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ANALYZING THE LEVEL OF 21 CENTURY SKILLS PERCEIVED BY THE STUDENTS OF PUBLIC UNIVERSITIES

*Ambar Farooq[1], Mushtaq Ahmad[2], Ahmad Bilal Cheema[3]

[1] PhD scholar, Institute of Education, University of Sargodha, Punjab, Pakistan.

[2] Associate Professor, Institute of Education, University of Sargodha, Punjab, Pakistan.

[3] Assistant Professor, Institute of Education, University of Sargodha, Punjab, Pakistan.

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ABSTRACT

The world has knowledge-based economy. So, the international higher education system is responsible to produce graduates with 21st-century skills. This research study aimed to Analyzing the level of 21 century skills perceived by the students of Public Universities. Research questions were: (1) What is the level of 21st-century skills of male and female students? (2) What is the gender-based difference of 21st century skills among university students? and (3) Is there any difference of 21st century skills among the students of different universities? This study used the survey design. The study population was undergraduate students of all general public universities in Punjab, Pakistan. The final sample comprised 900 undergraduate students selected from five general public universities. The data were collected using self-developed rating scale for 21st century skills validated through five experts' opinion and pilot testing on 507 students with Cronbach alpha value 0.89. The findings were that university students have average level of 21st-century skills. Male and female students have overall equivalent level of 21st Century Skills. It is recommended that University authorities especially curriculum development committees may incorporate content and activities to improve 21st Century Skills.

***Corresponding Author's Email:** dramberfarooq@gmail.com

INTRODUCTION

Skills have always been described as the required and necessary tools for an individual to carry out certain tasks with efficiency. With an ever-changing world, new skills are also on the rise. The global demand for these skills is also on the rise. Pakistan's economy, job market and technologies are on the verge of change. The skill gaps being seen are lowering output, job creation and also economic growth (World Bank, 2019).

A developing country like Pakistan, needs integration of technology in every industry, for this purpose it is ultimate requirement that every graduate must have modern age skills like digital literacy, collaboration, critical thing and problem solving etc. (Lassar et al., 2000). These are also called 21st century skills. Universities are trying to impart all the necessary skills in the graduates whereas a new scenario is arising (Fatima et al., 2020). As the number of female students is increasing in the universities, and female students earn better grades (Ameen, et al., 2007). Here a question arises that either female and male graduates are acquiring equal skills or not.

In Pakistani society, male and female students have different experiences. Similarly, the learning styles are also different among both male and female students. In one classroom and learning process, the knowledge absorption level of male and female students ought to be different (Mamnoun, 2023). So, it is necessarily the needed to make gender base comparison of students' 21 century skills in Public Universities of Pakistan.

As one of the major developers of workforce skills, universities also need to make sure students have all the skills required by the market (Stehle & Peters-Burton, 2019). 21st-century skills are referred to as a set of skills, knowledge, and mindsets that students should master to successfully enter the modern labor market (Scott, 2023).

The 21st century skills mostly include civic skills, critical thinking, creativity, communication, digital literacy, problem-solving, metacognition, and global citizenship (Tabari, Norian, & Damsaz, 2022). According to Van Laar et al. (2017), digital or ICT skills are technical skills and proficiency, information skills, communication skills, and interpersonal skills, higher-order thinking skills are collaboration, creativity, problem-solving and critical thinking skills, and lifelong learning skills are information literacy, scientific and technological literacy, ethical sensitivity, cultural literacy, adaptability, openness, and motivation skills,

Pakistani universities are responsible for the progress in human capital to support economic growth of the country. To provide the industry with a skilled labor force that can adjust with the fast changing international economy, students have to develop and master various skills such as technological skills, critical thinking, innovation, collaboration, and communication skills to become employable. Research investigating the development of 21st-century skills in Pakistani university students is limited. The present research attempts to Analyzing the level of 21 century skills perceived by the students of Public Universities.

The 21st century skills of students includes the collection of competencies necessary for a student to succeed in the workplace, is to be measured by indicators such as digital literacy، collaboration، innovation, communication, and critical thinking.

A focused approach to skills development is essential in designing curricula and classroom practices to nurture the vital 21st century competencies. Technology integration is one way to accomplish this task, seamlessly incorporating information, digital literacy, and media, as well as encouraging teamwork, communication, problem-solving, and active learning. Technology can also help promote higher-order thinking through the digital tools and alternative assessment methods (Chang & Kuo, 2025). Active learning is another important piece of the puzzle. This can take the form of internships, project-based work, or other hands-on tasks that help students gain practical knowledge and skills. Kolb (2014) supports this experiential approach to learning, stating it can be used to develop critical reflection, discussion, and action. Faculty development and training are also important to achieve this goal. Teachers need the necessary training to new learning approaches, technology, interdisciplinary, and cultural fluency (Anderson & Dexter, 2005). The government of Pakistan is slowly recognizing the importance of 21st century skills, but local habits are challenging to reform. The lack of funding has resulted in a lack of innovation, technological development, and infrastructure growth. It will take time to make the system ready. There is a need for government investment in infrastructure and capacity-building of the teaching staff.

The growth of 21st century skills in students is vital. This involves skills such as media literacy, critical thinking, civic literacy, collaboration, creativity, and problem solving, determination, information literacy, self direction and social skills (Dede, 2009; Silva, 2008).

Media literacy is a skill of accessing, analyzing, evaluating, creating, and acting via all types of communication (National Association for Media Literacy Education, 2022). Critical thinking is an intellectual way of dynamically and competently comprehending, using for analysis, and then synthesizing information collected through experience, reasoning, observation, communication, or reflection, lead to some certainty and taking actions accordingly (Scriven & Paul, 2007).

Whereas civic literacy is the knowledge and skills required for the information to become an empowered and engaged national (Gould, 2011). In the same way, collaboration is the working together of two or more person to attain common goal(s) (Thoughtfarmer, 2025). On the other hand, creativity is the method of constructing some novel and beneficial thing(s) (Amabile, 2016). Similarly, Problem solving is way of recognizing a problem, collecting data or material, to produce solutions, applying the solution and then evaluating its usefulness (Dion, 2019). Along with this determination is a mental condition to be committed to a definite objective(s) or consequence, persistently (Duckworth & Gross, 2015). Whereas Information literacy is a capability of understanding that now information is required, further having the skills to find out, assess and apply the information effectively (Bundy, 2017). Likewise, self-direction is also a capability of adjusting self-learning and mental processes (Zimmerman, 2015). The most importantly is social skills which means the explicit activities and mental progressions enabling one person to intermingle excellently with others (Dirksey et al., 2020). To develop all these skills in students, University education, in this context, involves the purposeful and effective use of technology, while critical thinking empowers students to enhance their logical evaluation and problem-solving abilities.

Collaboration, communication, and creativity skills enable students to address complex problems in diverse and efficient ways to improve students' 21st century skills.

RESEARCH QUESTIONS

The following were the research questions of the study:

1. What is the level of 21st-century skills of male and female students?
2. What is the difference of 21st century skills between male and female university students?
3. Is there any difference of 21st century skills among the students of different universities?

By focusing on the 21st century skills, it endeavors to generate deeper insights and knowledge to address the current gaps and challenges.

METHODOLOGY OF THE STUDY

The study was delimited to public sector general universities only as the public general universities made up a significant and large percentage of Pakistan's overall higher education institutions and that public general universities within only, Pakistan provided the researcher a set population of higher educational institutes that were somewhat comparable and homogenous, providing an opportunity for control and comparison.

A survey design was utilized, to assess undergraduate students' 21st-century skills in selected Pakistani universities.

Population and sampling

Students were the participants from selected public universities. A stratified random sampling for students was used as the following steps. At first using stratification by University Ranking, five top-ranked public universities were selected based on the Higher Education Commission (HEC) ranking; within each university, three faculties were randomly selected. From each faculty, four departments were chosen at random to ensure diversity across academic disciplines; 10% of Undergraduate Students were randomly selected.

Instrumentation

A self-developed '21st-Century Skills rating scale' was used to collect the data about university students' self-perception of their 21st-century skills. A comprehensive literature review was done to generated relevant items for Students' 21st Century Skills" including the factors civic literacy, social skills, critical thinking, media literacy, communication, information literacy, creativity, collaboration, self-direction, and problem solving, each have five (5) statements. Next, senior academicians were requested to review the instruments and provide content and face validity feedback. Finally, a pilot study was conducted on 507 students of two universities (and these were not included in actual sample) to establish reliability. Factor analysis (Principal component analysis) was performed and sub factors of each major factor were determined by factor analysis and the results are presented in the following table. The value 0.7 or more than 0.7 is acceptable; whereas overall Cronbach Alpha value was 0.89 which shows good reliability.

Data collection and Analysis

The researcher visited the sampled universities, in person, and administered rating scale to sampled students in each of the universities. The students were briefed and ensured that the data given by them will be held in confidential and will not be used other than research purpose. Descriptive statistics i.e. frequencies, mean, and standard deviation and inferential statistical techniques t-test and ANOVA etc. were applied to analyze the data.

Data Analysis and Results

Table 1

Analysis of University Students' Responses on factor

S#	Factors	Mean	SD	SA f	A f	N F	DA f	SD f
1.	Critical thinking	4.03	0.89	45.8% 2061	37.6% 1692	11.2% 504	3.8% 171	1.6% 72
2.	Communication Skills	4.24	0.55	62.4% 2808	32.8% 1476	3.8% 171	0.8% 36	0% 0
3.	Creativity	4.20	0.59	59.4% 2673	34.6% 1557	4.8% 216	1.2% 54	0% 0
4.	Problem solving	4.05	0.63	56.6% 2547	36.4% 1638	5.4% 243	1.4% 63	0.2% 9
5.	Determination	4.17	0.55	57.8% 2601	36.2% 1629	4.8% 216	1.2% 54	0% 0
6.	Collaboration Skills	4.25	0.53	62.0% 2232	33.0% 1188	4.0% 144	1.0% 36	0% 0
7.	Information Literacy Skills	4.22	0.53	60.6% 2727	34.4% 1548	4.0% 180	1.0% 45	0% 0
8.	Media Literacy Skills	4.25	0.55	61.8% 2781	33.2% 1494	4.0% 180	1.0% 45	0% 0
9.	Social Skills	4.28	0.55	63.5% 2286	31.8% 1143	3.8% 135	1.0% 36	0% 0
10.	Self Direction	4.28	0.54	63.6% 2862	32.0% 1440	3.6% 162	0.8% 36	0% 0
11.	Civic Literacy Skills	4.35	0.53	68.0% 3060	28.2% 1269	2.8% 126	1.0% 45	0% 0
12	Overall 21st century skills	4.21	0.58	38638 60.05%	16074 33.7%	2277 4.77%	621 1.3%	81 0.17%

Strongly Agree=SA, agree=A, Neutral=N, disagree=DA, Strongly Disagree=SD

Overall, majority (83.4%) of university students (with M=4.03, SD=0.89) opined that they have critical thinking skills. Most (95.2%) of the university students' (with M=4.24, SD=0.55) opined that they felt positive about their communication skills. Similarly, most (94%) of the university students' (with M=4.20, SD=0.59) opined that they felt and believed that they are creative thinkers, especially when solved problems or learnt new things. Likewise, most of the (93%) of the university

students' (with M=4.05, SD=0.63) stated that they have strong problem-solving abilities, especially in applying and evaluating solutions. Equally most of the (94%) of the university students' (with M=4.17, SD=0.55) reflected that they have good determination, particularly in learning and adaptation. Most of the (95%) of university students' (M=4.25, SD=0.53) opined that they reflected positive picture of students' collaborative capabilities.

Overall, almost (95%) of university students (with *M*=4.22, *SD* = 0.53) expressed that they have good information literacy skills; strong media literacy skills (M=4.25, SD=0.55) stated that they have strong media literacy skills and they have (M=4.28, SD=0.54) widespread confidence in self-directed learning capabilities and strong self-direction skills. Most (96.2%) of the students (M=4.35, SD=0.53) also stated that they demonstrate near-universal student competence in civic literacy matters. Overall most (94%) of the university students (M=4.21 & SD = 0.58) claimed that they are good in 21st century skills.

Table 2

Level of Students' 21st century Skills

S#	Factors	Poor F & %	Satisfactory F & %	Average F & %	Very Good F & %	Excellent F & %
1	Critical thinking	Nil	208 (23.1%)	55 (6.1%)	620 (68.9%)	17 (1.9%)
2	Communication skills	Nil	3 (.3%)	46 (5.1%)	844 (93.8%)	7 (.8%)
3	Creativity	Nil	1 (1%)	270 (30%)	620 (68.9%)	9 (1%)
4	Problem solving	Nil	1 (1%)	270 (30%)	607 (67.4%)	22 (2.4%)
5	Determination	1 (.1%)	3 (.3%)	261 (29%)	615 (68.3%)	20 (2.1%)
6	Collaboration	Nil	28 (3.1%)	848 (94.2%)	24 (2.7%)	Nil
7	Information literacy	Nil	Nil	63 (7.0%)	828 (92%)	9 (1%)
8	Media literacy	Nil	2 (.2%)	54 (6%)	832 (92.4%)	12 (1.3%)
9	Social skills	1 (.1%)	17 (1.9%)	857 (95.2%)	25 (2.8%)	Nil
10	Self-direction	1 (.1%)	Nil	37 (4.1%)	852 (94.7%)	10 (1.1%)
11	Civic literacy	Nil	Nil	36 (4%)	818 (91%)	46 (5.1%)
	Total 21st century skills	Nil	Nil	Nil	605 (66.2%)	295 (31%)

Table 2 shows that analysis of students' responses regarding their 21st-century skills, the majority of the students (71.8%) claimed to have very good and excellent critical thinking skills; likewise, majority of the students (94.6%) reported to have *very good* and *excellent* communication skills; Similarly, majority of the students 71% reflected to have *very good excellent* creativity skills. likewise, the majority of the students 70% claimed to have *very good* and *excellent* problem solving skills. The majority of the students 70.4% stated to have *very good* and *excellent* determination. Whereas majority (94.2%) students reported to have average collaboration skills. The majority of the students 93% claimed to have *very good)* and *excellent* information literacy skills. The majority of the students 93.7% stated to have *very good* and *excellent* media literacy skills. On the other hand majority of the students (95.2%) expressed that they have *average* social skills. Most (95.8%) of the students described to have *very good* and *excellent* self-direction skills. The majority of the students 96% reported that they have very good and excellent civic literacy skills. Overall, most (97.3%) of the students claimed to have very good and excellent for 21st century skills.

Table 3

Gender based comparison of Students' 21st century skills in critical thinking

S#	Variable	Group	Mean	SD	t-value	p-value
1	Critical thinking	Male	4.03	.77	0.11	0.90
		Female	4.03	.72		
2	Communication skills	Male	4.20	.26	-2.27	0.02
		Female	4.25	.31		
3	Creativity	Male	4.18	.33	-1.07	0.28
		Female	4.20	.35		
4	Problem Solving	Male	4.11	.42	-1.69	0.09
		Female	4.16	.43		
5	Determination	Male	4.12	.33	-2.48	0.01
		Female	4.18	.38		
6	Collaboration	Male	4.24	.33	-0.76	0.44
		Female	4.26	.33		
7	Information Literacy	Male	4.21	.27	-0.21	0.83
		Female	4.22	.29		
8	Media literacy	Male	4.22	.26	-1.64	0.10
		Female	4.25	.33		
9	Social Skills	Male	4.29	.35	0.73	0.46
		Female	4.27	.38		
10	Self-direction	Male	4.29	.28	0.37	0.70
		Female	4.28	.32		
11	Civic Literacy	Male	4.35	.29	-0.05	0.95
		Female	4.35	.32		
12	Overall 21st Century Skills	Male	222.9	14.2	-1.26	.208
		Female	224.2	15.6		

Table 3 shows that no significant difference was found between male and female students w.r.t. critical thinking skills (t =0.11, p = 0.90 > 0.05); creativity skills (t =-1.07, p = 0.28 > 0.05); problem solving skills (t =-1.69, p = 0.09 > 0.05); collaboration skills (t =-0.76, p = 0.44>0.05); social skills (t = 0.73, p = 0.46); information literacy skills (t = -0.21, p = 0.83> 0.05); media literacy skills (t = -1.64, p = 0.10>0.05); self-direction skills (t = 0.37, p = 0.70> 0.05) and civic literacy skills (t = -0.05, p = 0.95> 0.05).

While a significant difference exists between female and male students' communication skills (t =-2.27, p = 0.02< 0.05). Greater means score (M = 4.25, SD = 0.32) shows that female Students have better communication skills as compared to male students (M=4.20, SD =0.27). Similarly, there is a significant difference of determination skills between female and male students (t = -2.48, p = 0.01 < 0.05). Female students with a higher mean score (M =4.18, SD =.38) showed better determination skills as compared to male students, with mean score of (M= 4.12, SD = 0.33).

Overall female and male university students reported to have equal 21st Century Skills (as reflected by (t = -1.26, p = .208 > 0.05).

Table 4

Comparison of University-wise students' 21st century skills through ANOVA

Factor		Sum of	Mean Square	df	f	Sig.
Civic literacy	Between Group	2.35	0.58	4	6.11	.000
	Within Group	86.28	.09	895		
	Total	88.63		899		

Table 4 shows that a significant difference of 21st century skills was found among the students' of different universities as indicated by (F = 6.11, p= .000 < 0.05). Therefore, further to find out the magnitude post hoc test least significant difference (LSD) was applied and only significant results are presented in the following table 5.

Table 5

Post Hoc comparison of university-wise students' 21st century skills

University	University	Mean Difference	Std. Error	Sig.
Quaid-e-Azam	University of Punjab	.08	.03	.00
	BZU University	.16	.04	.00
University of Punjab	GC University Faisalabad	-.11	.03	.00
GC University Faisalabad	BZU University	.19	.04	.00
	UOS	.08	.03	.01
BZU University	UOS	-.11	.04	.01

Table 5 presents the comparison of university-wise students' 21st-century skills. The analysis of data showed significant differences among universities. Students at Quaid-e-Azam University reported to have significantly higher 21st century skills as compared to the students of the University of Punjab (MD = .08, p = .00 < 0.05) and BZU University (MD = .164, p = .00 < 0.05). Similarly, students of GC University Faisalabad reported higher 21st century skills in comparison of University of Punjab (MD = –.11, p = .00 < 0.05) BZU University (MD = .19, p = .00 < 0.05). and also than University of Sargodha (MD = .08, p = .01< 0.05). Moreover, students of BZU University reported higher 21st century skills than University of Sargodha (MD = –.11, p = .010 < 0.05). Overall, the findings indicate that GC University and Quaid-e-Azam University students reported comparatively better 21st century skills, followed by the students of BZU University.

CONCLUSIONS AND DISCUSSION

1. Students rated themselves highly on measures of 21st-century skills, particularly communication, collaboration, information literacy, media literacy, and civic literacy. These findings are consistent with recent research on Pakistani students developing transversal skills on university campuses, as they shift towards global standards (Javed & Bajwa, 2022). Further this is again aligning with recent work indicating the narrowness of grades-focused indicators in capturing important aspects such as creativity, collaboration, and media literacy (Ali & Saeed, 2022; Zafar et al., 2023).
2. Female university students reported their higher communication skills and problem solving skills as compared to male university students. The result is similar to the findings of Zubair et al., (2018) that in Pakistan, female students studying in universities presented better social and problem-solving skills than male students. whereas both male and female students reported to have equivalent creativity skills, collaboration skills, information literacy skills, media literacy skills, self-direction skills and civic literacy skills. The result is similar to the findings by Dolničar (2023) that male and female students tend to have similar levels of creativity, collaboration, information literacy, media literacy, self-direction, and civic literacy skills. Another study by Khan and Khan (2019) in Pakistani universities found no significant gender differences in critical thinking and creativity skills, indicating equivalent abilities in these areas. One more study by Rafiq et al., (2021) found that information literacy skills revealed no statistically significant difference between male and female students, suggesting equal proficiency. Possible reason may be that day by day due to advancement in mobile phones technology and availability for both the gender is the reason of this equivalent results.
3. A final, notable finding is that students of GC University Faisalabad and Quaid-e-Azam University reported about their higher 21st century skills than the students of other universities. Possible reason of this result may be the ranking of these universities and also that these universities are situated in advanced cities like Islamabad and Faisalabad.

RECOMMENDATIONS

As the students of Sargodha university reports is that they have lower 21st century skills in comparison of other universities. So, it is recommended that University authorities and curriculum development committees may revise the curricular outlines to incorporate such content and activities relevant to 21st century skills.

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