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# EXPLORING PRACTICES OF TEACHER EDUCATORS AND STUDENT-TEACHERS FOR LEARNING HIGHER-ORDER THINKING SKILLS IN PRE-SERVICE TEACHER EDUCATION

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**ABSTRACT:** This paper aims at scrutinizing teaching and assessment practices to foster Higher-Order Thinking Skills (HOTS) amongst students enrolled in pre-service teacher education B.ED 4 Years program. It also covers the practices of Teacher Educators and Student-teachers in pre-service teacher education programs. Learning of HOTSs (critical, creative, problem-solving) enables individuals to think logically and respond to the challenges of the 21st century. Mixed method research was applied to collect data in two phases. In the first phase, quantitative data gathered applying the Observation Scale (OS) from Teacher Educators that was triangulated by Focus Group Discussion (FGDs) with Student-teachers and in-depth interviews with the Teacher Educators in the second phase of the study. The purposive and criterion sampling techniques were used to select participants from the institutions offering pre-service teacher education programs in Pakistan.

The results revealed that teachers using teaching techniques and assessment practices are not supporting to foster higher HOTS in Student-teachers due to grade centric and judicial mode of assessment. The use of traditional pedagogies, teachers' attitudes, and infrastructural challenges are major barrios to foster the teaching of HOTS. The study has significant implications for teaching and assessment practices to embed HOTS in teacher education programs.

**Keywords: Observation Scale (OS), Focus Group Discussion (FGDs), Higher-Order Thinking Skills (HOTS)**

## I. INTRODUCTION

The world is changing rapidly and becoming more challenging for the current and coming generations by unfolding mind-boggling problems in every field. Consequently, we need adjustments in curriculum, teaching strategies, and assessment practices to enhance students' creative, analytical, critical, and problem-solving skills that are termed collectively as Higher Order Thinking Skills (HOTS). HOTS involves making judgments, evaluating reasons, justifying claims, and engaging in metacognitive activities that require analyzing, synthesizing, interpreting, inferring, assessing, creating, problem-solving skills (Ku and Ho, 2010; Sternberg, 2009; Willingham, 2007). Educators consider that HOTS occurs when a learner obtains new knowledge and stores it in memory, correlate, organize, or evaluate it to achieve a specific purpose. These skills enable individuals to think logically for examining and solving problems that are very helpful in making life comfortable (Casas, 2011; Kabilan, Adlina, and Embi, 2011). Sternberg (2009) views that HOTS as a component of intelligence increases with age as the acquisition, retention, and transferring skills increases.
Despite recognized significance about the learning of HOTS, it has been observed that they are almost missing in the preparation of Student-teacher (STs) enrolled in Preservice teacher education program run by Teacher Education Institutions (TEI) in Pakistan. It has serious implications in the preparation of teachers and on the overall quality of education (Behlol and Cajkler, 2018; Bashir, 2002). Assessment practices of Teacher Educators (TEs) and STs are focused on figuring out marks and grades instead of facilitating STs in learning HOTSs that may increase critical, analytical, creative, and problem-solving skills. We need assessment that not

only measures students learning in terms of marks and grades but also promotes learning in context to what their weaknesses and strengths are and how they can be helped to improve their learning (Behlol & Cajkler, 2018; Bashir, 2002). The teaching-learning process frequently runs in a tight jacket by merely imparting information without analyzing, criticizing, reflecting, and application of knowledge. Students are just empty vessels sitting in the classroom that has been filled by the teacher with outdated, irrelevant, and almost useless information (Iqbal and Anwar, 2014; Kiani, 2011). The draft National Education Policy 2017 also emphasizes the application of innovative and inquiry-based teaching-learning strategies that may develop thinking students, equipped with the abilities to observe, question, critically analyzing for exploring creative solution of problems. In the existing scenario, the study is aimed at exploring the practices of TEs, and STs in learning HOTS at Preservice B.ED 4 Years program. The findings may have significant implications for TEs and STs to fill the gaps in learning of HOTS.

## II. LITERATURE REVIEW

HOTS are learned when individuals encounter unfamiliar problems or dilemmas (Mahon, 2011) that demands an urgent solution. It may be fostered through practice, and a teacher plays a pivotal role in facilitating learning by using effective teaching strategies and appropriate assessment techniques. Teaching methods and classroom practices have been criticized in fostering HOTS in STs because of their emphasis on rote learning and storing of information (Constantinou and Kuys, 2013; 2012; Thitima and Sumalee, 2012). Some teachers consider that HOTS can only be developed in high achievers. However, the low achievers cannot deal with such skills (Zohar, Degani, and Vaaknin, 2001). But the studies revealed that HOTS in mixed ability students required the use of interactive methods that enable students to construct knowledge on their own and be able to relate acquired knowledge to multiple situations to solve problems.

Effective lesson planning would help attain the goals of HOTS when they are structured, sequenced, and contains the logical organization of concepts followed by the practical, relevant, and doable learning activities. Learning tasks require thinking, analyzing, interpreting, and problem-solving work on the part of learners (Vernez et al., 2014). According to Mahon (2011), a lesson plan is an organized teaching outline for aligning instructional objectives, teaching and learning strategies and activities, teaching aids, and time duration. During teaching practicum, it has been observed that lesson planning skills of novice teachers are weak, mechanical, and loosely tied concepts.

Zohar (1999) stated that students' engagement fosters HOTS learning when it is supported by effective, relevant, and communicative questioning. Effective questioning also increases the frequency of teacher-student interaction. It may fuel motivation and interest in learning tasks that consequently facilitates learning of HOTS. Authentic intellectual engagement requires more profound reciprocity in the teaching-learning process where students actively construct their learning in partnership with teachers and students, work toward deep conceptual understanding, and contribute their ideas to build new knowledge and practices (Friesen, 2008; Dunleavy & Milton, 2009).

According to Wenglinsky (2004), there are three types of learning activities that are particularly suited to facilitate HOTS development. They are *information-gap activities, reasoning-gap activities, and opinion-gap activities.* In the *information-gap activity*, each member worked in pairs as part of the information they needed to complete a task. *In reasoning gap activities,* new information is derived from given information, inferences and deduction is made, and practical reasoning is involved. *Opinion gap* activity involves discussion in which personal preferences, feeling, or attitude is identified or articulated. In the pre-service teacher education program in Pakistani TEIs, it has been observed that the teaching-learning process, by and large, does not focus on the activities as mentioned earlier because of multiple reasons (Bashir, 2002).

Constructive feedback facilitates students in improving their critical and problem-solving skills that may lead to self-correction. Reporting of right and wrong answers to the learner as feedback does not scaffold the learner in naturalistic learning and inhibit HOTS learning. Competent TEs do not directly correct students' errors; instead guide them to correct themselves by offering hints or asking leading questions (Shepard, 2000). Traditional assessment practices (annual and semester-based) consisting of written examination in which students vomit information in response to objective and subjective type tests are not fulfilling the requirements of HOTS.

Iqbal and Anwer (2014) reported that intended learning outcomes are not appropriately aligned to Bloom's Taxonomy cognitive levels in B.Ed. (Hons) Teacher Education curriculum. The findings also indicate that 52% of the curriculum objectives of the courses are confined to lower-order thinking skills (Remembering and Understanding). They reported that mid-term and final-term papers are also lacking alignment of assessment practices with cognitive levels of Bloom's Taxonomy. A minimal amount of final-term paper (05%) was related to HOTS (Evaluation &Creativity) of the taxonomy. Consequently, teaching and assessment of HOTS have been ignored in Preservice teacher education programs.

Learning, especially in public schools, is mostly text-book based and teacher-centered in Pakistan. Students tend to do better in subjects requiring rote memory but poorly perform on basic comprehension and understanding. Several educationists and researchers have criticized the Public Examination system in Pakistan (Mirza, 1999; & Bashir, 2002) because of its focus on grading, selection, and certification. Consequently, the majority of students go for rote memorization to accumulate information without knowing their usage (Anwer and Iqbal, 2014; Bashir, 2002). Students are required to spew knowledge on the day of examination without developing critical, creative, and problem-solving skills (Rehmani, 2000). Hence, there is a need to assess classroom teaching and assessment practices that promote and enhance learning about how much they have learned and their problems and strengths and how they can be facilitated to improve and enhance their HOTS.

## III. RESEARCH METHODOLOGY

### METHODS AND DATA

#### *Design of Study*

The study employed an *explanatory sequential mixed method design* to determine and describe the teachers' classroom teaching and assessment practices atthe pre-service teacher education program for teaching HOTS. The study was delimited to the three courses of the B.ED 4Years teacher education program: *Educational Psychology, English Teaching and Assessment, and Testing.*The first phase of the study was an observation of TEs lesson with observation scale (OS)and the second phasewas interviews of TEs and FGDs with students. According to Creswell (2003),the sequential mixed method can be used to expand the findings of one method with another method. The study may begin with a quantitative method in which theories and concepts are tested, to be followed by a qualitative method involving detailed exploration with a few cases or individuals.

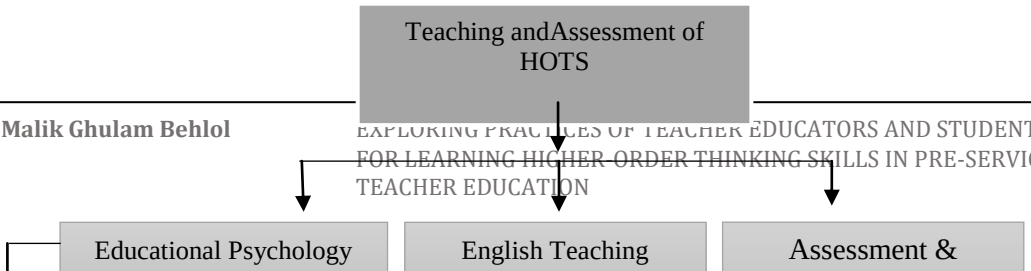

**Figure 1**Conceptual framework

**Source:** Current study

***Population and Participants***

The population of the study was TEs andSTsof B.ED (Hons) 4 Years pre-service teacher educationprogram of seven TEIs located in Rawalpindi, Islamabad, and Gujarat cities. The range of faculty members in these institutions was seven to fifteen with a varying number of students. The sample consisted of thirty-four teachers from seven TEIs teaching selected courses. In the first phase of the study,three teachers were observed twice in each institution with OS.Nine teachers amongst whom their lesson was observed selected for the second phase of the study for in-depth interviewsapplying criterion sampling technique(performed very high or very low on OS). Thirty-five students from the pre-service teacher education programparticipated in five FGDs for triangulation purposive.

***Measures***

The researcher administered three measures to gather data about classroom teaching and assessment practices to explore the learning of HOTS. A self-developed OS incorporates seven constructs that include Lesson Plan (LP); Students' Engagement (SE); Teaching Strategies for Student Engagement (TSSE); Teaching Methodology (TM); Authenticity of Learning Material (ALM); Teacher's Attributes (TA); and Assessment Techniques (AT) was used to collect statistics about teaching and assessment of HOTS. These seven constructs consist of fourteen indicators and fifty-one items. Each of the items was rated in 4 categories

design in ascending order from (1- 4) representing Very Low, Low, High, and Very High. Interview Guide (IG) was developed to address the intangible aspects related to teaching and assessment of HOTS. It was used to gather in-depth information from the teachers about their views and understanding regarding pedagogical and assessment practices, challenges, and suggestions to foster HOTS in STs. FGDs with STs were used to triangulate the gathered quantitative and qualitative data. STs were the primary stakeholders of the program, and their viewpoints guided them to elaborate and paint the picture more clearly. According to Creswell (2003), FGDs were useful to cross-check the data and overcome reactive and thought out the performance of the teachers when they were observed in the classroom

***Analysis of data***

The data gathered through OS was analyzed on SPSS by calculating frequencies, percentages, means, and standard deviations. The analyzed data is presented categorically, i. e., lesson planning; students' engagement; teachers' strategies for students' engagement; methods of teaching; the authenticity of learning material, teachers' attributes, and assessment techniques. A cumulative mean score was calculated to analyze teachers' classroom teaching and assessment practices to develop HOTS amongst PTs of the pre-service teacher education programs. The qualitative data was transcribed, refined, coded to apply thematic analysis for drawing major themes.

## IV. RESULTS OF THE STUDY

**Table 1.** Teaching and Assessment Practices of Teacher Educators to Teach HOTSs on Observation Scale (TCTAP-OS)

| *Sr.no* | *Items* | *V Low* | *Low* | *High* | *V High* | *Mean* | *SD* |
|---|---|---|---|---|---|---|---|
| | ***Lesson Planning*** | | | | | | |
| *1* | Extent of mental to formal lesson plan | 56.5 | 21.7 | 17.4 | 4.3 | 1.70 | 0.92 |
| *2* | Appropriate sequencing of lesson concepts | 8.7 | 26.1 | 47.8 | 17.4 | 2.74 | 0.86 |
| *3* | Communication of learning goals to students | 4.35 | 21.7 | 21.7 | 13.0 | 2.04 | 1.10 |
| *4* | Extent of HOTS in lesson | 21.7 | 47.8 | 30.4 | 0 | 2.09 | 0.73 |
| ***Mean=2.14 SD=0.43*** | | | | | | | |
| | ***Students' Engagement*** | | | | | | |
| *1* | Students ask question to teacher | 39.1 | 13.0 | 26.1 | 21.7 | 2.30 | 1.22 |
| *2* | Students' comments on learning tasks | 39.1 | 26.1 | 21.7 | 13.0 | 1.78 | 1.16 |
| *3* | Students' comments enhance learning | 34.8 | 17.4 | 34.8 | 13.0 | 2.09 | 1.08 |
| *4* | Student ask questions to student | 60.9 | 17.4 | 4.3 | 17.4 | 2.26 | 1.09 |
| | | | ***Mean=2.10*** | | | ***SD=0.23*** | |
| | ***Teaching Strategies for Students' Engagement*** | | | | | | |
| *1* | Activities are formulated | 34. | 26. | 30. | 8.7 | 2.1 | 1.01 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 8 | 1 | 4 | | 3 | |
| *2* | Activities are appropriate to teach HOTSs | 47.8 | 30.4 | 4.3 | 17.4 | 1.91 | 1.12 |
| *3* | Activities are connected to each other | 34.8 | 30.4 | 17.4 | 17.4 | 2.17 | 1.11 |
| *4* | Group work assigned | 52.2 | 13.0 | 0 | 34.8 | 2.17 | 1.40 |
| *5* | Group formation supports HOTS | 47.8 | 13.0 | 17.4 | 21.7 | 2.13 | 1.25 |
| *6* | Teacher ask questions to students | 0 | 4.3 | 21.7 | 73.9 | 3.70 | 0.55 |
| *7* | Teacher give wait time to answer questions | 4.3 | 0 | 52.2 | 43.5 | 3.35 | 0.71 |
| *8* | Questions are relevant to the topic | 4.3 | 4.3 | 30.4 | 60.9 | 3.48 | 0.79 |
| *9* | Teacher ask follow up questions | 13.0 | 17.4 | 30.4 | 39.1 | 2.96 | 1.06 |
| *10* | Questions are phrased in simple language | 0 | 8.7 | 34.8 | 56.5 | 3.48 | 0.66 |
| *11* | Questions about previous knowledge | 4.3 | 17.4 | 43.5 | 34.8 | 3.09 | 0.84 |
| | | | | | | ***Mean=2.77*** | |
| ***SD=0.68*** | | | | | | | |
| | ***Teaching Methodologies*** | | | | | | |
| *1* | Teacher apply monologue to conduct lesson | 26.1 | 17.4 | 47.8 | 8.7 | 2.39 | 0.98 |
| *2* | Teacher initiate discussion to conduct lesson | 8.7 | 26.1 | 39.1 | 26.1 | 2.83 | 0.93 |
| *3* | Teacher engage students in discussion | 21.7 | 17.4 | 21.7 | 39.1 | 2.78 | 1.20 |
| *4* | Teacher engage whole class in discussion | 26.1 | 26.1 | 26.1 | 21.7 | 2.43 | 1.12 |
| *5* | Teacher support students to summarize discussion | 13.0 | 13.0 | 43.5 | 30.4 | 2.91 | 0.99 |
| *6* | Teacher problematize the learning tasks | 13.0 | 4.3 | 34.8 | 47.8 | 3.17 | 1.02 |
| *7* | Alternative ways of solving problem | 13.0 | 26.1 | 30.4 | 30.4 | 2.78 | 1.04 |
| *8* | Teacher use examples to explain concepts | 13.0 | 21.7 | 17.4 | 47.8 | 3.00 | 1.12 |
| *9* | Breaks down complex lesson into manageable steps | 4.3 | 4.3 | 47.8 | 43.5 | 3.30 | 0.76 |
| *10* | Teacher set criteria of performance | 13.0 | 21.7 | 34.8 | 30.4 | 2.83 | 1.02 |
| *11* | Teacher present topic that demands reflection | 8.7 | 26.1 | 30.4 | 34.8 | 2.9 | 0.99 |
| | | | | | | ***Mean=2.84*** | |
| ***SD=0.27*** | | | | | | | |
| ***The authenticity of Learning Material*** | | | | | | | |
| *1* | Availability of learning material | 39.1 | 8.7 | 30.4 | 21.7 | 2.35 | 1.22 |
| *2* | Organization of learning material | 39.1 | 26.1 | 13.0 | 21.7 | 2.17 | 1.19 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *3* | Material used is self-prepared | 39.1 | 30.4 | 17.4 | 13.0 | 2.04 | 1.06 |
| *4* | Material is relevant to the topic | 47.8 | 21.7 | 4.3 | 26.1 | 2.09 | 1.27 |
| *5* | Material is related to local resources | 39.1 | 17.4 | 26.1 | 17.4 | 2.22 | 1.16 |
| *6* | Material is low cost | 30.4 | 13.0 | 21.7 | 34.8 | 2.61 | 1.27 |
| ***SD=0.20*** | | | | | | ***Mean=2.24*** | |
| | ***Teachers' Attributes*** | | | | | | |
| *1* | Teacher enthusiasm | 17.4 | 8.7 | 47.8 | 26.1 | 2.83 | 1.02 |
| *2* | Equality of attention to students | 0 | 17.4 | 30.4 | 52.2 | 3.35 | 0.77 |
| *3* | Provide encouragement | 0 | 21.7 | 30.4 | 47.8 | 3.26 | 0.81 |
| *4* | Caring attitude (appreciate/recognize) | 4.3 | 8.7 | 43.5 | 43.5 | 3.26 | 0.81 |
| *5* | Show patience while learning/during activities | 8.7 | 8.7 | 43.5 | 39.1 | 3.13 | 0.92 |
| *6* | Maintain proximity (closeness) with students | 4.3 | 21.7 | 26.1 | 47.8 | 3.17 | 0.93 |
| *7* | Build sense of affiliation | 4.3 | 21.7 | 26.1 | 47.8 | 3.17 | 0.93 |
| *8* | Students freely share their views | 0 | 30.4 | 39.1 | 30.4 | 3.00 | 0.79 |
| *9* | Sense of pride in work | 8.7 | 4.3 | 30.4 | 56.5 | 3.35 | 0.93 |
| ***SD=0.16*** | | | | | | ***Mean=3.16*** | |
| | ***Assessment Techniques*** | | | | | | |
| *1* | Use of self-assessment techniques | 21.7 | 21.7 | 17.4 | 39.1 | 2.74 | 1.21 |
| *2* | Relevance of feedback | 26.1 | 13.0 | 26.1 | 34.8 | 2.70 | 1.22 |
| *3* | Correction of students' errors with patience | 13.0 | 17.4 | 43.5 | 26.1 | 2.83 | 0.98 |
| *4* | Lesson alignment in teaching and assessment of HOTS | 8.7 | 21.7 | 34.8 | 34.8 | 2.96 | 0.97 |
| *5* | Circular seating in the classroom | 39.1 | 13.0 | 21.7 | 26.1 | 2.35 | 1.26 |
| *6* | Enough space to conduct learning activities | 26.1 | 21.7 | 17.4 | 34.8 | 2.61 | 1.23 |
| ***Mean=2.69 SD=0.20*** | | | | | | | |
| | **Total Mean Score & SD-** Classroom Teaching and Assessment Practices Observation Scale (TCTAP-OS) | **Mean=2.68 SD=0.508** | | | | | |

Source: processed data

In **Table 1** regarding the teaching and assessment practices of teacher educators to teach higher-order thinking skills, the mean score and standard deviation computed from the gathered data through TCTAP-OS explains the results by each category.

***Lesson Plan***

The data reveals that the mean score of the Four items of Lesson Planning is 2.14 and SD 0.43 that is slightly low than the average mean score of the construct on the scale. Formal Lesson Planning has the lowest mean score (1.70), followed by communication of goals and inclusion of HOTS (2.04, 2.09) in lesson planning.

***Students' Engagement***

The data reveals that the mean score of the Four items of Students' Engagement is 2.10 and SD 0.23 that is slightly low than the average mean score of the construct on the scale. Students' comments on learning tasks has the lowest mean score (1.78), followed by Students' comments enhance learning and students ask questions to a fellow student (2.09, 2.26) in a lesson on OS.

***Teaching Strategies for Students' Engagement***

The data reveals that the overall mean score of the eleven items of Teaching Strategies is 2.77 and SD 0.68, which indicates that the teaching strategies used for students' engagement are appropriate to teach HOTS. Learning activities are appropriate to teach HOTS has a lowest mean score (1.91) followed by effective group formulation techniques, group assignments/tasks, and connection of activities to one another (2.13, 2.13, 2.17) in the lesson.

***Teaching Methodologies***

The calculated mean score on eleven items of the construct is 2.84 and SD 0.27, which indicates that the teaching methodologies used for developing HOTS are suitable to teach HOTS. On the item, the teacher applies monologue to conduct lessons has the lowest mean score (2.39), followed by the teacher to engage students in whole-class discussion (2.43) in the lesson. The highest mean score was recorded on the items that the teacher problematize the learning task (3.17) followed on the items that break down the complex lesson into manageable steps, use examples to explain concepts, support students to summarize the discussion, present topics that demand reflection, and set criteria of performance for contribution in the discussion (3.30, 3.00, 2.91, 2.91, 2.83).

***The Authenticity of Learning Material***

The calculated mean score of six items of this construct is 2.24 and SD 0.20, which indicates that the use of authentic learning material for developing HOTS is slightly low than the average mean score of the construct on the scale. The lowest mean score is recorded on the item that material used is self-prepared (2.04) followed on the item that material is relevant to the topic, appropriate organization of learning material and learning material is related to local resources that may enhance the learning of HOTS (2.09, 2.17, 2.22).

***Teachers' Attributes***

The calculated mean score is 3.16 and SD 0.16, which indicates that the teachers' attributes used for developing HOTS are very high in classroom teaching. The construct 'Teachers' Attributes' comprised of nine items in which the mean score and SD of item 1 recorded high, which indicates teachers' enthusiasm in teaching style. While the mean score and SD of items 2, 3, 4, 5, 6, 7, 8, and 9 show very high practices by teachers. These items focus on teachers' equal attention to students, encourage them, showing caring attitude, show patience while teaching different activities, proximal behavior with students during teaching,

building a sense of affiliation, providing students platform to share their views in whole class, and showing a sense of pride in their work.

***Assessment Techniques***

The calculated mean score is 2.69 and SD 0.20, which indicates that the use of assessment techniques for developing HOTS is appropriate. The construct 'Assessment Techniques' comprised of six items in which the mean score and SD of item 1, 2, 3, 4, 5, and 6 recorded high, which indicates the use of self-assessment techniques, the relevancy of feedback, correction of students error with patience, lesson alignment in teaching and assessment of HOTS, circular seating arrangement in the classroom, and enough space to conduct assessment activities in classrooms.

**Analysis and Results of Interview and FGDs**

Nine male and female teachers participated in the study out of seven TEIs. IG covered their understandingof teaching and assessment practices, problems and challenges, space in the curriculum to teachHOTS.Five FGDs were conducted with the STs of TEIs participating in the study to triangulate the results.

***Understanding about HOTS***

Almost all nine male and female TEs had an understanding of HOT. Six out of nine participants related HOTS to Bloom's taxonomy and stated knowledge, comprehension, and application as lower-order skills, whereas analysis, synthesis, evaluation, and creation are HOTS. One of the participants (P3) viewed that HOTS include critical thinking and the ability to compare and contrast. However, one of the participants amongst teachers (P4) stated that cognitive growth is an integrated gradual process; therefore, it is not justified to be a divide into lower and higher levels of skills.

Participants of the FGDs viewed that it involves analysis, synthesis, evaluation, and creation. STs of FGD group 1, group3, group 4 commented that application of knowledge and to think critically and deeply are HOTS. Two participants (P2 and P5, Group 5) explained that HOTS means to look at the thing from multiple angles. One of the participants stated that HOTSs is the process of obtaining *self-actualization* and understanding of *one's own identity*. However, one of the participants said that "*they are not taught about HOTS that's why he has no clear understanding about it except that Bloom's different level of thinking and cognition (P7)"*.

***Assessment Practices***

In answering the question about the assessment practices, participants (TEs) shared multiple approaches they use for the assessment of students. Popular ways of assessment are taking presentations, practical assignments, tests, and quizzes, involving them in discussion and question-answer techniques. However, students' view that our majority of teachers are not using *learning supportive assessment practices* rather using them for grading and certification purposes that focused on checking on the power of memorization. Students also viewed that effective feedback practices are also missing on the part of teachers in *assessing assignments and projects*. Students suggested that existing assessment practices required to be linked with clear criteria that not only clear to teachers but also informed to students (P7; FGD 4).

***Problems in Teaching and Assessment of HOTS***

Most of theteacherspointed out that teaching and assessment practices lack sufficient focus on HOTS because of incompetence, time, crowded classes, grade centric and information checking assessment. Another participant highlighted that majority of teachers neither develop nor usethe rubric to assess learning ofHOTS. The participants also highlighted the need for proper planning, training of teachers for establishing and promotinglearning supportive assessment. Students also highlighted biasness on the part of teachers in grading students' assignments, midterm, and final term examination. Participant 4 (FGD 3) viewed that*"some*

*students are introvert, they are not much socialized and do not interact much with the teacher, as compared to those who are very social and so they are favorites and get high grades."*

***Teaching Methods to Teach HOTS***

Students highlighted that teaching methods that promote HOTS are activity-based teaching, experiential learning, questioning, reflective teaching, problem-solving, research projects, and discussion. Student participants viewed (P1, FGD 2) "*our some teachers teach us through experiment, demonstration, and I think this involves HOTS. We feel quite easy to learn in this way*." The majority of the students highlighted the importance of the *discussion method* that may generate ideas to study from multiple perspectives and angles. It also develops and cultivates the ability of reflective skills and provides space to students for sharing their opinions and thoughts. FGD 2 also highlighted the importance of experiment-based learning, and P 5 concluded:

*"We used to be taught through the lecture method in the past, but now the discussion method is used by teachers, and they take students point of view by involving them in the discussion. Secondly, practical is important; students should be allowed and asked to perform things practically, which they have learned. For example, we read about the computer, and we cannot learn them completely until we practically work on a computer. So practical work should be increased in teaching".*

Some students explained that they learn better when they are taught through innovative methods, and teachers provide them freedom and space to take the authority and responsibility of their learning. P1 (group3) highlighted that one of the teacher teaching in the current semester tries to motivate us in different ways such as "*looking at the things from different perspectives, providing space to disagree, facilitating engagement in learning and providing opportunities of doing things in our ways to learn and analyze ideas.* Teachers and students have unanimous opinions that the problem-solving method fosters learning of HOTS. It engages students in the lesson, strengthens analytical, critical thinking skills, and blends theory and practice in learning different concepts along with driving the learning process on experiential mode.

## V. DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

**DISCUSSION**

The quantitative findings established that Formal Lesson Planning, Communication of Learning Goals, and Inclusion of HOTS is missing in the teaching practices of TEs teaching in the B.ED (Hons) 4 Years program. Planning of lesson presents volleys of questions before the teacher about *WHAT and HOW to teach* at different stages of the lesson in an organized, sequenced, and logical way. It also prepares a teacher to address the challenges and issues he/she has to confront in the classroom before-hand, and critically reflect on them and think about their solutions. According to the famous Greek philosopher Plato, ideas precedes the actions, and without logical sequencing of lesson ideas; enactment, the pacing of lesson activities for achieving the targets would be difficult. The study also revealed that the majority of the teachers do not communicate Learning Goals to students at any stage of the lesson; consequently, the position of the learner is just wandering in the forest without knowing the destination. Thought out and planned lessons may help to design and carry out the learning process to achieve the desired targets. Mahon (2011) also verified that teaching and assessment of HOTS without realistic and well thought out lesson planning is not possible.

The study revealed that questioning strategies used by the majority of the teachers are not effective enough to engage students in the learning process. *Poor lesson planning, absence of learning targets, lack of students' comments on learning tasks, and no student-to-student interaction and questioning* inhibit students' engagement. Accepting and retaining concepts as has been communicated by teachers is a key challenge to develop HOTS because the learners have not been provided the opportunity to comment on the learning tasks. The teacher, as a sole custodian of knowledge, leaves limited space for the learner to comment on the lesson, to agree or disagree and present multiple perspectives (Friesen, 2008; Dunleavy & Milton, 2009). So learning of PTs happens in a tight, fixed, and stereotyped boring environment. Quantitative data revealed that the majority of the teachers ask questions that are relevant to the topic, phrased in simple language, and

connected to previous knowledge, but qualitative data gathered from the students contradicted this result. It is effective questioning that may lead to critical discussion for the teaching and assessment of HOTS.

The quantitative data revealed that the majority of the teachers *initiate discussion, engage students in discussion, support students to summarize the discussion, and set criteria of performance for contribution in the discussion.* They also problematize learning task, breaks down the complex lesson into manageable steps, use examples to explain concepts, presents a lesson in a way that demands reflection and alternative ways of solving the problem. *However, students shared that the majority of the teachers mostly follow lecture mode and provide handouts to students to initiate a discussion that is usually monologic in nature instead of interactive.* Participation and contribution in the discussion are difficult for students without having basic knowledge or pre-reading. Discussion is a planned, sequenced, and guided activity that may tilt the anchoring role from teacher to students in a gradual way. It has been observed that in the majority of cases, the teacher writes the topic on the whiteboard and invites students for discussion without ensuring to what extent they are already aware of the topic.

Students also contradicted the teachers about the application of student-centered approaches in teaching. They viewed that the majority of the teachers runs the teaching-learning process with the support of PowerPoint presentation in which students are the silent recipient of information. Usually, the focus of learning is on storing information instead of analyzing, evaluating, and reflecting. Teaching methods that promote HOTS are activity-based teaching, experiential learning, reflective teaching, discussion, problem-solving are rarely applied by the faculty. The study has also established that learning of HOTS happens when teachers provide freedom and space to the learner so that they take control of their learning. According to Rajendran (2008), to teach HOTS, we need to design and practice independent teaching-learning embedded in problem-solving mode. Miri, David, and Uri (2007) viewed to teach HOTS; we need to create opportunities for open-ended questions and also working in groups for unrestricted sharing of ideas.

Qualitative data gathered from teachers revealed that they use meaningful learning activities that are executed in group work to enhance analytical thinking skills. However, quantitative findings contradicted and highlighted that majority of the teachers do not formulate well connected and appropriate learning activities and also lack effective group formulation techniques that facilitate the teaching of HOTS. Teachers' views are also contradicted with the findings of FGDs, where students have the opinion that the majority of the teachers do not assign group work to students and rarely use activity-based teaching. Formulation of meaningful activities that have been executed in groups not only enhances learning but also increases the level of interdependence and team working skills. It may also facilitate to listen to different and contradictory views with patience and to address them in a logical and meaningful way. Group work also lessens the rate of tension and anxiety that may overwhelm the student when he/she is fighting all alone individually. Eisner (2002) states that if the development of HOTS is not fostered in today's challenging society, there is a risk of creating future citizens who lack the skills to appraise different situations and solve problems with multi-perspective angles.

Popular practices of assessment that teachers employ in their teaching are conducting presentations, theoretical assignments, tests, and quizzes. However, according to Shepard (2000), HOTS is better assessed by writing a research report, project presentation, review of literature, problem-solving tasks, reflective journals, and reflective assignments instead of formal testing. It is an urgent need to foster the competencies of teachers for developing performance assessment tasks that demand analysis, evaluation, reasoning, critical, and creative skills. It is the only way to shift the learning mode from mere rote memorization to a higher level of cognitive skills. Positive humanistic attributes of teachers also raise the level of students' engagement in learning and build a sense of affiliation that consequently supports the learning of HOTS.

## CONCLUSIONS

It is concluded from the findings that the majority of the teachers are using teaching techniques and assessment practices that do not develop HOTS in students. Teaching methods usually include lecture method with the support of PowerPoint presentation instead of engaging learner in practical tasks that requires the application of analytical, critical, reflective, and problem-solving skills. Students' perspective about a teaching method that they learn better when they are taught through activity, discussion, problem-solving, reflective, and student-centered teaching methods. Teachers may provide students' freedom and space to take the authority and responsibility of their learning by providing in time, targeted, and well communicated oral and

written feedback. Students viewed that there is a need for change in assessment practices to assess and promote learning of HOTS through the use of assessment-driven lessons, open-ended, self-assessment performance tasks, reflective journals, meaningful assignments, and need-based projects. Holistic lesson plans addressing cognitive, affective, and psychomotor domains with the use of effective questioning for processing information and constructing understanding, application of knowledge to solve problems in teaching HOTS. It requires deep-rooted changes in curriculum, teaching, and assessment practices to replace rote memorization with a higher level of cognitive skills.

**RECOMMENDADTIONS**

Based on the results, the study suggests the following recommendations:

1. The reforms are needed in teaching strategies to devise more open-ended performance tasks to ensure that students can reason critically, to solve complex problems, and to apply their knowledge in real-world contexts.
2. Assessment practices are required to support and enhance HOTS in students in two ways: First, its form and content must be changed to better represent thinking and problem-solving skills in each of the disciplines. Secondly, the way assessment is used in classrooms and how it is regarded by teachers and students must change.
3. Learning is a socially and culturally constructed phenomenon. Socially supported interactions have a significant impact on the *development* of cognitive abilities. Therefore, learning and assessment may be authentic and connected to the world outside of school. It is suggested that the goal of teaching should be to help students in developing "robust" understandings instead of "fragile" understanding.

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