RESEARCH ARTICLE

▪ Vol. 5, No. 2 (Spring 2024) ▪ p-ISSN: 2791-0237 ▪ e-ISSN: 2791-0202
▪ Pages: 391 – 403 ▪ DOI: 10.55737/qjss.791335465

Open Access

QLANTIC JOURNAL OF SOCIAL SCIENCES

Bloom's Taxonomy and Prospective Teachers' Preparation in Pakistan

Muhammad Amin [1] Syeda Um E Laila Naqvi [2] Humera Amin [3] Sundas Zahra Kayfi [4] Faisal Amjad [5]

Abstract: *The analysis of application of Bloom's Taxonomy in the future teachers' preparation of Pakistan is the aim of this study where gender differences, program differences and semester effects are considered. The researchers developed questionnaire and examined the data using IBM SPSS statistics software. The results point to the fact that female participants are more likely than men to display mastery of lower-level skills as defined by Bloom's taxonomy, such as "remembering" and "understanding, and males tend to excel at thinking critically and analytically, i.e. "analyzing" and "evaluating" according to Bloom's taxonomy. On the other hand, the students of the first, second and third years of the Bachelor of Education (B.Ed.) program were found to be scoring higher than M.Phil. participants. Additionally, freshman students were shown to have stronger achievements at the earlier levels of Bloom's Taxonomy compared to later-year students. These inferences, therefore, indicate the necessity of personalized educational strategies as well as staff development programs to raise the standards of education in Pakistani schools*

Key Words: Bloom's Taxonomy, Prospective Teachers, Pakistani University Context

Introduction

Modern pedagogy recognizes the need to adapt courses to each student's specific requirements, taking into account their particular strengths and weaknesses and offering adaptable resources (such as materials, techniques, and evaluations) to fulfill those needs. Many attempts have been made over the last 10 years to increase student participation to promote critical thinking abilities (Aşıkcan & Uygun, 2023; Byrd, 2002; Kocakaya & Kotluk, 2016).

Adhitya (2024) discovered that both pre-service and in-service teachers are unable properly utilize classroom diversity to meet their students' cognitive learning demands. According to studies (Byrd, 2002; Lisnawati et al., 2023; Tuncer et al., 2021), excellent course design is critical for ensuring that teaching techniques and practices align with the desired learning objectives. Furthermore, the cognitive weight of exam questions can have a significant impact on both students' and teachers' research approaches (Mohammadi et al., 2015; Nurhayati et al., 2023). Exams are an excellent technique to get students enthused about studying.

A taxonomy is a framework-based system that categorizes objectives (Seaman, 2011). Prospective teachers can use Bloom's taxonomy to their advantage by following its structure when developing course learning objectives. Blooms' revised taxonomy of cognitive education priorities organized cognitive processes in increasing order, beginning with fundamental memory and ending with detailed critical and creative thinking, using a dynamic hierarchy. In 1956, many psychologists, notably Dr. Benjamin Bloom,

[1] Associate Professor, Department of ELPS, Division of Education, University of Education, Lahore, Punjab, Pakistan.
[2] Senior Officer Publications, KRSS-ORIC, University of Management and Technology, Lahore, Punjab, Pakistan. Email: s.umelailanaqvi@gmail.com
[3] Lecturer, Department of ELPS, Division of Education, University of Education, Lahore, Punjab, Pakistan. Email: humera.amin@ue.edu.pk
[4] PhD Scholar (ELPS), Department of ELPS, Division of Education, University of Education, Lahore, Punjab, Pakistan. Email: sher21554@gmail.com
[5] PhD Schoalr (Special Education), Department of Special Education, Division of Education, University of Education, Lahore, Punjab, Pakistan. Email: pds24000237@ue.edu.pk

▪ **Corresponding Author:** Muhammad Amin (amin@ue.edu.pk)
▪ **To Cite:** Amin, M., Naqvi, S. U. E L., Amin, H., Kayfi, S. Z., & Amjad, F. (2024). Bloom's Taxonomy and Prospective Teachers' Preparation in Pakistan. *Qlantic Journal of Social Sciences, 5*(2), 391-403. https://doi.org/10.55737/qjss.791335465

made proposals for defining educational objectives. This is referred to as Bloom's Taxonomy (Akinboboye & Ayanwale, 2021).

The redesigned taxonomy simplifies educators' writing objectives. Despite having just a basic comprehension of the first level, the structure continues to evolve. Bloom's Taxonomy has three levels, each of which is used to categorize educational objectives based on their amount of specificity and generalizability (Bashir et al., 2020). The framework's conceptual core is the classification of persons based on their various cognitive talents. This taxonomy is divided into three categories: the Effective domain, the Psychomotor domain, and the Cognitive domain, which are used to identify educational objectives. The cognitive domain consists of six stages: remembering, understanding, applying, analysing, evaluating and creating. These phases range from basic to advanced levels of reasoning (Amer, 2006).

Despite the potential benefits of Bloom's cognitive taxonomy framework, there is limited research exploring its application in the context of university teaching practices in Pakistan. This research will try to fill this gap by examining among prospective teachers in Pakistan, their awareness and practical application of Bloom's Taxonomy. Thus, this study intended to give some suggestions on developmental needs for prospective teachers in response to the current tendency of their practice and the problems they face in order to contribute to the improvement of professional development programs as well as instructional design in the Pakistani context.

Research Questions

To fill the research gap the study aimed to answer the following research questions:

1. What are the differences among levels of Bloom's taxonomy based on gender?
2. What are the variations among levels of Bloom's taxonomy based on program?
3. What are the differences among levels of Bloom's taxonomy based on semester?
4. Which level(s) of Bloom's taxonomy prospective teachers stand at?

Literature Review

Utilisation of Bloom's Taxonomy

Ahmed et al. (2018) looked into how prospective teachers understood and used Bloom's taxonomy in the context of lesson planning. The results showed that aspiring teachers used lower-order thinking skills insufficiently and had little understanding of and use of Bloom's taxonomy. The paper suggests that prospective teachers ensure aspiring teachers are proficient in using Bloom's taxonomy while creating lesson plans.

In regards to Bloom's taxonomy utilisation, the study by Ateş and Özdemir (2019) sought to understand its effects on student achievement and did the teacher candidates' perspectives. Not only the students' performance but also the opinion of the instructor took a better direction following the application of the Bloom's taxonomy. Citing the research, the instructional programs must devise ways in which Bloom`s taxonomy is to be integrated into programs of study and provide the professional teachers with the required trainings.

In their 2017 study titled "The Implementation of Bloom's Taxonomy in Secondary Schools: A Case Study", Naeem and Bilal scrutinized the methodology of the teachers that relied on Bloom's Taxonomy to plan their lessons. Teachers failed to become acquainted with Bloom's taxonomy and do not sufficiently apply higher-level thinking skills, as the survey says. The profession program educators should give teacher training on and support them with effective lesson design by applying Bloom's taxonomy, according to the study.A research work by Othman and Amir on lesson planning and Bloom's taxonomy with the Malaysian Secondary Schools in focus was undertaken by Othman and Amir (2018). The data was analyzed and the result depicted that educators' understanding with Bloom's taxonomy and their application of it was ineffective enough, as well their approaches to the higher-order thinking skills. The education of teachers should be aimed at using Bloom's taxonomy during lesson planning, deciding to instruct them in order to achieve this aim, says the study author.

To prevent prospective teachers from only using Bloom's taxonomy in practice, but in planning lessons and teacher-facilitated learning as well, teacher education programs and counselors should provide

training and assistance. Educating the future teachers about the broad use of Bloom's Taxonomy during their period of learning, providing them with the chance to develop as professionals, adding the knowledge of the Taxonomy to teacher preparation courses – are all the instruments which are rather efficient to accomplish this goal from the study mentioned above.

The Role of University Teachers in Implementing Bloom's Taxonomy

Bloom's Taxonomy, which is widely accepted and applied in the educational side, allows highlighting learning objectives together with developing them. Benjamin Bloom was a educational psychologist major at University of Chicago and in the 1950s himself and associate developed this educational learning method. The taxonomy is based on the notion that learning involves distinct cognitive complexity levels, this can also be divided into six categories: recalling, understanding, applying, analyzing, evaluating, and creating (Mohammadi et al., 2015).

Effective teacher educators will focus on upscaling Bloom's Taxonomy, having more teacher trainings, and providing more support for student-teachers to ensure their learning about Bloom's is competent and complete. Such a measure as giving all those teachers of a university an actual grasp of Bloom's taxonomy and its levels will absolutely help to give realistic and practical standards in the studying process for their students. In order to observe noticeable modifications among teachers, college and school instructors have to develop their own taxonomy in such a way that it becomes transparent and straightforward. The end of this quest would be the assistance they could offer as the educators about the duties of Bloom's taxonomy could bootstrap among teachers and provokes how it might be included in the design of instruction material (Barrientos, 2023). Instructors of teachers organize work with education also activation students for developing tests and activities according to Bloom's Taxonomy levels. This is done by helping the students master the skill of working on scenarios and evaluations that align with the different levels of Bloom's Taxonomy. As an example, learners may illustrate instructors how to structure their course assignments in order to elicit students' ability to move beyond pure memorization to complex evaluation and critical analysis (Ramya & Rajeswari, 2023).

Teacher educators should introduce a diversity of methods to tach learners to apply Bloom's Taxonomy. For the very inception it is integral to figure out the range of the courses and assessments that relate to the different stages of Bloom's Taxonomy which must extend the teachers cooperation and collaboration. These collaborations may happen through a face-to-face encounter or through an online communication (Barrientos, 2023).

In order to enable teachers to actually apply Bloom's Taxonomy, experienced educators need to be "seeing less experienced" educators using this taxonomy. Mentoring initiatives teachers may participate in and teaching approaches of colleagues might all be ways how teachers get influenced by each other (Küchemann et al., 2023).

In addition to that, it is vital to make sure that teacher educators would supply continuous guidance to the learners as well as feedback on their progress. The most relevant aspect of such a process is provision of opportunities or to these instructors either reflect on themselves or make informed pedagogical decisions (Sa'dijah et al., 2023).

However, while there exist significant positive outcomes of using Bloom's Taxonomy approach, applying this particular instructional strategy of a teacher could be quite tricky since it is not without drawbacks. There stands an obstacle in the way of designing exercises and assessments that comprise representatives of each level of Bloom's Taxonomy, and so the problem needs to be solved. The generation of such tests could, however, be problematic as it may be very hard for the educators to differentiate between those who can well apply thinking from those who can merely regurgitate facts (Khizar et al., 2020).

The problem is that the instructors do not have enough time and resources to create activities that achieve all of the levels of Bloom's Taxonomy, and instead limit their lessons to low level cognitive skills. Teaching tasks may appear overwhelming for teachers, and they may be finding themselves under pressure to plan and carry out activities that work (Tuncer et al., 2021).

While teacher educators fulfil a crucial function in helping prospective teachers to learn how to use Bloom's Taxonomy, it should be noted that prospective teachers themselves have an active role in this process. The teachers should know exactly Bloom's Taxonomy and its many levels, which play an important role in the educational processes. Also, the teachers should be shown how to make evaluations and tasks that are easier/harder for the different level students. Moreover, they should do that by means of the wide range of the tictacs, for example, offering the chance of observation and teacher evaluation. Also, teachers have to adopt diverse strategies, such as cooperation, networking, etc.

Best Practices for Teacher Educators in Implementing Bloom's Taxonomy

Bloom's Taxonomy has long been a popular framework for directing and grading learning outcomes. It is frequently employed in educational contexts to organize and prepare learning experiences that help students advance their capacity for critical thought, problem-solving, and judgment. However, for the teacher educators to be able to apply the Bloom 's Taxonomy as envisaged, they should gain deeper understanding of the said framework and have a concrete idea on how the taxonomy could be effectively implemented in the teaching-learning process (Lisnawati et al., 2023).

Understanding Bloom's Taxonomy: First, as a framework, teacher educators should have a clear understanding of the framework in order to apply it to refining one's practices. Making sure that there is familiarity with the six categories of Bloom's Taxonomy and the related terms and concepts to each of them constitutes part of this. Moreover, teacher educators should be aware of the contemporary version of Bloom's Taxonomy with an extra domain of metacognition. Teacher educators, hence, observed that they will be in a better position to develop learning objectives, learning experiences, and assessments within the frame work of Bloom's Taxonomy if they have a sound understanding of the framework (Begam & Tholappan, 2018).

Learning Objectives and Bloom's Taxonomy Alignment: Of all the processes involved in the implementation of Bloom's Taxonomy, matching the learning objectives to the right cognitive domain is arguably the most critical. The routine learnt by the teacher educators needs to be congruent with the job demands and their cognitive demands. For instance, when one of the learning goals is to enable the pupils to be able to understand the key aspects of a scientific experiment, this would fall under Bloom's taxonomy under the former category with an understanding being considered as remembering (Amer, 2006).

Designing Learning Experiences: Teacher educators are responsible for creating learning opportunities that are in line with Bloom's Taxonomy and allow students to acquire the cognitive abilities needed for each domain. This may use a variety of instructional techniques, such as lectures, discussions, case studies, and exercises requiring students to solve problems. The degree of complexity required for each cognitive domain should be taken into account when designing learning experiences, according to teacher educators. Examples of tasks that are more likely to among the concepts that correspond to Bloom's Taxonomy's higher-level cognitive domains those that call for pupils to analyses information or create solutions to challenging situations (ElJishi et al., 2024).

Utilizing Assessment Strategies: Evaluation is important when it comes to the implementation of Bloom's Taxonomy. There is a need to ensure that the assessment methods being used are consonant with the cognitive domain being assessed by the teacher educators. For instance, if the goal of the lesson is for the students to analyse a case study, then the evaluation approach might involve writing an essay or presenting their findings to the class. Finally, teacher educators can review students' learning outcomes and determine whether or not they have acquired the expected dualistic thinking skills by employing Bloom Taxonomy-based assessment strategies (Domínguez-González et al., 2023).

Promoting Metacognition: Meta-cognition has been included as the seventh domain in the recent revised Bloom's taxonomy. Metacognition is a process that entails self-regulation of thinking and the way one learns. Thus, applying such teaching practices as self-evaluation, peer feedback, and reflective writing that enable students to think about their learning process, teacher educators can enhance metacognition. This

awareness may be achieved with the assistance of teachers and educators by developing pupils' critical thinking capacity and making them more conscious of their general learning processes through metacognition (Zhou et al., 2023).

Teacher educators can only apply this approach professionally if they have both a profound theoretical understanding and practical experience in Bloom's Taxonomy. In addition to this, they need to capitalize on the ability to consider the instructional modules and evaluate their viability and correlation between course director and cognitive domains. Teacher educators may apply the strategies highlighted in this study in order for them to provide richness to students' learning experiences.

Methodology

Scientific study involves using systematic approaches for handling problems (Rajasekar, 2013). The over all methodological process used for the conduct of this study was descriptive research methodology. The main research question of the given study is as follows: How do teachers apply Bloom's taxonomy, focusing on the cognitive domain, in a classroom setting. Descriptive statistics (mean and standard deviation) were used to analyze the questionnaire responses for cognitive domain levels.

Because of the quantitative and descriptive nature of the study, post-positivism is taken as the guiding paradigm. In reaction to the positivist canon of thinking, a new research school of thought known as post-positivism emerged. In contrast to positivism's emphasis on empirical observation and measurement, post-positivists seek to integrate multiple views and approaches to achieve a more complete knowledge of the world.

Post-positivism is a scientific field that prioritises the use of quantitative data, conducting empirical studies, and maintaining impartiality. As a result, we will focus on the good components of this paradigm. Postpositivists follow the scientific method, which prioritises data collecting, empirical analysis, and methods. As a result, it is one of the most effective methods for investigating the relationship between Bloom's Taxonomy and classroom teaching strategies. Post-positivism enables a multitude of data analysis approaches that can shed light on the study's variables and interrelationships. The verifiability of the link between variables by researchers is a core premise of post-positivism, an intellectual system derived from positivism. This makes it easy to see how various educators impact their students' knowledge development. Educators may sometimes overlook the importance of their students' social, cultural, and historical backgrounds when developing lesson plans and measuring student growth. Post-positivism is based on the premise that there is an objective universe that can be observed and quantified. However, a single variable cannot adequately describe the complex relationship that occurs between teachers' conduct and their students' academic performance.

Target Population

The bulk of the study's participants are students pursuing an Education major at a Public University in Lahore Pakistan. This study includes students in their third, fourth, sixth, and eighth semesters from the Faculty of Education's STEM, ELPS (educational leadership and policy studies), and Special Education departments. Ten percent of the total sample was M.Phil level students for program comparison.

Sampling

A sample of 500 respondents was selected from among the 1825 students at a public university. The sample had 454 females and 46 males. The researchers were unable to collect data from both gender groups equally because in Pakistan female strength is more than male strength in the teaching profession and degrees. To collect measurable data, the researcher used a self-designed structured questionnaire. The survey was designed with 30 items.

Instrument of the study

The study survey comprised thirty items dispersed across six levels of the cognitive domain as follows:

- Level 1: Remembering-6 items.
- Level 2: Understanding-4 items.

- Level 3: Applying-5 items.
- Level 4: Analyzing level-5 items.
- Level 5: Evaluating level-5 items.
- Level 6: Creating level-5 items.

The data was analyzed using IBM SPSS software. With the help of this software descriptive analysis was carried out. The summary of mean and standard derivation has been given out in the results section.

Results

Researchers evaluated the survey data collected from the Cognitive domain's sub-levels using Bloom's taxonomy and fundamental percentage analysis. The researcher used SPSS software to calculate the mean and standard deviation of each participant's replies at the lowest levels of the cognitive domain. Descriptive data is analysed using the mean average. The average mean is used to demonstrate academic success inequalities between male and female students based on gender. To highlight the mean score for the curriculum and semester used in the descriptive analysis. The genders were encoded as follows: male (1) and female (2). The programme was coded as (1 = Bachelor of Education, 2 = M.Phil. Education, 3 = BS Educational Leadership and Policy Studies, 4 = M.Phil. Educational Leadership and Policy Studies, 5 = B.Ed. special). It was classed by semester (2nd = 1st year, 4th = 2nd , 6th = 3rd , 8th = 4th).

Table 1

Descriptive Statistics of different levels of Bloom's Taxonomy

Taxonomy of Blooms Level	Mean	Cumulative mean
Remembering	2.57	15
Understanding	2.73	11
Applying	2.76	14
Analyzing	2.52	13
Evaluating	2.53	13
Creating	2.5	13
Total	2.61%	13.04%

Table 1 displays descriptive information for the six cognitive domain levels. The mean overall score is M=2.61%. According to the figures presented, the first level demands knowledge memorization at a rate of M=2.57. M = 2.73 is shown as the second understanding level. M=2.76 is displayed on the third level of application. The fourth level of investigation reveals M's value to be 2.52. M is 2.53, as established by the fifth round of examination.The value of M in the sixth level is 2.55. The level applied is associated with a higher mean value. Overall, the results show that comparatively more students stand at lower order thinking levels of Bloom's taxonomy.

Table 2

Mean Score of the Remembering level based on Gender

Taxonomy of Bloom	Gender	Mean	SD
Remembering	Male	2.5	2.0
	Female	2.6	2.1

The table 2 shows the mean scores for the Remembering level for male and female respondents. Male participants' average Remembering score was 2.5, with a standard deviation of 2, but female participants' average was 2.6 with a standard deviation of 2.1. This suggests that girls outnumber males in Bloom's Taxonomy's first level of learning, memory.

Table 3

Mean Score of the Understanding level based on Gender

Taxonomy of Bloom	Gender	Mean	SD
Understanding	Male	2.7	1.3
	Female	2.7	1.6

Table 3 shows the mean scores for the Understanding level across male and female respondents. In the Understanding level, male participants get an average score of 2.7 with a standard deviation of 1.3. Similarly, female participants had an average score of 2.7 and a standard deviation of 1.6. This suggests that males and females are more numerous at Bloom's Taxonomy's second learning level, comprehension.

Table 4

Mean Score of the Applying level based on Gender

Taxonomy of Bloom	Gender	Mean	SD
Applying	Male	2.7	1.9
	Female	2.8	1.9

Table 4 shows the mean scores for male and female respondents at the Applying level. At the Applying level, male participants had an average score of 2.7, with a standard deviation of 1.9. In comparison, female individuals had an average score of 2.8, with a standard deviation of 1.9. This suggests a larger number of females in Bloom's Taxonomy's third learning level, which is significant.

Table 5

Mean Score of the Applying level based on Gender

Taxonomy of Bloom	Gender	Mean	SD
Analyzing	Male	2.6	1.6
	Female	2.5	1.5

Table 5 shows the mean Analysing level scores for male and female respondents. At the Analysing level, male participants had an average score of 2.6, with a standard deviation of 1.6. In comparison, female individuals had an average score of 2.5 and a standard deviation of 1.5.According to Bloom's Taxonomy, men are more abundant in the fourth level of learning.

Table 6

Mean Score of the Evaluating level based on Gender

Taxonomy of Bloom	Gender	Mean	SD
Evaluating	Male	2.5	1.6
	Female	2.5	1.7

Table 6 shows the mean scores for male and female respondents at the Evaluating level. At the Evaluating level, male participants' average score is 2.5, with a standard deviation of 1.6. Similarly, female participants had an average score of 2.5 and a standard deviation of 1.7. This suggests that boys and girls are equivalent on Bloom's Taxonomy's evaluative fifth learning level.

Table 7

Mean Score of the Evaluating level based on Gender

Taxonomy of Bloom	Gender	Mean	SD
Creating	Male	2.5	1.7
	Female	2.5	1.7

Table 7 shows the mean scores for male and female respondents at the Creating level. In the Creating level, male participants had an average score of 2.5, with a standard deviation of 1.7. Similarly, female participants had an average score of 2.5 and an analogous standard deviation of 1.7. This means that boys and females are nearly equivalent at Bloom's Taxonomy's sixth learning level.

Table 8

Mean Score of the Remembering level based on Program

Taxonomy of Bloom	Program	Mean	SD
Remembering	B.Ed.	7	7
	M.Phil.	5	6

Table 8 shows the average Remembering score values for two different programmes. Typically, students participating in Bachelor's degree programmes achieve an average score of 7 with a standard variation of 7. In contrast, M.Phil. course participants get a mean score of 5 with a standard deviation of 5. This suggests that B.Ed. applicants have a reasonably high quotient at Bloom's Taxonomy's initial learning level, Remembering.

Table 9

Mean Score of the Understanding level based on Program

Taxonomy of Bloom	Program	Mean	SD
Understanding	B.Ed.	8	1
	M.Phil.	5	3

Table 9 illustrates the average scores of the program's respondents on the Understanding level. In contrast to the M.Phil. degree, which had a mean score of 5, the B.Ed. programme had a substantially higher mean score of 8. The B.Ed. programme appears to have a higher level of comprehension than the M.Phil. programme, as indicated by these figures.

Table 10

Mean Score of the Applying level based on Program

Taxonomy of Bloom	Program	Mean	SD
Applying	B.Ed.	8	1
	M.Phil.	5	2

The mean score values of the programme respondents at the Applying level are presented in Table 10. It is evident that the mean score for the B.Ed programme was 8, which is significantly higher than the mean score of the M.Phil. programme respondents, who also scored 8. This implies that respondents in the B.Ed. course were more adept at applying their knowledge and skills to resolve problems or accomplish objectives than those in the M.Phil. programme.

Table 11

Mean Score of the Analyzing level based on Program

Taxonomy of Bloom	Program	Mean	SD
Analyzing	B.Ed.	7	4
	M.Phil.	4	2

Table 11 illustrates the average scores of students enrolled in two unique degree courses (B.Ed. and M.Phil.), arranged according to Bloom's Taxonomy's Analysing level. The mean B.Ed. score is 7, with a standard deviation of 4, whereas the average M.Phil. score is 4, with a standard variance of 2. The difference in mean Analysing scores between B.Ed. and M.Phil. students indicates that B.Ed. applicants have higher analytical skills. The B.Ed. programme has a higher standard deviation than the M.Phil. curriculum, indicating that the data points are more dispersed.

Table 12

Mean Score of the Evaluating level based on Program

Taxonomy of Bloom	Program	Mean	SD
Evaluating	B.Ed.	7	3
	M.Phil.	5	3

The results of the programme respondents' average Evaluating level score values are presented in Table 12. The B.Ed. programme participants achieved an average score of 7, with a standard deviation of 3. The M.Phil. programme respondents had a mean score of 5 and a standard deviation of 3. Respondents from the B.Ed. course seem to have more refined evaluation skills, as their mean score is greater than that of the M.Phil. programme.

Table 13

Mean Score of the Creating level based on Program

Taxonomy of Bloom	Program	Mean	SD
Creating	B.Ed.	7	5
	M.Phil.	5	3

Table 13 illustrates the average outcomes of the programme participants at the Creating level. A mean score of 7 and a standard deviation of 5 were recorded for the B.Ed. course. Conversely, the average for M.Phil. programmes was 5 points, with a standard deviation of 3. The findings indicate that the average score of B.Ed students is higher than that of M.Phil students.

Table 14

Mean Score of the Remembering level based on Semester

Taxonomy of Bloom	Semester	Mean	SD
Remembering	2^{nd},4^{th},6^{th}	7	6
	8^{th}	3	2

Table 14 shows the average score values of participants at the Remembering level, grouped by semester. The second, fourth, and sixth semesters have a mean score of 7, with a standard deviation of 6. In comparison, the eighth semester average score is 3, with a standard deviation of 2. The findings show that students at the Remembering level do better in the second, fourth, and sixth semesters than in the eighth semester.

Table 15

Mean Score of the Understanding level based on Semester

Taxonomy of Bloom	Semester	Mean	SD
Understanding	2^{nd},4^{th},6^{th}	8	4
	8^{th}	3	2

Table 15 illustrates the average score for the Understanding level among all respondents during the semester. The data is divided into two categories: the second, fourth, and sixth semesters; and the eighth semester. The average score for students in the second, fourth, and sixth semesters is eight, with a standard deviation of four. In comparison, students in the eighth semester had an average score of three and a standard deviation of two. The findings show that students in the second, fourth, and sixth semesters had higher mean scores than those in the eighth semester. As previously established, students' understanding abilities are greater in the second, fourth, and sixth semesters as compared to the eighth semester.

Table 16

Mean Score of the Applying level based on Semester

Taxonomy of Bloom	Semester	Mean	SD
Applying	2nd,4th,6th	8	5
	8th	3	2

Table 16 shows the participants' average scores, which were assessed each semester. The average score of responders in the second, fourth, and sixth semesters was eight, while those in the eighth semester had an average score of three, according to the findings. According to these data, respondents' skill utilisation improved throughout the second, fourth, and sixth semesters as compared to the eighth.

Table 17

Mean Score of the Analyzing level based on Semester

Taxonomy of Bloom	Semester	Mean	SD
Analyzing	2nd,4th,6th	6	4
	8th	3	2

Table 17 illustrates the average Analysing level score values of the respondents, broken out by semester. In the second, fourth, and sixth semesters, students normally receive an average score of 6, with a standard deviation of 4. In contrast, eighth-semester students had a mean score of 3 with a standard deviation of 2. This shows that first-year students outperform their peers from the prior year.

Table 18

Mean Score of the Evaluating level based on Semester

Taxonomy of Bloom	Semester	Mean	SD
Evaluating	2nd,4th,6th	7	5
	8th	3	2

Table 18 illustrates the average results for each respondent's Evaluating level semester. The mean score for the eighth semester is 3, with a standard deviation of two, but the second, fourth, and sixth semesters' mean scores are 7, with a standard deviation of five. The statistical analysis findings show that students at the Evaluating level had greater mean score values in the second, fourth, and sixth semesters than in the eighth semester.

Table 19

Mean Score of the Creating level based on Semester

Taxonomy of Bloom	Semester	Mean	SD
Creating	2nd,4th,6th	7	3
	8th	3	2

The data above displays the mean score values for the Creating level for the respondent's semester. The second, fourth, and sixth semesters have an average grade of seven, with a three-point standard deviation. The average grade for the eighth semester is 3, with a standard deviation of 2. The statistics show that the mean score value for students at the Creating level is greater in the second, fourth, and sixth semesters than in the eighth semester. Students may have been better prepared for this level of reasoning based on previous semesters' curriculum and projects.

Discussion

In a study by Yilmaz (2018), Bloom's Taxonomy was the basis for the lessons of teacher candidates. While realizing that the majority of the teacher candidates have used the taxonomy to some extent, the results

of the survey still bring about concern that they lacked solid knowledge on how to use it effectively. This means that for teacher educators to enhance teacher candidates' capability of implementing Bloom's Taxonomy effectively in practice, additional support and mechanism of training should be provided.

In a study by Chen and Zhang (2016), the authors examined the effect of Bloom's Taxonomy on teaching strategies and student learning in the context of a Chinese classroom. Based on the research, using taxonomy of activities of learning as a model in designing the courses and instruction significantly improved the outcomes of learning, considering ideal test scores. Moreover, the research revealed that instructors who used the Taxonomy of Bloom devised more involving and intriguing lessons that in turn stirred the critical and creative thinking of students.

Furthermore, the introduction of Bloom's Taxonomy in teacher professional development was studied by Mastro (2012). The study showed that since teachers' knowledge and skills on student achievement and teaching strategies are improved when they implement this approach, it forms a great starting point for their own professional development. Moreover, the evaluation underscores the importance of continuous coaching and feedback to teachers to help them correctly implement the Bloom's Taxonomy paradigm into their daily routine.

These outcomes infer that teacher educators could include Bloom's Taxonomy as one of their pedagogical tools in their practices to ensure more meaningful learning. While the taxonomy exploitation is what is very important to the learning process, this very process requires the full compreshension of the taxonomy's design and practical application at the same time. The process of giving the teachers and the educators assisting them an understanding of the use of Bloom's Taxonomy in their practice and helping them use it, teacher educators can provide ongoing training and support.

Tariq and Khan (2016) studied the ability of the participants at a university in Pakistan to think critically as a result of Bloom's Taxonomy. It has been observed by the study that emerging critical thinking capabilities were evident when learning became the primary activity during proper enjoyable teaching using the taxonomy.

Moreover, a 2017 study by Khan and Ahmed researched how effective it is to use Bloom's taxonomy for enhancing Pakistani medical students' higher mental capabilities. The research found the efficacy of higher order thinking and critical thinking skills of students upon it;s usage for planning and evaluation.

Furthermore, Bloom's Taxonomy is widely utilized in numerous nations in order to influence the educational field and improve students' critical thinking prowess. Hinton and Fischer (2014) did research in the area of designing Applying Bloom's Taxonomy to raise students' achievements in a university located in the US. As the research suggests, implementing the taxonomy as a framework for lesson planning & teaching has a greater effect on students who scored higher on tests due to the instruction structure.

Besides, the researchers from Wang, Chen, and Li (2016 surveyed the Taiwanese nurses on how Bloom`s Taxonomy could be applied in nursing education to develop critical thinking capacities of the future nurses. As the studies affirm, when taxonomy is applied to instructional design and evaluation, the conceptions on student's critical thinking and problem-solving capabilities are much more expanded.

Therefore, the given data suggests that Bloom's Taxonomies can be a progressive approach to improving student learning outcomes, especially if the teacher's active involvement in the class can further boost the students' critical thinking skills in both formal and informal learning environments. Nevertheless, drawing the taxonomy properly is essential for a full understanding of its concepts as well as proper applying of the content. In order to help teachers and pupils achieve mastery of the principle and practice of the taxonomy of thought by Bloom, teacher educators must provide continuous guidance and training.

Cakir (2018) conducted a study, in which he focused on using Bloom's Taxonomy while, at the same time, ensuring the Turkish high school students' skills were enhanced in terms of scientific inquiry. The study portrays that taxonomic approach in instructional design and assessment yielded great improvements in students' learning, engagement, and scientific inquiry which in turn improved their understanding of science.

This study by Kurniawan and Nurjanah (2021) examined a model that lies at the intersection of Bloom's Taxonomy application and the development of Indonesian primary school students' mathematical thinking skills. According to the study‘s results, the learners' mathematical thinking abilities, problem-solving skills, and attitudes towards mathematics demonstrated a growth of 100% after the incorporation of the taxonomy into the instructional planning and evaluation exper

Yang & Wang's (2018) study made a focus on the instruction of English to the Chinese college students based on the conception of Bloom's Taxonomy. Data generated from the study showed that designing assessment and instructional planning that are based on the provided taxonomy substantially built language competencies and increased students’ communicational and critical thinking.

Nguyen and Zell (2018) considered the role of Bloom‟s Taxonomy in building historical thinking skills of American high school learners. The research realized that the process of teaching and assessing alignment to the calssified order granted students historical thinking skills and pushed them to be interested in the process of learning. Utilizing Bloom's Taxonomy's approach was the main purpose of the research on the development of critical thinking skills in business undergraduates in Hong Kong conducted by Ho and Lai (2021). The study found that teachers could greatly improve their classes and assessments by using the taxonomy in instructional design. This would lead to more critical, problem-solving thinking and better overall student achievement.

Recommendations

This paper identifies the role of teacher educators as facilitators in assisting pre-service and in-service teachers learn about Bloom’s taxonomy and how to apply them in their teaching practices. The following suggestions can be used by teacher educators to help prospective teachers practice higher order thinking levels of Bloom's taxonomy in the classroom:The following suggestions can be used by teacher educators to help prospective teachers practice higher order thinking levels of Bloom's taxonomy in the classroom:

1. Utilise Bloom’s taxonomy in increasing teacher education measures and delivering quality education. Thus, demonstrating an application of Bloom’s taxonomy in a specific context teacher educators can use this resource in their teaching practices. This can assist the educators in appreciating the relevance and mechanics of Bloom’s taxonomy.
2. As for the professional development of prospective teachers, the teacher educators should sensitize these prospective teachers on how Bloom’s taxonomy can be implemented in the classroom setting. Apart from conferences, seminars, and online courses, it might help the teachers to observe how other educators use Bloom’s taxonomy in practice or in their classes.
3. When implementing Bloom’s taxonomy to teacher education courses, educators can ensure that pre-service teachers are aware of such taxonomy. Efficient design of fieldwork, tasks, and the use of prescribed readings can be undertaken and aligned to the Bloom’s taxonomy.
4. It will be helpful for the teacher educators to encourage the prospective teachers and offer them positive remarks as they try harder to implement Blooms taxonomy in their strategies. Adding value to lesson plan and classroom activity may help educators better practice the use Bloom’s taxonomy by viewing and giving feedbacks.
5. Through encouraging prospective teachers to discuss with one another, teacher educators may assist prospective teachers to co-operatively apply Bloom’s taxonomy in classrooms. Moreover, it might take a critical stance toward one’s own instructions applying Bloom’s taxonomy and try to find new approaches for the practice.

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