

## **A shift from traditional pedagogy in Nepali Rural Primary Schools? Rural teachers' capacity to reflect ICT policy in their practice**

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### **ABSTRACT**

Policy by the government of Nepal emphasises the need to develop ICT competencies and suggests the use of ICT will transform traditional models of teaching to ones that are student-centred. This article reports a study of primary teachers' experiences of using digital technologies in rural primary schools in Nepal, and investigates their preceptions of how the availability and use of ICT in their schools has transformed traditional teaching models. It further examines the resources they can access and the training they received. Teachers' accounts of their experiences indicated that the integration of available digital technologies in instructional activities changed their role in the classroom to some extent, created a learner-friendly learning environment and improved aspects of their teaching. The study also found that there was often insufficient access to ICT in and outside the school premises, and that pre-service teacher education, as well as government-provided in-service training, does not cover the use of ICT in instructional activities. Rather provision of infrastructures and training in the use of digital devices is carried out by non-governmental organisations (NGOs). The article argues that for policy to be realised in practice, more sustainable and comprehensive systems need to be developed to train teachers in ICT use and to provide them with necessary facilities.

**Keywords:** *ICT, access, pedagogy, rural school, practice*

### **INTRODUCTION**

The Government of Nepal envisions the introduction of ICT as a means of transforming traditional pedagogies. To what extent is such transformation taking place in practice in rural primary schools? This article reports an exploration of how the use of Information and Communication Technology (ICT) is evolving in rural primary schools in Nepal and how teachers in such schools are integrating ICT in their instructional activities. The full findings of the research are reported elsewhere (Rana 2018). This article focuses on how rural primary teachers are using digital technology, their sources for learning about the use of ICT learning and the shifts, small but significant, in pedagogy that are occurring through the use of ICT.

Nepal has developed a comprehensive policy and curriculum affirming the use of ICT in all schools in order to transform traditional teaching styles into more student-centred ones, to better engage Nepal in global developments and to facilitate the country to compete in global markets. However, the government has not provided technology resources and initial or continuing teacher training in ICT, but rather allowed NGOs to provide the technology and short blocks of training (Rana 2018). It is important, therefore, to examine the ways that rural primary teachers do utilise

the technology they have been provided with by NGOs and, in particular to examine what changes in teaching approaches are taking place as a result of the use of technology. This article reports the results of one such exploration. The exploration is grounded in the context of rural Nepal and therefore it does not seek to evaluate practice or provision of resources against any external standards; rather it seeks to describe what is happening in the particular local context.

## THE CONTEXT OF NEPAL

As stated above, recent policy of the Government of Nepal emphasises the incorporation of ICT as a tool for teaching and learning and stated the aim of transforming the traditional forms of schooling through digital technology. The *National Curriculum Framework for School Education, 2005* for the first time included ICT to use as a tool for delivering information (MoES 2005). Then the reformed *National Curriculum Framework, 2007* reiterated the plan and stressed the need for ICT to be implemented throughout the country (MoES 2007). The government does not provide any funding for ICT infrastructure and ICT training. Instead, schools mainly receive infrastructural resources as well as training in ICT from NGOs. Pre-service teacher education does not cover ICT training, and neither does government in-service training. The NGOs which support state primary schools with ICT infrastructure train the teachers how to use ICT in instructional activities. The Ministry of Education and Sports (MoES) and Open Learning Exchange (OLE), a leading non-governmental organisation, signed an MoU in 2007 to implement the policy plan (OLE 2017 March 15). Starting with two primary schools in 2008, OLE is now supporting 225 schools in 34 districts with digital technology.

ICT has been widely adopted in the capital city, especially by private schools who sometimes use it to win a competitive edge. However, the use of ICT is still a very new practice for many teachers in schools, especially for those in remote rural villages. Because about 80% of total population of Nepal still resides in villages in rural areas (Central Bureau of Statistics 2011; published 2012 November), investigation of how rural teachers are coming to terms with ICT technology is very important to understanding how the national plan for ICT use in education is being implemented in practice. However, there has been little or no published research in this area and the study reported here has sought to address that gap. There are accounts, however, such as that by Shields (2011), about how remote rural schools are being encouraged to change their traditional teaching and learning activities, and the use of digital devices by NGOs offers an opportunity to make a change.

The research project was planned immediately before the major 7.8 magnitude earthquake that took place on 25<sup>th</sup> April 2015 and the fieldwork took place shortly after it. The earthquake and its aftershocks affected 8,308 schools, destroying about 30,756 classrooms and damaging, to a greater or lesser extent, about 16,813 classrooms (ICIMOD 2015). Inevitably, the catastrophe also affected the practice of ICT in many schools where digital technology had been introduced and so became part, an additional aspect of the study (Rana 2018). Although a full report of the impact of the earthquake on rural schools and on ICT is outside the scope of this discussion, this article briefly reports some aspects of that impact on the schools studied and on their access to ICT.

In Nepal, the varied geography of hills and mountains covers 84% of the land, making execution of the government policy of developing ICT infrastructures a great challenge (MoE 2013; UNESCO 2015). Nepal Telecom Authority (NTA) reported that about 50.11% of the total population has internet access and over fifteen thousand new subscribers are connected to the internet daily (Pokharel 2016 August 7; retrieved 2017 September 1). The NTA also stated that over 95% of the total population have telephone access that consists of both landline and cellular mobile. These figures indicate that the trend of digital technology use is increasing in Nepal. The

extent to which internet and mobile access could be accessed by schools has not previously been researched and so was one of the objectives of investigation (Rana 2018).

## **LITERATURE REVIEW**

As stated above, there is little published research about the use of ICT in Nepali rural primary schools. However, there is considerable literature, globally, about the relationship of ICT with teaching styles, about the resources that are necessary, and about the need for teacher training. Here a brief review is offered of significant writings about the importance of infrastructures, the relationship of ICT with pedagogy and the role of ICT knowledge and skills.

### **ICT Infrastructure**

It is widely claimed (for example, CAN-USA 2013) that the efficiency of ICT in education depends on the availability of ICT infrastructure, human resources and on the IT industry. In Nepal, *ICT in Education Master Plan, 2013* stated that ICT infrastructure consists of availability of the internet, sufficient computer technology, skilled workforce, content development and system enhancement, all of which must be considered in the planning of ICT in education (MoE 2013). Thus, systematic management of computer technology with an internet connection provides opportunities for educational activities, such as conducting virtual assessment, accessing digital information, using online discussion boards and communications. González-Lloret (2014) argued that the effort of many teachers in preparing their advanced lesson plans that require high-speed internet and computers might be counteracted by having to work with old model computers and unreliable internet connections in rural and non-urban areas. Dawes (2001) identified that lack of proper equipment, training and regular systems evaluation are major barriers for many teachers to practise ICT in their own contexts, particularly in developing countries. Lee (2002) in his Hong Kong study suggested that schools initially must have sufficient ICT infrastructure to motivate the teachers as well as learners in educational activities. On the other hand, Albirini (2007) in his study of Korean students' access to technology argued that, although the lack of technological materials is a major problem in the implementation of ICT in education, there are also other problems in ICT application, such as a lack of proper planning, inadequate teacher training, unsuitable computer programmes, limited knowledge and skills to integrate ICT in instructional activities, and insufficient digital content.

Donaldson and Knupfer (2002) and Jong (2012) suggested that teachers must be provided with sufficient technological access and support to make them proficient at using available ICT effectively. In addition, Bjerede, Atkins and Dede (2010) argued that ICT infrastructure for educational purpose must be practicable and powerful enough to adjust to new methods of teaching and learning. Krumsvik (2005) argued that technological infrastructure can only provide resources for the teachers and learners, but it cannot by itself create a learning community. Parr and Ward (2011) suggested that the provision of ICT facility for the educational purpose must focus on the needs of students and provide them with opportunities to learn.

These writings pointed to the importance of investigating what digital infrastructures and content resources were available in rural Nepali schools and what use teachers made of them.

### **ICT and Pedagogy**

Loveless, DeVoogd and Bohlin (2001) stated that pedagogy can be considered as similar to the way that a choreographer utilises the complexity of expressive dance. They claimed that integration of ICT in instructional activities offers an effective means to access a wide range of information and allows acknowledgement of culture, different learning environments and student-

teacher interactions. They emphasised that it is more important for teachers using ICT in their teaching activities to have an advanced ability to construct knowledge from information rather than the ability to use different forms of ICT. Vratulis *et al.* (2011) claimed learners gain more by searching widely with ICT than by just sitting at the back of the classroom. Anderson and Dron (2011), on the basis of socio-constructivist pedagogies, proposed that the use of ICT in teaching and learning activities extends teachers' teaching beyond facilitating learners in their learning in the classroom to choosing and constructing new interventions in educational activities.

Various researchers reported that the increase in the use of ICT in educational organisations indicates the expanding potential of the technology. Vesisenaho and Dillon (2013) argued that ICT integration in pedagogy opens up opportunities for learning beyond the restriction of school hours. Roth (2009) claimed that the use of advanced digital technologies in instructional activities facilitates deeper and long-lasting learning. Bjerede, Atkins and Dede (2010) found that the advent of mobile wireless technology made teaching and learning more probable, and created an ecology for learners where they could find their own suitable places. Armstrong (2014) argued that genuine and relevant ways of using tablets, smartphones and smart boards with an internet connection to explore information can provide students and teachers with opportunities to collaborate with each other in ways that textbooks and lectures cannot do (Armstrong 2014).

Voogt (2009) found that intermediate school science teachers' ICT practice highly increased students' learning activities, improved teaching quality and raised the quality of classroom discussion. Tezci (2009) argued that the positive and higher level experience of ICT use in instructional activities develops a positive attitude of teachers towards ICT, but he also stated that teachers' knowledge of how to use ICTs in teaching influences their use. Balakrishnan, Rossafri and Soon Fook (2007) argued that learning theory, teaching method and ICT cannot be effective in isolation to bring about changes in educational practices and learning outcomes. However, they claimed that ICT integration in teaching strategies can transform learning theory and methodology.

Mentis (2008) suggested the need for further study and investigation into the correlation between ICT, pedagogy and e-learning environments. This study reports such investigation in one situated context.

### **The Role of ICT Knowledge and Skills**

Sutherland (2005) suggested that teachers need to incorporate ICT as a bridge between learner and learning. Then, the success of ICT in teaching can be realised when the teachers can shift their current ways of teaching from traditional models (Demirli 2013). However, Chao and Stovel (2002) stressed that teachers need to understand that learning takes place when the previous knowledge has an association with a new acquaintance. Perkmen (2014) found that the teachers, who had practised the use of ICT in their initial teacher education, effectively used digital technology in their classroom. Therefore, pre-service teacher training must be oriented to provide theoretical and practical knowledge of ICT in order to apply in the classroom (Niemi 2003). Dawes (2001) earlier found that teachers are not threatened by new technologies and students' technological skills but by their own lack of knowledge. Henderson and Honan (2008) criticised teachers for failing to understand their students' outside school access to computer games, internet, mobile apps and other forms of ICT and being unable to link those technologies in their classroom teaching. Thus, it has been argued (Chai *et al.* 2011; Loveless 2011) that teacher preparation course should consist of technological, pedagogical and content knowledge.

However, Orlando (2009) voiced concern that everyday innovations in ICT complicate teachers' ICT practice and the teachers have a challenge in how they change their practices against the constant and rapid change of ICT. González-Lloret (2014) suggested that incorporating

innovative technologies into instructional activities invites more possibility of failing. Drent and Meelissen (2008) argued that the major obstacle in the practice of ICT is teachers' incompetence in using it. Albirini (2007) argued that lack of ICT infrastructure in schools itself is not a major problem, but teachers' insufficient ICT knowledge and skills stand as a determinant in the successful integration of ICT in teaching and learning. Thus, Tezci (2009) asserted that teachers require ICT competence to strengthen the implementation of ICT in education.

Higgins (2003) considered ICT as a powerful tool to visualise complex concepts and make them lively, to manipulate and deliver information through texts, pictures or graphs, but not to teach skills. He claimed that innovative use of ICT in instructional activities can transform traditional pedagogies and direct the teachers as well as learners to constructive thinking and innovative activities. However, teachers need to have skills to fix general technical problems, the experience of using ICT and subject-specific knowledge of pedagogy (Gibson, Moline & Dyck 2011). Loveless (2003) emphasised that teachers not only need to have skills in how to use ICT, particular applications or web resources, but also the knowledge of why and when they can be utilised. Salleh and Laxman (2014) argued that teachers' positive attitude of using ICT in their instructional activities increases their ability to successfully integrate ICT, escalates their motivation to innovate better strategies of ICT use and enables them to use it. However, Salehi and Salehi (2012) argued that although teachers in Iranian context were aware of digital technologies, they had inadequate technical support and little access to the internet for the promotion of their ICT skills. Thorburn (2004) argued that teachers need to be provided continuous training support to upgrade their professional skills and successful integration of ICT. In the context of rural schools in Nepal, Bhatta (2008) suggested that teachers need to be provided with technological and pedagogical knowledge and skills.

The literature highlights the need for sound infrastructures and adequate teacher training. It also indicates that the provision of ICT resources is not enough to create a learning situation that is both student-centred and optimally uses technology. These issues in the literature highlighted the need in this study to examine not only infrastructures and teachers' training in ICT skills, but also their ways of creating student-centred learning situations.

## **RESEARCH DESIGN AND PROCEDURE**

The overall study addressed the research question: how is Nepal's ICT policy being implemented in rural primary schools? This article reports aspects of the study that relate to the extent to which the use of ICT was perceived by teachers as transforming their teaching styles, and to the enablers and barriers to that transformation.

The overarching research study was qualitative in design with an interpretive social approach (Neuman 2006) that utilised participant observation, semi-structured interviews and content analysis of government and NGO reports, national policy statements, school reform plans, education acts and other official documents. Analysis of the documents focused on developing a narrative that summarised government intentions for the introduction of ICT in schools, strategies of implementation (or their absence), contextual factors relating to internet provision, initiatives of NGOs and reports of the impact of the 2015 earthquakes. After the field work, these documents were read against observational and interview data in order to develop a better understanding of the complexities of practice within the rural context. Such an overview of policy and the extent of its implementation had not previously been collated and it is fully reported in Rana (2018). Here relevant findings are summarised as background to a report on teachers' practices.

Five rural primary schools were selected on the basis of their reported use of technology in their teaching and in order to reflect a range of degrees of impact by the 2015 earthquake. The early

stages of the project found that there was a lack of government or district records of which schools had obtained and were utilising digital devices. NGOs were able to report the schools they had supplied. Overall, however, information about rural schools' practices had to be obtained throughout personal contact and referral. Difficulties of access were augmented by the closure of many schools and breakdown of communications following the 2015 earthquakes. Educational research is still a very new undertaking within Nepal and Rana *et al.* (2018) discuss the complexities of accessing the field.

In the first three of the schools studied, teacher interviews and class observations took place over a four-week period at each site. Teachers volunteered to become involved in the project and they are listed, by pseudonyms, in the table below. Semi-structured interviews were conducted with each teacher each week, focusing on their pre-service and on-going training, their understandings of the uses of ICT, their sense of comfort in using the devices they had been provided with, the changes they were making in their teaching as a result of access to the devices, the changes to their students' behaviour, and the obstacles they encountered. The interviews were audio-recorded, and several participants agreed to the recording of further more informal conversations inside and outside school.

At least seven of each teacher's classes were observed during the five-week visit. Observation focused on the provision of resources, the strategies teachers used to introduce curriculum topics, the activities students engaged with, and the relationships within the classroom. Class observation notes were made daily.

**Table 1:** *Participant Schools and Teachers*

| School            | Participant | Gender | Status    |
|-------------------|-------------|--------|-----------|
| Annapurna School  | Anuj        | Male   | Fix-term  |
| "                 | Ananda      | Male   | Temporary |
| "                 | Anita       | Female | Private   |
| "                 | Asha        | Female | Private   |
| Buddha School     | Binod       | Male   | Permanent |
| "                 | Bijen       | Male   | Permanent |
| "                 | Bhupal      | Male   | Permanent |
| "                 | Bikash      | Male   | Private   |
| Chadani School    | Chandra     | Male   | Temporary |
| "                 | Chiran      | Male   | Permanent |
| "                 | Chitra      | Male   | Temporary |
| "                 | Chetan      | Male   | Permanent |
| Dhaulagiri School | Deepa       | Female | Temporary |
| "                 | Dinesh      | Male   | Temporary |
| Ekata School      | Ekendra     | Male   | Private   |
| "                 | Elisha      | Female | Private   |

In the fourth and fifth schools, two teachers from each were interviewed but their classes were not observed. The fourth school had lost its ICT infrastructure in the earthquake and it was found that the fifth school kept the digital devices unused in the locked lab. Of necessity the study's focus in these schools was on recall of their previous experiences with the use of the devices they had and the training they had received. In addition, their accounts of discontinuation were in themselves noteworthy.

The audio recording of the interviews and informal conversations were transcribed, translated and initially coded using NVivo to discover recurring themes. In addition the data from participants was approached as narrative of individual experiences and contextualised understandings. This aligns with the process of interpretative phenomenological analysis (IPA). Smith, Larkin and Flowers (2009) explain that IPA emphasises the subjective meanings that participants give their experiences: it is an analysis that is committed to understanding data from the perspective of participants at the same time as it calls on the researcher to interpret, that is to make sense, of what the participant is saying. This combination of analytic approaches allowed common themes to be recognised as well as accentuating participants' personal experiences and perceptions. The combination leads to a descriptive and interpretative presentation of findings clustered around key emergent themes, as is seen in the following sections.

A study of five schools does not offer a comprehensive and generalisable depiction of the practices of all rural primary schools in Nepal. However, by identifying possibilities and limitations that were evident in those schools, it indicates directions that can be explored in further research and it allows recognition of gaps between policy and grounded practice as well as of specific issues in teacher preparation and provision of infrastructures that contribute to the gap.

## **FINDINGS**

A cluster of findings from the overall study is reported here. These include findings related to digital resourcing in the schools, to resulting teaching approaches, to teachers' perceptions of their preparedness to use the available digital devices and their understandings of their practice.

### **Digital Resources in the Schools**

Document analysis and field interviews revealed that of the five schools which participated in this study, three schools, Annapurna, Buddha and Chadani schools, had computer labs that contained XO laptops (specifically designed laptops for teaching and learning), a local server, routers and backup power. These had been provided by an NGO which also provided initial training in their use. The device monitors with a touch-sensitive feature could be twisted 90° and used flexibly. One of the other two schools, Dhaulagiri School, did not receive these laptops, and the 2015 earthquake destroyed its previously acquired desktop computers. The participants from the fifth school, Ekata School, reported that they received 83 XO laptops, returned 53 to the supporting organisation after using them for five years and kept 30 in a room unused for more than two years. However, the participants from the school were reluctant to be specific in explaining the reason for their disuse, rather suggesting that their upkeep was too much trouble.

Observation and interviews revealed that XO laptops contained digital contents for Science, Maths, Nepali and English. Teachers and students accessed the digital library on the devices by connecting to a local server in the school. However, it was found that the schools did not have internet facility to access information online. Thus, the devices and local server were a repository of programmes and information that teachers and students could theoretically access at any time. The supporting NGO updated the digital contents on the devices manually twice or three times a

year. Offline wiki, paathmala, games and e-paath were the commonly used applications on the devices.

In an interview, Bikash from Buddha School talked about the potential of one of the other features available on the discussion board:

*There is a useful feature: we can chat one to another on this device. Binod and I tried that before. He used to sit with this device somewhere outside, and I used to be here, and we could chat with each other. We used to connect it to the local network, but we never involved children in that space.*

Bikash's comments about the discussion board were echoed by comments by other teachers about a number of applications that were not directly related to curriculum content. It was repeatedly found throughout the study that some features of the devices were seen as useful, had been tried out by some teachers but were never used in teaching because they did not contain specific curriculum content.

Bhupal, another participant from the same school, emphasised that the use of those devices in teaching was to enhance material available in the printed textbooks:

*Most of what the textbook does to meet the objectives of the curriculum, this cannot do that. It is only a teaching material to enhance the textbooks. This is integrated into teaching and learning as a supporting tool. It is not itself curriculum.*

He further explained that the devices contained audio-visual materials, colourful pictures, text-to-speech features which made teaching and learning interesting and effective. Observations and interviews with other participants affirmed that they saw the digital devices as primarily useful for providing colourful, interactive and interesting materials to enhance the basic information in the 'official' textbooks.

It was noted that the devices were available only in the school lab, as was the case in the other schools (except for Ekata School) in the study. The majority of teachers, particularly from Chadani School, articulated that insufficient devices in the lab made it challenging to manage a large number of students. Observation confirmed that the teachers in Annapurna and Chadani Schools struggled to arrange a large number of students in their lab classes with fewer devices than students. Some of the learners shared the same device between two. Chiran from Chadani School complained about constraints caused by the need to share:

*In fact, one child one laptop is required to run the high-level teaching and learning activities. We would do better in teaching activities. We have tabled this issue in training too, but they did not say anything about it. They said, 'We will think about it' but we got no reply later.*

The insufficient number of devices was repeatedly reported to influence teachers' teaching and students' learning activities, reducing students' freedom to navigate through programmes and leading teachers to be directive in setting exercises. Moreover, some of the participants expressed disappointment about the features of the digital devices which they have been given. For example, Chetan commented the devices did not contain all the features like other common devices available in the market. And Anuj from Annapurna School argued that the limitations of the devices as well as lack of internet access only made it possible for teachers to use the XO laptops to provide curriculum material, but not for learning computer skills:

*In fact, e-paati<sup>1</sup> is not for learning the computer. It is a teaching tool. If we take this as computer learning, we may be wrong. We let students use it and learn by themselves, and we use it as an educational tool for teaching curriculum subjects.*

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1 Nepali name for laptop



The majority of participants in this study commented that the use of the digital devices in their teaching allowed them to be more efficient in their teaching and expressed their desire to upgrade the level of technology to improve school education. For example, Elisha from Ekata School suggested that the devices with all curriculum subjects could replace the printed textbooks if the schools could provide an individual device for each student: "If they have the individual device and all the subject contents, even without the textbook this can work." However, a number of teachers, like Chetan, expressed their judgement that the level of technology available on the devices was not of a sufficient standard to allow them to teach the use of digital technologies as they occur in the outside world.

### Teaching with Digital technology and Textbooks

Participants explained that they incorporated both digital sources and printed textbooks to prepare their teaching plans. The majority commented that the contents in two different sources were correlated, but a few were concerned about differences. For instance, Asha said:

*Textbooks have different contents than devices. I teach them separately. It is hard. There is a lesson about crow in the textbook, but on this device, the lesson is about parijat<sup>2</sup>.*

Her concern seemed to be an indication of the direct transmissional way she used the textbook rather than exploring underlying ideas and principles. She also suggested that the differences in content added an extra load of preparation on top of the prescribed textbooks.

Participants stated that they used the printed textbook in their regular classes and the digital devices in the lab. Many expressed their awareness that the printed textbooks were the only resource for the learners to read and do homework outside the school. Various participants commented that the digital devices provided the children with opportunities for learning lessons by doing various activities but stressed that it took careful preparation to find the right content from the digital source related to the curriculum. Ananda said:

*The contents of the textbook and digital device match but not serially. We have to search them randomly on the computer. That is the reason teachers have to prepare well before they go to the classroom. We do full work in classroom teaching. These device contents strengthen children's learning when they practice on these devices. It is not separate teaching. Next thing they have a feeling that they are learning from a computer.*

He stressed that core, or as he called it 'full', teaching takes place in the classroom and that the lab sessions with digital devices serve only to provide further practice. He acknowledged, however, that students were coming to think that they were learning from the computer rather than from the teacher who carefully selected the exercises to be used on the computer.

Anita stated that teachers need to employ pedagogical skills to coherently organise both the sources in their teaching plans and delivery. She commented the digital devices contained a broad range of digital content useful for the children which provided them with self-learning opportunities:

*Trainers trained us how to teach matching the textbook and digital contents in the classroom. Suppose I teach Science in class five. Whatever the matters in the textbook are, they are also found in e-paati though they are not the same and not consistent. Whatever is intended to teach in the textbook is also on this device. Digital contents are more than textbook contents, more practice-oriented. Students can learn when they do themselves, watch demos, listen to an automated voice like 'correct' or 'incorrect'.*

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2 name of a lady litterateur

*Learners can repeat the exercises that are wrong. What they have to learn they have here.*

Some of the participants' comments suggested that the digital devices, if available for each child whenever they were needed, could perhaps replace the printed textbook they used in the regular classroom and at home. Chitra, for example, commented:

*It is based on the textbook. It is the next side of the textbook. If the children have an individual device, they do not need this book. We must provide them a personal device which they can take home and bring with them in the classroom.*

Observation of participants' classes indicated that they followed separate, and sometimes parallel, routines for the lab classes and the regular classroom teaching. They taught the children in the lab using digital devices at least once a week and they quite separately taught them from the printed textbooks in regular classes on other days.

Participants repeatedly commented that the use of digital devices in their instructional activities made their teaching more effective. They variously stated that they preferred to use digital devices to deliver their lessons, in order to provide individual practice of lessons for the children and so improve their learning. However, observation revealed that they used the printed prescribed textbook as the main teaching material and the digital device as a complementary material for providing further practice for children.

### **Teachers' Perceived Preparedness**

Document analysis and field interviews revealed that for education in how to use ICT in teaching teachers need to rely on NGOs for short introductory courses and brief annual refreshers. It was found that no initial teacher training courses cover ICT in education, unlike the practice in developed countries. Teachers are given training in how to use the provided digital devices by the organisations which provide them. The organisations have developed agreements with the Government of Nepal to help with ICT infrastructure and provide ICT training for the teachers. Discussion of the rationale for government's reliance on non-governmental organisations to train the teachers is outside the scope of this article but it is important to note that at this time the government's policy to develop ICT in education is dependent for its implementation on outside agencies that may or may not have a continuing presence in the country.

The majority of participants stated that their initial teacher education and general government in-service training did not cover the use of ICT in teaching activities. They explained that an NGO which supported the schools with ICT infrastructure provided one-week intensive training on how to use ICT and stated that was the first formal training they had received. Participants also explained that the training provided them with basic computer skills, trained them to prepare integrated lesson plans and deliver lessons using the digital sources. For example, Bikash explained:

*Open Learning Exchange (OLE) had provided one-week training before we got this lab. In seven days we mostly did the computer activities like how to open the programmes, search information, shut down the device, like that. What computer skills do we learn in seven days? We'd never seen this before. We did not expect we could learn to use this device in teaching and learning. However, we learned how much we had to learn, and they made us perfect to use the devices at the end.*

Bikash's statement reflects that teachers developed their confidence in using digital devices in their instructional activities through the training provided by the NGO. Many of the participants agreed that the first one-week training in ICT made them able to explore digital content on the

devices and local server, integrate the content of the printed textbooks and the digital content, and teach in the classroom. For instance, Binod said:

*OLE provided one-week training before they provided this technology for our school. We learned to operate the laptops, search contents on them and find e-library books on the server.*

Similarly, Chitra said:

*Honestly, I didn't know how to open a computer but the trainers confidently said they would make us perfect in a week to use these devices in our teaching and learning activities. Then they provided one-week training during the holiday, and we did that at the end.*

And Bijen said:

*This was all about how to use the device in our teaching. When we learned basic computer skills, trainers trained us to present lessons using these devices. In this device, there are already materials.*

Most participants claimed that the use of digital devices in their instructional activities made their teaching more effective. However, Chetan who had been teaching with the technology for six years by the time of interview mentioned that he had not been able to develop his ICT skills further. Although he did not want to explain why he had that perception, his comment raised questions about whether there was any support from trainers to advance skills beyond basics and about the extent to which rural teachers could access ICT in their everyday lives.

### **Teachers' Perception of their Practice with Digital Devices**

Teachers' comments about the practice of digital technology and observations of their practice indicated that there has been some degree of change in teachers' traditional pedagogies. The participants in this study talked about collaborative activities in their teaching. They expressed their appreciation that the incorporation of digital technology in their teaching created student-centred learning and provided the children with self-learning opportunities in the classroom. The majority of participants perceived that the children learning with digital devices in the lab gradually overcame their hesitation to express their feelings and share their learning problems with their teachers and colleagues, and the use of the devices developed their friendly relations between learners and teachers. For example, Chitra stated:

*We behave like friends. They might have the feeling 'Am I weak in the study or less than someone?' That is a kind of hesitation in them. So, their involvement with their colleagues is really supporting them to learn.*

Elisha, a participant from the school that had shut away its devices, shared her experiences of the enthusiasm her students had shown when she had been able to teach with digital technology:

*They used to talk about a lot of digital contents and materials in the classroom and outside when they had individual devices with them.*

She expressed her dissatisfaction with her school's administration for not keeping the digital technology functional as it used to be before. She recalled that when the children had individual devices they had improved their learning habits and discussed their learning matters among their friends inside and outside the classroom. She expressed a sense of despair that such interaction between the students had gradually declined after the school had withdrawn all those devices from them and stopped the use of technology in teaching and learning activities.

The majority of participants who had been using the technology commented that the digital devices provided the children with opportunities for sustained practice and self-learning. They

perceived that the use of digital technology decreased their own reliance on lecturing and shifted their role to that of a facilitator. For example, Chiran explained:

*Just the lecture does not make teaching effective. We have to go through problems in the groups of students, ask them individually to participate in interaction or discussion or speak out their problems when they are working on their devices. That makes them active in learning lessons. We have to involve weak students in group works.*

Chiran's comment highlights how teachers perceived that the use of digital devices in instructional activities supported their efforts to involve the children in various collaborative activities. However, Chitra argued that, although capable learners were benefiting from learning with digital devices, low-performing students seemed to rely on copying others. He explained:

*I think high-level students have highly taken advantage of these devices. The low-level students mostly copy their friends. Even if we instruct them, somewhere, they are lost. But they better learn from their friends.*

Observations affirmed participants' comments that the provision of individual devices to the children in the lab created an environment for the children where they experienced freedom to use time according to their own pace, to practice individually and to utilise self-learning opportunities. Nevertheless, except for the mathematics teachers, observation showed that the majority of teachers would explain contents and learning goals in a used a direct instruction method even when children were engaged in various activities on their individual devices, and indicted intention to clearly direct learning rather than allow student exploration. However, the children's enthusiastic and striving engagement on their devices did suggest that a new kind of learning approach was being initiated and the freedom they seemed to experience in using individual devices might signal the beginnings of student-centred teaching.

## **A SHIFT IN PEDAGOGY? – DISCUSSION**

As indicated above, teachers in three of the schools studied were actively using a lab with digital devices that had been provided by the donor NGO. They were unable to connect to the internet but had a repository of content on their local server that related to and extended the curriculum resources in the official textbook. Teachers reported a growing sense of confidence in using the resources and affirmed that their students enjoyed the interactive capacity of the devices and experienced a greater degree of freedom in the pace and immediate direction of their learning. These factors, they asserted, led to better classroom learning. It also led to improved student to student and student to teacher relationships in the classroom. These factors point to changes from the traditional teacher-talk and textbook dominated teaching processes that have been characteristic of teaching in Nepal as well as in other developing countries, and a movement towards more student-centred learning.

However, teachers in these schools also complained about the lack of internet and the way that limited the ways they could use their digital devices for open-ended exploration. Some complained about additional workload they experienced in seeking to integrate textbook and digital contents, suggesting that they were still inclined towards a teacher-dominant classroom practice. Some others complained about lack of possibilities to learn more about the workings of computers and the uses of digital technology, suggesting that the training NGOs were able to provide was constrained in its scope and that there were no provisions for further teacher development. These factors point to limitations that seem to already circumscribe the emergent changes that are occurring in practice.

As reported, two of the studied schools were no longer using the digital devices that had used earlier. In one case the earthquake had destroyed all the school buildings including the computer

lab and all its computers, as occurred in thousands of other schools in Nepal. A relief organisation had helped build a tin walled space to allow classes to run, but not the library or the computer lab. There teachers had to return to chalk and talk, and they expressed frustration at the loss of facilities they had enjoyed incorporating into their teaching and were looking for ways they could raise community funds to replace their computers and reinstate technology-integrated teaching into their practice. The teachers' comments about loss indicated their belief that pedagogy that changed for the better with the use of ICT; they also indicated how vulnerable both the technology and the associated changing teaching practices were in a context that is not only highly earthquake prone but also insecure in its funding for resources.

The school that had locked away its computers after apparently successful initial use provided a slightly enigmatic contrast. No-one would speak directly about the reasons for the disuse, although the interviewed teachers did talk about the benefits they had experienced when the devices were operational. The vague allusions that were made to risk and potential costs to the school and community suggest that not all schools found the provision of digital labs unproblematic and that there were factors in upkeep that they did not feel able to accommodate. Perhaps reliance on NGO provision and training did not offer sufficient ongoing security to change existing patterns of teaching. The case of this school invites further research about the sustainability of changes in a context where the change is entirely at the discretion of an NGO and not the government.

This study of five schools provides an illustrative example of the use of digital technologies in the classroom instructional activities in rural primary schools in Nepal. It does not presume to suggest generalisations, but it does serve to highlight significant issues. A key issue is that there is enthusiasm for the use of digital technologies on the part of both teachers and students and apparently growing confidence that the use of technology can improve learning and classroom relationships. This resonates with the findings of Correa and Pavez (2016) in rural Chile: that the teachers in their study had a keen interest in learning new skills and using higher levels of digital technology in their instructional activities. A further key issue is that while changes are being made they are vulnerable. The supply of equipment and resources and the accompanying introductory training by NGOs offers a welcomed service to the schools who are the recipients, but there are no guarantees of the NGOs continuing operation within Nepal and there seem to be no means to replace equipment that has been lost in the earthquakes. The absence of internet access in many rural areas creates a firm limitation to the ways technology can be used in schools. In addition, in the schools supplied by NGOs teachers have been trained in basic operations but they have not yet been given a strong grounding in how technology can enable independent and collaborative ways of learning. Even programmes that are available, such as discussion boards appear to not be used.

The predominant current uses of the digital devices seems to be as an extension of the textbook and perhaps could serve to provide a more cost-efficient and timely alternative to the costly provision of textbooks, as Chapman, Garrett and Mahlick (2004) have suggested. However, Salleh and Laxman (2014) argued that schools need to have spacious rooms for mobilising learners with digital devices, and these were lacking in the schools studied. Several research studies (Moursund 2005; Ruthven, Hennessy & Brindley 2005) have found that the expense of new technologies becomes a burden even for developed countries, and Nepal is currently struggling to replace basic school buildings. Even where resources have been supplied and are still operational, the use of the resources is not enough to create through pedagogical change. A number of researchers (Burruss et al. 2009; Collins & Halverson 2009) found that bringing new technologies into the existing infrastructure causes a challenge for the teachers in terms of organising resources and students and creating collaborative learning activities. The teachers in the schools studied were just beginning to grapple with the challenges.

## CONCLUSION

Challenges remain. Teachers themselves expressed concerns about lack of infrastructures, especially internet access, insufficient training, insufficient devices, as well as earthquake damage and future earthquake vulnerability. ICT practices largely tend to be a replica of habitual teaching practices but using digital devices in the place of textbooks. However, in the schools studied the lab experiences are enriched by more interactive and more visually exciting materials and by allowing students some sense of freedom in the pace they set themselves and in what they explore on the devices. Friendlier classroom atmosphere has been created with more opportunity for peer support and dialogue. Teachers reported improvement in their teaching effectiveness and in students' learning. The growth of freedom and friendliness can be seen as a movement from traditional autocratic teaching approaches towards student-centred learning.

However, a vulnerability remains in the relegation of provision of infrastructures and training to NGOs who have no guarantee of on-going operation. Lack of government plans for robust and relevant training for teachers in ICT does not indicate a sustainable implementation process for achieving policy goals. There is still a lot of work to be done in providing means for rich and effective use of ICT in Nepali education, especially in rural primary schools.

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