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A descriptive study

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The state of Integration of the Virtual Learning Environment and ICT into the pedagogy of the Royal University of Bhutan: A descriptive study

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ABSTRACT

This paper reports a descriptive research study on the integration of ICT and pedagogy in the colleges of the Royal University of Bhutan. It investigates whether ICT is integrated into the pedagogy and, if so, in what way. The study identifies the use of a Virtual Learning Environment (VLE) as the key technology, which is used as part of ICT-integrated pedagogy. However, the VLE has been found to be confined to be a platform where sharing of items such as work plans, module descriptors and uploading assignments have been done. The actual interactive teaching/learning via VLE is considerably low. Besides the aforementioned use, only a few of the lecturers are found to be using the VLE for discussion, class tests and quizzes. The concepts and application of learning design or instructional design are confined to a few lecturers. Mixed method approach has been used to collect data. For data analysis Braun and Clarks thematic analysis has been used to analyse the interviews. From the study it has been found that the status of ICT-integrated pedagogy in higher education in Bhutan is at an early stage and is affected by low-speed Internet connectivity and a lack of adequate resources as well as training in ICT-integrated pedagogy. However, lecturers are found to be motivated by the perceived potential of technology.

Keywords: *ICT Integration; Virtual Learning Environments; Bhutan; Higher Education*

INTRODUCTION

Bhutan is a small country, whose higher education system is predominated by the Royal University of Bhutan (RUB), a federated institution of colleges. Like many other countries, Bhutan accords great interest in digitalising the country, but there is very little knowledge regarding its actual devolvement. With the exceptions of the preliminary research of NN et al. (2014), Kinley et al. (2013) and Khamsum (2010), there is little research on the impact of the ICT transformation of teaching practices in higher education in Bhutan, which, like so many other countries, increasingly integrates ICT. Though ICT integration has made its beginning, the status of ICT-integrated pedagogy in higher education in Bhutan is at an early stage and this is affected by low-speed Internet connectivity and a lack of adequate resources as well as training in ICT-integrated pedagogy (NN). This particular study on ICT-integrated pedagogy in the context of Virtual Learning Environment (VLE) in the colleges of RUB provides descriptive research on the extent and features of the pedagogical impact.

Such research results will become an important baseline for all researchers, professionals and policy-makers that deal with the educational technology of Bhutan. It will also enable the colleges to obtain an understanding of the level of ICT integration into their pedagogical practices. Previously, with the exception of the aforementioned studies at the individual college level, the actual situation in Bhutan was unknown, and we were left guessing whether it mimicked that of

other countries. Higher education in small states like Bhutan, (with less than 800.000 citizens) have other dynamics than in larger states, and it is important to get an empirical basis for developing an understanding of such dynamics (Baldacchino, 2011). This is even more so, given Bhutan's several special circumstances (political, demographical and historical), demarcating it from other neighbouring countries. Hence, this article is guided by the question: 'To what extent is ICT integrated into pedagogy in the colleges of RUB?' This can be broken down to:

- What professional use of ICT is being practised by RUB lecturers?
- Which types of ICT integration approaches are prevalent across RUB colleges?
- What is the level of ICT integration in the colleges of RUB?
- What barriers affect the higher levels of ICT integration?

BACKGROUND

The research participants were lecturers and ICT officers. The ICT officers are those who assist teachers and students with matters related to ICT facilities and services, but not in integrating ICT into classroom practices and pedagogies (Mishra & Koehler, 2006). The researchers conducted 27 interviews in eight colleges in Bhutan. Among the 27 research participants, two lecturers have IT backgrounds and three ICT officers were trained in VLE and instructional designs. All eight colleges have IT labs for students and the lecturers are provided either a desktop or laptop computer. All the students have basic knowledge of ICT since they had already mastered basic computer application prior to taking the undergraduate courses. All the colleges have a mechanism for familiarising new users of the VLE by way of in-house programmes, where faculty who have obtained training cascade this information to the other faculties.

LITERATURE REVIEW

According to Granger, Morbey, Lotherington, Owston and Wideman (2002) Information and Communication Technologies (ICT) have become significant feature in the field of education. Bhutan is no exception and the management of RUB has shown enthusiasm for educational technologies for several years (Reid & Cano, 2005), and that enthusiasm has only got stronger over the years. A milestone of that enthusiasm occurred in April 2011, when a policy requiring all RUB colleges to use a Virtual Learning Environment (VLE) was issued (Kinley et al., 2013). Several local colleges have voluntarily initiated it. However, Samtse College of Education (SCE) began using VLEs as early as 2004 (Jamtsho & Bullen, 2007).

ICT has been attributed to bringing changes in teaching since its penetration into the educational field. The use of ICT has also enabled distance learning by making use of the VLE. In the study conducted by Barker and Gossman (2013 p.19) it has been found that VLE could "maximise student reflection and encourage progressive thought, and independent thinking."

ICT and its integration are the key concepts of this paper, and hence the study presents the main underlying constructs of the study.

1) ICT: According to Pelgrum and Law (2003), ICT is a facilitator that brings change or reform to educational practices. In order to focus on this, ICT tools (or in short, ICT) in the context of this research activity concern the tools with the potential to improve teaching through their integration into the teaching and learning process.

Zuppo (2012) uses the term ICT as an umbrella under which a range of increasingly 'converging technologies' are included. She also states that ICT can be defined in reference to specific ICT tools being used in education. Therefore in the context of present research ICT tools are taken as the variety of communication facilities such as LCD projectors, email, Internet, MS Word, PowerPoint, laptops, mobile phones, VLEs, inclusive of both hardware and software. These tools are being used by research participants (faculty and ICT officers) in classroom teaching.

2) Integration: According to Wang (2008, p. 411) integration of ICT 'consists of three fundamental elements: pedagogy, social interaction and technology', as shown in Figure 1. He has diagrammatically represented the inter-relationships among the three 'elements' in the following manner:

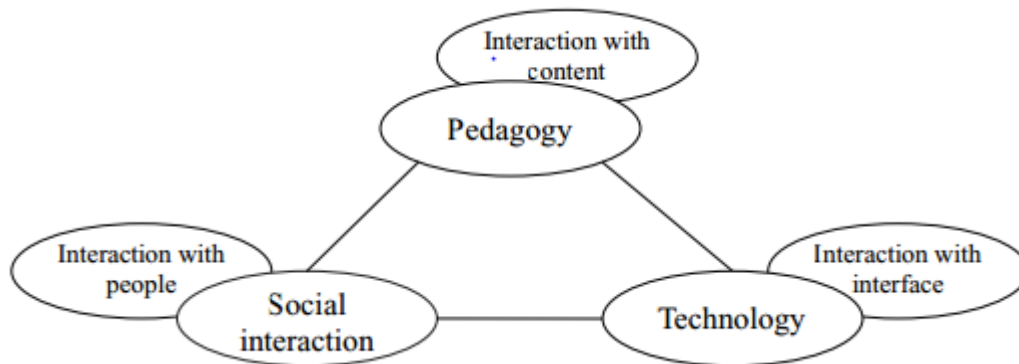


Figure 1: Relationship of the components

Integration involves the use of appropriate technology to support and enhance pedagogy to deliver content in an interactive manner. Vanderlinde and Braak (2013) considers 'Technology Planning' an important aspect of approach towards integration of technology into pedagogy. To analyse ICT-integrated pedagogy, factors such as approaches to integration, integration processes and their relevant characteristics become important matters to be studied. The SAMR model (Puentavventura, 2014) was used for the conceptual framework. However, the two lower levels, Substitution and Augmentation, have been merged on the emergent level because we are actually interested to describe if and to what extent pedagogy is affected. Therefore, Table 1 below shows three stages in the conceptual framework.

Since ICT-integrated pedagogy has been increasingly used in teaching, different stages of integration have been identified with specific usage of ICT tools. In all three levels, four characteristics remain common: 1) the college ICT resource at hand, 2) teachers' ICT skills and knowledge, 3) teachers' attitudes and motivation and 4) teachers' professional use of ICT.

Table 1: *Conceptual framework*

Approaches to ICT integration	Stages of integration	Level of integration
Pedagogy or integrated approach	Transformation level	Teachers would use ICT in a way that has no equivalents in non-ICT-based teaching
Enhancement approach	Innovative level	Teachers would use ICT tools to enhance their teaching method. They bring changes in their pedagogy using ICT
Complimentary approach	Emergent level	Teachers merely use ICT tools in ways that have direct equivalents with non-ICT. For example, use of PowerPoint and LCD projection instead of transparencies

These four characteristics apply to all levels of integration in varying uses of ICT, from simple to complex levels. For instance, at the emergent level, basic knowledge and skills of ICT would enable a teacher to make use of PowerPoint presentations using LCD whereas at the transformation level, a teacher having become skilful in the use of ICT would become creative and efficient. A teacher would have become highly knowledgeable with a high level of motivation at this stage.

The integration of ICT is challenged by many barriers, for example Khalid (2014) identifies over 70 barriers. Space restricts a full survey of the literature; (see *ibid*; Bingimlas, 2009 for a good overview). Frequently mentioned types of barriers include external barriers (e.g. electricity), internal micro-level barriers (e.g. negative attitudes from faculty), meso-level barriers (e.g. institution is not granting faculty freedom to incorporate changes), and macro level barriers (e.g. hype by national politicians leading to backlash). These barriers are almost empirically undocumented in Bhutan insofar that we know.

METHODOLOGY

This study employs mixed methods. The qualitative method explores subjective views with regard to the phenomena of pedagogy undergoing change as a result of the use of ICT in the colleges of RUB, and the quantitative, survey-based part describes the frequency distribution. Ponce and Pagán-Maldonado (2015) states that the value of using mixed method in education is gaining importance.

Interviews

Participation in the semi-structured interviews was voluntary, with a condition that the participants make use of ICT in some way as well as on the basis of individuals identified or appointed by college management. The data was collected from 27 semi-structured interviews conducted in 8 colleges under RUB. The lecturers interviewed have been numbered as L1, L2, etc.

The samples were drawn using purposeful sampling, consisting of men and women, old and young and from different colleges. Furthermore, the samples were also consequences of the availability sampling, based on the availability of the participants in the colleges. Our purpose in the interviews was not to describe the frequency of the variation among faculty but rather: a) to illustrate differences among faculty and b) to provide rich narratives on their opinions. The culture of Bhutanese faculty is not one of fixed appointments with strangers from other cultures, and random interviewing would be time-consuming and create time gap risks because the process would be stalled at some management level at some colleges. We expected large differences among the colleges. Hence, we prioritized the number of interviews over a more secured representative distribution. There is, however, no apparent skewing in the main demographics of the interviewees. The research has focused on capturing lecturers' viewpoints. Students may have other perceptions.

The interviews were done by appointment so that the participants' regular teaching activities were not disturbed. The interviews were recorded and later transcribed. The data collection was done in the autumn of 2012 and spring of 2013. The interviews lasted from 10 minutes to 40 minutes.

The analysis of interviews was done following the six-phase guidelines provided by Braun and Clark (2006). The analysis was done based on emerging themes from the transcripts. The theme, as stated by Braun and Clark (2006, p.10) is 'something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set'. The interview transcripts are embedded with themes. The analysis of the interviews thus becomes thematic analysis. The 'thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within data' (Braun & Clark 2006, p.6). Methodological hermeneutics have been used to provide overall guidelines in using latent theme identification (Betti, 1990). According to this hermeneutics theory, a meaning of a part can only be understood if it is related to the whole. The meaning of any part of the interview is thus related to the whole, taking into consideration factors such as the availability of ICT resources in a college, ICT knowledge and skills of faculty members and level of individuals' attitude or motivation.

While collecting interview data, two major limitations were encountered: distance and time constraints. It took long travel days for researchers to travel between colleges due to their scattered locations, especially the two colleges in the east of the country. Researchers' time could not be relieved to collect data due to involvement in regular college teaching and other academic and management responsibilities.

Survey

A total of 138 lecturers (114 males and 24 females) across ten colleges (out of 11) under RUB have taken part as research samples. A total of 111 lecturers were reached through questionnaires, whereas 27 (from 8 colleges) further participated in the interviews. The response rate was 46.25%. Random samples were used, though gender representation was not given importance since the number of women lecturers is comparatively low (101 compared to 378 male lecturers), as per RUB 2012 staff statistics. The sample participated voluntarily, that is, participants could choose not to answer the survey. The data does not include lecturers who were on long-term study leave. However, the proportion of the questionnaires administered was based on the size and strength of the college. Some larger colleges were sent a higher number of questionnaires.

DATA PRESENTATION AND ANALYSIS

ICT Qualification

Out of 111 respondents, 45 possess Information and Communication Technology (ICT) qualifications, ranging from certificates to masters, while the rest have no formal training in IT. The majority of the respondents with formal qualifications belong to the age group of 30–39 years. Within the same group, 14 respondents have obtained a certificate course in IT. As evident in the data, the majority of college faculty lies within the age group of 30–49 years. The rest, who do not possess formal IT qualifications, have gained ICT knowledge through college-based workshops or training, self-tutoring programs, consulting with ICT expert colleagues and peer learning (see Table 2).

Table 2: ICT Qualifications

Age group (in years)	MA	BA	Diploma	Certificate	Others	No response	Total
25 to 29	2	2	3	6	12	1	26
30 to 39	4	0	3	14	16	4	41
40 to 49	0	1	0	8	23	2	34
50 to 64	0	0	0	0	7	1	8
No response	0	1	1	0	0	0	2
Total	6	4	7	28	58	8	111

Out of 111 respondents, 77 have received some form of training in ICT use (Table 3). Of these, 62.1% were trained within Bhutan, mostly in college-based workshops and trainings. They were primarily trained in the use of the VLE to support teaching and learning. A dean of one of the RUB colleges said that crash courses on the VLE are being offered to the faculties. Very few respondents (7.2%) attended training outside Bhutan; they were trained in Linux, networking and tele-collaboration.

Table 3: Training

Age group (in years)	No. of respondents	Attended ICT Training			Total
		Outside Bhutan	Within Bhutan	Within college	
25 to 29	26	2	5	7	14
30 to 39	41	1	15	19	35
40 to 49	34	3	8	9	20
50 to 64	8	2	2	4	8
No response	2	0	0	0	0
Total	111	8	30	39	77

Further, 8 lecturers were sent to Singapore under the 'Bhutan Wire project', separately from in-house VLE training. The dean of a college said that they 'were sent to...learn some techniques of how to integrate ICT in teaching' (L21). One of the trained lecturers said two of the faculty members from his college were involved in instructional design training, and they were trying to make other faculty members aware of the advantages in using instructional design in teaching.

The Variance in Ways of Integrating ICT

Regarding the factors influencing the use of ICT in teaching, all age groups have rated adequate ICT facilities as very important, followed by personal interest and management support, respectively. Faculty members learn new ICT teaching tools through self-tutoring, peer learning and learning from expert colleagues. Figure 2 below shows the number of lecturers engaged in their own learning.

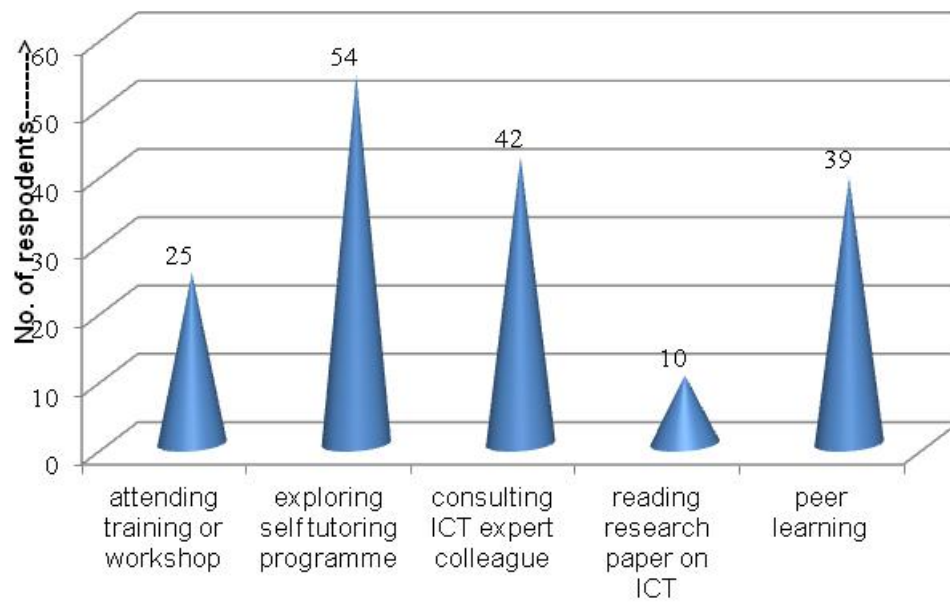


Figure 2: Self-learning of ICT is commonly perceived as the salient way to acquire ICT knowledge

Learning ICT

Generally, the sharing of resources among teachers and with students has become easier and convenient through the VLE. Lecturers are found to be sharing their resources when a module or unit has to be taught by a lecturer. A dean of a college (L6) said that sharing of materials via the VLE is done when a new lecturer takes over teaching, provided he or she wants the materials and that the owner is willing to share.

We will now proceed with *how* the teachers perceive their own knowledge and skills.

Quite a number of participants expressed that they required some intensive training in material design using ICT. For instance, one of them said, 'I would suggest there are some courses, concrete courses which talks about designing, learning materials from ICT' (L17). Another said, 'I

would certainly say designing teaching and learning materials using ICT tools is one of the most useful areas' (L9). Some think that it would be useful if they received continuous support from ICT personnel while they are on the job.

Some have mentioned that they require continuous hands-on practice because whatever skills they have learnt in one or two hours training is forgotten when they do not practise. One faculty member remarked, 'I see that it will be very useful if we keep practising the ICT skills we have learnt on a continuous basis' (L15). The respondents feel that one of the solutions to this is to have adequate access to computers. One of them observed, 'most of the time what I have noticed it [the IT lab] is packed with students' (L22) and he suggested, 'we are provided one computer or laptop for individual use' (L22).

However, a few lecturers found it difficult to add animations in PowerPoint, as indicated by one lecturer who said, '...especially the animation I find it difficult I mean I find it challenging. Animation especially the visual part' (L5). Here, he does not refer to animations of, for example, morphing molecules or data, but effects applied to text and objects (appearing, flying in, etc.). Interestingly enough, this is one of the few examples where teachers wished that they could do things to enhance their pedagogy, that is, they believe that animation effects would increase their presentation skills (and transparencies can, admittedly, not produce this kind of effect). Some are of the view that presentation with animations is required for disseminating information, and they suggest that they even require some form of training in preparing advanced presentations (L15). There is thus an attunement towards the visually impressive presentation slides among those who cannot utilise all those functions. We can see that the teachers are highly occupied with the potential of ICT for instruction, but not so much with the design of a learning environment. Questions such as how to make a VLE inviting for students to engage in peer-to-peer discussion or how to create knowledge base on each other's contributions are also non-trivial, but notably absent. When they (89% of the participants) said that they needed more training in ICT, they were predominantly referring to ICT for presentation skills.

Some participants have mentioned a lack of basic ICT skills. One participant mentioned that 'because we are from different background and not IT personnel, we face problems but whenever I face problem I call our IT personnel' (L23). Despite the basic training in ICT that enables the respondents to troubleshoot minor problems, such as connecting a projector, using PowerPoint, recovering deleted files and editing images and videos, some faculty members are still quite dependent on ICT personnel. Some think that it would be useful if they received continuous support from ICT personnel while on the job. One remarked, 'if our ICT help us we can pick up' (L23).

The lecturers experience breakdowns in their work, for example, when they cannot draw shapes in PowerPoint the way they want. The perception of teaching with only 'chalk & talk' is still salient in their minds. The use of technology is qualitatively different due to more frequent breakdowns (e.g. being completely unable to draw even an imperfect triangle because the function for drawing shapes cannot be found) – whereas 'chalk & talk' is perceived as free from breakdown. The lecturers react against these breakdowns by demanding problem solving from 'IT personnel', by demanding training or by rejecting the software. The alternative that they spend time to solve the problems and acquire the situation-dependent skills 'on the go' is not salient in their voice, nor is critique on the software itself (no respondents said that the ICT industry should turn out software of a different kind). Being a 'DIY' problem-solver is perceived as time-consuming based on the faculty members' general everyday experience. They frequently voiced concerns over professional time pressure, and in the interviews were almost absent from social mechanisms (award, collegial respect, perceived necessity) that foster *problem-solving*.

In the quotes above, there is a perception that in the organisation that faculty views as ideal, there would be an expert on the application being used (e.g. PowerPoint) to support a user in his or her work. He or she sees training as something that would, if adequate, make him or her capable of carrying out any task within the application (e.g. PowerPoint) without breakdown. This is telling in regard to his or her frustration. He or she is not yet aware that encountering problems is a part of working on a daily basis with software (and note that we here do not take a position regarding whether and how software should have higher usability). Being frustrated is a *function of disappointed expectations*. When working with, for example, chalk & talk instruction, an explanation may be good or bad, but downright breakdown in the flow of instruction or preparation is not common unless the chalk has been forgotten. Conversely, in ICT, translating the representational idea (e.g. drawing a triangle) will sometimes result in stalling. For instance, the user might simply not find the triangle drawing tool. But, many software programs (including the most commonly used among the RUB faculty) have far more functions than the ones used by any single user, and the variation among users is high, so it is not possible to train them in all necessary functions. Considering MS Word, for example, it is estimated that the average user utilises 27% of the program's functionality (McGrenere & Moore, 2000), but that is sufficient in some sense for carrying out work tasks. We are not saying that the RUB user is wrong in his or her demand for mastering all functions. Perhaps teacher software ought to be constructed and come with instruction in a way that enables every teacher to have full mastery. The point here is that there is incompleteness in how the faculty experience the software. They want the software the way it currently is, and they want to master it. However, they have not yet experienced that mastery can be equated with problem solving on the go rather than mastering all the functions.

Professional Use of ICT

Almost all lecturers use a computer or laptop to prepare lessons. A dean of a college said, 'people who have been assigned with additional responsibilities besides their teaching load, face time constraints [see Table 4].

Table 4: Constraints

Lecturer who acquired the knowledge of use of ICT by:	Key Constraint in designing lessons using ICT					
	No Time	Heavy teaching load	Connectivity	Lack of software knowledge	Power cut-off	No response
Attending training or workshop	8	6	5	2	1	2
Consulting ICT expert colleague	6	7	9	10	4	4
Exploring self-tutoring program	11	8	14	8	3	7
Reading research papers on ICT	3	1	2	1	1	1
Peer learning	6	4	12	7	4	3

They do not get the time to sit and prepare very good lesson that integrates ICT very well in their lessons' (L21). Similarly, a lecturer pointed out that having access to the Internet in the classroom helps to provide instant clarification when certain terminology cannot be understood. The survey gives a different picture. No constraint alone seems to hold back more than 10–15 per cent (connectivity) of the faculty in any particular activity. Most of the faculty are unable or unwilling to report any constraints. Thus, there is a variance in the constraints faced by lecturers, as shown in Table 4.

Also, as shown in the data in Table 5, a total of 91 (82%) lecturers used ICT for online professional learning, thus using the Internet beyond the classroom.

Table 5: Purpose of using ICT

Purpose of using ICT	Yes	Frequency (if yes)				No
		Daily	Weekly	Monthly	No response	
Create materials for students use (handout, test)	107	38	56	12	1	4
Access research and best practices in teaching and curriculum administration (planning, monitoring, evaluating and reporting)	105	33	47	24	1	6
Communicate with colleagues/other professionals	107	67	30	9	1	4
Communicate with students	102	49	38	13	2	9
Post information to a website to assist students in their work	92	20	46	26	0	19
Online professional learning	91	33	25	34	0	20
Online search for resources (journal, conference, papers, books etc.)	108	52	35	21	0	3

The college faculty mostly uses a face-to-face mode of teaching, and the online mode of teaching (which is used least) is used to support the former (Figure 3). The online mode (Figure 4) of teaching includes features such as post assignment task, group discussion forum, quiz and chat. In one of the colleges, a lecturer (and college VLE coordinator) was even found to be using Camtasia as a tool for teaching; this provides a basis for determining the level of integration some lecturers possess. Other tools, such as Photoshop graphics and animation making, are also used by lecturers. One said that he 'generally found those tools very important to be integrated in teaching/learning' (L7).

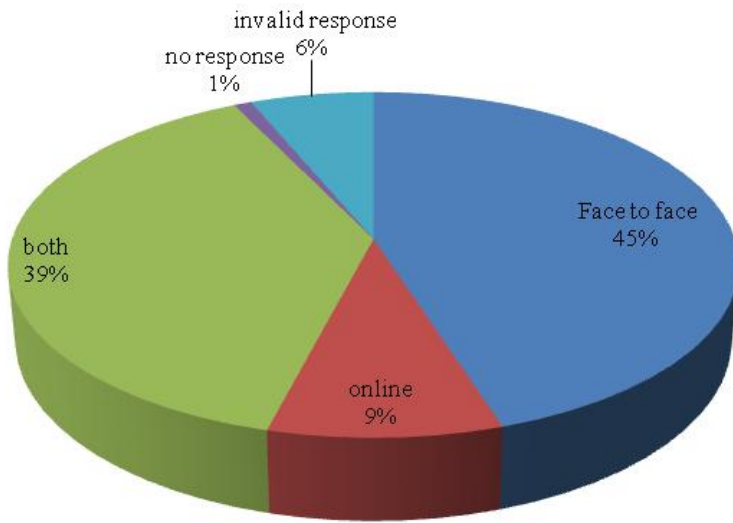


Figure 3: Modes of Teaching

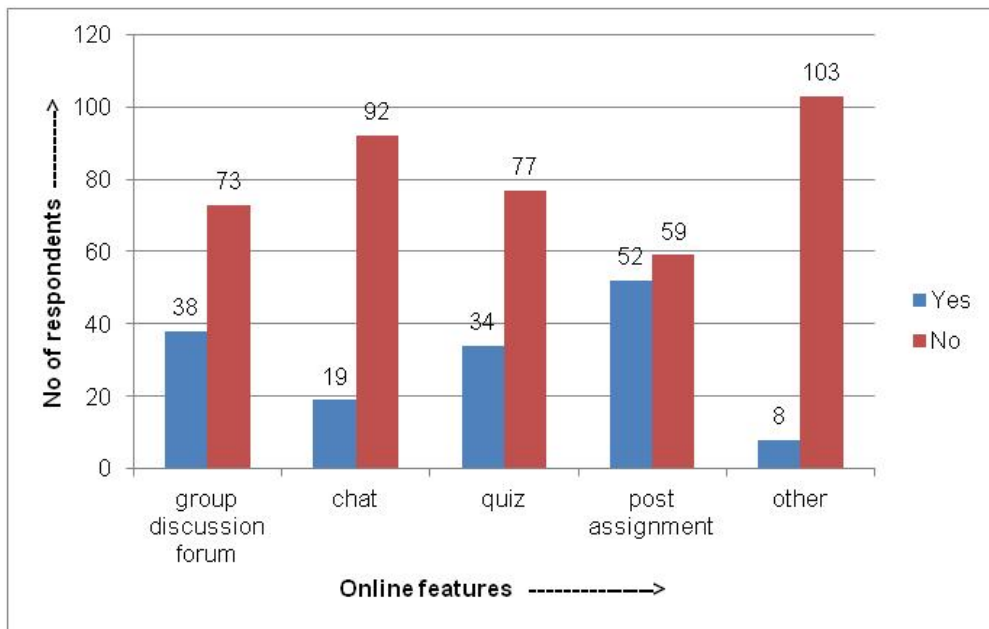


Figure 4: Online features used for delivering lessons

The data in Table 5 shows that, in general, the faculty members use ICT for a variety of purposes, including communicating information with others and online searches for materials for students. The usage of ICT generally appears to be more regular on a daily and weekly basis compared to its usage on a monthly basis. Communicating information with colleagues and students takes place on a daily basis, while planning, creating and making learning materials available for students as part of their regular teaching learning process takes place on a weekly basis. Figure 4 shows the engagement of lecturers in creating discussion forums, chats and quizzes.

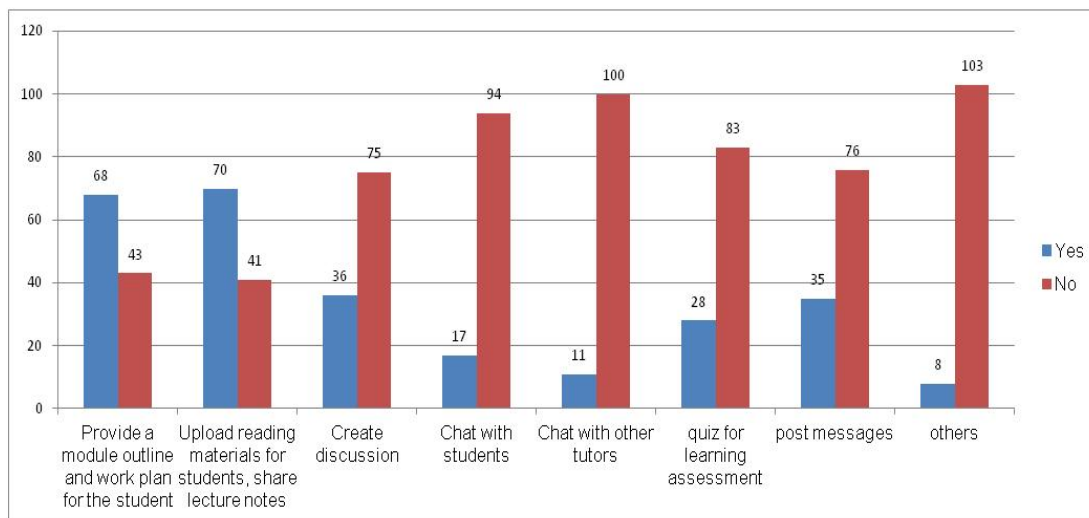


Figure 5: Purpose of using online teaching

Besides the fact that the faculty members use online teaching for uploading module outlines and work plans and for reading materials for students, the exact levels of use are not very significant (Figure 5), but still indicate the low level of VLE-mediated communication. Creating discussions and quizzes for learning assessment would be the most useful activity for assisting student learning, but only a minority of the faculty engages in those uses.

Though teachers have been trained how to use the VLE and its features, the dominant usage remains limited to a few features like uploading assignments and uploading module descriptors. A lecturer said that he was not able to use other options besides discussion forums. He highlighted the reason as a lack of time: 'The VLE consumes lot of teacher's time, to prepare, uploading, checking assignment etc.' (L6). From this, we can infer that the VLE is still perceived as an 'add-on', whereas other modes of learning are perceived as core and necessary. Lectures also take time to prepare and present, but these methods are still utilised as a mode of teaching and nobody questions them. Other factors mentioned are inadequate connectivity (L10, L20) and insufficient training (down to 3 hours).

Most participants mentioned the VLE, but it is used sparingly and inconsistently. As elaborated in the 'learning ICT' section, university-wide training on the use of the VLE was given, but its use has not picked up much among the faculty. Having even stopped employing the commitment on the part of users is another reason limiting the usage of VLEs to a few features (L11) after their initial use. One participant said, 'truly speaking I used to use, but now I have forgotten my password and all then I have to go to the IT and revive my password' (L22). Another participant

remarked, 'we are trained to use that [VLE] but we are not able to use it, specially I don't use I don't know about other faculty, but I am not using ... to be frank I am not using that' (L23).

Another teacher pointed out that the teaching of some common modules can happen at the same time in different colleges located far away through video conferencing (L6).

Attitude and Motivation

As indicated in the data (Table 6), most respondents agreed that the use of ICT in teaching enhances the effectiveness of classroom teaching, thereby leading to improvements in student achievement. The data further indicates that faculty members believe that ICT-integrated pedagogy helps students to learn the subject content better. It is found that the reliability of the total items is 0.831 in Table 6, showing the reliability of the data in Table 7. The study shows e.g. that the mean of 'teaching demands for use of ICT' is 4.26 and the standard deviation is 0.960.

Table 6. Reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
.831	.832	4

Table 7: Opinion on the use of ICT

<i>Opinion on the use of ICT</i>	N	Minimum	Maximum	Mean	Std. Deviation
Teaching demands use of ICT	100	1	5	4.26	.960
ICT supported teaching has enhanced my effectiveness in classroom teaching	105	1	5	4.24	.883
The use of ICT connects content with pedagogy resulting to ICT integrated teaching	106	1	5	4.08	.782
The learning outcome of the students is achieved more efficiently with the use of ICT	107	2	5	4.11	.769
Valid N (listwise)	97				

In Table 8, the mean of "ICT supported teaching has enhanced my effectiveness in classroom teaching, the use of ICT connects content with pedagogy resulting to ICT integrated teaching and the learning outcome of the students is achieved more efficiently with the use of ICT" are 4.24, 4.08 and 4.11 respectively, which shows that the faculty members agree that these variables effect teaching demands use of ICT.

According to a lecturer, 'It is...student-centred...[encouraging] independent learning' (L7). He also highlighted the use of e-learning with the use of ICT, which enables students to learn at 'any time,

any place, day or night'. Another lecturer said that teaching is not confined to classrooms alone. He observed that 'inside [the classroom] we use PowerPoint slides, that is the most commonly used in most of the faculties. And outside that VLE is the one, virtual learning that module component, we upload the material, we upload the teaching material, question bank and everything is kept in' (L8).

As Tables 7 and 8 show, there is cognitive and analytical appreciation for using ICT; the faculty members understand that using technology makes teaching more easy and comfortable. The materials, once developed, can be saved and retrieved for future use. The motivation level amongst the faculty for using technology for teaching is also high.

In addition to the faculty using technology in teaching, some faculty members have also tried to encourage students to use ICT tools in their learning processes. For instance, some of the faculty members have demonstrated how to make presentations, how to create discussion forums and how to upload assignments online (Figure 5). A lecturer pointed out that students are being trained to make use of the VLE when they get admitted to the college. Another lecturer stated that students prefer to submit assignments online. Table 8 shows that 54% of the lecturers ask students to submit assignments electronically as well as to make presentations using laptops.

Table 8: Encouraging students to use ICT

Encourage students to make use of ICT tools to:	Response (%)	
	Yes	No
Teach them how to make PPT presentations	38.74	61.26
Demonstrate the use of ICT when I make use of it while teaching	36.04	63.96
Create a forum for discussion on the VLE	36.04	63.96
Instruct them to make group presentations using a laptop	54.05	45.95
Ask students to submit assignments electronically	54.05	45.95

DISCUSSION

ICT Knowledge and Skills

Out of 111 research samples, 45 have formal IT qualifications. There are 58 lecturers who, despite having no formal IT qualifications, have participated in some trainings and workshops on ICT. Eight did not respond. Therefore, basic ICT knowledge and skills per se are not an issue in the colleges of RUB. The VLE is one major component of the training that has been imparted to the lecturers. Most of the participants suggested the need for VLE training. Furthermore, few teachers used VLE features that promote discussion, despite this being a commonly recommended e-moderation practice. This could be due to inadequate training or a reflection of insufficient practice. Other knowledge and skills that participants wanted were video editing, making animations and photo editing. The question is what kind of training should be provided (e.g. lecturing, more interactive instruction or coaching)? Should everyone receive training, or should a few super-users be appointed? Kinley (in review) studied one of the colleges and noted that after two VLE professional development programs, the VLE was still only used by the ICT

teachers and a few lead users. Unfortunately, our survey data does not give any further clues into solutions, nor do the interviews.

Approaches, Stages and Levels of ICT Integration

The data analyses (both quantitative and qualitative) reveal that the lecturers have mainly reached the enhancement level of ICT integration, though a very few have also reached the transformation level. As per Figure 3, only 39% of the lecturers use ICT (online) as well as face-to-face teaching. A lecturer expressed that 'the use of ICT as a classroom teaching and learning could be very basic and fundamental tool use, or flashing the information text on the LCD screen or LCD projector' (L21). The innovative level is mainly seen in the use of the features available in VLEs. Teacher activities such as posting materials on websites, creating discussion forums, communicating with students and colleagues online, quizzes, assessing assignments online and using rubrics are some common VLE features that are used for more active learning. Students, too, are engaged in using ICT to participate in the learning process. In the more progressive courses, they have to participate in group discussion forums using VLEs, get reading materials online, submit assignments electronically and make presentations using laptops. However, one lecturer has even moved beyond the enhancement level, using animation tools and Camtasia to make it possible for students to never miss a class and to re-experience classes an unlimited number of times since they are always recorded. Another transformative faculty member uses online exams to assess students. This transformation level is minimal, with only two lecturers having used these features in a way others have not. A few lectures mention potential uses (e.g. making joint modules in different colleges based on video), but this has not been taken into practice (for some promising experiments, see Kinley (2015)).

Attitude and Motivation

About 90 per cent of the samples agreed that the use of ICT is motivating for the students as well as lecturers. Due to the high motivation level of lecturers, the use of ICT has been found to be dominant compared to non-ICT use in teaching approaches. Some of the lecturers have also gone to the extent of inspiring students by literally demonstrating how to use ICT while they are teaching, showing and encouraging students to follow them. Several lecturers have been found to be learning on their own through consulting with ICT experts and self-tutoring. A total of 36.04% of lecturers are demonstrating the use of ICT to teach their students. Out of 111 respondents, 88 believe that ICT should connect content with pedagogy (Table 7). At the same time, the survey results are balanced by the interviews (see 'Learning ICT'), which shows that there are also large groups that are passive in their appropriation of ICT. Clearly, there are several types of users in this regard.

Barriers to ICT-Integrated Pedagogy

Though many lecturers were found to be using ICT for enhancing the use of ICT in their pedagogy, there are also certain barriers, though, none unique to Bhutan. To some degree, a lack of knowledge of computer software, Internet inconsistency, heavy workloads and time constraints are some of the hurdles affecting integration of ICT into the pedagogy at RUB, all of which are also seen in other studies of ICT for education (Bingimlas, 2009; Buabeng-Andoh, 2012). UNESCO (2002) points out that 'extensive knowledge of ICT' would be required if pedagogy has to be transformed with the usage of ICT. A great deal of thinking and planning must be done, requiring adequate time and consistent Internet service. Resource availability is also an important factor. A teacher said that 'all the classrooms are not equipped with LCD projectors and it takes lot of time in arranging one' (L19). Also, the lack of technical problem-solving competencies is highlighted as an issue. According to Fu (2013), adequate 'infrastructure' is important for effective use of technology. Another barrier that has been affecting all colleges is

low connectivity. As has been discussed above in conjunction with Table 4, no single barrier seems to be mainly responsible for keeping ICT-integrated pedagogy down. Since most faculty members are unwilling or unable to express their perceptions of barriers, it seems relevant to proceed with investigation forms that give more access, such as ethnographic methods or longitudinal action research.

LIMITATIONS

This study has not detailed actual access to ICT. Furthermore, we have deliberately focused on the faculty side of the impact, well knowing that student demand and perceptions are also necessary for ultimately understanding how to improve development through technology. We encourage further research to address student and access issues on the descriptive level.

Another study (Penjor & Zander, 2016) has conducted a study with a different purpose but with some of the same variables. It reports that 60% of lecturers were trained – with similar constructs for ‘training’ – whereas this study arrives at 70%. This indicates that there are some limitations in the validity of this study, but the study is within the normal confines of quantitative research in this context.

CONCLUSIONS

ICT knowledge and skills are mainly connected to the use of VLEs in the context of RUB. When the use of ICT is discussed, lecturers begin by relating it to the VLE. This gives an impression that the use of ICT in pedagogy is synonymous with VLEs. The training in ICT is mainly concentrated on the usage of the VLE. However, the participants still suggest the need for VLE training. This indicates that adequate training should be given to enhance the use of VLEs. Moreover, the use of ICT has highly motivated the lecturers. The ICT-integrated pedagogical approach occurs mainly at the emergent and innovative levels. There are a few barriers that impede the move towards the transformative stage, but they remain the exception, not the rule. Low Internet bandwidth, inconsistent Internet service and a lack of training in ICT pedagogy are the main barriers, particularly at RUB. Addressing these barriers will further raise the motivation level of the lecturers.

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