



COMMONWEALTH *of* LEARNING

# **Report of the Baseline Study on Technology-Enabled Learning in Rajiv Gandhi University of Knowledge Technologies**





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The Commonwealth of Learning (COL) is an intergovernmental organisation created by Commonwealth Heads of Government to promote the development and sharing of open learning and distance education knowledge, resources and technologies.

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This report was prepared by a team of faculty members at Rajiv Gandhi University of Knowledge Technologies, led by Professor V. Venkaiah, Director, Centre for Education Technology and Learning Sciences, under the guidance of Dr. Sanjaya Mishra, Education Specialist, eLearning, Commonwealth of Learning, Canada.

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## Foreword

Technology can be a powerful tool in transforming learning. It can help affirm and advance relationships between teachers and students and reinvent our approaches to learning and collaboration.

Technology-enabled learning (TEL) has changed the face of education. More and more educational institutions, teachers and students now have access to digital tools and the Internet. However, increased access to and use of technology is not evenly distributed across all countries, and technologies are not being used to their full potential in some areas.

We are fortunate to partner with the Commonwealth of Learning (COL) to strengthen RGUKT's vision and mission to deliver quality education. COL's TEL initiative is assisting educational institutions in adopting appropriate policies, strengthening technology infrastructure, helping learners to take advantage of the available technology and open educational resources for learning, and undertaking a rigorous approach to the assessment and evolution of TEL. The survey results presented in this report provide an overview of where we are in terms of ICT integration, the status of our ICT infrastructure, the attitudes and perceptions of stakeholders regarding ICTs as a tool for knowledge creation and sharing, and our progress in moving towards more intensely learner-centred education. This study certainly will help us in preparing a TEL Policy for RGUKT, which will guide all academic activities in creating a more learner-centric environment.

I appreciate the sincere efforts taken by everybody in conducting this study, analysing the responses and presenting the wider picture of TEL at RGUKT.

I am grateful to the Chancellor of RGUKT, Professor Raj Reddy, for his vision and leadership in conceptualising and developing RGUKT as one of the premier institutions in India and beyond.

My special thanks to Professor M. Venkateswarlu, Advisor to the Chancellor, RGUKT, and Professor V. Venkaiah, Director, CETLS, who provided exemplary guidance in undertaking the TEL Implementation Project at RGUKT.

I am thankful to COL for granting this TEL Implementation Project. I place on record my sincere thanks to Dr. Sanjaya Mishra for his valuable input and insights during the study, which helped us in developing a TEL Policy and strategic plan for the university.

**Professor V. Ramachandra Raju**  
Vice Chancellor  
Rajiv Gandhi University of Knowledge Technologies  
Andhra Pradesh

## Preface

The purpose of the *Baseline Study on Technology-Enabled Learning in Rajiv Gandhi University of Knowledge Technologies* was to record how far the objectives of TEL have been fulfilled at RGUKT in terms of the accessibility, perception and extent of use of ICTs for teaching and research by the teachers and learners at RGUKT. The report has been compiled by following a survey method using questionnaires prepared for the institution's teachers and learners.

Teaching with technology can deepen student learning by supporting instructional objectives. However, it can be challenging to select the “best” technical tools whilst not losing sight of student learning goals.

The impetus for the study was to highlight the role of TEL in imparting effective education to young minds. The Commonwealth of Learning (COL), Canada, shared this vision and came forward to support the TEL Implementation Project at RGUKT. To prepare a policy document for the university, the first and foremost requirement is to know the status of our students and staff in terms of their use of technology – not just the number of computers and labs, but the attitudes, perceptions and extent of use of ICTs by teachers and students.

When TEL was brought into practice, faculty members were enthusiastic about new, user-friendly technology tools, and they have shown interest in learning how to use those tools to make their teaching more effective. A baseline study was therefore planned, its major purpose being to understand the status of the TEL processes initiated at the university and stakeholders' perceptions of them.

This survey report has been prepared under the leadership, guidance and support of the Honourable Chancellor Professor D. Raj Reddy, the Honourable Vice Chancellor Professor V. Ramachandra Raju and Professor M. Venkateswarlu, Advisor to the Chancellor, RGUKT.

The baseline survey was conducted very systematically on the two campuses during January/February 2017. I am sure that this report will help the university in developing a sound TEL policy, as it portrays the status as well as perceptions and attitudes of valuable stakeholders.

I am thankful to all the teachers and technical staff who assisted in conducting this survey and in the preparation of this report. This work would not have reached its present form without their valuable help.

**Professor V. Venkaiah**

Director, Centre for Education Technology and Learning Sciences  
Rajiv Gandhi University of Knowledge Technologies  
Andhra Pradesh



## Acknowledgements

I express my profound sense of gratitude to all the individuals who provided support to complete the *Baseline Study on Technology-Enabled Learning in Rajiv Gandhi University of Knowledge Technologies* (RGUKT). I also acknowledge the unconditional support of my colleagues whilst planning this study, conducting the survey, analysing the data and presenting this report.

First of all, I thank Dr. Sanjaya Mishra, eLearning Specialist, Commonwealth of Learning (COL), Canada, who in more than one way was instrumental in making this happen. His contribution in planning this study, preparing the tools and planning a sharing workshop, as well as his enthusiasm and zeal, have been unmatched. I thank Professor Asha Kanwar, President and CEO of COL, for all of the academic and financial support provided to prepare the TEL Policy for RGUKT.

I am thankful to Professor D. Raj Reddy, Honourable Chancellor, RGUKT, Professor V. Ramachandra Raju, Honourable Vice Chancellor, RGUKT, and Professor M. Venkateswarlu, Advisor to the Chancellor, RGUKT, for envisaging this major step and taking it forward. It is always challenging to work on such projects, and I thank them for giving me the opportunity to conduct this study, which was the first step towards developing the policy.

My special gratitude and thanks to the Directors of the Nuzvid and RK Valley campuses, Professor V. Venkata Dasu and Professor G. Bhagavannarayana, who have shown the spirit of enthusiasm and provided exemplary support in moving this study ahead.

I sincerely thank Dr. S. S. S. V. Gopala Raju and Dr. S. Amarendra Kumar, Administrative Officers of the Nuzvid and RK Valley campuses, for their meticulous scrutiny of administrative matters at various stages of the study.

I also thank Mr. Satya Dev and Dr. B. Konda Reddy, Deans of Academics for the Nuzvid and RK Valley campuses, for their keen interest and constant supervision in providing the necessary information for completing the study.

During this baseline study, all heads of departments and faculty members of the Nuzvid and RK Valley campuses extended their support in monitoring the students taking the survey and of course took the survey themselves. Without their support, this study would not have been possible. All teachers and students co-operated and responded to all the questions. Many of them stated that they enjoyed the survey and also found it relevant to them. The results of the study will be shared with them, as these will be immensely useful to them in planning their department activities using ICTs.

I am also thankful to the deans of academics, associate deans and technical staff for their academic and technical support in conducting the survey and analysing the data in the stipulated time.

I look forward to a strong TEL Policy that will guide all learning-related and learner-centred activities in the university.

**Professor V. Venkaiah**  
Director, Centre for Education Technology and Learning Sciences  
Rajiv Gandhi University of Knowledge Technologies  
Andhra Pradesh



# Chapter 1: Introduction

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## 1.1 Background

The rate at which information and communication technology (ICT) is growing today is evident from the fact that it has invaded almost every part of our lives. This technological progress can be harnessed to both expand the reach of education and increase its quality.

Recent endeavours in this direction have been mainly directed towards equipping institutions of higher education with IT infrastructures and networks. However, universities now need to engage in digital resource development and fully exploit the potential of digital resources to create quality certification programmes and courses. The Government of India has been supporting the use of ICTs in higher education through its National Mission on Education through ICTs (NME-ICT<sup>1</sup>) to make higher education accessible to all deserving students.

The term “technology-enabled learning” (TEL) is self-explanatory. “Technology” refers to information and communication technologies (ICTs), which are becoming more user-friendly every day and are rapidly converging. Technologies have changed the face of the teaching and learning processes. The term “enabled” implies “empowered.” This is the basis of all learning. It is the responsibility of the institution to provide all that is possible — infrastructure (computer labs, connectivity), software, trained teachers, and learning resources such as journal databases, e-books, etc. — to enable the process of learning so that the learner takes responsibility for his/her learning and gains knowledge and skills. “Learning” is the central theme of all academic activities in an educational institution. Despite the phenomenal growth of access to mobile technologies, there is unequal access to ICTs for learning in Commonwealth countries. ICTs have challenged conventional teaching strategies and have supported learner-centred teaching and learning to a great extent. All fields of activities in a university, including teaching, learning, research and evaluation/assessment, have been influenced by ICTs. It is now imperative for teachers to use ICTs, as learners are more ICT savvy.

ICTs offer the possibility of the “mass personalisation” of instruction. Given these circumstances, university authorities must take a decision about introducing ICTs into their institutions’ academic activities. Stakeholders such as learners and teachers play a large role in decisions related to teaching, learning and evaluation. TEL focuses on increasing access to quality teaching and learning by supporting policy formulation and innovation in the application of ICTs in education and the development of ICT skills.

## 1.2 Rajiv Gandhi University of Knowledge Technologies

Rajiv Gandhi University of Knowledge Technologies (RGUKT) was established by the Government of Andhra Pradesh in 2008 with Act 18 of 2008. The primary objective in establishing RGUKT was to provide high-quality educational opportunities for the deprived rural youths of Andhra Pradesh. RGUKT represents a novel experiment in the educational arena. The key educational objective of RGUKT is to use the latest techniques and advances in learning sciences and explore the use of modern cognitive science tools in education and learning.

Since RGUKT’s inception, the education model followed by the university is ICT-based pedagogy, which is an advanced education model compared to the model followed by conventional

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<sup>1</sup> See <http://www.sakshat.ac.in/>.

universities. The practice of concepts such as “learning by example,” “learning by doing,” “problem-based learning,” “self-paced learning,” etc. is facilitated when every student can be assured of having a personal computer that does not have to be shared with anyone else. Education at RGUKT is based on the intensive use of information technology. Every student has access to a laptop, and teaching and learning are based on the latest advances in learning sciences. Online lectures are provided, and lectures are followed by problem-solving sessions that reinforce what has been covered in each lecture.

RGUKT always works in dynamic equilibrium and tries to implement modern education models. In light of this, the Honourable Chancellor Professor D. Raj Reddy proposed a co-operative education model at the beginning of the 2015–16 academic year, with the aim of reaching 100 per cent employability for RGUKT students. Co-operative education is a blended education model offering both academic studies and industrial internships during an academic programme. This model provides the students of RGUKT with the opportunity to undertake internships in their chosen industries and work as teaching assistants in one of RGUKT’s institutes for a period of two years, which can be done at a stretch with a company, in two one-year stretches with different companies, or in multiple six-month periods in different companies related to their field; the model even allows them to pursue courses as electives through an online education mode. Project work is based on the work done during their internship. RGUKT offers a six-year integrated BTech programme; the first two years are called PUC, and the last four years are called Engineering and have six branches.

The “flipped classroom” model of teaching was introduced in the 2016–17 academic year. In this model, students watch video lectures and go through reading materials (from various sources, such as NPTEL, edX, MIT OpenCourseWare, Coursera, Udacity, etc.) one day before the actual scheduled class period. The next day, during the instruction period (1.5 hours), the class teacher presents a video lecture (which was already watched by the students the previous day) to the students (approximately 200 to 300) in a big classroom; this is followed by tutorial and problem-solving sessions (1.5 hours) amongst groups of 15 to 30 students in small classrooms, with the help of academic assistants and teaching assistants. For a typical four-credit course, the instruction session is two periods per week and so are the tutorial and problem-solving sessions. A typical four-credit course has four periods (six hours) available per week, and two periods of assignments per week have to be worked on by students independently. These flipped classes are conducted for all the regular courses offered in the university.

For the past nine years, the university has been providing video-based lectures to students and even offering faculty the flexibility to develop their own lecture videos. The University has also provided all students and faculty with laptops to access the Internet. The University offers programmes at four campuses<sup>2</sup> (Nuzvid, Rajiv Knowledge Valley, Ongole and Srikakulam), which are autonomous institutes. These institutes are fully equipped with LAN and Wi-Fi connectivity. All the classrooms are connected to main content and database servers. The University is engaged in systematic efforts to introduce ICTs into teaching, learning and evaluation.

The University is very much interested in implementing newly emerging technologies in learning and training for students and faculty. The University has a Centre for Educational Technology and Learning Sciences to provide research and training on ICT applications for teaching and learning. Using technology in teaching and learning plays a key role in strengthening and fulfilling the university’s mandate to provide quality technical education to the rural students of Andhra Pradesh. The Commonwealth of Learning (COL), Canada, came forward to support RGUKT in the

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<sup>2</sup> Separate campuses at Ongole and Srikakulam are yet to be operational.

development of a TEL Policy and the systematic implementation of TEL in courses so as to show evidence of learning outcomes. When preparing a policy document, the first and foremost requirement is to know the views of our students and staff, including their attitudes, perceptions and extent of use with respect to ICTs.

Collaboration with COL will help the university to:

- develop a policy for TEL at RGUKT;
- train teachers in how to integrate technology into their teaching;
- assist students to use the university's ICT facilities effectively; and
- improve students' learning and engagement.

This report presents the findings of the policy review and infrastructure analysis as well as the survey of RGUKT teachers and students, to establish a baseline about ICT availability and use.

### 1.3 Objectives of the Study

As indicated above, the study was conducted to:

- review the existing infrastructure and policies that support TEL;
- examine teachers' and learners' access to and use of ICTs;
- understand teachers' and learners' perceptions about the use of technology for teaching and learning;
- analyse the extent to which teachers are using ICTs in teaching, research and scholarship; and
- recommend appropriate next steps, based on the data, to support TEL policy development.

### 1.4 Methodology

A survey method was followed to conduct the study. COL provided the tools, which are available in the COL publication *Technology-Enabled Learning Implementation Handbook*.<sup>3</sup>

The survey had three parts:

- **Institutional Questionnaire:** This was prepared by a group of teachers in consultation with the administrative officers and person responsible for offering various services in the university.
- **Learner Questionnaire:** The survey was administered online to all students in the university. A total of 875 completed responses were received.
- **Teacher Questionnaire:** The questionnaire was distributed to all teachers in the university. A total of 107 completed responses were received for analysis.

The data collected are presented in the following chapters.

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<sup>3</sup> <http://oasis.col.org/handle/11599/2363>

## Chapter 2: Policy Review and Infrastructure Analysis

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### 2.1 University Profile

The primary objective of establishing RGUKT was to provide high-quality educational opportunities for the meritorious rural youths of Andhra Pradesh. The initial goal was that at least the top one per cent of students who received the Secondary School Certificate (SSC) would be given the opportunity to study at RGUKT. The top one per cent of rural students obtaining the SSC totals around 4,000 per year. Thus, the four campuses need residential accommodation for about 24,000 students for a six-year integrated programme. The study covered two institutes of the university: RK Valley and Nuzvid. Presently, the university offers 288 courses for a six-year integrated BTech programme. There are 477 teaching and 334 non-teaching (administrative and technical) staff working in the university. There are 5,450 students in RK Valley and 6,355 students in Nuzvid. Post-graduate teaching is only available at the Nuzvid campus.

### 2.2 The TEL Environment in the University

The university has over 15,000 laptops, 275 desktops and eight tablets. It provides broadband connectivity on two campuses for officials, teachers, learners, researchers and visitors. Internet access is provided in classrooms, libraries, faculty rooms, seminar halls, student common rooms, laboratories as well as in hostels. Internet connectivity is provided through a government-supported Internet service provider (namely BSNL). Currently, the university has IGBPS Internet. It provides Wi-Fi across the entire campus for students and staff to access content from local servers as well as from the Internet. Access control is in place with proxy-based servers to prevent some online content, such videos with adult content, from being accessed or downloaded. The university maintains an official profile on Facebook<sup>4</sup> and LinkedIn.<sup>5</sup>

The university has e-classroom facilities, including an LCD projector fitted with a laptop in each of the 120 and 150 undergraduate classrooms in the RK Valley and Nuzvid campuses, respectively. These campuses also have two e-content storage units on local servers.<sup>5</sup> For this purpose, each campus uses five HP Proliant DL180 G6 servers (600 GB hard disk capacity per server). Of the available course content, a few materials have been designed by in-house faculty and the rest are cached from the NPTEL server. To date, the local content servers are not integrated with the local learning management system. However, efforts are being made to configuring the Moodle learning management system (LMS),<sup>6</sup> which is still in the testing phase. All students and staff of RGUKT's four campuses are provided with institutional email IDs created by the IT Department. E-journals published by companies and organisations such as Springer, IEEE, etc. are provided through the library website.

A range of digital and online software and resources are not available at present and need to be procured. Some of these are: plagiarism detection software, an institutional repository, access to electronic dissertations, theses and bibliographic databases, etc.

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<sup>4</sup> <https://www.facebook.com/RGUKTOfficial/>

<sup>5</sup> <https://in.linkedin.com/in/rgukt-university-79910b90>

<sup>5</sup> [engg1a.rkv.rgukt.in](http://engg1a.rkv.rgukt.in) and [engg1a.nuz.rgukt.in](http://engg1a.nuz.rgukt.in) (only on the local intranet)

<sup>6</sup> <http://intranet.rguktn.ac.in/moodle> (only on the local intranet)

The university understands the importance of training for keeping teachers abreast with the new trends in TEL. So far, no training programmes related to TEL have been organised/conducted at RGUKT.

The university recognises the importance of policy and plans in preparing a formal policy document on TEL, and this activity is the beginning of that exercise. As the policy document will be prepared and made available, the TEL strategies must be defined clearly.

RGUKT also does not have a formal policy on open educational resources (OER). However, teachers use OER in teaching and learning. Likewise, although repair and maintenance are important support services, the university does not have a workflow and escalation procedure for the repair and maintenance of its IT infrastructure.

## 2.3 Institutional Preparedness for TEL

Table 1 presents the institutional preparedness for TEL at RGUKT. Each of the criteria was scored from 1 to 5 thus: 1 = Strongly disagree or does not exist; 2 = Disagree or only marginally demonstrates existence; 3 = Neither agree nor disagree/existence or otherwise is difficult to explain; 4 = Agree or it does exist; 5 = Strongly agree or it definitely exists and is well established. As per COL's *TEL Implementation Handbook*, the scores for institutional preparedness tallied to 112; this is in the range of 95–129, indicating “developing preparedness”, which means the institution has put in place some of the aspects of a TEL system, policy and infrastructure and is in the process of developing a robust system.

**Table 1: Scores for and Remarks on Institutional Preparedness for TEL**

S. No.	Statement		Score (1 to 5 in steps of 1)	Remarks
1	Policy	There is a well-documented TEL policy.	1	The university has comparatively less documented TEL policy. It is getting ready to develop its own comprehensive TEL Policy. There is a commitment on the part of institutional leaders to use modern technology to achieve its strategic academic goals. The score in institutional preparedness for TEL for the <b>Policy</b> criterion is <b>9</b> out of 20.
		The vision and mission of the TEL policy are aligned with the mission of the organisation.	1	
		The vision and mission of the TEL policy are well understood across the organisation.	3	
		There is a commitment on the part of institutional leaders to use technology to achieve strategic academic goals.	4	
2	Strategic Plan	There is a strategic plan for the implementation of TEL.	3	At present, the university has an informal strategic plan for the implementation of TEL. Senior management has approved strategic measures that have measurable goals. The score in institutional preparedness for TEL for the <b>Strategic Plan</b> criterion is <b>9</b> out of 15.
		The strategic plan for TEL has measurable goals and outcomes.	3	
		The strategic plan for TEL is approved by the senior management of the organisation and is supported by adequate financial provisions.	3	
3	IT Support Department	The organisation has an IT department that handles the procurement, installation and maintenance of technologies for teaching and learning.	4	The university has an IT support department that handles procurement, installation and maintenance of technologies for teaching and learning. This department plays a major role in the procurement, installation and maintenance of technologies for teaching and learning. The head of the
		There is an ICT policy in place, which is implemented by a high-powered committee in the organisation.	4	

S. No.	Statement		Score (1 to 5 in steps of 1)	Remarks
		The head of the IT support department reports to senior management and is responsible for the overall functioning of technology in the organisation.	3	IT support department is able to manage the technological requirements of the organisation. The score in institutional preparedness for TEL for the <b>IT Support Department</b> criterion is 14 out of 20.
		The head of the IT support department is well qualified and up to date in order to manage the technological requirements of the organisation.	3	
4	Technology	There is adequate hardware infrastructure for teaching and learning (e.g., access to computers for students and learners).	5	The university has purchased various software for developing online lectures and desk-capturing software to display everything on a smartboard, along with providing adequate hardware infrastructure for teaching and learning. Learners have access to laptops. It has provided accessibility to the Internet, and even an intranet has been created, connecting the campus virtually. The score in institutional preparedness for TEL for the <b>Technology</b> criterion is 16 out of 20.
		There are adequate applications and software for teaching and learning (e.g., access to appropriate software, intranet, learning management system, etc.).	4	
		There is adequate networking infrastructure in the organisation (e.g., access to adequate bandwidth).	3	
		There are adequate policies and procedures in place to protect privacy and organisational data.	4	
5	Content	There is support available for the creation of digital multimedia content in the organisation (e.g., the production of e-courses, audio and video materials, animation, etc.).	2	A dedicated team worked at the head office to develop content (videos and reading materials) for the course. It was the responsibility of the team to edit and upload the videos on the intranet. At present, the team members have been assigned various other roles. The score in institutional preparedness for TEL for the <b>Content</b> criterion is 5 out of 15.
		There are instructional designers in the organisation, or faculty members are trained to organise learning content appropriately.	1	
		Teachers have adequate access to online systems to develop courses for TEL.	2	
6	Documentation	There is a variety of help available to support teachers and students in using technology effectively.	3	Presently, the work-flow processes and responsibilities to implement TEL have yet to be documented well in the organisation. However, as per the RGUKT policy of "learning by doing," utilisation of technology in teaching and learning by different means has been practiced from the university's inception. The score in institutional preparedness for TEL for the <b>Documentation</b> criterion is 5 out of 15.
		Lessons learned in the implementation of TEL are stored and shared within the organisation for others to access and learn from.	1	
		The work flow processes and responsibilities to implement TEL are well documented in the organisation.	1	
7	Organisational Culture	Faculty and staff members are willing to learn about new technology in the organisation.	4	Faculty members are involving effectively and with eagerness in skill development training programmes. Faculty and staff members are willing to learn new technology applications in
		Faculty and staff members support each other easily.	4	



S. No.	Statement	Score (1 to 5 in steps of 1)	Remarks	
	There is a culture of knowledge creation and sharing in the organisation.	4	the organisation. Faculty and staff members support each other in implementing the teaching methods effectively. There is a culture of knowledge creation and sharing in the university. The score in institutional preparedness for TEL for the <b>Organisational Culture</b> criterion is <b>12</b> out of 15.	
8	Leadership			
	Leaders in the organisation are involved in the implementation of TEL.	4	Leaders in the university are favourable towards implementing technology in teaching and learning. The top leadership of the organisation is supportive of TEL and provides encouragement and motivation to the faculty and staff to achieve their academic goals. The Chancellor of the University, Professor D. Raj Reddy, is always novel in his approach and encourages innovation in teaching. The score in institutional preparedness for TEL for the <b>Leadership</b> criterion is <b>13</b> out of 15.	
	Senior management in the organisation regularly review, monitor and evaluate the progress of TEL.	4		
The top leadership of the organisation is supportive of TEL and provides encouragement and motivation to the faculty and staff to achieve their academic goals.	5			
9	Human Resources and Training	Faculty members are qualified and trained to use technology for teaching and learning.	3	Faculty members are highly qualified and trained to use technology for teaching and learning to a great extent. They would receive regular training to update themselves in using TEL. The university has a structure in place to create teams for content development and delivery of TEL. Faculty members trust the support received from the instructional designers and technology support staff whilst developing and delivering courses. The IT staff members are highly skilled and well trained to provide the support needed. The score in institutional preparedness for TEL for the <b>Human Resource and Training</b> criterion is <b>16</b> out of 30.
		Faculty and staff members receive regular training to update them in the use of TEL.	3	
		There are adequate staff to support TEL.	3	
		The organisation has a structure in place to create teams for content development and delivery of TEL.	3	
		Faculty members trust the support received from instructional designers and technology support staff whilst developing and delivering courses.	1	
		The IT staff members are highly skilled and trained to provide the needed support.	3	
10	TEL Champions	There are early adopters of TEL in the organisation.	3	Learners are trained to work on "learning by doing." Learners are also trained in the use of technology by regularly taking online tests in digital literacy and English competency, as well as general aptitude tests. They are able to adapt easily to any kind of new technology and its implementation in the curricula. Faculty members are taking leadership roles in developing several institutional policies and are involved in developing a TEL strategy for the organisation. The score in institutional preparedness for TEL for the <b>TEL Champions</b> criterion is <b>13</b> out of 20.
		There are TEL champions in the organisation who support and care about pedagogic innovations.	3	
		There are faculty members who can take leadership roles in developing appropriate policies and a TEL strategy for the organisation.	4	
		There are TEL champions to research and disseminate good practices in TEL.	3	
<b>Total score for all statements</b>		<b>112</b>		

## Chapter 3: Teachers' Use of Technology for Teaching and Learning

### 3.1 Respondents' Profile

Of the 477 teachers working in the university, 107 responded to the survey. The response rate was 22.4 per cent, which is useful for gaining a general understanding of teachers' access to technology and their use of technology for teaching and learning. Of the respondents, 27.36 per cent were female, whilst the rest (72.64 per cent) were male. The age distribution of respondents is given in Table 2, which shows that the majority were in the 26–30 age group, followed by 31–35. The university has a very young teacher population, as over 92 per cent of its teachers are below 40 years of age. Nearly three-quarters (73.58 per cent) of the respondents worked as lecturers, whilst assistant professors accounted for 25.47 per cent, and only one associate professor was covered by the study.

Table 2: Age Distribution of Teacher Respondents

Age Group	Number	Percentage
Below 26	1	0.93
26–30	48	44.86
31–35	38	35.51
36–40	14	13.08
41–45	5	4.67
46–50	1	0.93

Table 3: Distribution of Teacher Respondents by Highest Qualification

Highest Degree	Number	Percentage
PhD	18	16.98
MPhil or MTech	45	42.45
Master's	43	40.57

Table 3 reveals that 42.45 per cent of the respondents had MTech or MPhil degrees, whilst 16.98 per cent had PhDs. This indicates that a majority of the teachers in the university had undertaken research after their graduation. Most of the teachers are engaged in undergraduate level teaching, as the university has limited post-graduate courses. The majority of the teachers (52.83 per cent) had six to ten years of experience in teaching or industry (Table 4). Most of the respondents (67.92 per cent) came from the Engineering and Technology field (Table 5).

Table 4: Respondents' Years of Experience

Years of Experience	Number	Percentage
5 or < 5 years	41	38.68
6–10 years	56	52.83
11–15 years	4	3.77
16–20 years	1	0.94
21–25 years	3	2.83
26–30 years	1	0.94

### 3.2 Access to and Use of ICT

#### Device Access

Most teachers have access to electronic devices; 86.91 per cent own a laptop, 81.3 per cent have a smartphone, whilst tablet ownership is lower (Table 6). However, the responses about laptop

ownership may not be accurate, as almost all the teachers indicated that the university had provided them with a laptop (Table 7). This means either they have two laptops (one provided by the university and the other owned by them) or they indicated ownership because the university-supplied device was in their possession.

**Table 5: Disciplines of the Respondents**

Discipline	Number	Percentage
Humanities	13	12.26
Social Sciences	1	0.94
Natural Sciences	19	17.92
Engineering and Technology	72	67.92

**Table 6: Devices owned by the Teachers**

Discipline	Number	Percentage
Desktop computer	29	27.1
Laptop	93	86.91
Smartphone	87	81.3
Tablet device (e.g., iPad)	6	5.6

*Multiple responses. Teachers have more than one device.*

**Table 7: Access to Devices in the University**

Discipline	Number	Percentage
Desktop computer	24	22.42
Laptop	105	98.13
Smartphone	18	16.82
Tablet device (e.g., iPad)	14	13.08

*Multiple responses.*

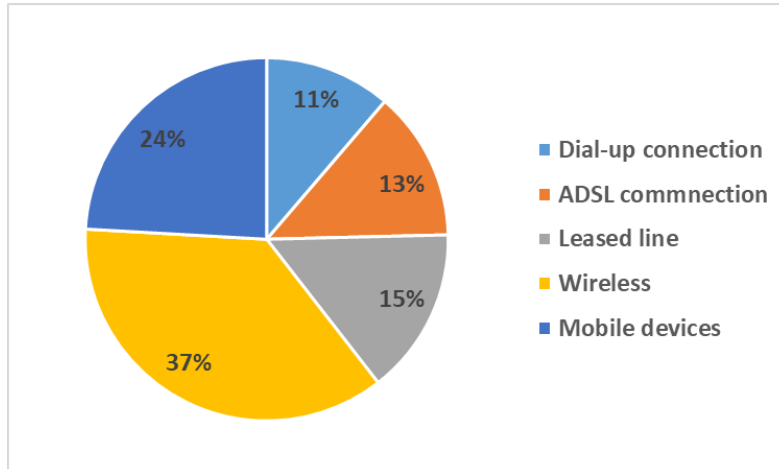
## Internet Access

The majority of teachers (93.46 per cent) indicated that they had access to the Internet in the university, whilst 63.55 per cent also had access at home (Table 8). All the teachers had access to the Internet. In terms of their connection to the Internet, 65.42 per cent indicated wireless access (which was predominantly at the university), followed by 42.99 per cent mobile devices (which was predominantly a personal smartphone). Some 11 per cent also indicated that they still use a dial-up connection (Figure 1). However, when asked about the device they use to access the Internet, 80.37 per cent indicated laptop and only 16.82 per cent indicated smartphone. Interestingly, eight per cent were unaware of the Internet access provided at the university. Similarly, with respect to Wi-Fi on the campuses, 31 per cent indicated that Wi-Fi was not available (Figure 2). It is primarily departments teaching technology-related subjects that possess Wi-Fi on their premises. Some buildings, such as academic blocks, are Wi-Fi enabled, but many teachers are unaware of this. The university needs to ensure that all teachers are aware of Internet accessibility through Wi-Fi on campus. When asked about their frequency of access to the Internet, 98 per cent indicated that they use the Internet daily.

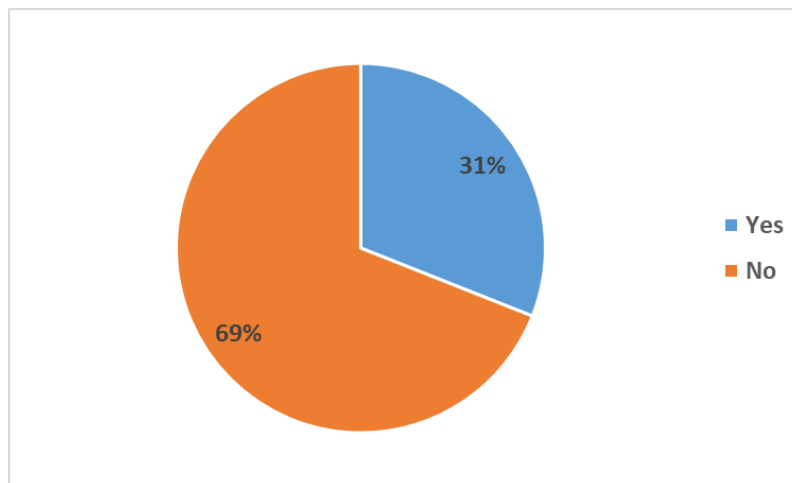
**Table 8: Internet Access by Teachers**

Place of Access	Number	Percentage
Home	68	63.55
Office	100	93.46
Cyber café	3	2.8

*Multiple responses.*



**Fig. 1: Internet connectivity of teachers**



**Fig. 2: Availability of Wi-Fi connectivity**

### **ICT Skills**

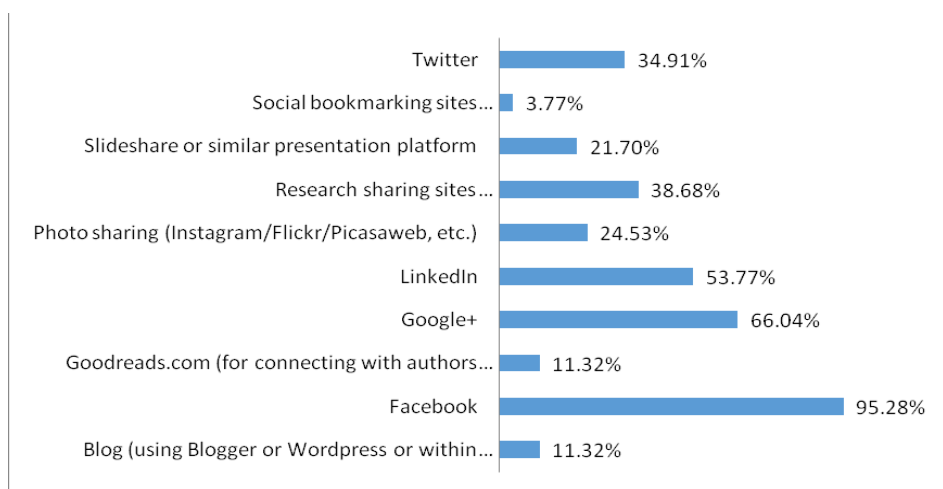
Table 9 indicates teachers' level of expertise in the use of ICTs. Only one teacher indicated a lack of word processing skills. Most of the teachers used word processing, spreadsheets, presentations, email, search engines and databases. Over 50 per cent of the teachers rated their skill level as advanced or expert in these skills, whilst only about 20 per cent rated themselves advanced or expert in skills such as graphics editing, multimedia authoring, digital audio, video editing, web design and LMS. Many teachers were comfortable with Web 2.0 tools.

Ninety-six per cent of the respondents had a social media presence. Facebook was the most commonly used social media, followed by Google+, LinkedIn and research sharing sites (Figure 3). Many departments have Facebook pages. Although Facebook accounts are currently used only for sharing personal experiences and getting socially connected, the same can be converted into effective learning environments, becoming tools for connecting learners and enhancing social learning. The use of blogging and micro-blogging in teaching-learning needs to be encouraged. However, only seven per cent of respondents updated their social media profile several times a day, and only 18 per cent engaged with social media on a daily basis. Thus, social media use is not particularly high amongst teachers at RGUKT.

Table 10 presents the data for teachers' use of mailing lists or discussion forums. About 50 per cent claimed that they were members of professional discussion forums. Only 18 teachers indicated they were either a moderator or a manager of a discussion forum. Those who claimed membership in discussion forums indicated very little engagement in terms of posting to these forums. Therefore, it can be safely concluded that the use of mailing lists and discussion forums is limited amongst teachers at RGUKT; in order to move forward, it would be useful to provide training on the use and facilitation of discussion forums for teaching and learning.

**Table 9: ICT Skills**

Computer-related Skills	Expertise Level (Trainer)	User Level (Advanced)	User Level (Intermediate)	User Level (Basic)	Non-user Level (N/A)
Word processor (e.g., Word)	36.79	33.96	23.58	6.60	0.94
Spreadsheets (e.g., Excel)	33.02	32.08	25.47	11.32	0.00
Presentation (e.g., PowerPoint)	35.85	33.96	23.58	7.55	0.00
Email	36.79	38.68	18.87	6.60	0.00
Search engines	37.74	32.08	15.09	7.55	6.60
Databases	18.87	24.53	19.81	16.04	16.98
Multimedia authoring	7.55	12.26	19.81	26.42	29.25
Graphics editing	5.66	13.21	16.04	28.30	30.19
Digital audio	8.49	10.38	23.58	19.81	33.96
Video editing	5.66	12.26	12.26	34.91	32.08
Webpage design	9.43	9.43	12.26	25.47	39.62
Learning management system	6.60	13.21	16.98	28.30	27.36
Web 2.0 tools (wikis, blogs, social networking and sharing tools)	14.15	19.81	24.53	16.98	22.64



**Fig. 3: Accounts on different social media**

**Table 10: Membership in Mailing List or Discussion Forum**

Answer Options	Response Count	Response Percentage
Yes	52	48.5
No	52	48.5
Skipped	13	3

## Using Institutional ICT Facilities

Table 11 presents data on teachers' experiences with the resources/services/spaces provided by RGUKT. The responses reveal mixed views amongst teachers. Notably, a large number of teachers responded that the resources, services and facilities are either "good" or "excellent." However, over 30 per cent rated as "poor" or "fair" their access to network bandwidth, Wi-Fi and relevant software. This is an area for future improvement.

**Table 11: Experiences with ICT Facilities**

Resources/Services/Spaces	Poor	Fair	Neutral	Good	Excellent	Not Available
e-classroom facilities (e.g., computers, projection systems, lecture capture systems, SMART boards, etc.)	2.83	11.32	6.60	31.13	42.45	3.77
Computer labs (for practical and Internet access)	2.83	12.26	15.09	26.42	26.42	13.21
Email services (institutional)	1.89	12.26	6.60	29.25	48.11	0.00
Learning management system (e.g., Moodle)	5.66	12.26	21.70	28.30	18.87	6.60
Network bandwidth/speed of Internet (download and upload)	11.32	19.81	15.09	32.08	16.98	1.89
Wi-Fi access	15.09	15.09	12.26	31.13	11.32	14.15
Online or virtual technologies (e.g., network or cloud-based file storage system, Web portals, etc.)	14.15	9.43	14.15	27.36	10.38	14.15
Access to software (e.g., MATLAB, GIS applications, statistical software, qualitative data analysis, graphic software, textual or image analysis programs)	16.98	15.09	12.26	23.58	9.43	13.21
Download and use of free and open source software for teaching and learning	9.43	12.26	18.87	33.02	17.92	2.83
Support for maintenance and repair of ICTs	10.38	15.09	16.98	29.25	15.09	5.66

## 3.3 Using ICTs for Teaching and Learning

In the study, we also covered how the teachers had been using ICTs in their teaching and learning. We asked about the nature of the classes they taught, which revealed that teachers at RGUKT used multiple different ways to teach. Table 12 shows that 95.28 per cent were involved in face-to-face teaching, whilst 34.91 per cent also taught completely online courses and 66.04 per cent taught blended courses. This is an ideal situation to promote and strengthen the use of TEL.

**Table 12: Nature of the Classes Taught**

Answer Options	Response Count	Response Percent
Traditional face-to-face	101	95.28
Completely online	37	34.91
Blended, with some study components done online	70	66.04

Table 13 presents the data on the frequency of teachers' use of digital resources in teaching. Images were the most commonly used resource (45.79 per cent), followed by Word files and presentations. It is useful to note that a significant percentage of teachers indicated using open textbooks and articles from open access research journals. The use of blogs, microblogging, social bookmarking,

simulations and even the LMS was low in comparison to the other resources. Notably, the use of digital video was quite high, as the university follows the flipped classroom approach.

**Table 13: Frequency of Usage of Digital Resources in Teaching**

Type of Resource	Always	Often	Sometimes	Rarely	Never
Images (pictures, photographs, including from the Web)	45.79	28.97	15.89	7.48	1.87
Presentations (e.g., PowerPoint, including from online sources)	31.78	38.32	22.43	6.54	2.80
Word files (activity sheets/handouts/notes)	35.51	33.64	18.69	3.74	9.35
Digital films/video (e.g., from YouTube)	22.43	31.78	27.10	10.28	5.61
Audio recordings	14.02	17.76	25.23	19.63	19.63
Simulations and 2D/3D animation	10.28	21.50	35.51	14.95	14.95
Learning management system	14.02	23.36	19.63	20.56	14.95
Blogs	6.54	18.69	18.69	17.76	32.71
Social bookmarking	5.61	15.89	14.02	24.30	33.64
Microblogging (Twitter, Facebook, etc.)	7.48	15.89	11.21	24.30	37.38
Open textbooks	29.91	27.10	23.36	13.08	3.74
Open access research papers	22.43	27.10	22.43	15.89	8.41

**Table 14: Creation and Sharing of Teaching and Learning Materials**

Type of Resource	Never	Yes, but not shared with others	Yes, and shared through an open licence
Images (pictures, photographs, including from the Web)	11.21	44.86	41.12
Presentations (e.g., PowerPoint, including from online sources)	10.28	45.79	42.99
Word files (activity sheets/handouts/notes)	14.02	41.12	38.32
Digital films/video (e.g., from YouTube)	40.19	20.56	28.04
Audio recordings	43.93	27.10	14.95
Simulations and 2D/3D animation	42.99	32.71	16.82
Blogs	51.40	24.30	14.95
Course packs	42.99	21.50	24.30

Table 14 presents the data on teachers' creation and sharing of teaching and learning materials. Whilst most teachers were creating digital resources using word processing, presentation and image tools, they were also creating videos and animations to share. Sharing of digital artefacts created by teachers was not uniform, but it was surprising that many teachers indicated they use open licences to share the digital resources they create. Whilst the teachers may have indicated sharing on the Web as open, many indicated that they share their presentations on Slideshare, which allows the use of open licences. As 82.52 per cent of the respondents were aware of open educational resources (OER), the information on sharing looks credible. Table 15 also shows teachers' use of various OER repositories. Respondents indicated that they have used a range of open resources. NPTEL resources were the most used (52.34 per cent), followed by MIT OpenCourseWare (28.04 per cent).

The survey asked the respondents to report their competency to integrate ICTs in teaching and learning. The responses presented in Table 16 are diverse and indicate that teachers' skill level in this area varies. It also indicates that there are teachers in the university who have appropriate skills and can be asked to play the role of "buddy" to support other teachers who are interested in learning new skills. Of the respondents, 36.27 per cent indicated that they had received some

training in ICT skills for teaching and learning, whilst the rest had not received any training. The university does not presently provide regular training; those with training had received it at their previous place of employment; 22.42 per cent also indicated that they had received training online. Teachers indicated that they were aware of massive open online courses (MOOCs), especially those offered by Coursera, Udacity and EdX.

**Table 15: Use of OER Platforms for Teaching and Learning**

OER Platforms/Sources	Always	Often	Sometimes	Rarely	Never
OER Commons	7.48	14.95	6.54	9.35	39.25
Saylor Academy	1.87	7.48	6.54	10.28	46.73
WikiEducator	16.82	16.82	12.15	5.61	32.71
OpenStax College	3.74	8.41	7.48	8.41	45.79
BC Campus Open Textbooks	4.67	8.41	8.41	7.48	42.06
NPTEL, India	52.34	26.17	5.61	4.67	8.41
MIT Open Courseware	28.04	24.30	10.28	8.41	14.02
OpenLearn, UK	5.61	12.15	8.41	10.28	33.64
CollegeOpenTextbook	14.02	12.15	12.15	13.08	24.30
Directory of Open Access Journals	17.76	17.76	9.35	10.28	24.30
Directory of Open Access Books	15.89	20.56	9.35	12.15	22.43
MERLOT	0.93	6.54	2.80	14.02	47.66

**Table 16: Level of Skills for Integrating ICT in Teaching–Learning**

Technology	I can't use it	I can use it to a small extent	I can use it satisfactorily	I can use it well	I can use it very well
Learning management system (e.g., Moodle)	18.69	15.89	28.04	16.82	11.21
Online collaboration tools (e.g., Adobe Connect, Google Docs)	10.28	18.69	24.30	20.56	15.89
e-portfolio	20.56	20.56	13.08	14.02	10.28
e-books/e-textbooks	4.67	10.28	15.89	32.71	29.91
Online video/audio	4.67	8.41	14.95	35.51	29.91
Educational games/simulations	11.21	21.50	20.56	17.76	15.89
Lecture capture tools	17.76	14.95	14.95	20.56	19.63
Accessible tools (for people with disabilities)	26.17	16.82	14.02	14.95	9.35
Social media (blogs, wikis, etc.)	13.08	21.50	16.82	25.23	14.95

### **Policy Issues for Technology-Enabled Learning**

Since the use of ICTs in teaching and learning is affected by the policy decisions taken by the university to provide infrastructure as well as guidance, we asked about the teachers' understanding of policies to support the use of ICTs for teaching and learning. Table 17 presents a mixed view on policy and strategy. Whilst at present, RGUKT is in the process of developing a policy, many executive decisions taken are considered part of the university's strategy to implement the use and integration of ICTs. In ideal circumstances, the responses to these questions should be mostly yes or no; the actual results indicate that whatever policies presently exist need to be made available in one place to create awareness about them. The institutional analysis makes clear that there are no policies on open source software (although it is encouraged), OER, data protection or plagiarism. These are areas of future action by the university.



**Table 17: Awareness about Policy Issues in TEL**

Question	Yes	No	Do Not Know
Is there a policy for ICT use in teaching and learning in your university/institution?	62.00	13.00	25.00
Is there a strategy for TEL in your university/institution?	57.00	17.00	26.00
Is there an ICT policy in your university/institution (covering what technologies to use and not use for teaching and learning)?	43.30	17.53	39.18
Is there a privacy and data protection policy in your university/institution?	34.02	23.71	42.27
Is there a policy on dealing with plagiarism in your university/institution?	21.65	31.96	46.39
Is there a policy for the use of OER in your university/institution?	57.73	14.43	27.84
Is there a system in place for the use of open source software in your university/institution?	52.58	20.62	26.80
Is there a workflow and escalation procedure for repair and maintenance of ICTs in your university/institution?	39.58	27.08	33.33

### 3.4 Using ICTs for Research and Scholarship

Whilst the university subscribes to and provides access to e-resources through its library, awareness about the availability of these is not high, as shown in Table 18. Only 59 per cent of respondents were aware of access to subscription-based e-resources. The survey also asked about the availability of different types of e-resources and how often the teachers used these. Table 19 indicates that e-journals and e-books were the most used. Table 20 indicates that technologies for research support in the university are not very well established and need attention.

**Table 18: Access to subscription-based e-resources in Library**

Answer Options	Response Count	Response Percentage
Yes	59	59.00
No	30	30.00
Do Not Know	11	11.00

**Table 19: Library Resources Used**

Digital Library Resources	Always	Often	Sometimes	Rarely	Never
e-journals	35.53	34.21	6.58	13.16	10.53
e-books	44.59	28.38	10.81	5.41	10.81
e-newspapers	39.44	19.72	15.49	8.45	16.90
e-proceedings of conferences	23.88	22.39	14.93	13.43	25.37

**Table 20: Experiences of Teachers with Technology for Research Support**

Resource/Service/Space	Poor	Fair	Neutral	Good	Excellent	Not Available
Access to data storage	16.67	17.78	12.22	27.78	11.11	14.44
Data visualisation software	21.59	11.36	17.05	27.27	3.41	19.32
Citation/reference management software	26.19	10.71	15.48	21.43	0.00	26.19
Plagiarism detection software	34.12	11.76	15.29	9.41	0.00	29.41
Institutional repository for sharing of research	25.58	12.79	20.93	13.95	2.33	24.42
Funds to support open access publications	31.40	9.30	16.28	17.44	2.33	23.26

### 3.5 Perceptions of the Use of TEL

This section attempts to understand teachers' attitudes, motivations and barriers to the use of TEL in RGUKT.

#### Attitude towards TEL

Table 21 presents the data regarding teachers' attitude towards TEL. The data reveal an extremely positive attitude, as there was no strong disagreement with any of the statement the statements. Teachers perceived that the use of TEL would solve many educational problems, provide new opportunities for presenting teaching–learning, increase access to quality teaching and learning materials, foster collaborative learning, and improve student engagement. Such a positive mindset in the university needs to be harnessed to implement TEL in a systematic manner to support the university's vision and mission.

**Table 21: Attitude towards TEL**

Statement	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree
TEL can solve many of our educational problems.	29.13	63.11	6.80	0.97
TEL will bring new opportunities for organising teaching and learning.	35.58	57.69	5.77	0.96
TEL saves time and effort for both teachers and students.	31.37	58.82	6.86	2.94
TEL increases access to education and training.	35.64	53.47	6.93	3.96
TEL will increase my efficiency in teaching.	35.64	49.50	11.88	2.97
TEL enables collaborative learning.	31.37	50.98	13.73	3.92
TEL can engage learners more than other forms of learning.	34.00	56.00	7.00	3.00
TEL increases the quality of teaching and learning because it integrates all forms of media: print, audio, video and animation.	35.00	55.00	9.00	1.00
TEL increases the flexibility of teaching and learning.	32.67	45.54	13.86	7.92
TEL improves communication between students and teachers.	31.00	47.00	20.00	2.00
TEL enhances the pedagogic value of a course.	30.69	52.48	14.85	1.98
Universities should adopt more and more TEL for the benefit of their students.	31.00	62.00	6.00	1.00

#### Motivators and Barriers for Using TEL

Even though the teachers possessed a highly positive attitude towards using TEL, it is essential to identify motivating factors for teachers to integrate TEL. Table 22 presents the data on teachers' motivation. Personal interest, intellectual challenge, training and self-gratification emerged as the main motivators. Technical support and infrastructure also played major roles in motivating teachers. Credit towards promotion, peer recognition and status were considered comparatively less significant, which is a positive indicator. It can be concluded that almost all the listed factors play a role in motivating teachers to adopt TEL. Weighted rank analysis indicates that intrinsic motivators such as personal interest and intellectual challenge top the motivator list, followed by extrinsic motivation related to the availability of better bandwidth, hardware, software and technical support.

**Table 22: Motivators for Using TEL**

Motivator	Very Strong Motivator	Strong Motivator	Average Motivator	Weak Motivator	Very Weak Motivator	Motivator Weighted Rank
Personal interest in using technology	42.86	40.82	15.31	1.02	0.00	1
Intellectual challenge	33.33	45.83	19.79	1.04	0.00	2
Self-gratification	33.33	40.86	22.58	3.23	0.00	6
Training in TEL	27.66	51.06	18.09	2.13	1.06	8
Better Internet bandwidth at workplace	34.74	44.21	17.89	2.11	1.05	3
Credit towards promotion	28.42	43.16	23.16	3.16	2.11	12
Professional incentives to use TEL	31.25	38.54	25.00	2.08	3.13	11
Technical support	30.11	50.54	16.13	1.08	2.15	5
Peer recognition, prestige and status	25.81	48.39	21.51	2.15	2.15	10
Improved infrastructure (hardware and software) deployment	31.87	41.76	26.37	0.00	0.00	4
Release time / Reduction in existing workload	27.96	44.09	24.73	1.08	2.15	9
To be a trendsetter by early adoption of technology in education	30.00	48.89	15.56	4.44	1.11	7

**Table 23: Barriers to Using TEL**

Barriers	Very Strong Barrier	Strong Barrier	Average Barrier	Weak Barrier	Very Weak Barrier	Weighted Barrier Rank
Concern about faculty workload	24.74	19.59	29.90	19.59	6.19	4
Concern about students' access to technology	17.71	26.04	27.08	17.71	11.46	11
Lack of training in TEL	21.88	27.08	26.04	20.83	4.17	3
Lack of technical support in the university	26.32	18.95	25.26	18.95	10.53	8
Lack of institutional policy on TEL	23.40	20.21	24.47	20.21	11.70	10
Lack of professional prestige	17.39	14.13	28.26	27.17	13.04	14
Concern about the quality of e-courses	16.84	18.95	31.58	22.11	10.53	13
Lack of incentives to use TEL	23.66	23.66	22.58	23.66	6.45	6
Lack of credit towards promotion	17.39	25.00	25.00	26.09	6.52	12
Intimidated by technology	13.19	17.58	31.87	25.27	12.09	15
Concern about security issues on the Internet	22.58	22.58	22.58	22.58	9.68	9
Inadequate availability of hardware and software	23.40	25.53	20.21	21.28	9.57	7
Poor Internet access and networking in the university	34.41	17.20	22.58	21.51	4.30	1
Lack of time to develop e-courses	25.27	23.08	26.37	19.78	5.49	2
Lack of instructional design support for TEL	24.18	20.88	28.57	19.78	6.59	5
No role models to follow	19.78	10.99	21.98	29.67	17.58	16

### **Barriers to the Use of TEL**

Table 23 shows the barriers to the use of TEL at RGUKT. Teachers indicated that poor Internet access and networking were the main barriers. They also felt that lack of time to develop e-courses

was the second most important barrier. The third most significant aspect identified was lack of training in the use of ICTs. Many were also concerned that the faculty workload might increase due to the use of TEL. It is important to address the identified barriers to provide an enabling environment for TEL use at RGUKT.

To conclude, the availability of additional new infrastructure, good connectivity, improvement in existing infrastructure and proper training are a few major factors, which need to be addressed when framing and implementing a TEL Policy for RGUKT.

## Chapter 4: Students' Use of Technology for Learning

### 4.1 Learners' Profile

We received 875 completed and usable survey responses over a period of 15 days. Of the total respondents, 45 per cent were girls and 55 per cent boys (Figure 4). Age-wise, respondents were mostly 20 years old or younger (83.23 per cent), with nearly all of the remainder between 21 and 25 years (15.77 per cent). All the respondents were studying in undergraduate engineering programmes, and 2.79 per cent indicated having a physical disability that required assistive technologies. This is an important issue to be noted whilst developing policies for TEL, so that RGUKT provides inclusive and equitable learning opportunities for all its students.

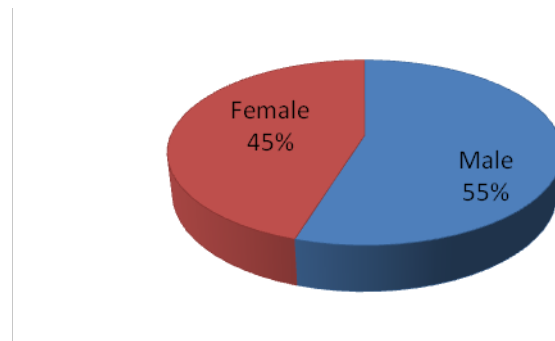


Fig. 4: Respondents' gender

The respondents were mostly from the first, second, third or fourth year of the BTech programme, with, respectively, 26.48, 33.91, 38.17 and 3.23 per cent in each of those years (Figure 5). Very few students from the final year participated in the survey, as most were busy with their internship and project work when it was being conducted.

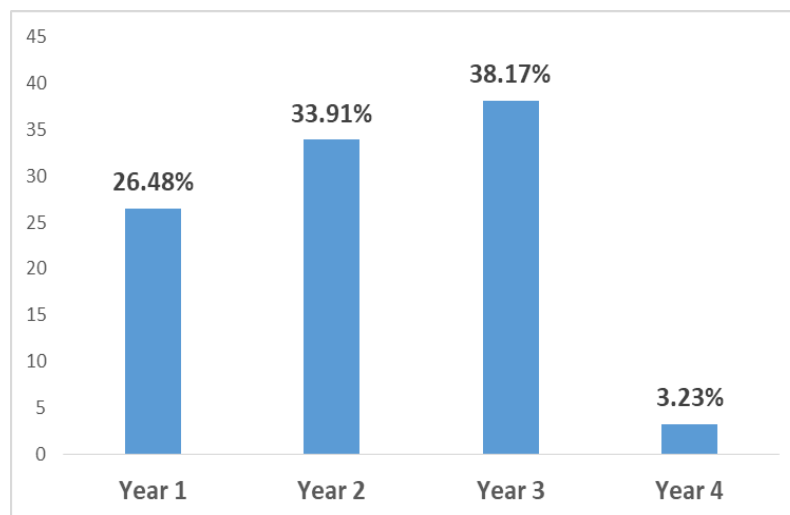


Fig. 5: Learners' batch-wise sample distribution

**Table 24: Learners' Current Course Study Distribution**

Answer Response	Response Count	Response Percentage
Traditional face-to-face	587	67.55
Completely online	36	4.14
Blended, where some components of study are done online	246	28.31

The university uses traditional face-to-face and blended teaching modes. Some of the lab courses in the computer science department were done online. Sixty-eight per cent of learners indicated they learned via traditional face-to-face courses and 28 per cent via the blended mode (Table 24). There are presently no courses offered online, but around four per cent of the respondents indicated they were doing courses completely online. In RGUKT, all subjects in the curriculum contain content on the intranet. Students can access the intranet within the campus and learn their subjects that way. Some of the students might have misunderstood the availability of content via the intranet to mean they took courses online.

## 4.2 Access to and Use of Information and Communication Technologies

### Devices Owned by Learners

Table 25 shows that about 53 per cent of learners had their own personal laptops, 66.21 per cent carried smartphones, five per cent had desktops at their homes and 12.24 per cent possessed tablets. RGUKT issues laptops to all students soon after they are admitted to the institution. Therefore, students do not need to purchase a laptop, and all learners have access to electronic devices. However, only 93 per cent of the learners indicated that their laptop had been provided by the university. RGUKT has taken a policy decision to give both a laptop and a smartphone to every student, beginning in the 2017–18 academic year.

**Table 25: Devices Owned by Learner (Percentages)**

Answer Option	Yes	No, but I plan to buy one in the next 12 months	No, I do not plan to buy one in the next 12 months
Desktop	5.11	89.77	5.11
Laptop	52.68	18.21	29.11
Smartphone	66.21	14.03	19.76
Tablet device (e.g., iPad)	12.24	5.97	81.79

### Access to Internet

Learners' access to the Internet in different places is presented in Table 26. The university's aim is to cater to the needs of rural meritorious youths coming from village backgrounds. According to the responses, 54.44 per cent of the students did not access the Internet, 27.51 per cent claimed to use the Internet at home and 6.52 per cent used cyber cafés. Whilst only 11.39 per cent indicated having access to the Internet at the university, all students do indeed have access.

**Table 26: Learners' Access to Internet**

Answer Option	Response Count	Percentage
Home/hostel	244	27.51
University	101	11.39
Cyber café	58	6.52
Do not have access	484	54.44

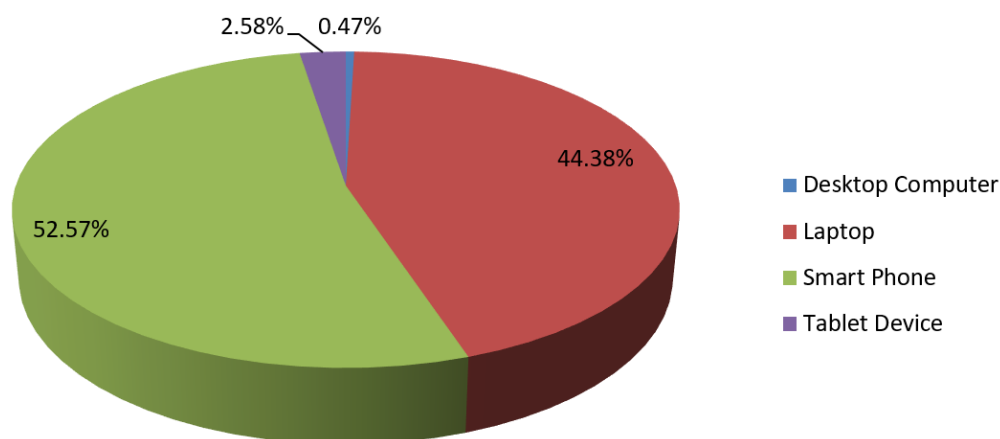
Learners (except in the computer science department) may not have had a proper knowledge of terms such as dial-up connection, ADSL connection, etc. when they answered the question on how

they accessed the Internet. However, the responses in Table 27 indicate that majority of the learners (52.77 per cent) used mobile devices. Interestingly, this is in contrast to the 54.44 per cent who indicated that they did not use the Internet.

**Table 27: Technology Used to Access the Internet**

Answer Option	Response Count	Response Percentage
Dial-up connection	49	5.22
ADSL connection	16	1.71
Leased line	33	3.52
Wireless	345	36.78
Mobile devices	495	52.77

As mentioned earlier, RGUKT provides each student with a laptop when they start their journey in the six-year integrated program (PUC and Engineering). Students keep this laptop till the end of the sixth year (i.e., the fourth year of Engineering). Therefore, 53 per cent of learners use laptops most frequently to access the Internet, 44 per cent use their smartphones, less than one per cent use a desktop computer and a little over two per cent use a tablet (Figure 6).



**Fig. 6: Most frequently used devices to access the Internet**

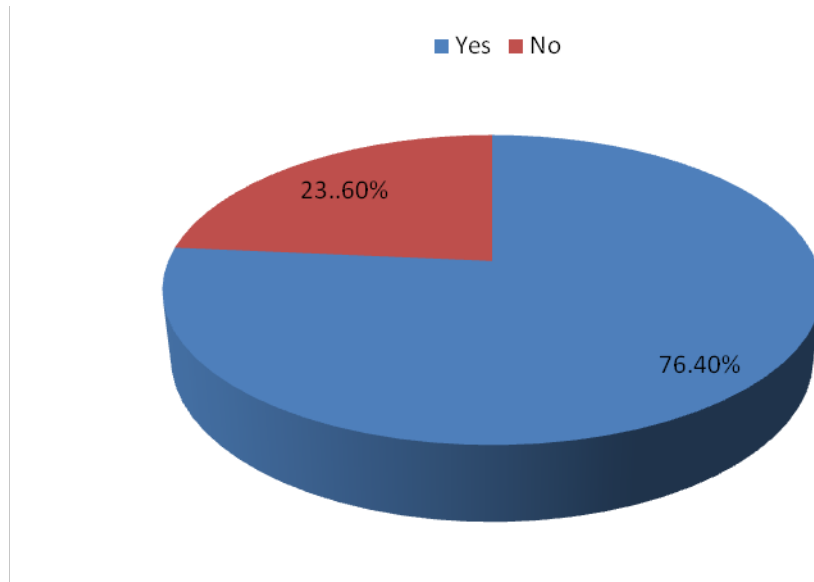
Seventy per cent of the students indicated that Internet connectivity was available in RGUKT classrooms, whilst, 40 per cent indicated that it was also available in hostels (Table 28).

**Table 28: Internet Access at the University**

Answer Option	Response Count	Percentage
Classrooms	613	70.05
Faculty rooms	103	11.7
Seminar halls	15	1.7
Library	35	4
Laboratories	24	2.7
Student common rooms	54	6.17
Hostels	354	40.4
Reception lounges	6	0.6
Open areas	25	2.8

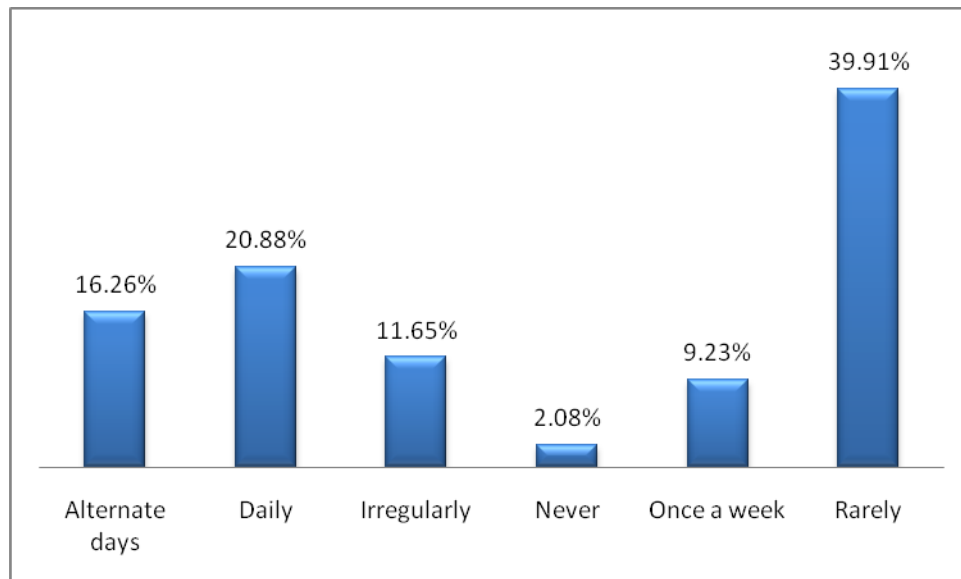
*Multiple responses.*

The university provides wireless Internet connectivity to students in their hostel rooms. Nearly 76 per cent indicated Wi-Fi was available at the university, whilst 23 per cent were either not aware of it or had never used it (Figure 7).



**Fig. 7: Wi-Fi internet connectivity**

About 21 per cent of the students used the Internet daily and 16 percent on alternate days. Only two per cent did not access the Internet. Daily users of Internet at the university totalled 20.88 per cent (Figure 8). These data indicate that the students were not accessing the Internet regularly. In terms of time spent on the Internet, 31.57 per cent indicated that they used the Internet for less than one hour per visit.



**Fig. 8: Frequency of Internet use**



## Computer Proficiency and IT Skills

**Table 29: Computer Proficiency and IT Skills**

Software/tools	I can't use it	I can use it to a small extent	I can use it satisfactorily	I can use it well	I can use it very well
Word processor	22.25	19.83	28.66	19.83	9.43
Spreadsheets	24.35	25.71	24.6	17.1	8.24
PowerPoint	11.47	23.88	27.78	24.23	12.65
Email	10.74	20.3	24.15	27.42	17.39
Databases	57.61	18.47	12.09	7.02	4.81
Multimedia authoring	60.82	16.36	12.14	6.46	4.22
Graphics editing	65.32	16.95	9.26	6.13	2.35
Digital audio	61.41	16.43	12.91	6.52	2.74
Video editing	51.96	21.49	14.16	8.22	4.17
Webpage design	54.26	21.96	12.66	6.59	4.52
Learning management system	55.98	21.81	12.35	7.1	2.76
Web 2.0 tools (wikis, blogs, social networking)	56.32	15.65	15.65	7.82	4.56
Search engine	34.2	14.81	17.28	16.17	17.53

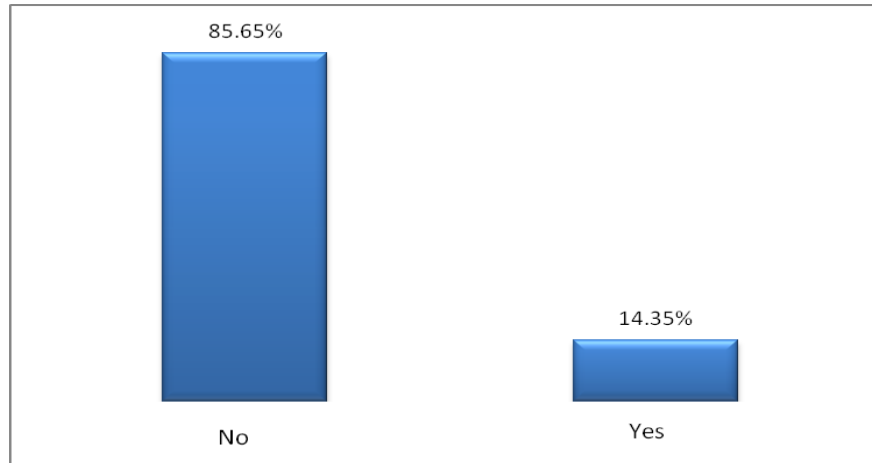
Students use laptops from their first year onwards, and they are good at basic IT skills. At the time of the survey, many of them had not needed to learn how to use IT tools such as multimedia, graphics editing, digital audio, video editing, webpage design, learning management systems and Web 2.0 tools, so over 50 per cent of them lacked such skills, as shown in Table 29. Due to their lack of familiarity with the terminology, some students might have selected the wrong options even though they actually do use some of the software related to these IT tools. For example, most of the students used a search engine routinely whilst browsing the Internet, but more than 34 per cent responded that they couldn't use a search engine. This calls for digital literacy training for all learners in the university. It is also worth noting that some of the IT tools may not be needed now, but having these competencies would help learners be creative in their professional work, assignments and projects.

### Social Media Use

When asked about social media, 77.8 per cent of the respondents indicated that they use it. Amongst the social media users, 77.28 per cent indicated using Facebook, followed by Google+ (41.82 per cent) and Twitter (20.91 per cent). Around 19 per cent of the students visited social media platforms but did not update their status. However, around 80 per cent of them did update their status. Amongst these, 30 per cent frequently updated their status and around 55 per cent did not. Only 2.12 per cent updated their social media several times daily (Table 30). This shows that student engagement on social media was limited, which may have been due to limited Internet access. Thirty-six per cent of the respondents spent less than an hour on social media during a single visit. Only 14.35 per cent indicated that they were members of discussion forums or mailing lists (Figure 9). Those who used discussion forums and mailing lists also indicated that their use was limited (only 3.5 per cent used such platforms daily).

**Table 30: Frequency of Updating Social Media Status**

Response	Response Count	Percentage
Not at all	142	18.78
Not very frequently	419	55.42
Once a day	41	5.42
Once a fortnight	15	1.98
Once a week	123	16.27
Several times a day	16	2.12



**Fig. 9: Access to mailing list or discussion forum**

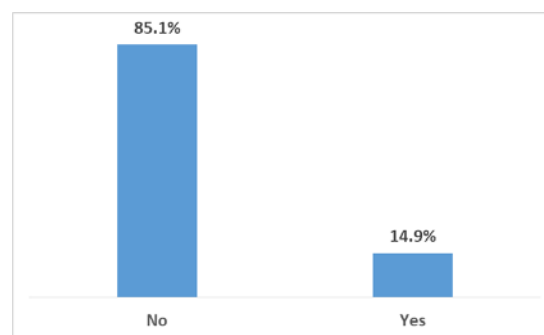
### **Experiences with University Facilities**

For the baseline survey, we asked learners about their satisfaction with the e-resources and facilities provided by the university. Table 31 shows that 76.75 per cent were satisfied (responses of fair, good and excellent) with the e-classroom facilities, 43.46 per cent were not satisfied with the learning management systems, whilst 12.91 per cent said these facilities were not available at the university. Only 15.64 per cent were satisfied with the Internet bandwidth speed (download/upload), and only 48.62 per cent were satisfied with Wi-Fi access. More than 50 per cent claimed that they did not have access to a cloud-based Web storage system, and they also claimed that their access to relevant software was below a satisfactory level.

More than 50 per cent claimed that they were not satisfied with the availability of e-journals, e-books, etc. Around 34.66 per cent were satisfied with support for the maintenance and repair of ICTs, etc.

### **Experiences with Online Courses**

Only about 15 per cent of learners claimed to have done online courses, and the rest (85 per cent) had never participated in an online course (Figure 10). Around 75 per cent indicated that they were not aware of massive open online courses (MOOCs). Only 4.39 per cent had previously completed a MOOC (Table 32). This shows that for online learning and blended learning to be used in the university, a massive awareness-building exercise amongst learners is needed. Moreover, with the University Grants Commission's request that MOOCs be used via the SWAYAM platform to enhance the quality of education, the RGUKT may need to integrate MOOCs within its curricula.



**Fig. 10: Participation in online course**

**Table 31: Experiences with University Facilities**

Resources/services/spaces provided	Poor	Fair	Neutral	Good	Excellent	Not Available
e-classroom facilities (e.g., computers, projection systems, lecture capture systems, SMART boards)	7.47	13.3	13.18	45.98	17.47	1.03
Computer labs (for practical and Internet access)	19.7	17.58	14.79	29.66	7.74	7.03
Email services (institutional)	30.25	21.37	18.68	17.04	4.4	9.72
Learning management systems (e.g., Moodle)	34.46	17.79	14.93	15.79	2.88	12.91
e-portfolios	45.1	15.63	18.15	6.25	1.36	18.48
Network bandwidth/speed of Internet (download and upload)	39.64	22.42	16.4	12.73	2.91	7.51
Wi-Fi access	25.73	25.15	16.3	22.44	3.76	4.23
Online or virtual technologies (e.g., network or cloud-based file storage system, Web portals)	38.43	21.14	17.47	10.2	2.49	12.81
Access to software (e.g., MATLAB, GIS applications, statistical software, qualitative data analysis, graphics software, textual or image analysis programs)	29.48	20.22	15.22	16.57	7.19	8.4
Download and use of free and open source software for teaching and learning	30.46	22.07	12.78	15.66	5.55	9.86
Support for maintenance and repair of ICTs	37.9	21.47	12.30	9.96	3.23	11.13
Access to data storage	34.06	23.47	14.29	9.31	3.44	12.24
Data visualisation software	42.32	18.42	13.33	7.74	1.74	14.55
Citation/reference management software	46.07	17.84	16.46	5.99	1.46	15.85
Plagiarism detection software	48.8	16.27	12.83	4.63	1.06	16.93
Institutional repository for sharing of research	42.86	18.78	12.94	8.73	1.45	13.89
e-journals	44.05	16.86	18.26	8.88	2.75	14.12
e-books	30.78	20.98	11.72	16.83	5.4	9.55
e-newspapers	10.66	17.16	11.99	27.57	20.71	5.64
e-proceedings of conferences	39.54	16.08	11.12	6.76	2.43	16.21

**Table 32: Participation in MOOCs**

Response	Response Count	Percentage
No, and I don't know what a MOOC is	378	75.45
No, but I do know what a MOOC is	56	11.18
Yes, and I completed it	22	4.39
Yes, but I didn't complete it	45	8.98

### 4.3 Perceptions of the Use of TEL

We asked students why they would like to use technology for their studies. Table 33 shows they were very positive about such use; 80.21 per cent thought that using technology would help them get better results, whilst 77.81 per cent considered that using technology would help them understand the subject material better, and 76.73 per cent indicated that using technology would make completing their studies more convenient. Many students (76.81 per cent) thought that using technology would also motivate them to explore subjects of interest to them, and 69.4 per cent thought that using technology would help them to collaborate better within and outside the university. Over 75 per cent also believed that using technology would improve their IT skills and

help them become more employable, improving their job prospects. The range of responses shows a very positive attitude towards the use of technology for teaching and learning, which can be harnessed to integrate technology in courses offered by RGUKT.

**Table 33: Perception of How Technology Use Would Benefit Learners**

Statements of Benefit	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
It will help me get better results in my subjects.	23.07	57.14	12.41	3.86	3.51
It will help me understand the subject material more deeply.	21.94	55.87	13.76	5.22	3.2
It makes completing work in my subjects more convenient	19.7	56.93	14.84	5.72	2.8
It motivates me to explore many topics I may not have seen before.	23.07	53.74	13.41	6.64	3.14
It allows me to collaborate with others easily, both on and outside of the campus.	20.07	49.33	17.65	9.91	3.02
It will improve my IT/information management skills in general.	21.53	54.99	12.65	6.81	4.01
It will improve my career or employment prospects in the long term.	22.49	53.67	14.55	5.99	3.3

We asked the learners how a range of technological tools would be beneficial in their studies. It is worth noting that based on the ICT competencies of the learners, they may not have understood many of the terms used. However, Table 34 gives an overview of their reactions to a range of technologies and tools in terms of usefulness for their university studies. Students' top priorities in terms of technological resources that would help in their studies were as follows:

- Recordings of lectures and supplementary materials available online to review
- Multimedia presentation skills
- University services on the Web to pay fees, etc.
- Personal dashboard on the university intranet to access academic information related to courses, grades, etc.
- Use of audio and video as part of course requirements
- Use of mobile phone to access university web services and receive alerts about course information (e.g., timetable changes, the release of new learning resources, changes in assessment) via text message
- Use of the Web to share digital files related to courses (e.g., sharing photos, audio files, movies, digital documents, websites, etc.)
- Contribute with other students to the development of a wiki as part of course requirements
- Use of social media networking platforms (e.g., Facebook) on the Web to communicate/collaborate with other students in a course
- Integration of mobile text into class discussion and pre-class discussion questions
- Use of e-portfolios to record student projects
- Use of instant messaging and hangouts to connect with students on other campuses (which could be good for attending seminars and lectures offered by other institutes)

**Table 34: Usefulness of Technologies in Learners' Studies**

Technology and Tools	Not at All Useful	Use to a Limited Extent	Neutral	Useful	Very Useful	Do Not Know	Weighted Rank
Webpage design	15.32	18.58	15.2	26.54	12.42	11.94	20
Create and present multimedia shows as part of course requirements (e.g., PowerPoint)	10.15	15.16	14.04	34.21	17.92	8.52	4
Create and present audio/video as part of course requirements	11.52	16.08	16.84	31.14	16.46	7.97	7
Facility to download or access online audio/video recordings of lectures you could not attend	10.33	15.11	16.5	30.73	20.78	6.55	2
Facility to download or access online audio/video recordings to revise content of lectures you have already attended	8.35	15.59	15.96	33.92	20.57	5.61	1
Facility to download or access online audio/video recordings of supplementary content materials	8.94	14.05	18.39	33.46	16.99	8.17	3
Use the Web to access university-based services (e.g., enrolment, fee payment)	10	15.90	16.92	30.38	17.56	9.23	5
Use your mobile phone to access Web-based university services or information (e.g., enrolment, fee payment)	11.03	16.54	18.33	28.72	16.15	9.23	9
Use instant messaging/chat (e.g., Skype, Messenger, Hangout) on the Web to communicate/collaborate with other students in the course	13.96	18.78	17.51	27.92	12.06	9.77	17
Use a social media networking platform (e.g., Facebook) on the Web to communicate/collaborate with other students on the course	13.07	18.27	20.05	27.79	11.42	9.39	14
Use microblogging (such as Twitter) to share information about class-related activities	16.78	16.51	20.31	24.38	8.52	13.5	23
Use a personal blog as part of course requirements	16.67	16.8	18.8	24.27	11.06	12.4	21
Use instant messaging/chat (e.g., Skype, Messenger, Hangout) on the Web to communicate with teachers and administrative staff	15.62	17.19	19.82	25.2	11.42	10.76	19
Contribute to another blog as part of course requirements	15.43	16.62	21.01	24.06	8.78	14.1	22
Use the Web to share digital files related to your course (e.g., sharing photos, audio files, movies, digital documents, websites)	11.74	17.28	20.84	27.44	14.24	8.44	10
Use Web-conferencing or video chat to communicate/collaborate with other students in the course (on other campuses)	15.23	16.56	20.26	25.83	12.19	9.93	18
Receive alerts about course information (e.g., timetable changes, the release of new learning resources, changes in assessment) via RSS feeds on the Web	11.36	17.1	20.89	26.1	14.62	9.92	11

Technology and Tools	Not at All Useful	Use to a Limited Extent	Neutral	Useful	Very Useful	Do Not Know	Weighted Rank
Receive alerts about course information (e.g., timetable changes, the release of new learning resources, changes in assessment) via text message on your mobile phone	10.47	17.28	19.1	29.19	15.31	8.64	8
Contribute with other students to the development of a wiki as part of your course requirement	12.02	16.51	22.46	26.16	13.61	9.25	12
Receive grades/marks from your lecturer via text message on your mobile phone	14.1	15.02	19.37	27.54	14.5	9.49	13
Receive pre-class discussion questions from your lecturer via text message on your mobile phone	14.4	14.94	20.46	24.63	14.54	11.04	15
Use a personal dashboard on the university intranet to access all your academic information related to courses, grades, etc.	10.96	15.19	19.29	28	18.1	8.45	6
Use an e-portfolio system to record your achievements for future use beyond the course of your studies	14.88	14.61	19.17	25.34	14.75	11.26	16

We asked the learners to share their overall perception of technology use in teaching and learning. Table 35 presents the following findings:

- About two-thirds of the learners either agreed or strongly agreed that the use of technology in the course would make them more involved in the course.
- 35 per cent said that they would skip classes when the course materials were made available online. This matter needs to be carefully viewed in the light of the university's attendance rules. However, learners' perspectives may change, as they will find that a blended learning environment provides more engagement than just a video.
- Around 65 per cent agreed that technology connects them with other students and teachers.
- 59 per cent agreed that technological advances invaded their privacy, and around 55 per cent were worried about cyber threats (password sniffing and hacking).
- 55 per cent opined that the use of mobile phones in classrooms caused distraction for the teacher.
- 63 per cent said that the use of laptops/tablets in class improved their engagement with the content and class.
- 60 per cent said that they wanted to keep their personal life and academic life separate when it came to social media.
- Around 68 per cent wished that their teachers would use and integrate more technology into their teaching.
- 70 per cent agreed that the use of technology connected them to what was happening at the university. In our institutes, we use online notice boards to inform students about university events.
- 51 per cent felt that the use of mobile phones in class was a distraction.

Overall, the learners were very positive about technology use in education, and they presented a balanced view of how they thought they would use technology if the university integrated it into the teaching and learning environment in a big way. It is important to note that the learners showed self-direction in their responses about learning, particularly by indicating that the use of mobile

phones in class is a distraction for their teachers as well as themselves. They also indicated that multitasking with technology prevented them from concentrating on their studies. Their responses also show that they were not adequately prepared to use technology before entering the university. This is an obvious issue, as the learners in RGUKT come from schools (after completion of Grade 10). They normally become acquainted with technology at the university during the first two years of (pre-university) studies.

**Table 35: Learners' Perceptions about Technology Use in Education**

Statements	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Do Not Know
I get more actively involved in courses that use technology.	15	56.5	15.51	5.8	3.15	4.04
I am more likely to skip classes when materials from course lectures are available online.	6.8	27.58	22.42	36.15	2.02	5.04
When I entered college, I was adequately prepared to use the technology needed in my courses.	2.32	9.02	17.65	55.28	10.44	5.28
Technology makes me feel connected to other students.	12.52	55.69	17.24	7.15	2.94	4.47
Technology makes me feel connected to teachers.	10.88	53.39	18.95	9.35	3.2	4.23
Technology interferes with my ability to concentrate and think deeply about subjects I care about.	3.12	8.46	17.97	52.34	13.8	4.3
I am concerned that technology advances may increasingly invade my privacy.	9.87	48.81	22.76	8.03	3.16	7.37
I am concerned about cyber security (password protection and hacking).	12.15	43.46	20.87	11.9	3.04	8.59
In-class use of mobile devices is distracting to my teacher.	11.24	44.84	21.3	10.85	3.57	8.2
Use of tablets/laptops in class improves my engagement with the content and class.	12.99	50.26	17.32	10.24	4.59	4.59
Multitasking with my technology devices sometimes prevents me from concentrating on or doing the work that is most important.	10.87	49.6	19.36	9.95	3.98	6.23
When it comes to social media (e.g., Facebook, Twitter, LinkedIn), I like to keep my academic life and social life separate.	11.23	48.61	19.42	9.9	3.83	7
I wish my teachers in the university would use and integrate more technology in their teaching.	15.35	53.41	17.32	5.38	4.07	4.46
Technology makes me feel connected to what's going on at the college/university.	17.04	53.5	16.78	5.15	3.83	3.7
In-class use of mobile devices is distracting to me.	10.06	41.32	23.05	12.98	3.97	8.6

## Chapter 5: Conclusions and Recommendations

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It is necessary to take a broad view in order to understand and determine how ICT impacts learning. This is because educational achievements are shaped not only by the way education is organised but also by the socio-economic background of the learners, their socio-cultural environments, the changing skills and competencies that are necessary for employment, learner motivation, self-development and participation in society. This baseline study was conducted to gain a deeper understanding of teachers' and learners' contexts at RGUKT, as well as their dispositions and their current level of use and experience of using technology for teaching and learning. This understanding will be useful for all teachers in the university to design appropriate levels of ICT interventions in their classes, and thereby help achieve the university's goals to provide high-quality technical education using the advances in learning sciences and technologies.

### 5.1 Major Findings

The RGUKT is a unique institution in providing access to quality education for talented rural learners identified at the Grade 10 level, and giving them residential education for six years to turn them into employable engineers in the world of work. From its inception, the university has integrated the use of technology into teaching and learning as a key means of providing quality education that fosters learning by doing, as well as co-operative and collaborative learning to suit the industry's needs. The university has a relatively adequate infrastructure and good support in the form of IT and networks for the current method of teaching, which largely uses flipped classrooms. The university provides each learner with a laptop at the time of admission. A review of the university's infrastructure and policies reveals that many TEL practices are used but not documented. The senior management of the university is highly committed to strengthening the existing infrastructure and creating the required capacity-building opportunities so that teachers can integrate technology into their teaching. The university previously had a content development studio, which needs to be re-organised to help teachers develop digital content. Whilst some departments are using a learning management system for teaching and learning, this is not a university-wide service. RGUKT's presence on the Web is through institutional websites and Facebook, but there is a strong requirement for improving the bandwidth at the university and increasing its Web presence through providing various services on the Web. The insufficient availability of special software for teaching and learning is also a matter of concern, and there is a need to improve access to e-resources by joining existing networks such as INFLIBNET. The e-classrooms are well organised, and the university maintains its own content servers to store content created by teachers. These are available on the intranet, with learners having 24/7 access through the university LAN and Wi-Fi. Institutional preparedness for TEL is therefore concluded to be at the level of "developing preparedness," which means RGUKT has put in place some of the aspects of TEL processes, policies and infrastructure and is in the process of developing a robust system.

The teachers in the university are highly qualified and are flexible within the university's flipped classroom environment. They have adequate access to digital devices, as the university provides each teacher with a laptop. Over 80 per cent of them also have a smartphone. Most of the teachers use word processing, spreadsheets, presentations, email, search engines and databases. However, advanced digital content creations skills such as graphics editing, multimedia authoring, digital audio, video editing, Web design and LMS skills are poor. They also have social media accounts, though engagement with social media is not strong. Over 30 per cent of teachers indicted that access to network bandwidth, Wi-Fi access and availability of relevant software was "poor" or "fair." The use of blogs, microblogging, social bookmarking, simulations and even LMSs was low in



comparison to the use of word processors, presentations and digital graphics, which are in line with their skill level, indicating the need for higher levels of training. Teachers in the university perceive the use of TEL very positively and believe that it would solve many educational problems, provide new opportunities for presenting teaching–learning, increase access to quality teaching and learning materials, foster collaborative learning and improve student engagement. Such a positive mindset in the university needs to be harnessed to implement TEL in a systematic manner so as to support the university’s vision and mission. Teachers are also intrinsically motivated to use TEL due to personal interest and intellectual challenge, whilst they indicated that there are extrinsic motivators that would also encourage them to use TEL better. The extrinsic motivators are availability of improved bandwidth, hardware, software and technical support. Teachers indicated that poor Internet access and networking are the main barriers to using TEL. They also felt that lack of time to develop e-courses and lack of training in the use of ICTs are additional barriers. It is important to address the identified barriers if we are to provide an enabling environment for the use of TEL at RGUKT.

The learners’ responses to the survey reveal their level of enthusiasm for and interest in engaging with an increased level of technological integration in their teaching and learning. They have access to laptops provided by the university, and over 66 per cent also have access to smartphone. They have access to the Internet at the hostels, and they also use their smartphones to access the Internet. Not all students are aware that there is Wi-Fi access at the university and so they are not taking advantage of it. Their ICT skill levels are satisfactory for the current level of ICT use in teaching and learning. However, their skills for using advanced digital creation tools and software are limited. Most of the learners have social media presences but are not active, which may be due to poor access to the Internet. Their attitude towards technology also revealed that they prefer to keep learning and social media use separate. However, in general, the learners are very positive about the possibility of technology being integrated into their courses. They believe that technology will be useful if the university decides to undertake the following:

- Recording of lectures and sharing of these online
- Multimedia presentation skills
- University services on the Web, along with a personal dashboard for each learner
- Use of mobile phones to access university Web services and receive alerts via text messages
- Working on wikis for projects and collaborative learning
- Use of social media to communicate/collaborate with other students in a course
- Use of video conferencing facilities for sharing lectures from other institutions

## 5.2 Recommendations

Based on the findings of the baseline study, the following recommendations can be made for the university:

- Many of the university facilities are not known to students, which is due to the lack of an institutional policy. The adoption of a policy on TEL would not only give clarity about the university’s facilities, but also help streamline TEL activities.
- There is a need to improve the bandwidth capacity to access the Internet at the university. An estimate based on the number of students and the need for TEL integration in the university requires a minimum 10 Gbps bandwidth.
- Provide training for teachers on advanced ICT skills as well as skills to integrate technology in teaching and learning, including the effective use of LMSs, discussion forums, social media, etc.

- Whilst the university has a programme on digital literacy for learners, it is important to review the content of the course and include advanced ICT skills to prepare learners for the 21<sup>st</sup>-century world of work.
- It is important to upgrade the availability of software in the university, including access to e-resources and plagiarism detection tools. Some of these resources are available through INFLIBNET.
- A central facility is needed to create digital resources, and a hosting platform is required to share these on the Web beyond the university network. Sharing of the content created by teachers in the university would increase the university's visibility and improve its reputation as a quality education provider.
- A blended learning approach should be adopted to supplement the flipped classroom model so as to align with the university's vision. All the courses offered in the university should have a companion webpage and LMS, where teachers share the learning content, students interact with each other and the teacher, and grading takes place for internal assessment. Such blended courses would prepare learners for the future world of work and help them become self-directed learners.
- Technology should be used to make available lectures from one campus to other, and lectures should be recorded so learners can view them again later.
- Make Web-based services accessible on mobile devices and use instant messaging and text-based SMS services for some interactions with students.
- Create a repository to share digital content (courses as well as research materials) created by teachers and published under open licences.

Technology is enabling multi-modal teaching, changing curricula and facilitating rich forms of online research and collaboration. The university would certainly enhance its reputation for providing high-quality education by strengthening its implementation of TEL.