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A Study to Compare Relationship between Situated Learning Model Methodology and Reflective Insight of Community Projects Carried Through Preservice Teachers from Public Sector Universities

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ABSTRACT

This research explores the relationship between the Situated Learning Model Methodology (SLM) and Reflective Insight in community projects undertaken by preservice teachers from public sector universities. Adopting a sequential explanatory design, data was collected over a semester in two phases from 66 participants at a public sector university in Lahore, Punjab, Pakistan. Quantitative analysis, utilizing an independent sample t-test, preceded the integration of qualitative data. Pearson's correlation identified a significant relationship between the multidimensional SLM and reflections, revealing variations in preservice teachers' reflections on knowledge, disposition, and attitude. The study advocates for the adoption of SLM methodology, aligning with Krathwohl's recommendation for realistic explanations in real-life settings.

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1 Introduction

Previous learning and teaching theories has recommended that our preservice teachers can be more capacitated if they employ new pedagogies in order to meet the learning needs of students.

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Since, many researches and studies have examined preservice teachers' disposition, attitude, and knowledge and found it dynamic and multifaceted (Heidari & Karimi, 2015)

Teachers' dispositions varied for new methodology and so the students' learning. Such varying methodology, over a period of time result in elevated professional capacity of preservice teachers. It became imperative that learnt knowledge, dispositions and attitudes of preservice teachers should be evaluated to enhance their understanding toward significance of community projects (Zahedi & Heaton, 2016).

Students' dispositions and interests were set in the local context. The teachers designed their classes around their students' interests, learning takes on a meaningful purpose. According to the ideal scientific curriculum would incorporate the students' interests and enable them to come up with their own ideas and objectives. Students were inspired to develop the abilities which were required to accomplish their objectives. The advantages of utilizing students' interests in science were also discussed by researcher who urged science education researchers to "explore ways of teaching science that was utilized by local community of knowledge and student interest". It is of great opinion that "science involved inquiry into one's own world" (Akbar et al., 2023).

Researchers talked on the advantages of bringing students' extracurricular activities into lectures since they showed knowledge of academic material. Teachers used their students' love of sports as a selling point when created problems using sports analogies (for instance, utilizing football terminology, basketball, and tennis inbound or out-of-bounds examples to illustrate the distinction between less than and equal to).

Over past years, the researchers wrote theories about situational learning which constituted effective instructional strategy and had also shared community benefits in a meaningful way. It has promoted academic and personal growth of a preservice teachers which had appealed every individual to invest his/her potential energy and time to pursue real-life situations inside as well as outside the premises of university (Chanthala et al., 2017).

The principals of the situated learning model states that making situated learning insightful and meaningful, it reciprocated preservice teachers' real-life strategies; established real-life connections and set in students' dispositions and interests according to class needs (Ericson, 2022).

It is recommended educators to use a range of tools and pedagogical approaches (such as situated learning, experiential learning, dialogic learning and cooperative learning dialogues, etc.) in order to achieve educational impartiality and distinction in every real-life walk of life. The practice of situated learning model and cooperative learning has been considered a necessary component of good learning through situations and cooperation since it had been educating marginalized preservice teachers of remote area (Fatima et al., 2022).

The preservice teachers' real-life strategies consisted of cooperative teams and experiential learning emphasized mainly on context-based situation. Similarly, the researchers believed that situated learning model increased academic achievement with different name but with same mechanism, lets for example cognitivism, experiential learning, social learning and real-life learning which had ultimately improved advancement, learning and engagement for preservice teachers. This in turn, led to higher levels of confidence and efficacy toward real-life resolution in a better shape to the community. Additionally, group projects within class or outside community

and class discussions had switched students' perceptions about situated learning model from passive learning to active learning (Khan & Khanam, 2023).

Working in small groups for a community project helped preservice teachers of university level to enhance their social skills, cognitive thinking, emotional intelligence and communal awareness. They emphasized very need of professional instructors who explained major ideas for mapping real-world contexts. The given were the examples such as, stories, folk lore, exercises, media campaigns, movies which urged preservice teachers for effective use of situated learning model; an instructional strategy (Scheer et al., 2012).

How real-life connections were established in this regard? Researchers talked about how important it is to teach material that is applicable to students' everyday lives. Many researchers have talked about various efficient methods for Science and Maths instructors who utilized their lesson plans to teach students. These instructors used real-world examples (such as rocks, plants, or clocks) and they employed role-playing to convey challenging, scientific and abstract mathematical concepts (Wang et al., 2010).

Similar to this, an account is provided that how a science instructor fostered a sense of community among his pupils by having them work together on projects that was related interest of their daily lives. How experiential learning exercised events that showed through videos, teaching new or challenging ideas interweaved real-life tales? These boosted students' self-esteem to overcome the challenges at their own (Davies, 2011).

How culturally sensitive instructors incorporated their students' real-world experiences into the formal curriculum by using community resources to teach various subjects in Science and Mathematics. Students collaborate to study the material in classrooms i.e., communities of learners where they also gained critical awareness of problems and events as a result of their local community practices (Raza et al., 2023).

The professors utilized examples of everyday objects like food, water, money, etc. to relate the subject of Mathematics and Science to real-world situations. For instance, when teaching about carbs, lipids, and proteins, instructors addressed the significance of a balanced diet and urged students to keep a food diary to analyses the macromolecules in the foods they ate. This is just one example of how science teachers utilized food analogies to make the material more interesting (Sohail et al., 2023).

More cognitive techniques, such as information-processing approaches which states purpose of learning is about transferring of knowledge and retrieving memories to make them the part of long-term memory. It was introduced in the 1970s with the development of computers and artificial intelligence. This often entails mechanisms to encode new knowledge (rehearsal or elaboration) for extended periods of time so that it may be retrieved later (making sense of new information through attention and perception). Sociocultural techniques were developed in response to these cognitive entities and focused on knowledge (the real environments). The sociocultural school of thought emphasized apprenticeships of thinking rather than the removal of components like cultural and language descriptions toward learning (Dennis & O'Connor, 2013)

Additionally, instructors used the cha-cha slide to teach about mathematical translations to educate about evolution while showing them Dance Movie of Evolutions. This showed students'

interest in dance and music during their class discussion about evolution i.e., skin colour and environmental adaptability, genetics etc. Other instructors used memes in their courses or other methods to engage their students' interests in social media or other topics (Carlson et al., 2020).

Research on the comparison of relationship between Situated Learning Model methodology and Reflective Insight of community projects carried through preservice teachers from public sector universities yielded tangible changes in behavior of the students. Determinants of situation-based learning are environmental stimuli, individual and mental processes (Macfie et al., 2023).

1.1 Objectives of the Research Study

The objectives of the study were:

1. To compare relationship between Situated Learning Model Methodology and Reflective Insight from Community Projects for Preservice Teachers in Public Sector Universities.
2. To show variability and changed reflections of preservice teachers through their learnt knowledge, disposition and attitude about the subject of science with respect to local context for carrying out community projects through effective instructional methodology i.e., Situated Learning Model.

1.2 Rationale of Study

It is important to identify the current debates that surround situated learning theories (Kavousi et al., 2020). It is crucial to recognize the role of individuals who interplay to maintain congruence or incongruence with others. In this regard, beliefs about the reality of a situation and awareness with the context can influence the educational environment that how preservice teachers apply their knowledge. This distinction between an individual's perception of a situation and the context are quite understandable (Khan, Khanam, et al., 2023). From an epistemological standpoint, it is vital for individuals to experience these situations and contexts, as some may perceive them to be completely congruent while others do not (Butler & Roberto, 2018). This awareness is especially relevant when it comes to the process of learning.

This recognition holds great importance in our understanding of the processes of learning, practicing, and teaching. This is evident in various models, including the naturalistic teacher decision-making model (Dym et al., 2005), which highlights the significance of teachers' core beliefs regarding teaching as a crucial influence on their strategic actions in the classroom. For many years, researchers have extensively discussed effective methods for situated learning instruction, reaching a shared consensus in their findings. The students found value in their experience, which facilitated their personal and academic development in a specific setting. To truly enable profound learning, these circumstances and environment were essential in captivating the students' interest, prompting them to dedicate their efforts and attentiveness to studying and achieving progress in both in-class and out-of-class subject matters. The incorporation of fundamental guidelines was crucial in creating meaningful situations (Garcia et al., 2022).

Consequently, utilizing student-centered approaches, fostering connections to real-life encounters, and incorporating the students' passions which transform into community, institutional, and classroom culture, presents a significant evolutionary journey (Mowafy et al., 2015).

1.3 Significance of the Research Study

This study was useful for counsellors to gain some insight into the psychological well-being which used to link pre-service teachers' trends, reflections and perceptions about their love and wisdom for learning. This teaching methodology compared the relationship between Situated Learning Model Methodology and Reflective Insight from Community Projects for Preservice Teachers in Public Sector Universities (Younas et al., 2023).

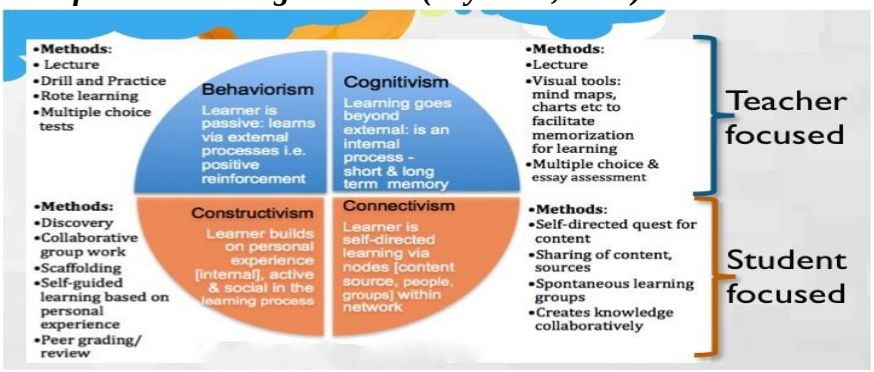
It showed variability and changed reflections of preservice teachers through their learnt knowledge, disposition and attitude about the subject of science with respect to local context for carrying out community projects through effective instructional methodology i.e., Situated Learning Model. Principles of Situated Learning Model was an effective instructional strategy which made an explicit link between learning and instruction (Dorst, 2011).

2 Review of Literature

Upon development of preservice teachers' understanding toward new instructional strategy has best provided the platform for teaching and learning Thus, interaction between learning and teaching theories has recommended that capacitating preservice teachers with new pedagogies has catered learning needs of the students (Khan & Salsabeel, 2022). Such interrelations for the respective framework have explored theories of teaching and learning that in addition, examined how reflections, attitude and learnt knowledge might differ on individual basis.

Moreover, conceptual framework has recognized elevated space for new pedagogies intervening through research and development for giving better shape and articulation to the quest of knowledge and practice toward pre-service teachers. Learning took place whilst underpinning variety of perceptions for an existing context. Main focus of all learning theories was based on practice such as behaviorism, cognitive, constructivism, humanism, and connectivism (Ignacio & Shealy, 2023).

Figure 1 ***Annexes of main Learning Theories (Say et al., 2020)***



Learning was a tangible change in behavior developed through an ecological stimulus. In Classical Conditioning, the behaviors were shaped by an ecological stimulus which was associated unconditionally or it was previously conditioned with anew conditioned response (Vignoli et al., 2023).

In Operant Conditioning, conditional stimulus was a consequence which occurred after a behavior that was either an increased change in behavior i.e., reinforcement or decreased change in behavior i.e., punishment. Other theorists' perspective about neo-behaviorism was analogical to

social cognitive theory that emphasized on learning with a permanent change in behavior, therefore, radicals view was stricter about behaviorism (Carlson et al., 2020).

Cognitive constructivism and social constructivism are two learning philosophies that, have received the most attention, especially in institutions of education. Two of the constructivist methods concentrated on creation of cognitive schema rather than the role of behaviour (Patterson & Eggleston, 2017). Piaget suggested that information was absorbed (added) and accommodated (modified) through an equilibration process in which an initial schema was rebuilt in response to any different event for any different individual, encountered (Kijima et al., 2021). Reflective Insights were therefore, essential for gaining multiple experiences. Vygotsky, contended about the process of equilibrium which was feasible for the infants to learn concrete concepts to abstract concepts and vice versa (concepts that might be learnt by exploration or discovery). Language and social contact were therefore, crucial instruments for children to learn abstract notions (learnt through explorations), a process of internalization and self-regulation (Gero & Milovanovic, 2020).

3 Methodology of Research Study

3.1 Operational and conceptual definitions of the study

Situated Learning Model Methodology and Reflective Insight of Community Projects is operationally defined as a teaching methodology to teach student in an adjustable working environment in order to acquire productive adjustments in a community of practice. Since, the conceptual definition of both variables i.e., Situated Learning Model Methodology and Reflective Insight of Community provides an authentic learning platform for active participation. Through problem solving skills, the opportunities are replicated to apply on real world situations (Khan & Seema, 2023).

3.2 Inclusion criteria of the study

The inclusive criteria identified that the present research population is consistent, homogenous and objective as all were belonging to 8th semester preservice teachers having same study background level.

3.3 Exclusion criteria of the study

The exclusive criteria identified that the present research was carried for the subject of science to B.Ed. (Honors Elementary Programme) of a public sector university in district Lahore, Punjab, Pakistan was selected as a sample.

3.4 Design of the Study

A sequential explanatory design was adopted. The data was collected over the period of semester in two consecutive phases. Researcher first collected and analyzed the quantitative data and then, collected qualitative data in second phase of the study which was related to results of quantitative, phase. Through closed and open-ended reflective questionnaire, the data was collected to measure the preservice teachers' learnt knowledge, disposition and attitude teaching with the use of an effective instructional strategy i.e., Situated Learning Model. Closed and open-ended reflective questionnaire was validated by expert's reviews and pilot testing. Participants were sixty-six Preservice Teachers of Eight semester from B.Ed. (Hons.) programme at public sector university of Lahore, Punjab, Pakistan. Quantitative data compared the relationship

between variables i.e., Situated Learning Model Methodology and Reflective Insight from Community Projects for Preservice Teachers. Qualitative data was taken through open-ended reflective questions in a form of codes which was decoded, identified for inconsistencies and finally refined consensus, a categorical form of quality data (Cuddy et al., 2007).

3.5 Research Instruments

3.5.1 Demographic Questionnaire

A demographic questionnaire had the information about demographic variables which were likely obtained from the literature review. The demographic variables included age, gender and CGPA.

3.5.2 Multidimensionality of Situated Learning Model (mSLM)

According to (Makhdum et al., 2022) multidimensionality of Situated Learning Model (mSLM) was assigned to Preservice Teachers responses which were collected both quantitatively and qualitatively.

3.5.3 Research Questions

Three reflective question measured data. The extent of learnt knowledge was assessed through quantitative closed-ended reflective question with the use of an effective instructional strategy in the subject of science to teach the Preservice Teachers.

1. Upto what extent, preservice teachers' reflections were satisfied about the subject of science with the use of Situated Learning Model (Knowledge)?

The disposition and attitude of Preservice Teachers with the use of effective instructional methodology was assessed through qualitative survey contained in open-ended reflective questions: -

2. How do preservice teachers' reflections were influenced with the use of Situated Learning Model in the subject of science (disposition)?
3. How do preservice teachers' reflections were changed with the use of Situated Learning Model in the subject of science (attitude)?

4 Results and Analysis

Formal permission and informed consent were initially taken before the data collection. Preservice Teachers were briefed about the aim and purpose of the research study. They were also instructed about how to fill in the demographic questionnaire and multidimensionality of Situated Learning Model (mSLM) (Khan, Anwar, et al., 2023) which was developed to assign their responses. Through closed and open-ended reflective questionnaire, the data was collected to measure the preservice teachers' learnt knowledge, disposition and attitude with the use of an effective instructional strategy i.e., Situated Learning Model.

Quantitative data compared the relationship between variables i.e., Situated Learning Model Methodology and Reflective Insight from Community Projects for Preservice Teachers. Qualitative data was taken through open-ended reflective questions in a form of codes which was decoded, identified for inconsistencies and finally refined consensus, a categorical form of quality data (Cuddy et al., 2007). The analysis was carried out to show variability and changed reflections of preservice teachers through their learnt knowledge, disposition and attitude about the subject of science with respect to local context for carrying out community projects through effective instructional methodology i.e., Situated Learning Model.

All qualitative answers to these questions were connected back to the quantitative findings to get the final results. Since, the confidentiality and anonymity of the given data was ensured. Preservice Teachers were instructed to be honest, while responding to the each qual-quant questions for further analysis. Results showed that learnt knowledge, disposition and attitude were dynamic in nature and subjected to change even over the course of a semester. A quantitative to qualitative paradigm shift in preservice teachers' reflections about learnt knowledge, disposition and attitude was surprising in context of community projects (Barish, 2012).

Table 1

Mean and SD of Age, Frequencies, Semester Level and CGPA (Preservice Teachers) (N=66).

Demographic Variables	***F***	***%***
Age		
M=14.15, SD=1.240		
Gender		
Boys	35	54
Girls	31	46
Semester Level		
8^{th}	66	100
CGPA		
3.5 and above	6	10
3.0 and not above 3.4	29	44
2.5 and not above 2.9	28	42
2.4 and not below 2.0	2	0

Note. f = Frequency; M = Mean, SD = Standard Deviation

Above table 1 showed the demographic profile of preservice teachers with CGPA within range of 3.0 and not above 3.4 (44%) and least was 2.4 and not below 2.0 (0%). There were 35 boys and 31 girls.

Table 2

Pearson's Product Moment Correlation Coefficient between multidimensional Situated Learning Model and Reflections taken from University Level Preservice Teachers (N=66), in Context of Community Projects.

Variables	**1**	**2**	**3**	**M**	**SD**
1. QuanK	.212**	.150**	.060	144	19.5
2. QualD	.620**	.520**	.600**	9.00	4.50
3. QualA	.420**	.440**	.520**	6.13	2.90

Note: mSLM = multidimensionality of Situated Learning Model, QuanK=Qualitative Knowledge, QualD=Qualitative Disposition, QualA= Qual Attitude

The above table is showing significant relationship between multidimensional Situated Learning Model (mSLM); a teaching strategy and its Reflective Insight for preservice teachers. It is showing variability and changes in learnt knowledge (QuanK), disposition (QualD) and attitude (QualA) within local context through community projects. All qualitative answers for reflections were connected back to the quantitative findings to get the final results.

Table 3

Independent sample t-test for comparing relationship between multidimensional Situated Learning Model and its Reflective Insight in context of community projects for University Level Preservice Teachers

Variables	Boys (N=35)		Girls (N=31)		*t*	*p*
	M	**SD**	**M**	**SD**		
multidimensional Situated Learning Model Strategy (mSLM)	142.20	19.39	148.21	20.35		
Knowledge	20.07	8.49	22.10	9.49	.33	.73
Disposition	13.12	10.21	19.42	15.21	2.1	.02
Attitude	11.38	12.25	19.31	20.01	-.10	.36

Note: M=Mean, SD=Standard Deviation, p=level of significance, t=t-value

Independent sample *t*-test is applied to compare the relationship between the multidimensional Situated Learning Model (mSLM) and Reflection in context of community projects for University Level Preservice Teachers. The result indicates significant difference *p*-value ($p<0.05$) with the use of multidimensional Situated Learning Model in context of community projects for University Level Preservice Teachers in the subject of science; boys ($M=142.20$, $SD=19.39$) and girls ($M=148.21$, $SD=20.35$). In terms of Reflective Insight, the result of boys is higher in Knowledge ($M=20.07$, $SD=8.49$) than girls ($M=22.10$, $SD=9.49$) since, the results showed equivalence of preservice teachers' reflections about the subject of science in terms of their learnt knowledge. Disposition for boys is ($M=13.12$, $SD=10.21$), for girls ($M=19.42$, $SD=15.21$) and Attitudes for boys is ($M=11.38$, $SD=12.25$), girls ($M=19.31$, $SD=20.01$) that indicates good impact of multidimensional Situated Learning Model Strategy (mSLM) and its relationship with reflections in context of community projects carried through Preservice Teachers for University Level. The findings reveal that girls are more responsive toward Disposition and Attitudes with the use of multidimensional Situated Learning Model Strategy (mSLM) and the boys are better in Knowledge.

5 Discussion

The current study compared the relationship between multidimensional Situated Learning Model (mSLM) and Reflective Insight of Preservice Teachers ($N=66$) in context of community projects for university level in the subject of science. The demographic profile of the research participants showed that mostly Preservice Teachers had CGPA within range of 3.0 and not above 3.4 (44%) and least was 2.4 and not below 2.0 (0%). Preservice teachers comprised of 35 boys and 31 girls from the 8th semester. Multidimensional Situated Learning Model; a teaching strategy and its reflections were interlinked in terms of learnt knowledge, disposition and attitude which showed improved actions/reflections in preservice teachers i.e., boys and girls (Gul et al., 2023).

Independent sample *t*-test is applied to compare the relationship between the multidimensional Situated Learning Model (mSLM) and Reflection in context of community projects for University Level Preservice Teachers. The result indicated significance level *p*-value ($p<0.05$) with the use of multidimensional Situated Learning Model in context of community projects of preservice teachers for university level in the subject of science. The findings revealed that girls were more responsive toward Disposition (QualD) and Attitudes (QualA) with the use of multidimensional Situated Learning Model Strategy (mSLM) and the boys were better in learnt Knowledge (QualK) (Hay et al., 2017)

6 Conclusion and Recommendations

The present study compared the relationship between multidimensional Situated Learning Model (mSLM), an instructional strategy and its reflections in context of community projects carried through preservice teachers for university level. Multidimensional Situated Learning Model (mSLM) has played an important role in betterment of preservice teachers' learnt knowledge, disposition and attitude. Significant relationship existed between multidimensional Situated Learning Model (mSLM); a teaching strategy and its Reflective Insight for preservice teachers which showed variability and changes in Learnt Knowledge (QuanK), Disposition (QualD) and Attitude (QualA) within local context through community projects. The findings revealed that girls were more responsive toward Disposition and Attitudes and boys were better in Knowledge with the use of multidimensional Situated Learning Model Strategy (mSLM).

Multidimensional Situated Learning Model (mSLM) has played an important role in betterment of preservice teachers' learnt knowledge, disposition and attitude. Therefore, it is recommended that subjects other than STEM (science, technology, engineering, mathematics) may also be taken into account for revolutionary changes on its way to educate and train our preservice teachers. Since, the present study strongly recommended that relationship between multidimensional Situated Learning Model (mSLM) and its Reflective Insight of preservice teachers can be revamped and restructured through schools' faculties, communities of practices and situated learning-based agencies etc.

Situated learning-based agencies may provide opportunities for preservice teachers to flourish them multidimensionally inter-professional relationships. Traditionally, focus should be about the well-beingness of preservice teachers, institution and community. This model may help to cater the needs of community benefits. Preservice teachers may increase awareness about community work and related variety of togetherness. Inter-professional relationships on community-based transformations may build the potential for producing effective preservice teachers. These findings may speak important roles for higher education agencies which may create meaningful learning experts of situation-based learner. Relevant professional impact and practice may help families, children, schools and communities for future endeavors. Our preservice teachers may need to work on situation driven decisions to improve their understanding. Field notes may help in hands on experiences which are installed through preparatory programs on education. This could make community, a better platform to practice socio-eco-psycho interactions among the stakeholders, preservice teachers, administrators, and people at large.

Furthermore, the situation-based learning may help in growth of preservice teachers and giving reflective insight of their professional, personal and Inter-professional relationships through their roles in local context. Preservice teachers may also gain full understanding of community,

institution and schools and their ecosystem. This situation-based learning may address the gaps, problems, strength and weakness and challenges through National Education Assessment System (NEAS). This may help in appropriate decision-making for promoting accessible, equal and quality situations-based learning environment. Another institute, National Accreditation Council for Teacher Education, Pakistan (NACTE) may also take initiative to organize training programs of situation-based learning alongwith appropriate reflective insight assessment through practice within communities, institutions, departments, faculties and other disciplines of society.

References

Akbar, H., Fatima, H. G., & Khan, B. S. (2023). An Investigation Of Styles Of Learning For Openness Traits Of Personality: A Correlational Study. *Journal of Positive School Psychology*, *7*(6), 220-230.

Barish, K. (2012). *Pride and Joy: a guide to understanding your child's emotions and solving family problems*. Oxford University Press.

Butler, A. G., & Roberto, M. A. (2018). When Cognition Interferes with Innovation: Overcoming Cognitive Obstacles to Design Thinking: Design thinking can fail when cognitive obstacles interfere; appropriate cognitive countermeasures can help disarm the traps. *Research-Technology Management*, *61*(4), 45-51.

Carlson, S. E., Lewis, D. G. R., Maliakal, L. V., Gerber, E. M., & Easterday, M. W. (2020). The design risks framework: Understanding metacognition for iteration. *Design studies*, *70*, 100961.

Chanthala, C., Santiboon, T., & Ponkham, K. (2017). Affecting the activity-based on learning approaching management through the stem education instructional method for fostering the creative thinking abilities, learning achievements and environmental perceptions in physics laboratory classes of secondary students at the 10th grade level. *European Journal of Education Studies*.

Cuddy, A. J., Fiske, S. T., & Glick, P. (2007). The BIAS map: behaviors from intergroup affect and stereotypes. *Journal of personality and social psychology*, *92*(4), 631.

Davies, M. (2011). Concept mapping, mind mapping and argument mapping: what are the differences and do they matter? *Higher education*, *62*, 279-301.

Dennis, S. E., & O'Connor, E. (2013). Reexamining quality in early childhood education: Exploring the relationship between the organizational climate and the classroom. *Journal of Research in Childhood Education*, *27*(1), 74-92.

Dorst, K. (2011). The core of 'design thinking'and its application. *Design studies*, *32*(6), 521-532.

Dym, C. L., Agogino, A. M., Eris, O., Frey, D. D., & Leifer, L. J. (2005). Engineering design thinking, teaching, and learning. *Journal of engineering education*, *94*(1), 103-120.

Ericson, J. D. (2022). Mapping the relationship between critical thinking and design thinking. *Journal of the Knowledge Economy*, *13*(1), 406-429.

Fatima, H. G., Akbar, H., Khan, B. S., Amin, H., & Anjum, S. M. A. (2022). Cooperative Learning As An Innovative Method In Teaching Science At Elementary Level. *Journal of Positive School Psychology*, 879-889.

Garcia, V. M. S., Garcia-Cuahutle, K. B., Flores-Carapia, R., Gonzalez-Ramirez, M. D., & Chimal-Eguia, J. C. (2022). Image encryption based on chaos, elliptic curve, dynamic S-boxes and variable permutations.

Gero, J. S., & Milovanovic, J. (2020). A framework for studying design thinking through measuring designers' minds, bodies and brains. *Design Science*, *6*, e19.

Gul, B., Anwar, R., Saleem, M., Ahmad, M., Ullah, M. I., & Kamran, S. (2023). Attenuation of CFA-induced arthritis through regulation of inflammatory cytokines and antioxidant mechanisms by Solanum nigrum L. leaves extracts. *Inflammopharmacology*, 1-21.

Hay, L., Duffy, A. H., McTeague, C., Pidgeon, L. M., Vuletic, T., & Grealy, M. (2017). Towards a shared ontology: A generic classification of cognitive processes in conceptual design. *Design Science*, *3*, e7.

Heidari, A. A., & Karimi, L. (2015). The effect of mind mapping on vocabulary learning and retention. *International Journal of Educational Investigations*, *2*(12), 54-72.

Ignacio, P., & Shealy, T. (2023). EFFECTS OF BIOPHILIC RESTORATIVE EXPERIENCES ON DESIGNERS'BODIES, BRAINS, AND MINDS. *Proceedings of the Design Society*, *3*, 1565-1574.

Kavousi, S., Miller, P. A., & Alexander, P. A. (2020). Modeling metacognition in design thinking and design making. *International Journal of Technology and Design Education*, *30*, 709-735.

Khan, B. S., Anwar, S., Begum, S., Tuaseen, M. A., & Iqbal, N. (2023). Situational Leaders And Emotional Intelligence Among Preservice Science Teachers At Higher Education Level: An Experimental Study. *Journal of Positive School Psychology*, 760-781.

Khan, B. S., & Khanam, A. (2023). Developing a Situated Learning Model in Local Context for carrying Community Projects by Preservice Teachers: An Experimental Inquiry. *Pakistan Journal of Social Sciences*, *43*(3), 389-398.

Khan, B. S., Khanam, A., & Saqib, M. (2023). An Agent of Change: Education for Sustainable Development (ESD) Carried Through Situated Learning Model. *Pakistan Journal of Social Sciences*, *43*(2), 257-270.

Khan, B. S., & Salsabeel, W. (2022). The Growing Importance of Regime Change toward Mid-Career Progression of Graduates at Public Sector Universities in All over Pakistan. *Journal of Development and Social Sciences*, *3*(3), 918-927.

Khan, B. S., & Seema, S. (2023). Emotional Attachment toward the subject of Science and Attitudinal Problems of University Students A Correlational Study. *International Research Journal of Social Sciences and Humanities*, *2*(2), 190-199.

Kijima, R., Yang-Yoshihara, M., & Maekawa, M. S. (2021). Using design thinking to cultivate the next generation of female STEAM thinkers. *International Journal of STEM Education*, *8*(1), 1-15.

Macfie, R. L., Hay, L. A., & Rodgers, P. (2023). A FRAMEWORK FOR UNDERSTANDING MENTAL IMAGERY IN DESIGN COGNITION RESEARCH. *Proceedings of the Design Society*, *3*, 171-180.

Makhdum, F. N., Khan, B. S., Munir, F., Younas, A., & Faisal, A. (2022). Ubiquitous Learning Workforce in the Learning World: The Middle Class. *Pakistan Journal of Social Sciences*, *42*(3), 523-533.

Mowafy, M., Ahmed, D., Halawa, E., & Emad El Din, M. (2015). Prevalence and predictors of emotional and behavioral problems among rural school Egyptian adolescents. *The Egyptian journal of community medicine*, *33*(1), 79-93.

Patterson, R. E., & Eggleston, R. G. (2017). Intuitive cognition. *Journal of Cognitive Engineering and Decision Making*, *11*(1), 5-22.

Raza, S., Naz, V., Ali, R., & Khan, B. S. (2023). University Students' Perceptions Rgarding Online Learning In Punjab Pakistan: A Comparative Study. *Journal of Positive School Psychology*, *7*(5), 653-660.

Scheer, A., Noweski, C., & Meinel, C. (2012). Transforming constructivist learning into action: Design thinking in education. *Design and Technology Education*, *17*(3), 8-19.

Sohail, A., Khan, B. S., & Raza, S. (2023). Educational Leadership's Motivational Strategies for Transformational Growth of Teachers: A Comparative Analysis of Public and Private Schools. *Pakistan Journal of Humanities and Social Sciences*, *11*(2), 1229–1236-1229–1236.

Vignoli, M., Dosi, C., & Balboni, B. (2023). Design thinking mindset: scale development and validation. *Studies in Higher Education*, *48*(6), 926-940.

Wang, W.-C., Lee, C.-C., & Chu, Y.-C. (2010). A brief review on developing creative thinking in young children by mind mapping. *International Business Research*, *3*(3), 233.

Younas, A., SairaTaj, S. K., Hussain, S., Makhdum, F. N., & Khan, B. S. (2023). Classroom Quality In Terms Of Structural And Process Dimensions At Early Childhood Education Level In Pakistan. *Journal of Positive School Psychology*, 79-94.

Zahedi, M., & Heaton, L. (2016). Mind mapping as a tool, as a process, as a problem/solution space. DS 83: Proceedings of the 18th International Conference on Engineering and Product Design Education (E&PDE16), Design Education: Collaboration and Cross-Disciplinarity, Aalborg, Denmark, 8th-9th September 2016,