ICT and learning at Norbuling RIgter College: perceptions and practices[1]

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Key words

ICT, learning, perceptions and practices, Edtech, e-environment

Abstract

ICT has become an indispensable part of teaching and learning, especially with the increased demand due to the chaos caused by the Covid pandemic. People from all spheres of life have started to recognize and appreciate the pedagogical benefits of ICT. Thus, this study explores the perceptions and practices of Norbuling Rigter College faculty on the use of ICT in learning. This paper also discusses the challenges and opportunities of using ICT in learning at Norbuling Rigter College.

Introduction

ICT enabled learning environments have become a crucial component of education more than ever. The COVID-19 experience disrupted learning, as educational institutions were unprepared to seamlessly transition to online learning. Many educators were not conversant in using Edtech. This tumultuous period in the history of education underscored the indispensability of investing in ICT-enhanced learning and building the capacity of educators in using e-learning, b-learning, distance learning and other Edtech facilities.

Norbuling Rigter College (NRC), an infant college established in July 2017 was not spared from the learning disruptions and ravages of COVID-19. Against this background, this study aims to explore the perceptions and practices of educators of NRC related to ICT and learning. The findings of this study discuss the challenges and opportunities from the perspective of the educators and recommend intervention strategies to invest in ICT enabled learning and build capacity of educators in using of Edtech so that digital learning environment is enhanced.

Methods

This study adopted purposive sampling method and ensured that there are few respondents from each of the six programmes offered by NRC, Further, the

* I extend my gratitude to Dr. Tandin Dorji, President for reading the paper and giving enriching comments and Assistant Professor Karma Pedey for editing the language. I also thank all the respondents of my survey.

sample also ensured that there is a mix of male and female respondents and age categories. Of the 49 faculty teaching at NRC at the time of the study, 26 responded to the survey which accounts to 53.01%.

The study used quantitative method and data was collected using online questionnaire. The quantitative data was complemented by findings from few Key Informant Interviews. Descriptive data analysis was done and presented as percentage.

Limitations

The findings of the purposive sampling method adopted by this study will provide insights into the perceptions and practices of educators at NRC related to ICT and learning but will limit generalization.

Literature review

Digital transformation has become indispensable starting from business to education. Edtech has transformed the classroom, and on average the 10 uses of ICT in every class are enhancing the way that children learn. Edtech tools have enabled learning to happen outside the classroom from anywhere with internet accessibility in virtual format. Learning management system**,** Blended Learning Platform, Videoconferencing Platforms, Virtual Labs, Smart Classroom, e-Resources and many others have made learning accessible and enjoyable. Studies by Grinin et al. (2017), Jamaludin et al. (2013), Lopes et al. (2017), Blayone et al. (2017) and many others show that this changing learning style fosters self-learning, promotes creativity and builds collaborative learning.

Blayone et al., 2017 mention that elaboration of an e-environment based on social constructivist models fully online learning is a necessary condition for the modern educational process design. Further, Jamaludin et al. (2013) underscores that in the 21stcentury, learning preferences of students in terms of building ICT enabled classroom should be a priority. In this regard, it has become essential to innovate information and communication models related to education so that necessary competencies for effective learning is developed in the information society [Baranova et al., 2016] within the framework of the sixth technological wave [Grinin et al., 2017].

With regard to integration of ICT in leaning, Lopes et al. (2017) mentions that ICT use in learning should support students' self-directed learning, expanding their independent behaviour and initiative. Brush, Glazewski and Hew (2008) complements by stating that ICT as a tool enables students to discover learning topics, solve problems, and provide solutions to the problems in the learning process. The study goes on to say that ICT makes learning more accessible and engaging. To this, Chai, Koh and Tsai (2010) adds that ICT provides more creative solutions and innovative alternatives to the traditional methods of

learning. Further, ICT promotes collaborative learning and enables students to communicate and support one another conveniently using Edtech (Koc, 2005).

Studies also show that, in the context of a constructive learning approach, ICT helps students focus on higher-level concepts (Levin and Wadmany 2006). McMahon's study (2009) complements this by underscoring that there were statistically significant correlations between studying with ICT and the acquisition of critical thinking skills. This means that exposure to ICT enabled learning environment fosters students to develop higher critical thinking skills.

Bansa and Asrini (2020) asserts that ICT integration enhances the quality of teaching and learning. This study also found a significant positive correlation between teachers' technological pedagogical and content knowledge, and their technological competencies.

Literature research clearly informs us that integration of ICT can help revitalize learning. Using ICT as a tool enhances the quality of education. Studies also show that Edtech facilitates active, collaborative, creative, integrative, and evaluative learning. In the e-environment context, teachers play important role of an advisor, critical dialogue partner and leader for specific subject domains to enrich learning.

However, literature show that attitude and belief of teachers are critical for the successful integration of ICT in learning, building an e-environment and eventually enriching the experiences of students' learning. Aligned to this, Angers & Machtmes (2005) and Russell et al. (2003) state that teachers' personal beliefs and determines the successful use of technology in education. In the same light, according to Angers & Machtmes (2005) the way that teachers perceive their role influences the way they teach using Edtech. Further, the study asserts that teachers who believe that Edtech can be used to enhance lessons are motivated to use ICT in learning to enrich their teaching and strategies as opposed to those who do not believe in Edtech, will tend to block opportunity to create e-environment. This complemented by Gulbahar and Guven's study (2008) where it highlights the probability of teachers who believe in the opportunity of ICT enabled learning are likely to integrate ICT in their lessons.

In the similar context, Zhao and Cziko (2001) identifies three conditions which are necessary for teachers to introduce ICT into their classrooms. They are belief of the teachers in the effectiveness of technology, belief of teachers that the use of technology will not cause any disturbances, and belief of teachers that they have control over technology. Demetriadis et al (2003) reached similar conclusions in their study. In this regard, Rogers (1995) asserts that features of the technology are one of the major factors that affect people's attitudes towards Edtech.

There is enough evidence that integration of ICT in learning, using Edtech and building an e-environment will enhance the quality of learning and make learning enjoyable. Recognizing the benefits of integrating ICT in learning, the Government of Bhutan has accorded high priority to the development of ICT infrastructure and capabilities. The 12th Five-Year Plan identified and approved two flagship programmes on digitisation which are Digital Drukyul and Digitising Schools. Investments are also made in digitisation of essential public services. The Digital Drukyul flagship programme which was approved during the financial year 2019-2020 aims to create a digital ecosystem to deliver efficient public services. This flagship programme will see facilities such as e-Patient Information System (e-PIS), Bhutan Integrated Tax System, Integrated Citizen Services, e-Business and Digital Schools (Chimi Dema, 30 November 2020).

In the framework of Digital Schools, the draft Education Policy (2019) of Bhutan highlights the indispensability of developing an education system that is dynamic and responsive to the changes, to harness the potentials of young minds and prepare them to grow into socially useful and economically productive citizens (Ministry of Education, 2019).

Literature shows that integration of ICT in Education should be a priority to achieve better educational outcomes. Bhutan is investing in ICT infrastructure for schools to build an e-environment for learning. This is hoped to foster self-paced, self-assessed, and self-directed learning through the applications of ICT.

Results

Table 1.
Respondent details

Category	Details	Frequency	Percent
Sex	Female	8	30.77
	Male	18	69.23
Age	Below 30 years	9	34.62
	30 to 40 years	11	42.31
	40 to 50 years	3	11.54
	50 plus	3	11.54
Education	Bachelor's degree	3	11.54
	Master's degree	22	84.62
	PhD	1	3.85
Years at NRC	Less than 1 year	2	7.69
	1 year and more	6	23.08
	2 years and more	5	19.23
	3 years and more	7	26.92
	4 years and more	6	23.08

As presented in table 1, of the 26 respondents, 8 (30.77percent) are female and 18 (69.23 percent) are male. By age, majority of the respondents (11=42.31 percent) are in the age group of 30 to 40 years while are only 3 (11.54 percent)

above 50 years of age. By education, majority of the respondents (22=84.62 percent) have a Master's degree. Analysis by years of service to NRC show that majority of the respondents (7=26.92 percent) have been employee of NRC for 3 years and more.

Table 2.
Perception on broad areas of integration of ICT in teaching and learning

Category	Sub-category	Broad areas of assessment	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Consolidated		Knowledge	58.46	33.85	2.31	0.77	4.62
		Ease of use	56.98	22.18	14.04	6.80	0.00
		Benefits of using ICT	51.10	44.51	4.40	0.00	0.00
Sex	Female	Knowledge	19.23	10.00	1.54	0.00	0.77
	Male		40.34	24.28	0.77	0.77	2.31
	Female	Ease of use	22.02	11.49	2.00	0.00	0.00
	Male		30.77	21.79	5.13	6.80	0.00
	Female	Benefits of using ICT	17.58	13.74	0.00	0.00	0.00
	Male		36.81	28.02	4.40	0.00	0.00
Age	Below 30 years	Knowledge	22.31	17.69	1.54	0.00	7.69
	30 to below 40 years		26.92	3.85	0.00	0.00	10.77
	40 to below 50 years		4.62	4.62	0.77	3.85	2.31
	50 years plus		4.62	5.38	0.00	0.00	6.15
	Below 30 years	Ease of use	15.38	8.97	10.26	0.00	0.00
	30 to below 40 years		23.08	17.95	1.28	0.00	0.00
	40 to below 50 years		0.00	6.41	2.56	1.28	0.00
	50 years plus		5.13	2.56	0.00	3.85	0.00
	Below 30 years	Benefits of using ICT	21.43	6.59	3.30	0.00	0.00
	30 to below 40 years		14.29	28.02	0.00	0.00	0.00
	40 to below 50 years		2.20	9.89	0.55	0.00	0.00
	50 years plus		11.54	0.00	0.00	0.00	0.00

Table 2 presents consolidated findings, findings by sex and age of broad areas on perception of integrating ICT in teaching and learning. The broad areas are

knowledge, ease of use and benefits of using ICT. The consolidate findings show that more than 90 percent of the respondents perceive to have the required knowledge of integrating ICT in teaching and learning and acknowledge the benefits of using ICT in teaching and learning. Similarly, more than 90 percent of the respondents also report that they can integrate ICT in teaching and learning with ease. Only 4.62 percent of the respondents expressed that that they do not have the necessary knowledge to integrate ICT in teaching and learning. The absence of necessary knowledge of integrating ICT in teaching and learning is specifically related to preparation of advanced animated Power Point. 6.80 percent of the respondents also reported issues related with ease of use. This challenge of ease of use is mainly associated with managing basic technical problems. All the respondents reported to know the benefits of incorporating ICT in teaching learning.

Analysis by age show that all the respondents reported that they perceive to know the benefits of benefits of incorporating ICT in teaching learning and can use Microsoft Office and search engines comfortably. However, a handful of respondents reported to have difficulty in using audiovisual facilities, preparing animated power point presentations and using ICT in teaching and learning.

In the ease of using ICT in teaching and learning category, the respondents who are 40 years and below reported to be able to integrate ICT in teaching and learning easily. However, a small group of respondents who are 40 years and above perceive to have challenges with ease of use of ICT in teaching and learning.

Table 3.
Practice of ICT integration in teaching and learning

Respondent category	Sub-category	Rating Scale				
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Consolidated		29.81	46.63	12.50	11.06	0
Sex	Female	9.44	12.66	5.16	3.37	0
	Male	23.76	32.15	6.25	7.21	0
Age	Below 30 years	12.50	17.79	2.88	0.00	0.00
	30 to below 40 years	10.10	18.27	6.73	0.00	0.00
	40 to below 50 years	3.37	5.77	2.88	1.93	0.00
	50 years plus	3.85	4.81	0.00	9.13	0.00

The analysis of the practice of ICT integration in teaching and learning (table 3) show that 11.06 percent of the respondents have disagreed on this aspect. Their disagreement indicates that they do not allow learners to use ICT devices during lesson, inability to use different ICT devices in teaching, inability to use ICT in all relevant topics, inability to choose ICT devices that they are familiar with and inability to choose the latest ICT tools available for teaching and learning. Male

respondents (7.21 percent of the 11.06 percent) reported more disagreement than female (3.37 percent of the 11.06 percent). By age, the disagreement is sounded more by those respondents in the age category of 50 years and plus (9.13 percent of the 11.06 percent) followed by those in the age range of 40 to below 50 years (1.93 percent of the 11.06 percent). The respondents below 40 years representing the younger group comfortably integrate ICT in teaching and learning.

Table 4.
Use of VLE

Indicator	Respondent category	Sub-category	Rating	
			Yes	No
I can use all the features of VLE	Consolidated		53.85	46.15
	Sex	Female	55.56	44.44
		Male	50.00	50.00
	Age	Below 30 years	88.89	11.11
		30 to below 40 years	27.27	72.73
		40 to below 50 years	33.33	66.67
		50 years plus	0.00	100.00
I can help students to use VLE	Consolidated		50.00	50.00
	Sex	Female	50.00	50.00
		Male	50.00	50.00
	Age	Below 30 years	55.56	44.44
		30 to below 40 years	27.27	72.73
		40 to below 50 years	33.33	66.67
		50 years plus	0.00	100.00
I can demonstrate how to use VLE	Consolidated		50.00	50.00
	Sex	Female	50.00	50.00
		Male	50.00	50.00
	Age	Below 30 years	55.56	44.44
		30 to below 40 years	27.27	72.73
		40 to below 50 years	33.33	7.69
		50 years plus	0.00	100.00
I can help colleagues to use VLE	Consolidated		53.85	46.15
	Sex	Female	50.00	50.00
		Male	37.50	62.50
	Age	Below 30 years	88.89	3.85
		30 to below 40 years	27.27	72.73
		40 to below 50 years	33.33	66.67
		50 years plus	0.00	100.00
Faculty should be trained more on use of VLE	Consolidated		80.77	19.23
	Sex	Female	88.89	11.11
		Male	62.50	37.50
	Age	Below 30 years	66.67	33.33
		30 to below 40 years	81.82	18.18
		40 to below 50 years	100.00	0.00
		50 years plus	100.00	0.00

NRC faculty uses virtual learning Environment (VLE) which has many features including interactive facilities. 53.85 percent of respondents reported that they can use all the features of VLE while 46.15 percent indicated that they cannot.

Compared to male (50 percent), more female faculty (55.56 percent) reported to be able to use all the features of VLE. By age, all the respondents (100%) in the age category of 50 years plus reported that they cannot use all the features of VLE. In contrast, most of the respondents (88.89 percent) in the age range of less than 30 years reported that they can use all the features of VLE.

On the capacity to help students to use VLE, 50 percent responded that they will be able to support students to use VLE while 50 percent said that they do not have the capacity to support. Analysis by sex also show similar findings with no difference between male and female respondents. By age, all the respondents (100%) in the age category of 50 years plus reported that they cannot help students to use VLE while most of the respondents (55.56 percent) in the age range of less than 30 years reported that they can support students to VLE.

Similar to the capacity to help students to use VLE, 50 percent responded that they could demonstrate how to use of VLE while 50 percent said that they cannot. Analysis by sex also show similar findings with no difference between male and female respondents. By age, all the respondents (100%) in the age category of 50 years plus reported that they cannot demonstrate how to use VLE while most of the respondents (55.56 percent) in the age range of less than 30 years reported that they do.

53.85 percent of the respondents said that they can help their colleagues to use VLE. By sex, more male respondents (50 percent) reported to be able to help colleagues to use VLE as compared to female (37.5 percent). By age, all the respondents (100%) in the age category of 50 years plus reported that they cannot help their colleagues to use VLE. In contrast, most of the respondents (88.89 percent) in the age range of less than 30 years reported that they can help colleagues to use VLE.

Majority of the respondents (80.77 percent) expressed that faculty should be trained more on the use of VLE, at least half a day at the start of each academic year. By sex, the need is expressed more by female respondents (88.89 percent) as compared to male (62.50 percent). Analysis by age show that 100 percent of the respondents in the age category of 50 years plus and 40 to below 50 years expressed the need for capacity development. While majority of the respondents in other younger age range expressed the need, compared to the older respondents, they need for capacity development is felt less.

Qualitative data showed that the most used VLE feature is ‘uploading resources and assignment while the least used is the interactive facility. Many even mentioned that they do not know what VLE features are there other than ‘uploading resources, assignment and interactive facility’.

Table 5.
ICT facility used the most in teaching and learning

Facility	Consolidated data	Sex		Age			
		Male	Female	Below than 30 years	30 to below 40 years	40 to below 50 years	50 years plus
Audiovisual	19.2	3.85	7.69	34.62	3.85	0.00	0.00
Website interactive tools	11.6	15.38	3.85	3.85	0.00	0.00	0.00
Grade records software	7.7	7.69	0.00	3.85	0.00	0.00	
Power Point	50	30.77	19.23	7.69	3.85	11.54	19.23
Blogging	0	0.00	0.00	0.00	0.00	0.00	0.00
Podcast	0	0.00	0.00	0.00	0.00	0.00	0.00
Web seminars Television /Video conferencing	0	0.00	0.00	0.00	0.00	0.00	0.00
Online Guest speakers	0	0.00	0.00	0.00	0.00	0.00	0.00
Smartphone	7.7	7.69	0.00	4.85	2.84	0.00	0.00

Power Point is the most used ICT facility. Analysis by sex also showed the same result. However, analysis by age showed that Power Point is the most used facility by those in the age range of 40 to below 50 years and 50 years plus. In contrast, those in the age bracket of 30 to below 40 years reported to use Power Point and audiovisual facilities the most while those below 30 years use audiovisual the most. The other popular ICT facilities used during teaching and learning are Website interactive tools, Grade records software and Smartphone. However, from the known Edtech some of the facilities such as Blogging, Podcast, Web seminars, Television /Video conferencing and Online guest speakers are not used by any.

Table 6.
Factors that encourage integration of ICT in teaching and learning

Factors that encourage use of ICT	Rating
Investments of the college on infrastructure of instructional technologies	34.44
Developing the policies and plans to promote use of instructional technologies	30.94
Willingness of College Management to invest in the integration of ICT in teaching	21.84
Investments of the college on teachers training programs for instructional technologies	7.84
Investments of the college on the support services of instructional technologies	4.94

The key drivers of ICT integration in teaching and learning are investments of the college on infrastructure of instructional technologies (34.44 percent) followed by developing the policies and plans to promote use of instructional technologies (30.94 percent), willingness of College Management to invest in the integration of ICT in teaching (21.84 percent), investments of the college on teachers training programs for instructional technologies (7.84 percent) and

investments of the college on the support services of instructional technologies (4.94 percent).

Table 7.
Challenges of ICT Integration in teaching and learning

Challenges	Rating
Internet speed.	38.60
Limited understanding on how to integrate ICT into teaching	17.06
Limited knowledge on how to make full use of ICT	16.40
Lack of interest of teachers in ICT usage for teaching-learning	12.70
Absence of motivation and reward systems for ICT usage	9.50
Lack of technical support when things don't work	5.74

The constraints of ICT integration in teaching and learning are internet speed (38.60 percent) followed by limited understanding on how to integrate ICT into teaching (17.06 percent), limited knowledge on how to make full use of ICT (16.40 percent), lack of interest of teachers in ICT usage for teaching-learning (12.70 percent), absence of motivation and reward systems for ICT usage (9.50 percent) and Lack of technical support when things don't work (5.74 percent).

Key conclusions and recommendation

The key findings of the study show that majority of the respondents reported to perceive that they had the required knowledge of integrating ICT in teaching and learning except for a small group of respondents in the age category of 50 years plus who perceived to have some challenges. Further, respondents who are 40 years and above also reported to have some issues with ease of use of Edtech. However, all the respondents acknowledged the benefits of Edtech integration in teaching and learning.

The study also showed that the respondents below 40 years representing the younger group comfortably integrate ICT in teaching and learning while those who are 40 years and above expressed some challenges of integrating Edtech in teaching and learning.
Regarding use of VLE, many respondents expressed to use only limited features such as uploading resources and correcting assignments while some even expressed that they do not know what other features are there.

Majority of the respondents reported to use Power Point the most, while many other Edtech facilities are available which can enrich teaching and learning.

The respondents expressed that they are motivated to integrate Edtech in teaching and learning by the investments of the college to enhance infrastructure of instructional technologies. In contrast, internet speed and limited

understanding on how to integrate Edtech are constraints that act as bottleneck to effectively use ICT to enrich teaching and learning.

Integration of Edtech in teaching and learning has become inevitable and indispensable to achieve better educational outcomes. Literature also clearly indicate that integration of ICT contributes to improved teaching and learning quality. Therefore, it has become necessary and urgent for Norbuling Rigter College to build e-environment by investing in ICT infrastructure and capacity development of its faculty to build their e-readiness. This will drive the practices of Edtech integration in teaching and learning which will consequently improve the overall learning and academic performance of students.

Specifically, Norbuling Rigter College should focus on the following:

- Consult service providers and Internet professionals to enhance internet speed and consistency.
- Conduct capacity development on popular and relevant Edtech.
- Build capacity of faculty to use ICT in assessment.
- Build capacity of faculty to prepare advanced PPT.
- Conduct longer duration capacity development on use of VLE and its features including refreshers course for all at the start of each academic year.
- Create forums or use Rigter Experiment to initiate discussions on ICT integration in teaching and learning.
- Initiate policies to reward for innovative use of ICT in teaching and learning.

In the age of digital ecosystem where educational institutions are enhancing their e-environment, it has become vital for Norbuling Rigter College to invest in Edtech, preparing the e-readiness of its faculty and inspire them to integrate ICT in teaching and learning. College management has the critical role to build a culture of ICT inspired teaching and learning at Norbuliig Rigter College.

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ANNEXURE

Annexure 1: Consolidated perception					
Indicators	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Knowledge					
I can use Microsoft Office	92.31	7.69	0.00	0.00	0.00
I can search information using search engines like Google	76.92	23.08	0.00	0.00	0.00
I can use audiovisual facilities with ease.	61.54	26.92	7.69	3.85	0.00
I can prepare advanced animated Power Point	23.08	53.85	0.00	0.00	23.08
I can use ICT in teaching and learning with ease	38.46	57.69	3.85	0.00	0.00
Ease of use					
I have access to necessary technology that facilitates use of ICT in teaching and learning	63.24	12.71	19.03	5.01	0.00
I have necessary resources (Computer/projector/sound system, etc.) to teach using ICT	61.54	30.77	7.69	0.000	0.00
I can manage basic technical problems that I encounter when using ICT	46.15	23.08	15.38	15.38	0.00
Benefits of using ICT					
Using ICT promote innovation and problem-solving skills of learners	38.46	57.69	3.85	0.00	0.00
ICT makes learning diverse	42.31	53.85	3.85	0.00	0.00
Using ICT keeps the teachers abreast with current trends in Education	73.08	23.08	3.85	0.00	0.00
Use of ICT as instructional tool can increase the interest of students toward learning courses.	42.31	50.00	7.69	0.00	0.00
Use of instructional technologies can increase the quality of learning	46.15	50.00	3.85	0.00	0.00
Usage of instructional technologies makes it easier to prepare course materials (assignments, handouts etc.).	73.08	23.08	3.85	0.00	0.00
ICT makes learning more enjoyable	42.31	53.85	3.85	0.00	0.00

Annexure 2: Perception by sex

Indicators	**Sex**	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Knowledge						
I can use Microsoft Office	Female	34.62	0.00	0.00	0.00	0.00
	Male	65.38	0.00	0.00	0.00	0.00
I can search information using search engines like Google	Female	23.08	7.69	0.00	0.00	0.00
	Male	53.85	15.38	0.00	0.00	0.00
I can use audiovisual facilities with ease.	Female	23.08	0.00	7.69	0.00	0.00
	Male	38.46	26.92	0.00	3.85	0.00
I can prepare advanced animated Power Point	Female	7.69	19.23	0.00	3.85	0.00
	Male	15.38	42.31	0.00	11.54	0.00
	Female	7.69	23.08	0.00	0.00	0.00

I can use ICT in teaching and learning with ease	Male	30.77	34.62	3.85	0.00	0.00
Ease of use						
I have access to necessary technology that facilitates use of ICT in teaching and learning	Female	3.85	15.38	0.00	0.00	0.00
	Male	19.23	30.77	0.00	11.54	
I have necessary resources (Computer/projector/sound system, etc.) to teach using ICT	Female	19.23	7.69	3.85	0.00	0.00
	Male	42.31	23.08	3.85	0.00	0.00
I can manage basic technical problems that I encounter when using ICT	Female	15.38	11.54	3.85	0.00	0.00
	Male	30.77	11.54	11.54	15.38	0.00
Benefits of using ICT						
Using ICT promote innovation and problem-solving skills of learners	Female	7.69	23.08	0.00	0.00	0.00
	Male	30.77	34.62	3.85	0.00	0.00
ICT makes learning diverse	Female	11.54	19.23		0.00	0.00
	Male	30.77	34.62	3.85	0.00	0.00
Using ICT keeps the teachers abreast with current trends in Education	Female	23.08	7.69		0.00	0.00
	Male	50.00	15.38	3.85	0.00	0.00
Use of ICT as instructional tool can increase the interest of students toward learning courses.	Female	11.54	19.23		0.00	0.00
	Male	30.77	30.77	7.69	0.00	0.00
Use of instructional technologies can increase the quality of learning	Female	11.54	19.23		0.00	0.00
	Male	34.62	30.77	3.85	0.00	0.00
Usage of instructional technologies makes it easier to prepare course materials (assignments, handouts etc.).	Female	23.08	7.69		0.00	0.00
	Male	50.00	15.38	3.85	0.00	0.00
ICT makes learning more enjoyable	Female	11.54	19.23	0.00	0.00	0.00
	Male	30.77	34.62	3.85	0.00	0.00

Annexure 3: Perception by age

Indicators	Age	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Knowledge						
I can use Microsoft Office	Below 30 years	30.77	3.85	0.00	0.00	0.00
	30 to below 40 years	42.31	0.000	0.00	0.00	0.00
	40 to below 50 years	7.69	3.85	0.00	0.00	0.00
	50 years plus	11.54	0.00	0.00	0.00	0.00
I can search information using search engines like Google	Below 30 years	26.92	7.69	0.00	0.00	0.00
	30 to below 40 years	38.46	3.85	0.00	0.00	0.00

	40 to below 50 years	7.69	3.85	0.00	0.00	0.00
	50 years plus	3.85	7.69	0.00	0.00	0.00
I can use audiovisual facilities with ease.	Below 30 years	15.38	11.54	7.70	0.000	15.38
	30 to below 40 years	38.46	3.85	0.000	0.000	38.46
	40 to below 50 years	3.85	3.85	0.000	3.80	3.85
	50 years plus	3.85	7.69	0.000	0.00	3.85
I can prepare advanced animated Power Point	Below 30 years	15.40	30.8	0.000	0.00	15.40
	30 to below 40 years	7.70	7.70	0.000	3.80	7.70
	40 to below 50 years	0.00	3.80	0.000	3.80	0.00
	50 years plus	0.00	3.80	0.00	7.70	0.00
I can use ICT in teaching and learning with ease	Below 30 years	23.10	34.60	0.00	0.00	7.70
	30 to below 40 years	7.70	3.80	0.00	0.00	3.80
	40 to below 50 years	3.80	7.70	3.8%	0.00	3.80
	50 years plus	3.80	7.70	0.0000	0.00	3.80
Ease of use						
I have access to necessary technology that facilitates use of ICT in teaching and learning	Below 30 years	11.50	11.50	11.50	0.00	0.00
	30 to below 40 years	7.70	30.80	3.80	0.00	0.00
	40 to below 50 years	0.00	3.80	3.80	0.00	0.00
	50 years plus	3.80	7.70	0.00	0.00	0.00
I have necessary resources (Computer/projector/sound system, etc.) to teach using ICT	Below 30 years	19.20	7.70	7.70	0.00	0.00
	30 to below 40 years	30.80	11.50	0.00	0.00	0.00
	40 to below 50 years		11.50	0.00	3.80	0.00

	50 years plus	11.50	0.00	0.00	11.50	0.00
I can manage basic technical problems that I encounter when using ICT	Below 30 years	15.40	7.70	11.50	0.00	0.00
	30 to below 40 years	30.80	11.50	0.00	0.00	0.00
	40 to below 50 years	0.00	3.80	3.80	0.00	0.00
	50 years plus	0.00	0.00	0.00	0.00	0.00
Benefits of using ICT						
Using ICT promote innovation and problem-solving skills of learners	Below 30 years	23.10	7.70	3.80	0.00	0.00
	30 to below 40 years	3.80	38.50	0.00	0.00	0.00
	40 to below 50 years	0.00	11.50	0.00	0.00	0.00
	50 years plus	11.50	0.00	0.00	0.00	0.00
ICT makes learning diverse	Below 30 years	23.10	7.70	3.80	0.00	0.00
	30 to below 40 years	7.70	34.60	0.00	0.00	0.00
	40 to below 50 years	0.00	11.50	0.00	0.00	0.00
	50 years plus	11.50		0.00	0.00	0.00
Using ICT keeps the teachers abreast with current trends in Education	Below 30 years	26.90	3.80	3.80	0.00	0.00
	30 to below 40 years	34.60	7.70	0.00	0.00	0.00
	40 to below 50 years	0.00	11.50	0.00	0.00	0.00
	50 years plus	11.50	0.00	0.00	0.00	0.00
Use of ICT as instructional tool can increase the interest of students toward learning courses.	Below 30 years	3.80	7.70	3.80	0.00	0.00
	30 to below 40 years	3.80	38.50	0.00	0.00	0.00
	40 to below 50 years	11.50	3.80	3.80	0.00	0.00
	50 years plus	11.50	0.00	0.00	0.00	0.00
Use of instructional technologies can	Below 30 years	23.10	7.70	0.00	0.00	0.00

increase the quality of learning	30 to below 40 years	7.70	34.60	0.00	0.00	0.00
	40 to below 50 years	3.80	7.70	0.00	0.00	0.00
	50 years plus	11.50	0.00	0.00	0.00	0.00
Usage of instructional technologies makes it easier to prepare course materials (assignments, handouts etc.).	Below 30 years	26.90	3.80	3.80	0.00	0.00
	30 to below 40 years	34.60	7.70	0.00	0.00	0.00
	40 to below 50 years	0.00	11.50	0.00	0.00	0.00
	50 years plus	11.50	0.00	0.00	0.00	0.00
ICT makes learning more enjoyable	Below 30 years	23.10	7.70	3.80	0.00	0.00
	30 to below 40 years	7.70	34.60	0.00	0.00	0.00
	40 to below 50 years	0.00	11.50	0.00	0.00	0.00
	50 years plus	11.50	0.00	0.00	0.00	0.00

Annexure4: Consolidated rating on practice of ICT integration in teaching and learning.

Assessment Indicator	**Rating Scale**				
	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
I use ICT (computer/laptop with internet) to search information during my lesson planning and preparation	84.62	11.54	3.85	0.00	0.00
I use ICT to arouse and direct my learners' attention and to make my lesson interesting	34.62	34.62	30.77	0.00	0.00
I motivate my learners to learn and solve task collaboratively through the use of the internet	23.08	42.31	34.62	0.00	0.00
I allow my learners to use gadgets (ICT devices) during the lesson	19.23	46.15	7.69	26.92	0.00
I confidently use different ICT devices in teaching	11.54	73.08	7.69	7.69	0.00

I use ICT in all relevant topics	19.23	61.54	7.69	11.54	0.00
I choose the type of technology (ICT devices) that I am familiar with	26.92	65.38	3.85	3.85	0.00
I choose the latest ICT tools available for my teaching	19.23	38.46	3.85	38.46	0.00

Annexure 5: Practice of ICT integration in teaching and learning by sex

Assessment Indicator	Sex	Rating Scale				
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I use ICT (computer/laptop with internet) to search information during my lesson planning and preparation	Female	26.92	11.54	0.00	0.00	0.00
	Male	57.69	34.62	0.00	0.00	0.00
I use ICT to arouse and direct my learners' attention and to make my lesson interesting	Female	7.89	5.69	17.38	0.00	0.00
	Male	26.92	26.92	15.38	0.00	0.00
I motivate my learners to learn and solve task collaboratively through the use of the internet	Female	3.95	7.79	17.23	0.00	0.00
	Male	19.23	29.62	15.38	0.00	0.00
I allow my learners to use gadgets (ICT devices) during the lesson	Female	4.93	7.04	2.85	11.54	0.00
	Male	17.01	23.77	3.85	15.38	0.00
I confidently use different ICT devices in teaching	Female	0.17	30.77	0.00	0.00	0.00
	Male	11.54	42.31	7.69	7.69	0.00
I use ICT in all relevant topics	Female	3.95	23.08	3.85	0.00	0.00
	Male	15.38	38.46	3.85	11.54	0.00
I choose the type of technology (ICT devices) that I am familiar with	Female	26.93	0.00	0.00	0.00	0.00
	Male	23.08	38.46	0.00	0.00	0.00
I choose the latest ICT tools available for my teaching	Female	0.76	15.38	0.00	15.38	0.00
	Male	19.23	23.08	3.85	23.08	0.00

Annexure 6. Practice of ICT integration in teaching and learning.

Assessment Indicator	Age	Rating Scale				
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I use ICT (computer/laptop with internet) to search information during my lesson	Below 30 years	26.92	3.85	3.85	0.00	0.00
	30 to 40 years	38.46	3.85	0.00	0.00	0.00

planning and preparation	40 to 50 years	7.69	3.85	0.00	0.00	0.00
	50 years plus	11.54	0.00	0.00	0.00	0.00
I use ICT to arouse and direct my learners' attention and to make my lesson interesting	Below 30 years	11.54	19.23	3.85	0.00	0.00
	30 to 40 years	7.69	7.69	26.92	0.00	0.00
	40 to 50 years	3.85	7.69	0.00	0.00	0.00
	50 years plus	11.54	0.00	0.00	0.00	0.00
I motivate my learners to learn and solve task collaboratively through the use of the internet	Below 30 years	0.00	15.38	7.69	0.00	0.00
	30 to 40 years	11.54	3.85	26.92	0.00	0.00
	40 to 50 years	11.54	11.54	0.00	0.00	0.00
	50 years plus	0.00	11.54	0.00	0.00	0.00
I allow my learners to use gadgets (ICT devices) during the lesson	Below 30 years	11.54	19.23	3.85	0.00	0.00
	30 to 40 years	3.85	11.54	0.00	0.00	0.00
	40 to 50 years	3.85	3.85	3.85	0.00	0.00
	50 years plus	0.00	11.54	0.00	26.92	0.00
I confidently use different ICT devices in teaching	Below 30 years	7.69	26.92	0.00	0.00	0.00
	30 to 40 years	3.85	38.46	0.00	0.00	0.00
	40 to 50 years	0.00	3.85	7.69	0.00	0.00
	50 years plus	0.00	3.85	0.00	7.69	0.00

I use ICT in all relevant topics	Below 30 years	15.38	15.38	3.85	0.00	0.00
	30 to 40 years	3.85	38.46	0.00	0.00	0.00
	40 to 50 years	0.00	3.85	3.85	3.85	0.00
	50 years plus	0.00	3.85	0.00	7.69	0.00
I choose the type of technology (ICT devices) that I am familiar with	Below 30 years	11.54	23.08	0.00	0.00	0.00
	30 to 40 years	7.69	34.62	0.00	0.00	0.00
	40 to 50 years	0.00	3.85	3.85	3.85	0.00
	50 years plus	7.69	3.85	0.00	0.00	0.00
I choose the latest ICT tools available for my teaching	Below 30 years	15.38	19.23	0.00	0.00	0.00
	30 to 40 years	3.85	7.69	0.00	0.00	0.00
	40 to 50 years	0.00	7.69	3.85	7.69	0.00
	50 years plus	0.00	3.85	0.00	30.77	0.00

Annexure 7: Use of VLE (Consolidated data)

Indicator	Rating	
	Yes	No
I can use all the features of VLE	53.85	46.15
I can help students to use VLE	50.00	50.00
I can demonstrate how to use of VLE	50.00	50.00
I can help colleagues to user VLE	53.85	46.15
Faculty should be trained more on use of VLE (may be half day minimum)	80.77	19.23

Annexure 8: Use of VLE

Indicator	Sex	Rating	
		Yes	No
I can use all the features of VLE	Male	55.56	44.44
	Female	50.00	50.00

I can help students to use VLE	Male	50.00	50.00
	Female	50.00	50.00
I can demonstrate how to use of VLE	Male	50.00	50.00
	Female	50.00	50.00
I can help colleagues to user VLE	Male	50.00	50.00
	Female	37.50	62.50
Faculty should be trained more on use of VLE (may be half day minimum)	Male	88.89	11.11
	Female	62.50	37.50

Annexure 9: Use of VLE by age

Indicator	**Age**	**Rating**	
		Yes	**No**
I can use all the features of VLE	Below 30 years	88.89	11.11
	30 to 40 years	27.27	72.73
	40 to 50 years	33.33	66.67
	50 years plus	0.00	100.00
I can help students to use VLE	Below 30 years	55.56	44.44
	30 to 40 years	27.27	72.73
	40 to 50 years	33.33	66.67
	50 years plus	0.00	100.00
I can demonstrate how to use VLE	Below 30 years	55.56	44.44
	30 to 40 years	27.27	72.73
	40 to 50 years	33.33	7.69
	50 years plus	0.00	100.00
I can help colleagues to user VLE	Below 30 years	88.89	3.85
	30 to 40 years	27.27	72.73
	40 to 50 years	33.33	66.67
	50 years plus	0.00	100.00
Faculty should be trained more on use of VLE (may be half day minimum)	Below 30 years	66.67	33.33
	30 to 40 years	81.82	18.18
	40 to 50 years	100.00	0.00
	50 years plus	100.00	0.00