

## **An Investigation about Creative and Critical Thinking Skills of Prospective Teachers: A Preliminary Study**

Maimoona Naeem\* and Rizwan Akram Rana\*\*

---

### **Abstract**

This preliminary study was designed to probe the prevalence of two main 21<sup>st</sup> century higher order thinking skills which are creative and critical thinking skills. The sole objective of the study was to examine the perception regarding the current level of creative and critical thinking skills among prospective teachers. All terminal semesters' prospective teachers of public universities of the province Punjab from B.Ed. Honors and B.Ed. (1.5) were population of the study. The sample of the study was consisted of 311 prospective teachers of terminal semesters from two programs i.e. B.Ed. (1.5) and B.Ed. Honors. The convenient sampling technique was used to collect the data from five public sector universities. The instrument was a self-assessment scale based on two main higher-order thinking skills. Creative thinking skills were constructed on eight sub-factors and critical thinking skills on six sub-factors. Two instruments Creative Process Assessment Scale (CPAS), English and Urdu version by Schuler & Görlich (2007) and Critical Thinking Self-assessment Scale (CTSAS) short form by Payan et al. (2022) were adapted and merged for construction of a single self-assessment seven point likert-scale. The quantitative survey research was applied. The descriptive statistics were used to run the analysis. The study concluded the dominance of perception as low level of creative and critical thinking skills among prospective teachers.

**Keywords:** Creative Thinking Skills, Critical Thinking Skills and Prospective Teachers

---

\* Ph.D. Scholar, Department of Education, University of Management and Technology Lahore.  
Email: f2021095012@umt.edu.pk

\*\* Chairperson, Department of Education, University of Management and Technology Lahore.  
Email: rizwan.akram@umt.edu.pk

## **Introduction**

The growing incorporation of AI presents abundant challenges for the future workplace. Despite Industry revolution 4.0 being in its early stages, several industry trailblazers and tech leaders are already envisioning the emergence of the Fifth Industrial Revolution, often referred to as Industry 5.0. The industrial revolution 5.0 is almost set to join us (Mourtzis, 2021) and the industrial revolution 4.0 had already made a loud call embarked with globalization and a transferal from previous era to 21<sup>st</sup> century. The 4.0 industrial revolution encompasses the use of AI, openness of information and extensive transition of life style (Sepriyanti et al., 2021).

The requirements of the 21<sup>st</sup> century underscore the crucial requisite for top-tier human means, refined by institutions with skillful management to yield loftier results. These sprouting necessities prompt novelties in thinking and actions (Ramirez, 2018). Today's employment landscape entails persons skillful enough for operating, producing, and managing new information via technology. In this case, educational institutions own the chance to boost student eagerness for the demands of the contemporary millennium, relevant to required thinking skills (Miterianifa, 2021). The educational system is only a path to bridge the gap between job market supplies and programs intended to equip learners to strive effectively in this dynamic setting and at diverse workplaces (Khan et al., 2019).

In the up-to-minute time of knowledge-driven economy, higher education plays a pivotal part in the economic expansion and affluence of populations through learners as deep thinkers (Bhattacharya & Mohalik, 2021). A far the concern of spawning new knowledge, organizations of higher education including teacher education institutions are delegated with the task of enhancing forward-thinking skills in young learners, that is essential for booming in the new millennium. Higher education is the motivating force behind the uplifting and enrichment of a country's social, scientific, financial, technological and industrial headway (Khan, 2019; Miterianifa, 2021).

Contemporary higher education is viewed as a capital investment which is crucial for the societal and economic expansion of any nation. Institutions of higher education stand the chief obligation of training learners with conceptual knowledge and skills for assuming significant positions at diverse job places (Ramirez, 2018). Task of higher education bodies outspreads beyond imparting knowledge in specific disciplines; it is deeper and more multidimensional, encompassing personal, social, cultural, and economic development (Khan et al., 2019).

The current tasks are aligned with the demands and appeals of the 21<sup>st</sup> century for the application of higher-order thinking skills (HOTS) like critical and creative thinking skills (Pervez et al., 2022; Wiyaki et al., 2020). The skills to think creatively and critically are integral part of learning in this epoch. These two skills are also vital to survive and to produce essential human resources in the arena of 21<sup>st</sup> century as top order thinking skills (Marsella, 2018; Mahendra et al., 2020).

By encountering the challenges it is unavoidable to make creative and critical thinking skills as central skills for 21<sup>st</sup> century students. These skills equip students to evaluate, and create knowledge and ideas and will also get them ready to deal with a diverse range of forthcoming problems. The workforce in this century needs to be creative, critical, reflective, logical, analytical and metacognitive (Perdana, 2019; Sepriyanti et al., 2021).

Both creative and critical thinking skills are independent as well as having a complementary role for each other. Creative thinking encompasses the process of assembling thoughts and new ideas, including brainstorming. On the other hand, critical thinking involves evaluating the success of these new thoughts (Aghazadeh, 2019).

## **Literature Review**

The term "21<sup>st</sup> century literacy skills" has become extensively renowned in existing educational discourse. Variants such as "21<sup>st</sup> century learning" or "21<sup>st</sup> century knowledge" are also used for this term, all terms are directing to an underpinning in the instructive process that conveys indispensable knowledge for upcoming generations (Khan et al., 2019). In short, "21<sup>st</sup> century literacy skills" entail the growth of skills necessary for success in work-life. Educationalists, specialists in education, and leaders employ creative and critical thinking skills to shape the scheme of learning and teaching (Ramirez, 2018).

Regarding "information literacy, fundamental skills" are categorized into two dimensions. The initial dimension entails apprehending, retrieving, criticizing, and competently evaluating information, that is critical thinking. The second dimension, involves employing information with precision and creativeness to tackle the problems, is called creative thinking (Greenhill, 2010).

"The "Framework for 21st Century Learning," commonly known as the P21 framework, outlines the fundamental skills and abilities individuals need to acquire for success in both work and life. Additionally, the P21 framework encompasses a blend of skills, knowledge, expertise, and literacy P 21 (2011). There are three categories of skills were reflected as "21<sup>st</sup> century skills" which are: "Learning and Innovation Skills, Life

and Career Skills, Information, Media and Technology Skills". Learning and Innovation Skills encompass creative and critical thinking skills as pivotal skills (Khan et al., 2019).

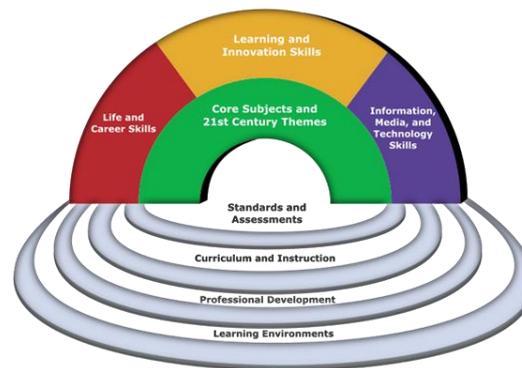


Figure 1: P21 Model of 21<sup>st</sup> Century Skills

### **Creative Thinking Skills**

Afterward World War II, the connection between creative thinking and economic prosperity has grown significantly (Sawyer, 2015). The evolution of information technologies, coupled with heightened global economic competitiveness, has elevated creative thinking to a crucial prerequisite in the workplace competency, which further provoked need of the creative thinking skills to be imperative part of classrooms and learning institutions (Ramirez, 2018).

The most distinguished scholar in the area of creativity Torrance (1977) writes creative thinking as "the process of perceiving problems or gaps in information, generating ideas or hypotheses, testing and adjusting these hypotheses, and communicating the results" (p. 7). Creative thinking involves the generation of something novel or original, being open to experiences, recombining ideas, identifying new relationships, and reaching its pinnacle when the "creative idea is true, generalizable, and surprising given what was previously known (Marsella, 2018).

If higher education organizations value creative thinking, it should be integrated into the curriculum, providing students with opportunities to learn and apply it. In the case of adult learners, creative thinking enhances the connection of real world and content knowledge by incorporating existing knowledge to explore new information. Moreover, creativity enhances research skills and enhances students' abilities to tackle complex problems (Khan et al., 2019; Marsella, 2018).

Creative thinking skill model by Schuler & Görlich (2007) is based on the following factors.

1. Problem discovery
2. Information search, intake and evaluation
3. Concept combination
4. Idea generation
5. Development of a solution approach
6. Idea evaluation
7. Adaptation and realization
8. Communication and implementation” (p.1).

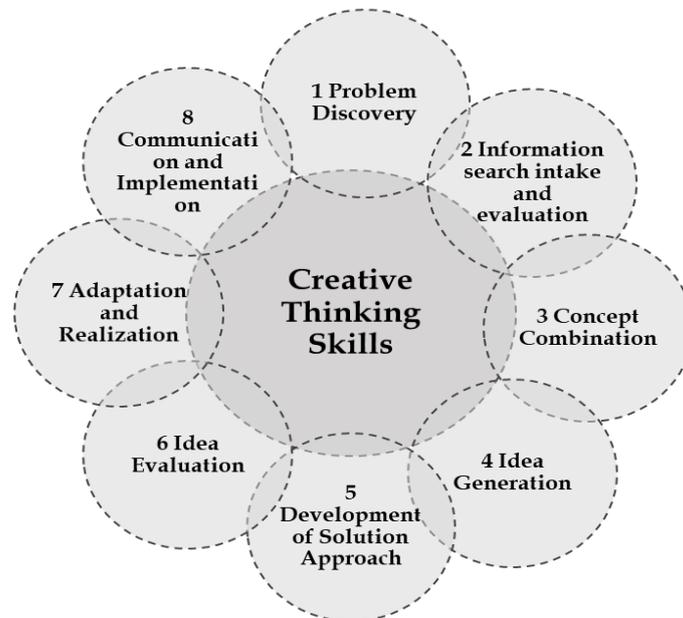


Figure 2: Creative thinking skills model by Schuler & Görlich

### Critical Thinking Skills

P21 (2010) describes critical thinking as the skill of individual to inquire and think deeply. Critical thinking is not a natural trait but rather a skill that could be cultivated through learning. This ability cannot develop naturally and needs to be imparted to students during the teaching-learning process. Many learners do not naturally acquire this skill, and it cannot be effectively transmitted by peers or parents. The transmission of critical thinking skills to students entails well-trained and knowledgeable teachers (Khan et al., 2019). Numerous definitions exist for critical thinking. It can be characterize as an

individual's capacity to analyze, interpret, and evaluate information. Critical thinking (CT) skills encompass students' capacity to analyze arguments, draw conclusions through reasoning, assess or evaluate, and engage in decision-making or problem-solving. "National Council for Excellence in Critical Thinking" (California) states it as an intellectual process involving conceptualizing, evaluating, analyzing, and synthesizing information gathered from observation, reasoning, experience, and reflection (NCECT, 2014). Critical thinking (CT) skills encompass students' capacity to analyze arguments, draw conclusions through reasoning, assess or evaluate, and engage in decision-making or problem-solving. In the educational context, CT skills involve an objective decision-making process and self-control that lead to interpretations, analysis, evaluation, conclusions, and explanations based on considerations such as evolutionary, conceptual, methodological, criteria, or contextual factors underlying the research (Andrews, 2015).

Critical thinking involves assessing the authenticity of ideas and opinions in light of available evidence. If the evidence fails to support the opinions, critical thinking deems them generally incorrect. Critical thinking extends beyond common sense and individual ideas, focusing on the objective analysis of data that supports a given phenomenon (Andrews, 2015; Brookhart, 2010).

Display of critical thinking in the classrooms at higher education level is imperative for students' academic growth. Teachers must to articulate the thinking manners as essential part for critical thinking. Learners at higher education level should be evaluative, reflective, judgmental and analytical (AlKhatib, 2019).

There are many frameworks available for critical thinking, one of the significant one is Facione (1990) comprised of the following components

1. Interpretation
2. Analysis
3. Evaluation
4. Inference
5. Explanation
6. Self-regulation" (Payan et al., 2022, p.5).



Figure3. Facione's Model of Critical Thinking Skills

Both creative and critical thinking skills are learnable and teachable skills (Anderson et al., 2001). In the 21<sup>st</sup> century, the efficacy of universities will be assessed based on their ability to cultivate individuals as critical and creative thinkers capable of generating practical, beneficial, necessary, economically feasible, technologically viable, and justifiable arguments and ideas (AlKhatib, 2019).

But teacher education institutions in Pakistan are lacking in producing critical and creative thinkers. The exam system is more marks oriented and learners are more focused on lower order thinking skills. Recalling the information is the prominent drawback of the examination system (Khan et al. 2019; Khizar et al., 2020; Nauman, 2017). Teachers' knowledge, professional development, classroom practices, curriculum structure, assessment practices, and institutional infrastructures provide limited support, are also reasons for less developed creative and critical thinking skills (Bhattacharya & Mohalik, 2021). Even though market is also demanding the skills which are more real life oriented in terms of higher order thinking skills. Most of the prospective teachers are also being recruited in private schools and institutions, these schools also appeal for creative and critical teachers (Khizar et al., 2020).

There could be many problems for not developing creative and critical thinking skills among students, like limitation in career growth, ineffective communication, inability of decision making, shallow understanding, less innovation, reduced problem solving and lack of adaptabilities for new situations (Khan et al., 2019; Nauman, 2017; Saeed & Ahmed, 2021; Zohar & Dori, 2003).

## Methodology

**Research Design:** A survey research design was used to gather the data. The used design underpins the positivism paradigm as a quantitative research. The design gives a numerical and factual insight to gather opinion as representative of a large group of people (Cohen et al., 2018; Creswell, 2022).

**Participants:** The participants of the study were 311 prospective teachers from terminal semesters of two teacher education program that were B.Ed. Honors and B.Ed. (1.5). The convenient sampling technique was applied. The population of the study is all prospective teachers from terminal semesters of two programs, B.Ed. Honors and B.Ed. (1.5) belong to public sector universities, in the province of Punjab. Five public sector universities included: University of Education (Main campus Lahore), University of Gujrat, University of Sargodha, Islamia University of Bahawalpure and Govt. College University, Faisalabad.

**Instrument:** A self-assessment seven-point likert scale was used to collect the data. Two self-assessment scales were adapted to construct the instrument. The permission was sought from the relevant researchers to use their instruments. Creative Process Assessment Scale (CPAS), English and Urdu version by Schuler & Görlich (2007) and Critical Thinking Self-assessment Scale (CTSAS) short form by Payan et al., 2022 were adapted. The instrument comprised of 60 statements, under the two main factors of creative and critical thinking skills.

**Reliability and Validity:** The procedure of content validation was applied to ensure the content validation of the tool. Two field experts were involved to ensure the validation procedure. All the statements were validated by experts and no statement was rejected or revised. As far as the reliability of the tool is concerned it was indicated by a score identified as the Cronbach Alpha, with a value of 0.95, which is an excellent value as per specialists.

**Data Analysis:** To calculate the overall score of the instrument, the researcher used SPSS Version 21. Descriptive statistics were employed to calculate the mean and standard deviation.

## Results

The seven point likert scale was divided into seven categories from never to always as: Never = 1, rarely = 2, occasionally = 3, sometimes = 4, frequently = 5, usually = 6 = always = 7. The mean for creative thinking skills was 3.8, which was on lower side, showed that students were using their creative thinking skills sometimes. The critical thinking skills were also low with the mean value of 3.9, directed that they used these skills sometimes. Overall mean score was 3.9. The overall results indicated that the creative and critical thinking skills of students were found to be on lesser side.

Table 1  
*Descriptive Statistics*

Thinking Skills	N	Mean	Std. Deviation
Creative thinking skills	311	3.8063	1.03854
Critical thinking skills	311	3.9263	.46125
Overall mean	311	3.9	.70

## Discussion

Research has revealed the imperative role of two main 21<sup>st</sup> century skills in addressing the demands of the present epoch in the context of education. The ultimate focus of this study was to examine the level of creative and critical thinking skills of future teachers through their perception. The results exposed that a majority of prospective teachers perceived themselves at a lower level of creative and critical thinking skills. These findings from the current study align with previous research with reference to the deficiency of critical thinking skills (Noman, 2016) and creative thinking skills (Khan et al., 2019). Ahmad et al. (2014) also conclude that university students were in deficit in top order thinking skills including creative and critical thinking skills. Another local context oriented study of Khizar et al. (2020) came up with the deduction that two vital higher-order thinking skills which are also needed as 21<sup>st</sup> century skills were lacking in prospective teachers (Afifah & Retnawati, 2019; Bibi & Akhter, 2020).

## Conclusion

The present study concluded that prospective teachers were still lacking in creative and critical thinking skills as 21<sup>st</sup> century skills. Prospective teachers showed the low level of these skills. Despite being in high demand and relevant to the market, these skills continued to be overlooked.

The low level of creative and critical thinking skills may cause several issues among students. It could include restricted career advancement, ineffective communication, weakened decision-making abilities, superficial understanding, diminished innovation, decreased problem-solving capabilities, and a lack of adaptability to new situations.

## References

- Afifah, I. R. N., & Retnawati, H. (2019). Is it difficult to teach higher order thinking skills? *Journal of Physics: Conference Series*, (1320). IOP Publishing.
- Aghazadeh, S. (2019). *Assessment of 21st century skills*. (NIE Working Paper Series No. 14). Singapore National Institute of Education.
- Ahmad, I., Ali, A., Khan, I., & Khan, F. A. (2014). Critical Analysis of the Problems of Education in Pakistan. Possible Solutions. *International Journal of Evaluation and Research in Education*, 3(2), 79-84.
- Alkhatib, O. J. (2019). A framework for implementing higher-order thinking skills (problem-solving, critical thinking, creative thinking, and decision-making) in engineering & humanities. *Advances in Science and Engineering Technology International Conferences (ASET)* (pp. 1-8). IEEE.
- Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., & Wittrock, M. C. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*, abridged edition. White Plains, NY: Longman.
- Andrews, R. (2015). Critical thinking and/or argumentation in higher education. In *The palgrave handbook of critical thinking in higher education* (pp. 49-62). Palgrave Macmillan.
- Bhattacharya, D., & Mohalik, R. (2021). Factors Influencing Students' Higher Order Thinking Skills Development. *Education India Journal: A Quarterly Refereed Journal of Dialogues on Education*, 10(1), 349–361.
- Bibi, S., & Akhter, M. (2020). A Study to Assess Critical Thinking Skills among Prospective Teachers. *Pakistan Social Sciences Review*, 4(4), 134-143.
- Brookhart, S. M. (2010). *How to assess higher-order thinking skills in your classroom*. ASCD.
- Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education*. (8th ed.). Routledge.
- Creswell, J. W., & Creswell, J. D. (2022). *Research design: Qualitative, quantitative, and mixed methods approaches*. (6th ed.). Sage.

- EkaMahendra, I., et. al. (2020). Teachers' Formative Assessment: Accessing Students' High Order Thinking Skills (HOTS)? *Teachers' Formative Assessment: Accessing Students' High Order Thinking Skills (HOTS)*. 12(12), 180-202.
- Facione, P.A. (1990). Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction, executive summary, *The Delphi report*. Millbrae, CA: American Philosophical Association, California Academic Press. Retrieved from <https://www.qcc.cuny.edu/socialsciences/ppecorino/CT-Expert-Report.pdf>
- Görllich, Y. (2023). Development of Creative Process Assessment Scale (CPAS). *Journal of creativity*, 33 (1), 100042
- Greenhill, V. (2010). *Memo from Partnership for 21st Century Skills from Common Core Standards Initiative Design Team*. John Wiley & Sons
- Khan, H., Jumani, N. B., & Gul, N. (2019). Implementation of 21st-century skills in higher education of Pakistan. *Global Regional Review*, 4(3), 223-233
- Khizar, A. S. M. A., Anwar, M. N., & Zainab, G. (2020). Does it matter to assess the high order thinking skills among prospective teacher educators. *International Review of Social Sciences*, 8(11), 163-170.
- Marsella, N. R. (2018). *Critical and creative thinking in general education*. A descriptive case study. Ph. D. Thesis. College of William and Mary, School of Education. <http://dx.doi.org/10.25774/w4-kcrj-rt68>
- Miterianifa, M., Ashadi, A., Saputro, S., & Suciati, S. (2021). *Higher order thinking skills in the 21st century critical thinking*. In Proceedings of the 1st International Conference on Social Science, Humanities, *Education and Society Development, ICONS*. Indonesia.
- Mourtzis, D. (2021). Towards the 5th industrial revolution: A literature review and a framework for process optimization based on big data analytics and semantics. *Journal of Machine Engineering*, 21(3).
- Nauman, S. (2017). Lack of critical thinking skills leading to research crisis in developing countries: A case of Pakistan. *Learned Publishing*, 30(3), 233-236.
- NCECT. (2014). *Defining critical thinking*. Retrieved from <http://www.criticalthinkig.org/pages/the-national-council-for-excellence-in-critical-thinking/406>
- P 21, (2011). Partnership for 21st Century Skills (P21). *Framework for 21st Century Learning*. Retrieved from <http://www.P21.org>

- Payan-Carreira, R., Sacau-Fontenla, A., Rebelo, H., Sebastião, L., & Pnevmatikos, D. (2022). Development and Validation of a Critical Thinking Assessment-Scale Short Form. *Education Sciences*, 12(12), 938.
- Perdana, R. (2019). Analysis of student critical and creative thinking (CCT) skills on chemistry: a study of gender differences. *Journal of educational and social research*, 9(4), 43.
- Pervez, K., Muhammad, Y., & Waqar, Y. (2022). Higher-order thinking: An analysis of the prescribed versus tested Curricula in private secondary schools in Pakistan. *Journal of Social Sciences Advancement*, 3(3), 165-175.
- Pervez, K., Muhammad, Y., & Waqar, Y. (2022). Higher-order thinking: An analysis of the prescribed versus tested Curricula in private secondary schools in Pakistan. *Journal of Social Sciences Advancement*, 3(3), 165-175.
- Ramirez, F. A. R. (2018). *Analysis of 21st Century Skills in a Graduate Program for Educators Concerning Linked Learning*. A Doctoral Dissertation. California State University, Long Beach.
- Saeed, M., & Ahmed. I. (2021). Using service-learning approach for promoting higher order thinking skills among Pakistani pre-service teachers, *Pakistan. Journal of Humanities, Social and Management Sciences (JHSMS)*, 2(1), 187-199. <https://doi.org/10.47264/idea.jhsms/2.1.16>
- Sawyer, K. (2015). A call to action: The challenges of creative teaching and learning. *Teachers College Record*, 117, 1-34.
- Schuler, H., & Görlich, Y. (2007). *Kreativität: Ursachen, Messung, Förderung und Umsetzung in Innovation*. Hogrefe.
- Sepriyanti, N., Nelwati, S., Kustati, M., & Afriadi, J. (2022). The Effect of 21st-Century Learning on Higher-Order Thinking Skills (HOTS) and Numerical Literacy of Education and Science Students in Indonesia in the term of Gender. *Jurnal Pendidikan IPA Indonesia*, 11(2).
- Torrance, H. (1993). Formative assessment: Some theoretical problems and empirical questions. *Cambridge Journal of Education*, 23(3), 333.
- Wiyaka, W., Prastikawati, E. F., & KusumoAdi, A. P. (2020). Higher-order thinking skills (hots)-based formative assessment: a proposed model for language learning assessment. *Vision: Journal for Language and Foreign Language Learning*, 9(2), 115-130.

- Zohar, A. (2013). Challenges in wide scale implementation efforts to foster higher order thinking (HOT) in science education across a whole school system. *Thinking Skills and Creativity, 10*, 233-249.
- Zohar, A., & Dori, Y. J. (2003). Higher order thinking skills and low achieving students: Are they mutually exclusive? *Journal of the Learning Sciences, 12*, 145–183.
- Zubaidah, S., Fuad, N. M., Mahanal, S., & Suarsini, E. (2017). Improving Creative Thinking Skills of Students through Differentiated Science Inquiry Integrated with Mind Map. *Journal of Turkish Science Education, 14*(4), 77–91. <https://doi.org/10.12973/tused.10214a>