectual property, have been reoccurring concerns by consumers and suppliers (Kumar Das, 2014).

A large portion of the Indian education system in order to meet the needs of the country's population is delivered by distance formats. Corresponding to similar global initiatives as those in the US and Africa, India has adopted a variety of information technology options to address the issue. Bodwkurwar and Sambhe (2015) propose under the current conditions a need for the improvement in the overall quality of teaching personnel, facilities, and access. In a study centered on the use of mobile phones as a delivery system (Balasubramanian, 2010) the authors identified the importance of self-directed learning and gender dimensions to acceptance of the disruptive force of a new technology. The dual purpose of mobile phones for rural communities, of learning tools and business, make this a popular informational technology option in many rural centers. Modular Object-Oriented Dynamic Learning Environment (Moodle) has been found to be a valuable addition to the rural educational setting in India (Dinesha, 2011). Supplying informational delivery for internet based courses and web sites have proven to be an advance technology tool with the potential to alleviate issues acknowledged prior in this review. Similar results were found in a 2008 rural Bangladesh based study on the use of cell phones for distance education (Islam, 2008).

China's approach to serving the needs of the worlds' largest rural population have been meet with an array of technology options ranging from China Central Radio and TV University

(CCRTU) established 1978 to the Distance Education Project for Rural Schools (DEPRS)from 2003-2007. McQuaide (2009) found the continued need in developing countries for low cost and conventional learning technologies in distance education for rural communities with limited access to the Internet. Yu and Wang (2006) in a study designed to provided clarity on the Chinese' Modern Distance Education project of 1998, described as a valuable tool for the government to further develop China's rural education. Explained the stages and results, of the then largest distance learning project, which began with the first phase implementation of educational demonstrating centers in 2003, followed by the launch of CD/DVD-TV, satellite resource-receiving stations and computer classrooms by 2006. The authors recommended the shift in focus away from the type of technology utilized to the application of the technology to continue to be impactful.

The use of mobile devises has also been on the rise in the distance learning movement in China and neighboring areas. The research on mobile learning in rural areas has received considerable attention as reviewed by Huang, Liao, Huang, and Chen (2013). Handheld devices have been credited with an increase in student engagement, motivation and learning outcomes when balanced by the correct instructional models. Following the results found in the deployment of mobile learning devices in the US, Africa, and India the need for adequate training for instructors, quality content that is reflective of the sustainable needs required by the rural stakeholders, and finical infrastructure support continue to plague China's distance learning program.

Conclusions and Future Study

In an attempt to better understand the dimensions of the tools used to support distance learning in rural areas struggling to address literacy issues hindering the obtainment of sustainable living wages. A review of the literature centered on the use of distance education models and tools in rural areas of Africa, China, India and the United States was examined. Identifying a globally acceptable definition for the term rural that encompassed the characteristics was achieved through an assessment of the research. The range of tools used in the delivery of distance learning has grown and evolved from radio and TV courses, tele-cottage delivery, computer delivery, SMS to the use of mobile devices and cloud computing in today's educational landscape.

The overwhelming consensus from the reviewed literature was the importance of the development of instructional models that are consistent with the needs of the rural community that are guided by well trained teachers equipped with adequate and appropriate materials, training and support. The research supported a blended-learning approach but cautioned the over reliance on advanced technologies that some rural communities are not yet prepared to utilize appropriately. The rapid speed by which technology has changed in the past decades has provided multiple options to access and delivery methods for rural areas, but the infrastructure, social, political, cultural and economic ingredients that make for a successful product have not always kept pace. Future studies on the long term outcome of the use of m- learning on rural communities with the shifting global narrative would be beneficial to the field attempting to design effective distance learning programs.

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