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Impact of Students' Ubiquitous Learning through Web 2.0 Tool on Students' 21st Century Skills: Creativity and Communication

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Abstract

Ubiquitous learning is transforming education by enabling human-focused learning through seamless access to resources from anywhere. In addition, these tools enhance context understanding and make it easy to interact between real and digital learning resources, all while offering individualized learning opportunities. This research surveyed public sector university teachers in Sindh and Punjab provinces of Pakistan to gather their opinions on the How web 2.0 tools and ubiquitous learning are affecting the development of 21st century learning skills in students. The research aimed to assess the impact of Web 2.0 tools for ubiquitous learning (UL) on the creativity and communication skills of graduate-level students. To collect data, the study administered a self-developed questionnaire with 50 items rated on a 7-point Likert-type scale to 500 university teachers. This constituted the primary data for the research. According to the findings, ubiquitous learning has a noteworthy effect on fostering creativity and communication skills in university students. To make ubiquitous learning successful, both private and public sector universities must have adequate ICT infrastructure and provide teacher training that focuses on ICT-based teaching methods. The study can assist university teachers in establishing a ubiquitous learning (UL) environment that employs web 2.0 tools, thereby enabling students to effectively enhance their 21st-century learning skills, including creativity and communication.

Keywords: Personalized Learning, Web 2.0, Communication Skills, Ubiquitous Learning, Creativity Skills.

Introduction

"Ubiquitous learning" refers to a customized learning approach that merges the resources of "Web 2.0" and the principle of ubiquitous learning (Sharples, 2019). This unique learning context is formed by the widespread availability of the internet, desktop computers, and multimedia in lecture rooms. Participants can collaborate within the "Web 2.0" and "ubiquitous network" using intelligent learning sources, enables students with diverse skill levels, learning abilities, and varying stages of development to pursue their personalized learning objectives and life goals, irrespective of their location or time constraints. The concept of ubiquitous learning has been recommended in academia due to the widespread availability of computing technology and its penetration in the teaching field.

Web 2.0 is the present-day version of the internet that features a greater amount of user-generated content and interactivity as opposed to its earlier iteration, Web 1.0. Web 2.0 represents a shift in how the internet is used and experienced in the 21st century, with a high level of information sharing and participation from users. Web 2.0 allows users to actively participate rather than just passively consuming information. This term first emerged in 1999, as the internet moved towards active engagement with users, encouraging content creation and participation. Web 2.0 gave rise to self-publishing platforms, social media sites, and web apps like Wikipedia, Facebook, and Twitter, transforming the way information is shared and delivered.

The National Educational Technology Plan 2010 calls for new evaluation techniques to capture the evolving learner experience. Global, national, and local technology and ICT has provided standards for curricular reforms. These frameworks do not provide a clear indication of how to attain valuable skills. Policymakers must back up their incorporation of 21st century skills into curricula with a well-articulated execution plan. A well-researched technique is needed to guide educators,

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school administrations, and policymakers through the process of enforcing 21st century skill education. This research analyzes the impact of ubiquitous learning on the development of 21st century learning skills of creativity and communication.

Statement of the Problem:

This study aims to explore the potential impact of Web 2.0 learning tools on students' ability to think outside the box and effectively express their ideas. As technology continues to transform the landscape of education, it is essential to understand how we can leverage its capabilities to empower students with the creativity and communication skills they need to succeed in the rapidly changing world. By investigating the relationship between ubiquitous learning, Web 2.0 tools, and creativity and communication skills, this study seeks to offer insights into the future of education and how we can best prepare our students for the challenges ahead.

Objectives of the Study:

1. Examine the impact of ubiquitous learning environment at higher level on students' creativity & communication skills.
2. Analyze the creativity & communication skills among students when engaging in Web 2.0 tools.
3. Investigate the effectiveness of Web 2.0 technology tools to develop the ubiquitous learning environment at higher level.
4. Determine how the use of Web 2.0 tools for ubiquitous learning affects the development of 21st-century skills among students.
5. Analyze the importance of creativity & communication skills.
6. Evaluate the importance of Web 2.0 tools in education settings.

Research Hypothesis:

H0: There is no significant impact of using Web 2.0 tools for ubiquitous learning on students' creativity skills.

H1: There is a significant impact of using Web 2.0 tools for ubiquitous learning on students' creativity skills.

H0: There is no significant impact of using Web 2.0 tools for ubiquitous learning on students' communication skills.

H2: There is a significant impact of using Web 2.0 tools for ubiquitous learning on students' communication skills.

Research Questions of the Study:

1. How does the use of Web 2.0 tools for ubiquitous learning affect the development of 21st-century skills among students?
2. What is the significance of creativity and communication skills for students in the current educational context?
3. How web 2.0 tool in education setting helps to develop Ubiquitous learning environment?

Significance of the study:

The study on the impact of students' ubiquitous learning through Web 2.0 tools on their 21st century skills of creativity and communication is significant as it addresses the need to understand the effectiveness of technology in enhancing students' skills. The study aims to provide insights into how ubiquitous learning through Web 2.0 tools can be used to promote creativity and communication in the classroom. The results of the study can contribute to the development of effective teaching strategies that incorporate technology and enhance students' learning outcomes. The findings of the study can also inform policymakers and educators in their efforts to prepare students for the demands of the 21st-century workplace.

Figure 1
Conceptual Framework

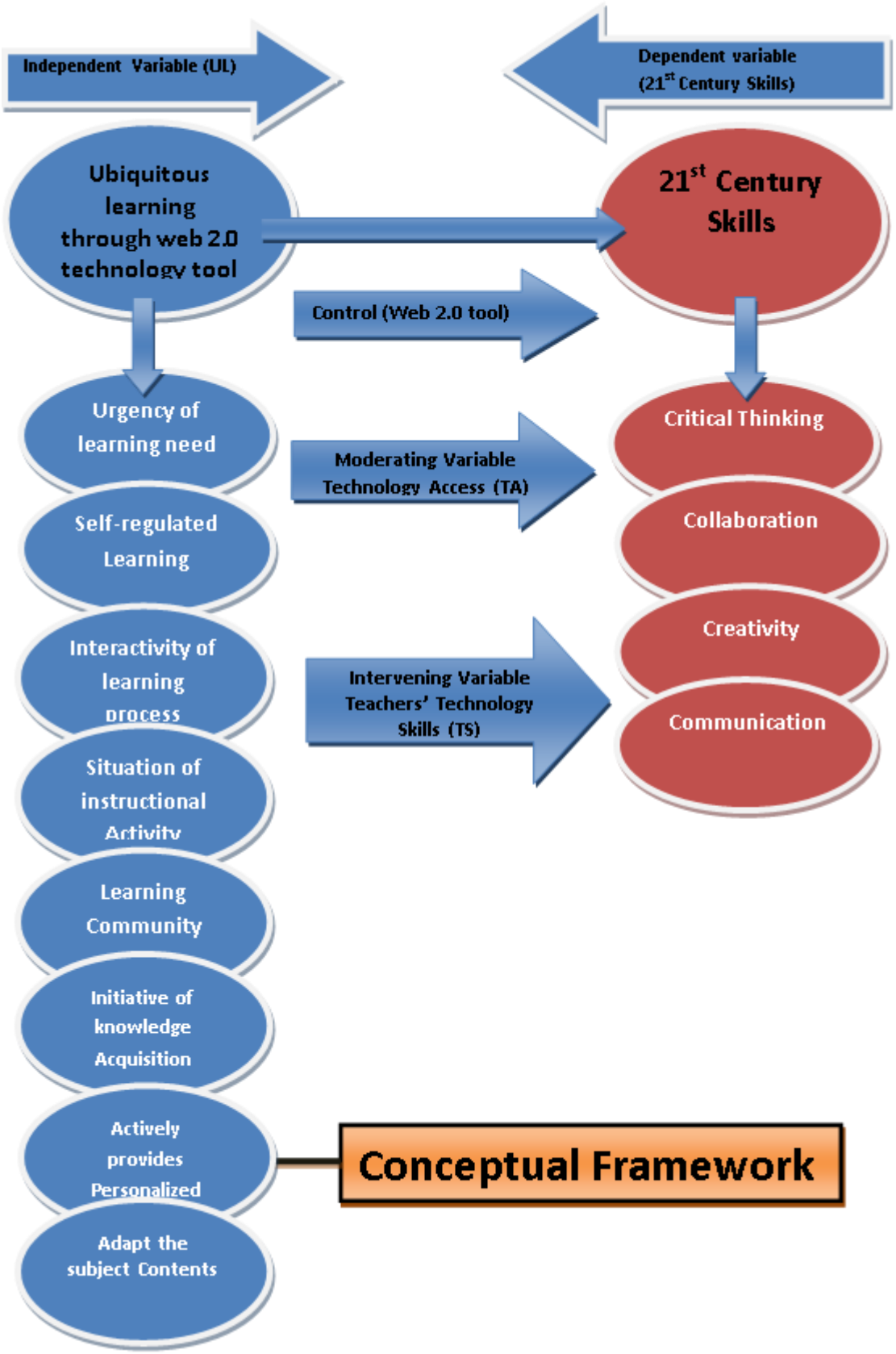
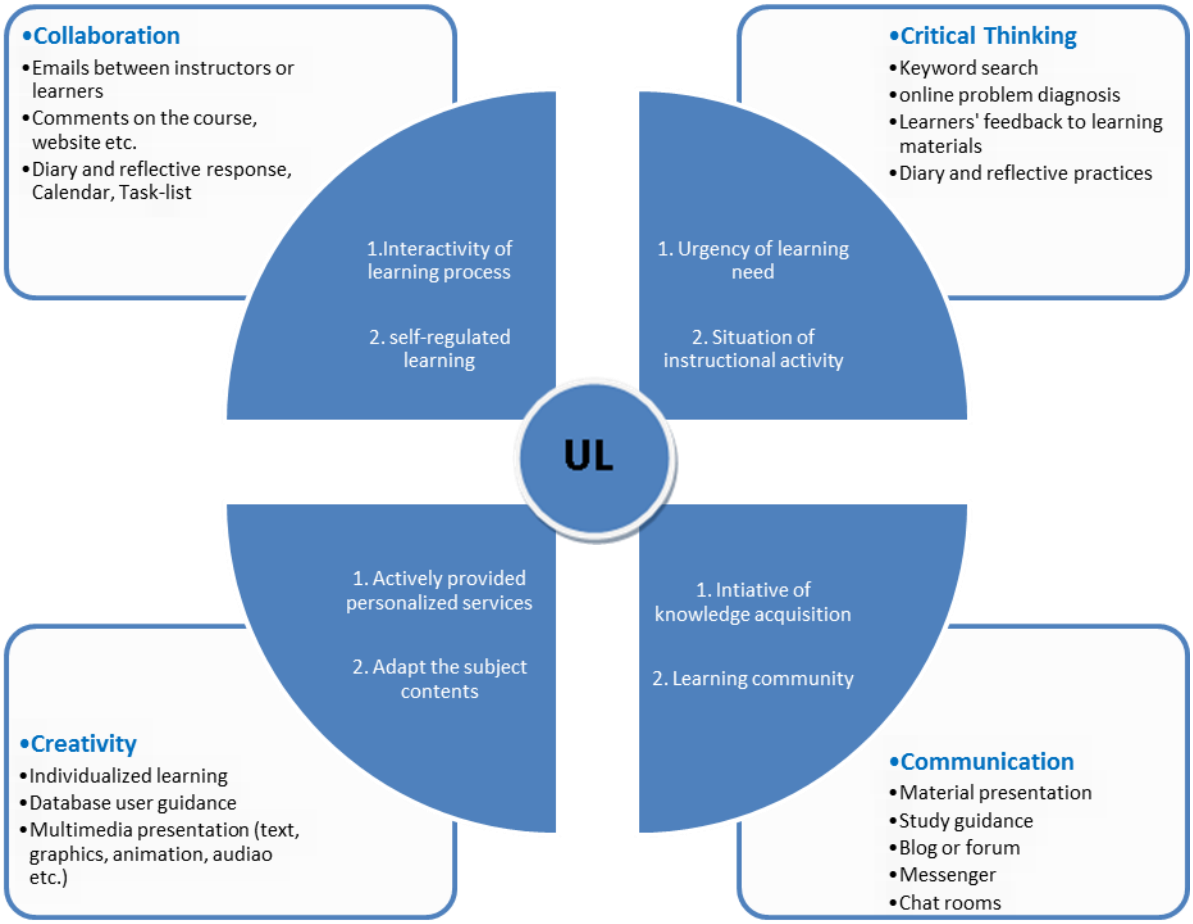


Figure 2
Development of 21st century 4Cs learning skills through ubiquitous learning environment



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Review of Literature

Theoretical Foundation:

The study is based on connectivism and online collaborative learning theory, which acknowledge the impact of Internet technology on learning. Connectivism, introduced by George Siemens in 2004, recognizes the shift in the way knowledge and information are shared through vast data communication networks. Linda Harasim's theory (OCL) suggests that the internet can be utilized to facilitate collaborative learning and knowledge construction. It also proposes that the use of the internet can transform education in the knowledge age, including both formal and informal settings. Siemens and Harasim in 2012 agree on the advantages of shifting education to the internet and implementing networked education on a large scale.

Ubiquitous learning:

UL is typically well-defined as learning that is context-aware and can cater to the personalized learning needs of individuals, enabling them to learn anytime and anywhere (Ramaprasad, 2009). Notwithstanding this common thread, there are numerous and diverse definitions of ubiquitous learning. Jones and Jo (2004) take the view that ubiquitous learning permits total immersion by students in their learning environment. The integration of ubiquitous tools and their utilization for educational purposes leads to the expansion of the traditional e-learning model into a new concept known as mobile learning or, consequently, ubiquitous learning. Motiwalla (2007), a widespread availability of m-devices has a significant influence on the everyday learning behavior in higher education.

According to Terry T. Kidd (2011, P. 138), Zhan and Jin (2005) outlined five parameters that define **u-learning,** which are: ***u-Contents, u-Environment, u-Behavior, u-Interface, and u-Service.***

A ubiquitous learning environment (ULE) is an educational setting where learning occurs seamlessly and pervasively, often without the learner being aware of the process. This is made

possible by ubiquitous sources of information and embedded devices. Ubiquitous computing extends beyond connecting people across distances and time, as it also combines physical and virtual spaces and integrates computing into public and social spaces through portable devices. In the realm of education, it is important to recognize that learning activities increasingly occur online and that learners can access information on a wide range of topics. This means that anyone can experience learning, regardless of their location or background. Therefore, According to Cope and Kalantzis (2009), the definition of ubiquitous learning needs to be expanded to incorporate the concept of knowledge creation and construction.

Ubiquitous learning is a learning paradigm, which uses ubiquitous devices, software, and services to support teaching and learning anytime and anywhere, offering potential of instructing and learning anything at any time in any place. While this declare is unrealistic at the moment, given the constraints of current implementing technology (computational, networking, and storage). Some researchers have updated the definition of u-learning to focus on teaching the appropriate content, at the right time, in the most relevant location. Additionally, Po-Sheng, Yen-Hung, Yueh-Ming, and Tzung-Shi (2008) have identified a list of characteristics that define u-learning. After reviewing and synthesizing similar projects by different researchers (e.g., Chen & Chang & Kao, 2002; Chen, Chang, & Wang, 2008; Hwang, 2006; Ogata & Yano, 2004; Yang, 2006). Note that these characteristics are presented in the framework of u-learning environments, though they have got applications throughout many instructional contexts:

- *Immediate of learning need* — an u-learning environment can be utilized to meet the immediate learning requirements. On-demand or in-time learning is an interpretation of this u-learning characteristic and traits.
- *Motivation of knowledge acquisition* — an ubiquitous learning system can promptly provide information in response to a learner's request.
- *Interactivity of learning process* — u-learning interfaces facilitate effective communications between learners and peers, teachers, and professionals.
- *Situation of instructional activity*—u-learning involves situated interaction. Learning system is embedded deeply into the natural phenomena of everyday activities.
- *Context-awareness*—learners' interplay with u-learning environment is managed by context—person, location, time, interest, activity, and so forth.
- *Activity provides personalized services*—learners are provided personalized learning activities by using the u-learning system based on surrounding context.
- *Self-regulated learning*—u-learning environment allows learner to actively control their learning progress and captures this behavior as learner context for future use.
- *Seamless learning*—learning activities can progress seamlessly as pupils move from place to place.
- *Learning community*—u-learning devices can access networked content and services to improve the learning interplay among pupils and instructors.
- *Adjust the subject contents*— Learner interaction with the u-learning environment can take place through the usage of various learning devices.

Ubiquitous learning is a type of education that utilizes wireless communication technologies, sensors, and location tracking devices to immerse learners in their environment. The utilization of Web 2.0 tools not only improves the capacity for innovative class design, but also fosters student creativity. As an educator in an online higher education setting, providing students with options for completing work has not only been helpful but also inspires creativity. Although u-learning is a relatively new area, previous research provides a broad perspective and highlights specific topics of interest, such as cross-cultural understanding and language learning, as identified by Kukulska-Hulme's (2010) analysis of 44 referenced works between 2005 and 2010.

The Web 2.0 Tool and Education

In today's knowledge society, Web 2.0 tools like social networks, blogs, wikis, podcasts, and multimedia sharing platforms such as YouTube have opened up new avenues for lifelong learning and the development of personalized learning environments. (Cobo & Pardo, 2007). These tools enable individuals to generate digital content and collaborate with others without requiring specialized programming skills. Web 2.0 tools can be helpful in utilizing information in the academic

environment. These tools have a beneficial influence on the use of information and communication technology (ICT) in academic settings. Educators play an essential role in instructing students on how to appropriately assess and filter online content, as well as determining its authenticity. The use of a blog can help students to demonstrate critical thinking, creativity, and effective communication skills (Duffy & Bruns, 2006). Through the use of these tools, students can develop creative and innovative talents, and acquiring communication and collaborative skills can be beneficial for individuals in both educational and professional settings. As a result, students are more capable of showing that the skills acquired in education are not limited to their areas of specialization, but provide them with an open-mind and flexible ability to adapt to new environments.

Table 1

Benefits of Using Flickr for Design Education Robbie & Zeeng, (2008).

Teaching the Digital Student	Flickr Platform Web 2.0 Technology offers various features
Strong visual orientation	• Allowing for sharing of uploaded images • Limiting the number of images to avoid careless production • Tagging images for easy categorization and access by teachers and students • Adding metadata during the image capture process to provide information about the image, such as its quality, quantity, and the time it was uploaded.
Active learning and student centerdness	• Opportunities for collaborative learning among peers • Ability to provide beneficial feedback and analysis on the work of others and oneself • Interaction and engagement between students • Ownership and control of discussion forums • Flexibility for new topics to be added and posted by any member within the group • Options for both private and public communication within the platform.
Engaging and supporting students	• Utilization of social networking features • Option for students and teachers to comment on any photograph • Opportunity for more introverted students to gain confidence through online communication • Support for international students with availability in 8 languages • Elimination of the constant and expensive need for printing.
Flexibility	• anytime, anywhere access • convenience without being restricted to timetabled class times. • immediacy of feedback
Sense of community	• Creation of accounts within a private teaching space • Display of student profiles featuring their name and portrait • Emphasis on identity, not anonymity • Interaction across the entire student cohort • Exposure to a global community

21st century skills

According to Binkley, 21st century skills refer to a set of teachable abilities and characteristics that improve various aspects of thinking, learning, working, and living in the world. These skills encompass creativity, innovation, critical thinking, problem-solving, decision-making, metacognition, communication, teamwork, information literacy, digital literacy, citizenship (both local and global), career and life skills, and personal and social responsibility, which includes cultural awareness and competence.

Learning and Innovation Skills:

These competencies and skills are commonly referred to in the context of the 21st century and are gaining more recognition as qualities that set apart students who are prepared for the progressively intricate work and life settings of this era.

- **Critical Thinking and Problem Solving:** This skill involves the ability to analyze and evaluate evidence, arguments, claims, and beliefs effectively. It also involves the capability to resolve different types of unfamiliar problems using both traditional and innovative approaches.

- **Communication:** Communication skill involves the capacity to articulate ideas and thoughts effectively using both written and oral communication skills in various forms and contexts.
- **Collaboration:** Collaboration skills entail the capacity to collaborate successfully and respectfully with diverse groups to accomplish a shared objective.
- **Creativity and Innovation:** The Creativity and Innovation skill entails utilizing a broad spectrum of idea generation techniques to develop novel and valuable ideas.

Table 2

The following is a list of abilities associated with each of the 21st century skills, adapted from P21's 2009 framework

Skill Sets	Learning and Innovation	Digital Literacy	Life and Career Skills
Core Subjects	Content Knowledge	Computer Basics	Flexibility and Adaptability
Critical Thinking	Creativity and Innovation	Online Research	Initiative and Self-Direction
Problem Solving	Inquiry and Analysis	Digital Citizenship	Social and Cross-Cultural Skills
Communication	Communication Skills	Digital Communication	Productivity and Accountability
Collaboration	Collaboration Skills	Technology Use	Leadership and Responsibility

Enhancing Creativity in the Teaching-Learning Process Through Ubiquitous Learning and Web 2.0 Technology Tools:

Enhancing creativity in the teaching-learning process has become a crucial aspect of education today. Research by Treffinger (2002) has classified creativity into four categories, namely, generating ideas, delving deeper into thoughts, exploring ideas with openness and courage, and paying attention to one's "inner voice." However, with the advent of ubiquitous learning and web 2.0 technology tools, teachers and learners now have access to a wide range of resources to enhance creativity in the classroom.

Ubiquitous learning, also known as u-learning, refers to learning that can take place anywhere, anytime, and using any device (Chen & Hwang, 2014). The integration of ubiquitous learning with web 2.0 technology tools can provide students with multiple opportunities to explore their creativity in the learning process. For instance, tools such as blogs, wikis, and social media platforms like Twitter and Instagram can be used to facilitate student-generated content, collaborative problem-solving, and discussions.

Web 2.0 technology tools can also be used to promote creativity in the teaching-learning process. Tools like Padlet, Canva, and Piktochart can help students create and design visually appealing presentations and infographics that showcase their creativity. Other tools such as Prezi and Animoto can be used to create engaging multimedia presentations that encourage creativity and critical thinking.

Lucas and Claxton (2010) state that creativity is learnable, and approaches to evaluating its development can be useful for both learners and teachers. Therefore, teachers can provide opportunities for students to develop their creativity through the use of ubiquitous learning and web 2.0 technology tools. By incorporating these tools into the teaching-learning process, students can explore their creativity and develop the necessary skills needed for the 21st century workplace.

In conclusion, enhancing creativity in the teaching-learning process is crucial for students' success in the 21st century. The use of ubiquitous learning and web 2.0 technology tools provides a wide range of resources for students to explore their creativity and develop the necessary skills for their future careers. As stated by Perkins (1995), creativity is a critical aspect of education, and by integrating these tools into the curriculum, teachers can facilitate students' creativity, critical thinking, and problem-solving skills.

The Centre for Real-World Learning (CRL) conducted a study in 2011 to analyze the existing literature on the evaluation of creativity in schools. The study found that despite the enhanced status of creativity in schools, it is not discussed as an idea that can be assessed. As a result, CRL developed a 5-dimensional model of creativity, which aims to identify the core tendencies or habits of mind that are central to creativity. The model also focuses on being as comprehensive as possible in terms of the existing research, achieving general coherence while maintaining distinct sub-elements, clearly

situating creativity in a broader social and contextual view of learning, and being "disciplined" in the technical and craft aspects associated with creative pursuits. (Spencer, Lucas, & Claxton, 2012).
The 5 elements that define the Centre for Real-World Learning (CRL):

1. It is a research-based organization that is focused on understanding how people learn in the real world.
2. CRL aims to bridge the gap between education and the needs of the workplace by promoting creativity, innovation, and critical thinking.
3. The organization uses a multidisciplinary approach that draws on research from psychology, sociology, economics, and other fields to inform its work.
4. CRL's work is centered around developing practical tools and strategies for teachers, learners, and employers that can help them improve their skills and achieve their goals.
5. Finally, CRL is committed to promoting social justice and equity in education by working to reduce the achievement gap and increase opportunities for all learners.

The use of PowerPoint has been found to positively impact the relationship between instructors and students, according to Andrew (2018). San Bolkan (2018) analyzed the effect of technology on students' abilities by examining their test scores. Alan K. (2015) used humor in instruction to examine how teachers' wit could enhance students' learning outcomes, and found that learning alignment was a positive predictor of students' cognitive learning. Although mobile phones are often viewed as a distraction in the classroom, text recommends that they can have a positive effect on education, with potential uses including language learning, quizzes, and accessing information (Prensky, 2004; Kukulska-Hulme & Traxler, 2005). Additionally, mobile technology offers opportunities for learning outside the classroom and real-world application in subjects like science (Naismith, 2004; Ekanayake & Wishart, 2010).

To ensure quality and excellence in education, it is important to incorporate new technologies that will meet the demands of the future. Creativity is a critical component of education, and leveraging ICT can help foster it. One innovation that can enhance creativity-oriented learning is the development of a learning management system (LMS). E-learning can inspire and guide creativity, and instructors can incorporate strategies to tap into learners' creativity in their course development.

Empowering Communication in the Teaching-Learning Process through Ubiquitous Learning and Web 2.0 Technology Tools:

In modern times, the utilization of technology has become an integral component of how individuals communicate, with digital communication primarily based on written and/or oral messages. With internet technologies, people can communicate anytime and anywhere in the world. Digital interface abilities have become the meeting point for senders and receivers, and special iconic symbols are designed to facilitate better communication between people. Learning from the ubiquitous environment doesn't require individuals to be professionals as these systems are personalised and easy to use. Learners can receive information in a specific format that aligns with their perceptions.

Communication is a fundamental aspect of the teaching and learning process. With the rise of technology, communication has become even more important as it has enabled students and teachers to communicate and collaborate more effectively. According to Crompton (2013), the use of ubiquitous learning and Web 2.0 technology tools has transformed communication in education, enhancing learning experiences, and improving student engagement.

One way that technology has empowered communication in education is through ubiquitous learning, which is the concept of learning that occurs anytime, anywhere, and on any device. According to Sharples (2019), ubiquitous learning has facilitated communication in education by providing learners with access to learning materials, resources, and support systems through mobile devices and the internet. This has made communication between learners and teachers more accessible and has enabled learners to engage in collaborative learning, regardless of their physical location.

Web 2.0 technology tools have also revolutionized communication in education. These tools, which include social media platforms, online collaboration tools, and video conferencing software, have enabled learners to communicate and collaborate with their peers and teachers in real-time, regardless of their geographical location. According to Hew and Cheung (2013), Web 2.0 technology tools have enhanced communication in education by providing learners with opportunities to engage in group discussions, share resources, and receive feedback from their teachers and peers.

Moreover, Web 2.0 technology tools have also facilitated the creation and sharing of multimedia content. Learners can now create and share audio and video content, which can be used to enhance their understanding of concepts and share their learning experiences with others. According to Ritzhaupt (2013), the use of multimedia in education has been shown to improve student engagement and motivation, as well as enhance learning outcomes.

In conclusion, ubiquitous learning and Web 2.0 technology tools have revolutionized communication in education, empowering learners and teachers to communicate and collaborate more effectively. These tools have provided learners with access to learning materials and support systems, enabled real-time communication and collaboration, and facilitated the creation and sharing of multimedia content. As technology continues to evolve, the potential for communication in education will continue to expand, creating new opportunities for learners and teachers to engage in meaningful communication and collaboration.

Research Methodology

This study follows Positivism theory which relies on logic and sensory organs to explore natural phenomena. It supports this philosophy and seeks to identify the most influential independent variable. Research philosophy is crucial in social science investigations as it helps select methodology and theoretical framework, while review of literature identifies the philosophical approach. Philosophical approaches guide researchers in problem-solving, and intermediate philosophical approaches allow for a match between methodology, philosophy, and the research problem.

Research Method: By purpose it is an applied research. By Approach it is a quantitative research. Postpositive knowledge claim support quantitative research approach. This study has been describing the relationship of independent variables with dependent variable. Random sampling was used as the sampling technique in this research study. Descriptive and inferential statistics applied. For analysis reliability, correlation and regression test has been used through SPSS latest version. Results have been showed the level of significance.

Research Design: refers to the framework of research techniques that a researcher selects to investigate a particular topic. This design enables researchers to use appropriate research methods for their subject matter and establishes their studies to achieve success.

The current research is quantitative and descriptive in which researcher revealed statistical conclusions to collect actionable insights. The current research has regression model and through SPSS regression test has been run to test hypothesis. There are four hypothesis in the current research in which relationship of Students' Ubiquitous Learning and Students' 21st Century Skills has been analyzed. The sample of the current research focused only public university teachers of Sindh and Punjab Province of Pakistan. Lahore and Karachi city have been selected as target population. 05 public sector universities have been chosen for collecting data through simple random sampling as a target sample. The deductive approach has been used to analyse the data. This current research is quantitative and close ended questionnaire has been used for collecting data. The opinion of teachers has been taken through questionnaire. From 05 universities 500 teachers have been selected randomly. For Measurement of analysis a close ended questionnaire having 07 Likert scale has been used to collect the survey opinion. Reliability test and t-test has been run through SPSS software for analyzing data in the current research. There have been no apparent objections to the research. The settings for the research study is natural. It was one year cross-sectional research. The current research study is purely quantitative and has a deductive approach.

Population, Sample and Sampling:

A research population refers to a clearly defined group of individuals or objects that share similar characteristics and are the primary focus of a scientific investigation. Conducting research is typically done for the benefit of the population being studied. In order for research findings to be meaningful and accurate, the sample selected for the study must be representative of the population being studied and must be of sufficient size to allow for statistical analysis. The population "provides" the sample, and the conclusions drawn from the study are then applied back to the population as a whole.

The population for this study includes all teachers working in public sector universities in Pakistan. The sample of the current research focused only public sector university teachers of Sindh and Punjab Province of Pakistan. Lahore and Karachi city have been selected as target sample of 05 public sector universities have been chosen for collecting data through simple random sampling. From 05 public universities, 500 teachers have been chosen as a target sample. In current research simple

random sampling has been chosen. 05 public sector universities have been chosen for collecting data through simple random sampling.

Research Tool:

In this study, Ubiquitous learning is an independent variable 21st century skills (creativity and communication) are the dependent variable. There are 50 items in the close ended questionnaire to measure variable. All the items have 07 sub-scale such as e.g. 1 [strongly disagree] to 7 [strongly agree].

Data Collection and Data Analysis Procedure:

Quantitative Method:

Quantitative research methods involve presenting data in numerical form and typically require mathematical calculations to arrive at conclusions. For example, using a questionnaire with closed-ended questions can produce numerical data that can be analyzed mathematically. Other quantitative methods include correlation and regression analyses, as well as calculating measures of central tendency such as the mean, mode, and median.

Online questionnaire has been floated among our social circle to gather the required responses through Google forms and other hand, physically fill up the questionnaire by respondent through survey method.

To gather the necessary responses for this study, an online questionnaire was distributed among our social circle using tools like Google Forms. In addition, a physical questionnaire was also made available to respondents through survey methods. The collected data was analyzed using SPSS v21, with statistical methods like reliability tests, and t-test being used to analyze the variables based on the primary data obtained from the survey questionnaire.

Data Analysis and Interpretation

Analysis: as per the frequency table value "University" was found as Benazir Bhutto Shaheed University Liyari 20%, Federal Urdu University of Arts, Science & Technology, Karachi 20%, Punjab University Lahore 20%, Sindh Madressatul Islam University Karachi 20% and University Of Karachi 20%.

Table 3:

Religion wise analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Christian	9	1.8	1.8	1.8
	Hindu	8	1.6	1.6	3.4
	Islam	483	96.6	96.6	100.0
	Total	500	100.0	100.0	

Analysis: as per the frequency table value "Religion" was found as Christian 1.8%, Hindu 3.4%, and Muslims 96.6 %

Table 4:

Gender wise analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	206	41.2	41.2	41.2
	Male	294	58.8	58.8	100.0
	Total	500	100.0	100.0	

Analysis: as per the frequency table value "Gender" was found as Female 41.2%, and Males 58.8 %

Table 5:

Age wise analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21 to 30 years	197	39.4	39.4	39.4
	31 to 40 years	303	60.6	60.6	100.0
	Total	500	100.0	100.0	

Analysis: as per the frequency table value "Age" both males and females were found as 21 to 30 years 39.4% and 31 to 40 years 60.6%.

Table 6:

Group Statistics

	Gender	n	Mean	Std. Deviation	Std. Error Mean
TotalCRUL	Male	294	23.663	8.8860	.5182
	Female	206	24.597	8.0096	.5581
TotalCMUL	Male	294	21.170	8.2919	.4836
	Female	206	22.238	6.8044	.4741
Gtotal	Male	294	44.833	17.1779	1.0018
	Female	206	46.835	14.814	1.0322

Analysis: From the calculated data it is clear that the entire male & female are strongly agree & agree. The mean and standard deviation of the data were taken and proved, strongly agree & agree. So, it is accepted that the Ubiquitous learning is enhanced the 21st century skills, creativity and communication among university students.

Table 6:

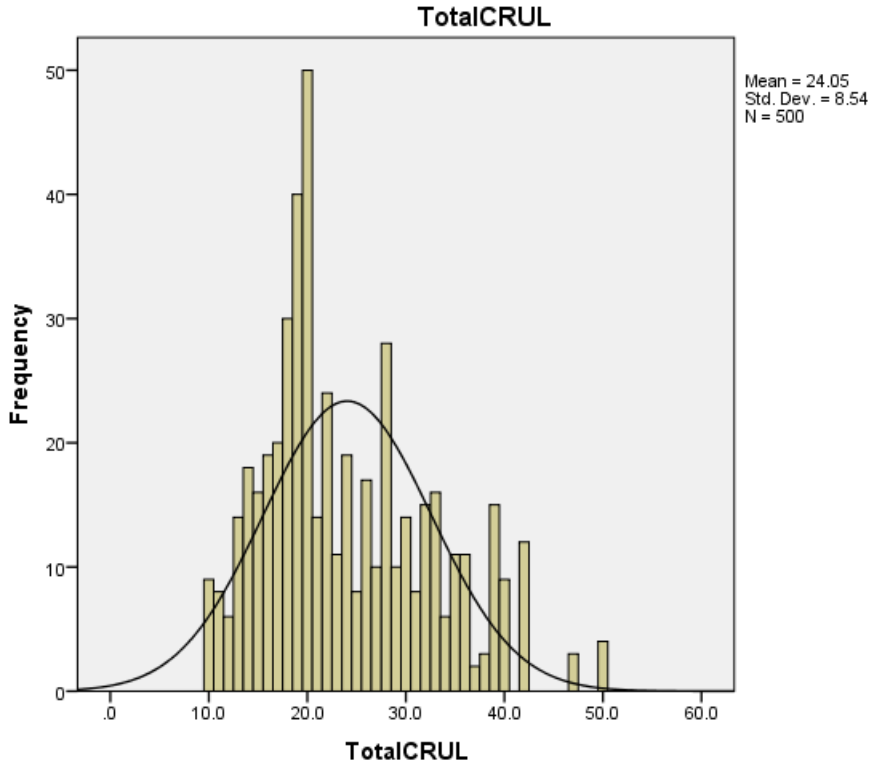
Independent Samples Test

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
TotalCRUL	-1.204	498	.229	-.9338	.7756	-2.4577	.5900
TotalCMUL	-1.523	498	.128	-1.0678	.7009	-2.4450	.3094

Analysis: Based on the results of the statistical calculation of the t-test Null hypothesis are rejected in this study and research hypothesis are accepted. It means that there is a significance impact of students Ubiquitous learning through web 2.0 tool on students creativity and communication. The finding shows a significant impact of U-learning in developing 21st century skills creativity and communication among university students.

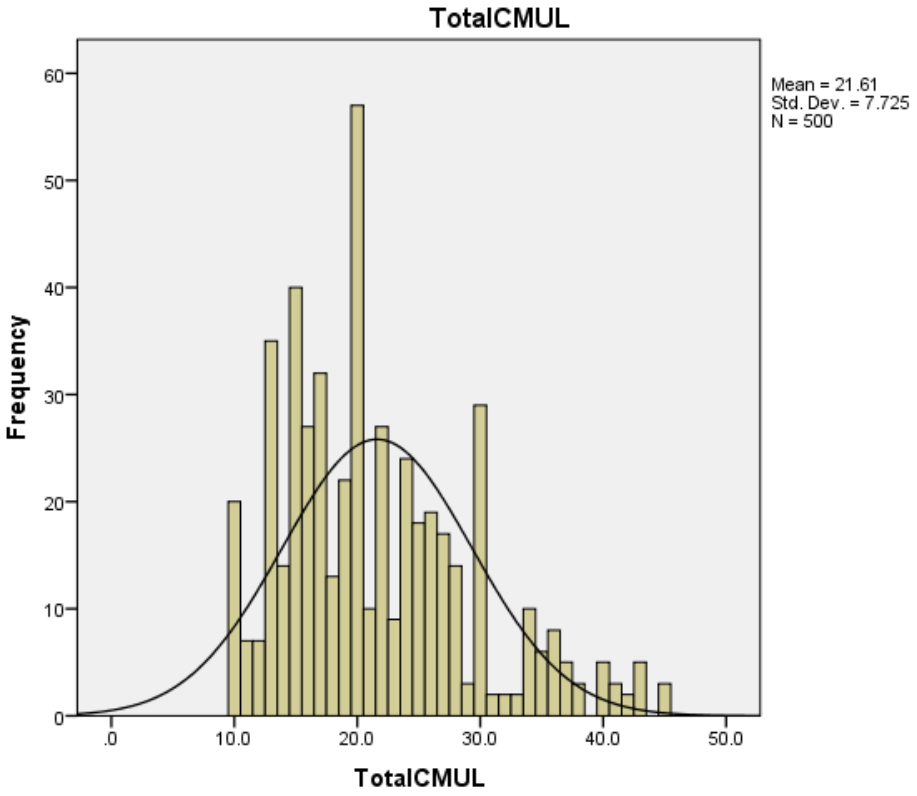
Graph 1

Creativity and Ubiquitous Learning



Graph 1 shows that Mean=24.05, Std. Dev. = 8.54 regarding Creativity and Ubiquitous Learning.

Graph 2
Communication and Ubiquitous Learning



Graph 2 **s**hows that Mean=21.61, Std. Dev. = 7.725 regarding Communication and Ubiquitous Learning.

Results and Discussion

The current study found that Ubiquitous Learning (UL) has a significant positive impact on the development of 21st century skills, particularly creativity and communication, among university students. UL involves various levels of interactions driven by intrapersonal and psychosocial processes. Task-oriented interactions, which focus on skill and ability development, are generated through processes of ability skill imitation, negotiation, and argumentation. Meanwhile, person-oriented interactions, which involve technology-mediated social and group dynamics, are generated through processes of impression formation, mentalizing, social observation, and communication. UL enables the web learning community to reflect on the interaction between the intra-individual reality and the external technology-intensive experience. The study suggests that there is a need to reconsider traditional views on university learning and to involve decision-makers in institutional policies on teaching and learning. Although the study's findings are consistent with international research studies, further research is necessary in Pakistan to enhance the quality and standard of education.

Conclusions

The research study has achieved its objectives as it has found a significant positive impact of Ubiquitous Learning (U-learning) on the development of 21st-century skills, such as creativity and communication, among university students. This suggests that U-learning can improve the development of these skills among students at the university level. The implications of this study are highly beneficial for the enhancement of the education process, teaching methods of teachers, and learning outcomes of students. The findings of this research can assist teachers in implementing technology-based teaching-learning processes and fostering 21st-century skills among university students, which will contribute to the betterment of the economy and society in Pakistan and globally.

Recommendations

- Teachers and students should be provided with opportunities to engage in Ubiquitous Learning (U-learning).

- Efforts should be made to enhance the development of 21st century skills among students, which are essential for survival in the modern era.
- Teachers should be provided with ICT-based training to effectively integrate technology into teaching and learning.
- Management of educational institutions should give serious attention to the use of ICT to face the challenges of the 21st century.
- The importance of ICT integration in education should be recognized by the management.
- Both public and private sector universities should promote the infrastructure necessary for U-learning among their students.
- Curriculum and Pedagogy: Curriculum developers and educators should consider integrating U-learning and 21st century skills into the curriculum and pedagogy. This can be done through the creation of new courses, revision of existing courses, and the incorporation of U-learning tools and resources.
- Collaboration and Partnership: Collaboration and partnership among universities, private sector companies, government agencies, and non-governmental organizations should be encouraged to promote the integration of U-learning and 21st century skills in education. These collaborations can help provide resources, support, and expertise to ensure the success of U-learning initiatives.
- Research and Development: Further research and development should be conducted to explore the potential of U-learning in enhancing other skills and competencies among university students. This can help identify new opportunities for U-learning and ensure that it remains a relevant and effective approach to teaching and learning in the 21st century.
- Funding and Resources: Universities, governments, and other stakeholders should allocate sufficient funding and resources to support U-learning initiatives and the development of 21st century skills among university students. This can help ensure that U-learning is accessible and affordable to all students, regardless of their socio-economic background.

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