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Concepts, Importance, and Challenges of Using Technology to Enhance 21st Century Skills

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Abstract

The research aimed to explore the concept, importance and challenges of using technology to enhance 21st century skills in higher education. An online Microsoft survey form was created and data were obtained from the university teachers including Education, Management, Arts and Science faculty. The major findings of the research include the concept of 21st-century skills as the wide range of knowledge, skills and behavior that are necessary to cope with the technology-driven changing world. Various frameworks define such skills. However, It includes 4Cs, Information and media literacy, and life and career skills. Similarly, active classroom engagement, collaboration, communication, promoting digital and data literacy, coping skills, and enhancing emotional and social skills are important in integrating technology in the classroom. Lack of technology infrastructure, lack of support and training, high cost associated with acquiring and maintaining ICT equipment, and lack of policy guidelines are major challenges that were explored.

Keywords : 21st-century, technology, digital literacy, collaboration

Introduction

21st-century skills refer to a set of abilities, competencies, and attributes that are essential for success in the modern world, characterized by rapid technological advancements, globalization, and evolving workplace demands (Ağaoğlu, 2020). Relander (2023) has explored 21st-century skills such as technical skills, information management skills, communication skills, collaboration skills, creativity skills, critical thinking skills and problem-solving skills. (P21 Resources 21st Century Learning Resources, n.d.) P21 framework has explored three categories of skills as 21st-century skills; critical thinking, collaboration, communication and creativity as learning skills, Information literacy, Media literacy and technology literacy as IMT literacy and Flexibility, Leadership, Initiative, Productivity, social skills as life and career skills. The importance of 21st-century skills in higher education lies in their ability to prepare students for success in a rapidly changing, technology-driven society (Mehta, 2023). These skills are crucial for students to navigate

the complexities of the modern world, where they will face challenges that require adaptability, critical thinking, and collaboration.

Objectives

The objectives of the research are as follows:

- To conceptualize the meaning of 21st-century skills
- To explore the importance of integrating ICT's to enhance 21st-century skills
- To trace the challenges of using technology to enhance 21st-century skills

Significance of the Study

21st-century skills are the range of skills and abilities that are essential to solving complex problems in personal and professional life. The study focuses on conceptualizing 21st-century skills, their importance and their challenges in higher education. It helps those persons who are interested in learning and developing 21st-century skills. Moreover, it explores the importance and challenges of integrating technology into higher education. This research will be more beneficial to university teachers and students to develop competencies in 21st-century skills with digital competencies.

Methodology

The study is based on a survey research design. An online survey form was prepared in MS form and delivered to the respondents through WhatsApp and Facebook messengers. The respondents were requested to fill up the form and express their ideas on 21st-century skills. The MS form was opened for two weeks after that, the form was closed. The study was focused on Koshi province, Itahari municipality and two community colleges which are providing higher education. In this study, Janta Multiple Campus and Rastriya Janasayog College were selected as the research sites. The population of the study was considered as the teaching staff of both colleges. During the data collection procedure, 40 responses were obtained within 2 weeks and analyzed based on descriptive statistics. After collecting responses online, the data were extracted on an Excel sheet, coding, editing and cleaning process was completed. When the coding, editing and cleaning were completed, SPSS software was used to analyze the data. During the analysis phase, charts and tables were obtained. The data were analyzed descriptively based on themes; like the concept of 21st century skills, importance, challenges, and overcoming challenges.

Role of ICT to promote 21st Century skills

ICT is a vital tool for the development of essential knowledge, skills, and attitudes in changing contexts and situations, it is evolving rapidly and revolutionizing every aspect of our lives; including 21st-century skills. Has presented the benefits of integrating ICT to promote 21st-century skills; promotes online and offline collaboration, improves access to quality educational resources, promotes mastery in ICT and media literacy, improving the efficiency of educational administration and management at every level from classroom to their personal and professional life (Kumareshwar, 2022, p. 2). Relander (2023) argues

that learning with technology has become more versatile and more collaborative regardless of time and location. Smartphones, tablets, and computers should promote collaboration, critical thinking and problem-solving skills, building teams to accomplish assigned tasks.

Result and Discussion

The result and discussion are the main body of any research task. This study is based on survey design. So, in this research brief demographic background of the respondents is presented. After the presentation of background information, the discussion is focused on an objective analysis of the study. While analyzing the data, two fundamental tools were used. The majority of the data are obtained directly from the Microsoft form and some of the data are extracted from Excel and analyzed by using APSS software.

Demographic information of respondents

In this section, the age, gender, academic background, and college or university of the respondents were traced and analyzed with the help of a bar graph created by Microsoft Forms.

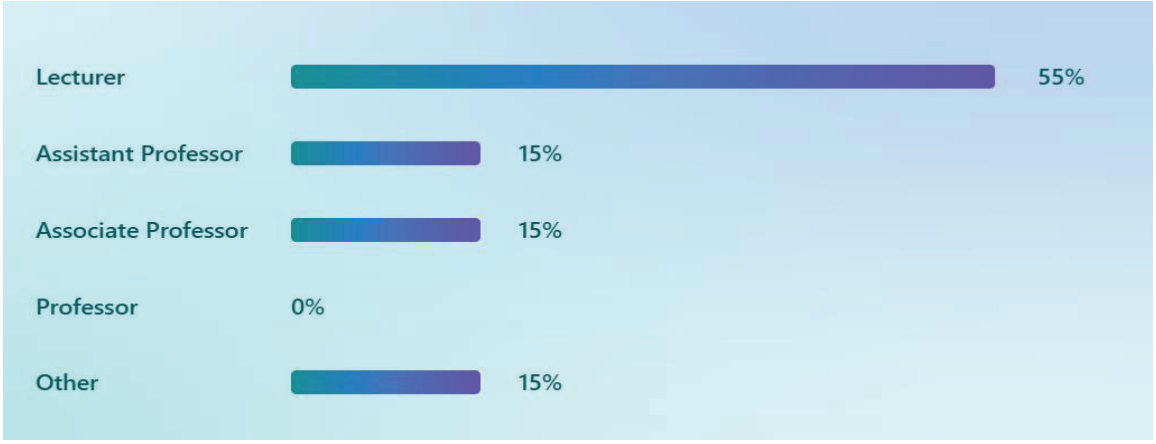
Chart 1

Age Group of the Participants

Chart No. 1 shows the ages of different participants. This clearly shows the majority 40 percent of the participants from the age group of 45-54 and 15 percent of participants under 25 years. This indicates that more experienced participants involved in this survey.

Chart 2

Academic Status of Participants



The chart 2 shows the percentage of University teachers in different academic positions. Most of the participants form lecturer, at 55%. Following that are assistant professors, associate professors and others, all tied at 15%. There is zero percentage of participants from professor positions.

Chart 3

Academic Qualification of Participants

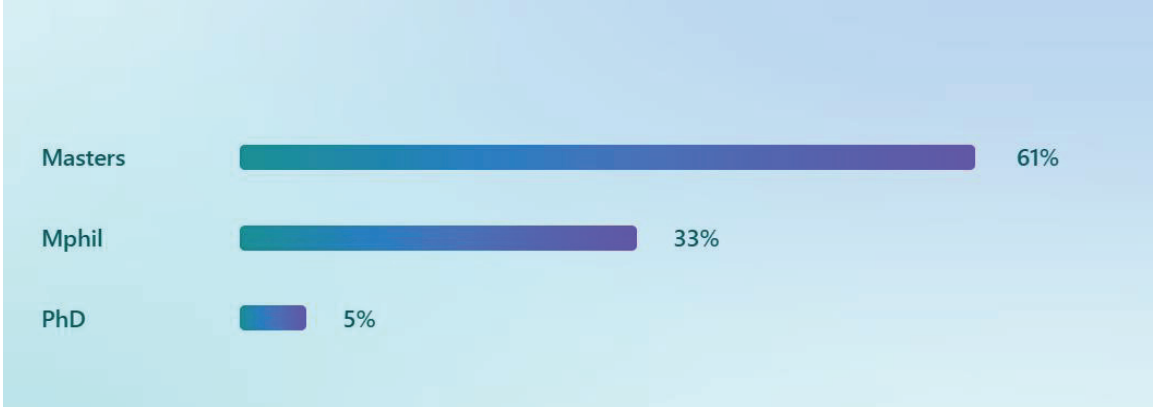


Chart 3 presents the academic qualifications of participants. This indicates that 61 percent of master's degrees and followed by M.Phil. and PhD. This shows that the academic qualification of the majority of university teachers is a master's degree. The university should encourage their teachers to further academic study. Otherwise, this could not contribute to the quality of higher education.

Chart 4

Experience of University Teachers

The chart shows the distribution of university teachers by their years of teaching experience. The largest proportion, 38%, have between 16 and 20 years of experience. Following that is a tie between those with less than 5 years and more than 21 years of experience, at 27% each. There is a smaller group, 16%, with 5-10 years of experience, and there are no teachers represented with 11-15 years of experience.

Chart 5

Teaching Background of Participants

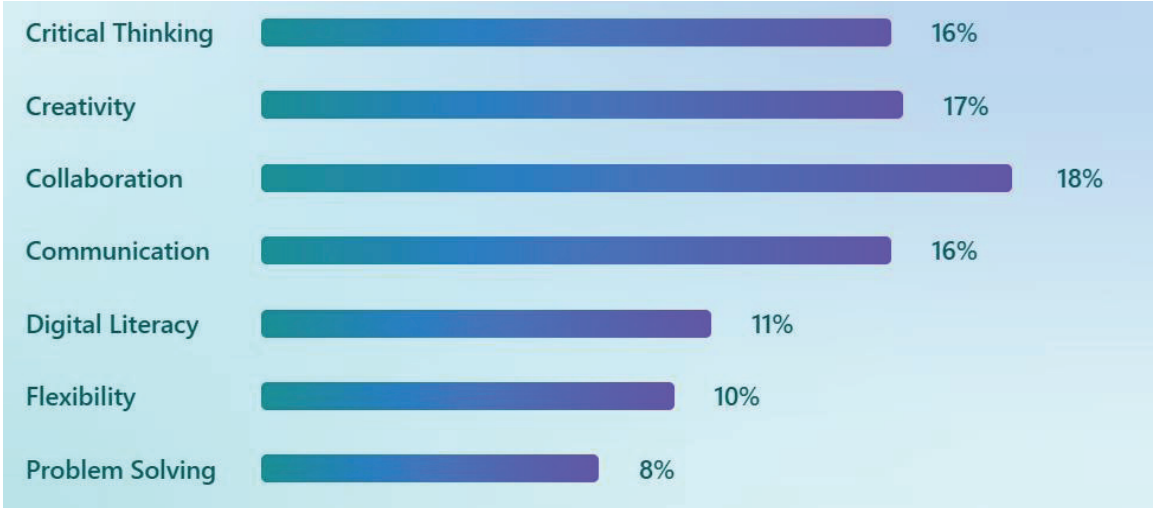
The Chart shows the distribution of university teachers by their academic background. The largest proportion, at 68%, come from an educational background. This is followed by Humanities and Management, both at 12%. The remaining 6% come from a background classified as "Other." This indicates that the majority of the participants are from the faculty of Education.

Concept of 21st-century skills

21st-century skills are the set of wide abilities, knowledge, and learning outcomes that are essential for success for individuals to cope with the rapidly changing technology-driven world. There are various concepts as the framework. (Dede, 2009) argues that partnership for 21st Century skills identified key skills across three categories; learning and innovation skills, digital literacy skills and life and career skills. OECD framework has highlighted cognitive and meta-cognitive skills, social and emotional skills and physical and practical skills as 21st-Century skills. It incorporates traditional literacy, numeracy, data literacy, digital literacy, physical and mental health, and social-emotional competencies for students to succeed in the future.

Chart 6

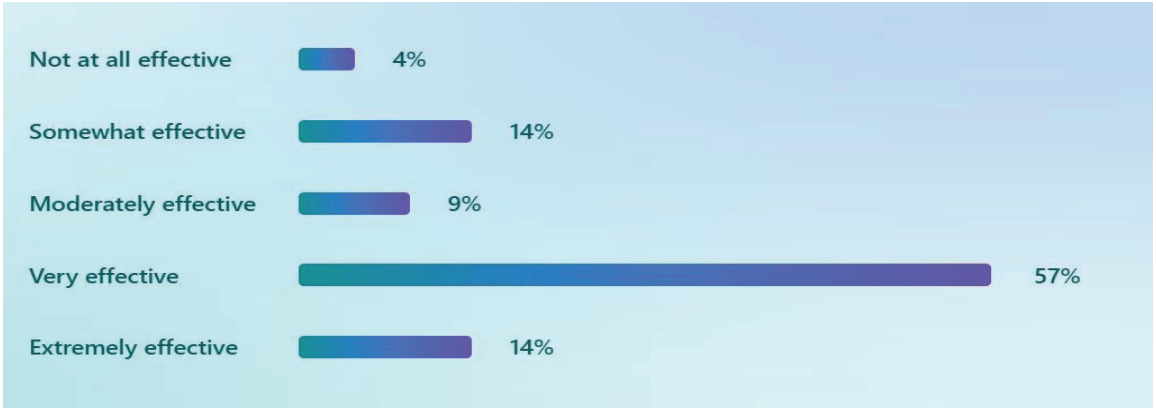
Teachers' Understanding of 21st-Century Skills



The data shows the perception of University teachers on 21st-century skills. According to the graph, critical thinking is the most important skill, with 16% of teachers believing it to be the most important. This is followed closely by Collaboration, Creativity, and Communication, all at 18%, 17%, and 16% respectively. Digital Literacy and Flexibility are seen as less important by the teachers surveyed, at 11% and 10% respectively. Problem-solving is the least important skill according to the data, with only 8% of teachers ranking it as the most important.

Chart 7

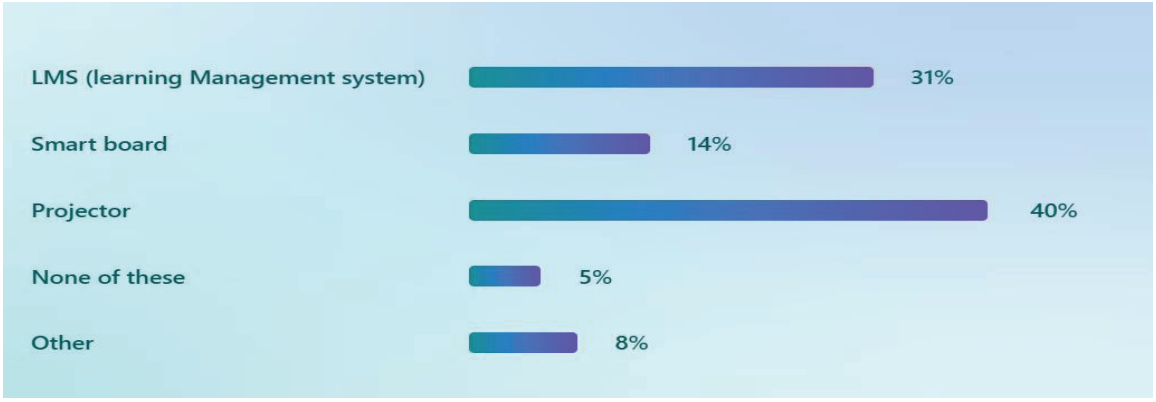
Teachers Perceptions on ICT Tools on Enhancing 21st-Century Skills



The chart you sent shows that the vast majority of university teachers believe ICT is very effective for improving 21st-century skills in higher education. Specifically, 71% of teachers responded that ICT is very effective. Very effective: 57%, Extremely effective: 14%. This suggests that university teachers see ICT as a valuable tool for helping students develop critical thinking, collaboration, communication, creativity, and other skills needed to succeed in the 21st century. (Weber & Greiff, 2023) Argues that integrating ICT skills in primary and secondary education ensures a strong foundation for lifelong learning. So ICT integration is extremely important to achieve 21st-century skills.

Chart 8

Uses of ICT Tools in Higher Education Classroom



The data suggests that a significant majority of university teachers are using some form of ICT tools in their classrooms. Projectors are the most common tool, likely due to their versatility and affordability. LMS and smart boards are also relatively common, which suggests that teachers are embracing technology to deliver course content and create interactive learning experiences.

Table 1

University Teachers believes to Promote 21st-century Skills

						Total
Age Range	Extremely effective	Moderately effective	Not at all effective	Somewhat effective	Very effective	
25-34	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
35-44	16.7%	0.0%	16.7%	0.0%	66.7%	100.0%
45-54	25.0%	25.0%	0.0%	25.0%	25.0%	100.0%
Under 25	0.0%	0.0%	0.0%	33.3%	66.7%	100.0%
Total	14.3%	9.5%	4.8%	14.3%	57.1%	100.0%

The above table shows the beliefs of university teachers in promoting 21st-century skills through the use of Information and communication technology. This shows that the majority of respondents show a positive response. 71% of them are sure to enhance 21st-century skills by the proper use of ICT. The majority of school heads and teachers realized the importance of ICT use for developing 21st-century skills in the classroom (Lewin & McNicol, n.d., p. 181). This shows that ICT is useful not only at the higher level but also could bring significant contributions to the development of various necessary knowledge, skills and efficiencies for quality education.

Table 2

Teaching Experience and Classroom Appropriateness

Experience	Extremely effective	Moderately effective	Not at all effective	Somewhat effective	Very effective	Total
16-20 years	25.0%	12.5%	12.5%	12.5%	37.5%	100.0%
5-10 years	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
Less than 5 years	0.0%	0.0%	0.0%	20.0%	80.0%	100.0%
More than 21 years	20.0%	20.0%	0.0%	20.0%	40.0%	100.0%
	14.3%	9.5%	4.8%	14.3%	57.1%	100.0%

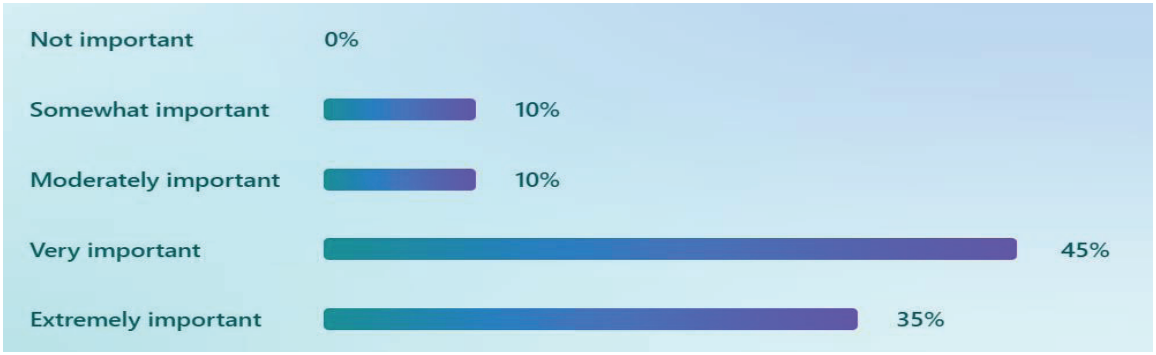
Table 2 summarizes the perceived effectiveness of an activity or intervention based on respondents' years of experience. Responses are categorized into five levels of effectiveness: "Extremely effective," "Very effective," "Moderately effective," "Somewhat effective," and "Not at all effective." This indicates that the majority of the respondents across all experience levels find the activity "very effective" or 'Extremely effective." Professionals with up to 10 years showed a high degree of ratings in it.

	Experience		Maybe	No	Yes	Maybe
Teaching_Experience:		0	2	4	2	8
	16-20 years	0.0%	25.0%	80.0%	28.6%	38.1%
	5-10 years	0	2	0	1	3
		0.0%	25.0%	0.0%	14.3%	14.3%
	Less than 5 years	0	3	0	2	5
		0.0%	37.5%	0.0%	28.6%	23.8%
		1	1	1	2	5
	More than 21 years	100%	12.5%	20.0%	28.6%	23.8%
Total		100%	100%	100%	100%	100%

The above table shows the classroom appropriateness across the working experience. The majority of the teachers are confusing whether the classrooms are appropriate or not to achieve 21st-century skills. Their concern is the current ICT infrastructure. The classrooms are not ICT-friendly. There is no possibility of high-speed internet in the classroom for collaborative work and enhancing creativity. So, the university or college administration should be focused on building ICT-friendly infrastructure.

Chart 9

Importance of ICT in Higher Education.

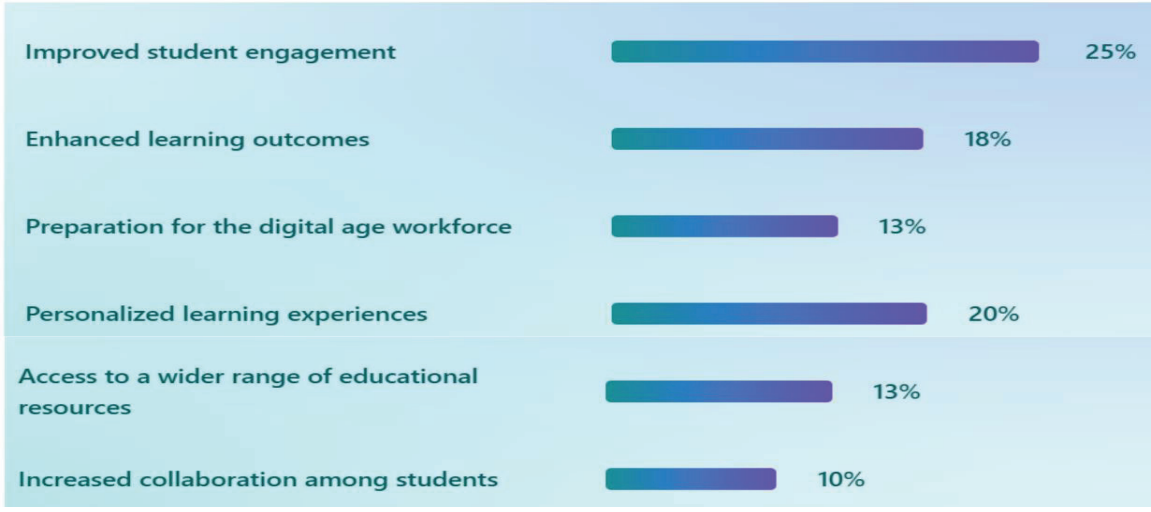


The data you sent shows that a very large majority of university teachers believe ICT tools are important or extremely important for effective teaching in higher education. Specifically, 90% of teachers responded that ICT tools are important or extremely important.

This suggests that university teachers see ICT as a valuable tool for improving teaching and learning in higher education.

Chart 10

Importance of ICT Enhancing 21st Century Skills Among Students



The above chart shows the benefits of using technology to enhance 21st-century skills among university teachers. Majority of teachers (25%) argued that it improves student engagement. Followed by personalized learning, enhanced learning outcomes, preparation of digital-age workers, and access to a wider range of educational resources. This means when a teacher has good knowledge and skills of technology it will support students' quality learning.(Ben Youssef & Dahmani, 2008) Has also supported this argument. (Bruno, 2018) has identified the importance of 21st-century skills as; perspective-taking, critical thinking, respectful communication, cooperation, etc. This argument also supports the importance explored the respondents of our research.

Challenges of ICT Integration in Higher Education

ICT offers many opportunities in higher education, but challenges like digital inequalities, faculty training, learner preparedness, privacy concerns, pedagogical adaptation, financial sustainability, and content quality must be addressed for effective implementation(Ahmad Mir, 2019). Based on our empirical study following challenges are explored.

Chart 11

Challenges of ICT Integration in Higher Education

The chart shows that a significant number of teachers (28%) feel they lack access to necessary technology resources they need to effectively use ICT in their classrooms. This suggests that universities need to provide more support for teachers in this area.

The digital divide is a concern for some teachers (14%). This highlights the importance of ensuring that all students have equal access to the technology they need to succeed in a technology-integrated classroom.

Some teachers are worried that ICT will replace traditional teaching methods (8%). This suggests a need for professional development that helps teachers see ICT as a tool to supplement and enhance their teaching, rather than replace it altogether. (Kumareshwar, 2022) explored some of the challenges of ICT in higher education which are aligned with the field data. Availability, lack of knowledge, cultural challenges, insufficient funds, lack of trained teachers, pace of change, lack of equipment etc.

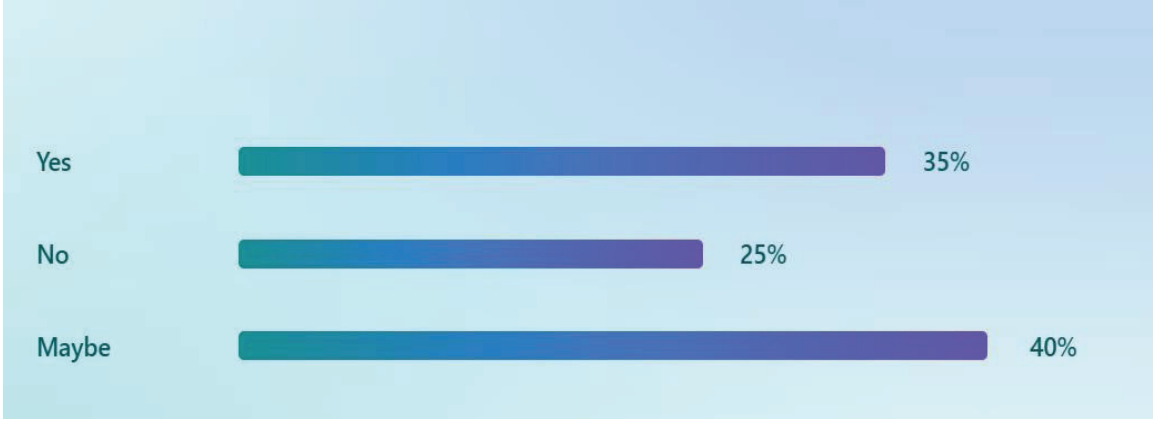
Picture 1

Ways of Addressing Challenges of ICT Integrating in Higher Education

The above word cloud shows that various factors contribute to overcoming the challenges of digitalization in higher education such as; infrastructure development, training and experience building, resource development, the mindset of teacher, seminars and training etc. However, the majority of teachers focus on teacher training as the major factor that enables them to solve the challenges of effective integration of digital tools in higher education. (Kumareshwar, 2022) has summarized the main factors to be considered to overcome the barriers and difficulties; such as policy intervention from the ministry or university level, school management, motivating teacher as learners, providing support and necessary training, promoting collaboration and peer support etc.

Chart 12

Viability of Infrastructure in Traditional Classrooms



The above chart shows the viability of infrastructure to apply ICT tools in the classroom. This indicates that the majority of the teachers are confused whether their classrooms have appropriate ICT infrastructures to apply digital pedagogy in the classroom. 35% of the teachers' response was positive to use technology in their traditional classroom. However, 25% percentage of teachers do not agree with the ICT infrastructures appropriate to use ICT tools in the classroom.

Conclusion

The study was conducted on the topic of concept, importance, and challenges of using technology to enhance 21st-century skills. A Microsoft form was created and delivered that form on whats app group of Janta Multiple Campus Itahari and Rastriya Janasayog College. 40 responses were collected. Microsoft-generated charts and SPSS software were used to analyze the results. During the study, it was concluded that, if a teacher of higher education has technical knowledge and skills, he/she could promote critical thinking, collaboration, communication and creativity among students. Not only those skills, but s/he could complete complex research tasks in a short period.

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