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RESEARCH PAPER

Relationship between Formative Assessment Techniques, Students' Learning and Academic Achievement at University Level

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ABSTRACT

The study's objective was to determine the relationship between formative assessment techniques, students' learning and academic achievement at university level. The study's methodology included quantitative, descriptive, and survey. All universities in the Lahore district, (public and private), were the target population of the research. It employed a multi-stage sampling technique. The total sample was comprised of 600 students. The questionnaire was self-constructed. The validity of the instrument was determined through experts' opinions and the questionnaire' reliability was found through pilot-testing. The Cronbach's Alfa value was 0.912. It was concluded that there was strong positive relationship among different formative assessment techniques, students' learning and academic achievement. It was recommended that the study be used by university teachers to create various appropriate formative assessment techniques to improve students' learning and academic achievement.

Keywords	Academic Achievement, Formative Assessment Techniques, Students' Learning

Introduction

Assessment refers to the methods and techniques used to gather information on a learner's ability, understanding as well as motivation (Tosuncuoglu 2018). Formative assessment is an evaluation that takes place within the educational process with the intention of enhancing both learning and teaching. Both the teacher and the learner undertake formative assessments to provide feedback for learning and teaching adjustments and to increase pupils' achievement in intended learning objectives. Teachers use a variety of approaches and instruments in formative assessment, incorporating them into teaching activities and making them an internal component of instruction, allowing students to practice and quantify their accomplishment of intended learning outcomes (Hung, Ha, and Thu 2019). Formative assessment is a technique for gathering information about learning and using it to enhance the teaching and learning strategies that both students and teachers utilize. Pupils and teachers are equally involved in formative assessment and it involves the concept of response. To identify individual student's potential to promote their learning and offers qualitative feedback to teachers thus they can improve their teaching techniques and content is the aim of formative assessment. As a result, learning effectiveness can be improved (Liu 2013).

The aim of formative assessment is to improve the excellence of instruction activity by investigating societal needs, educational participant needs, feasibility and issues in the instructional process. The following are the characteristics of formative assessment: 1) Formative assessment is a type of assessment that focuses on enhancing an ongoing educational activity. As such, it is an assessment in progress not the entire procedure of instructive movement. In a nutshell, formative assessment is analytic, stressing students and teachers' feedback and complexly participating in the teaching process. Formative assessment can assist in identifying instructional issues so that new or remediable procedures can be implemented as soon as possible. 2) Formative assessment uses both nonverbal and vocal data. Teachers' work in their books, remarks and homework as well as their listening to students' speech and questions are all forms of formative assessment. Different learning circumstances can be put up by teachers to enable chances for this data to be drawn out. 3) The goal for which formative assessment was conducted is the most significant feature. Formative assessment has two basic goals: to inform pupils' learning and teachers' instruction. Monitoring progress and learning as well as comprehending the students throughout learning and teaching are some of the goals of FA for supporting students' learning. Planning for the making decisions regarding education; recognizing when to acquire innovative thoughts and when to proceed on to the next subject, assessing the procedures done in prior formative assessment and methods of instruction; determining whether or not the pupils have grasped the material; giving information to children, caretakers, the institution for reporting and offering assessment data in regard to numerical marks on success are all examples of teaching purposes (Asamoah, Shahrill, & Latif, 2022).

Literature review

Guskey, (2005) stated that formative assessment can be narrated as a step-by-step procedure that incorporate teacher-led teaching, "correctives" and feedback **(**Guskey, & Link, 2022). According to McMillan (2014) in formative assessment, asking questions is critical for gaining information about students' understanding and learning (Ozan, & Kıncal, 2018). In order to foster lifetime learning skills, students can subsequently become more active in the evaluation process (Paul, Weeden, Simmons, and Michael, 2018.).

Techniques for formative evaluation can have a significant impact on student learning and academic accomplishment. Teachers can utilize a variety of strategies to collect crucial information about students' comprehension, provide feedback and help students to define and achieve meaningful learning goals. Each strategy has the potential to improve student learning and achievement (Cauley, & McMillan, 2010). Peer assessment, self-evaluation, self-governing evaluation and instructor evaluation are examples of lecturer ways for gathering information about students' productivity (the means) is called formative evaluation/assessment techniques (Pla-Campas, Arumí-Prat, Senye-Mir, & Ramírez, 2016).

Hodgson & Pyle, (2010) suggested that asking questions is one of the major aspects of formative assessment. Moss & Brookhart, (2009) opinioned that one-third of a teacher's time in the classroom might be spent asking pupils questions. According to Sadler, (1989) and Taras, (2005), In order to close any gaps between their desired aim and their existing knowledge, understanding, and competence, students might employ formative evaluation feedback as well as to coach them from side to side the steps essential to accomplish the goal. Boaler, & Anderson, 2018) suggested that effective category of feedback on homework and tests gives detailed explanation on

misconception and explicit ideas for enhancement, encouraging learners to concentrate their thought wisely on the work rather than merely receiving the correct respond.

According to Tunstall, & Gsipps, (1996) and Fluckiger, Vigil, Pasco, & Danielson, (2010), lower-achieving kids may benefit from this form of feedback for the reason that it highlights learners can get better through attempt rather than being destined to poor accomplishment. When we focus on the five key methodologies that make up the formative assessment umbrella phrase, we may better understand it. Formative assessment theory is based on research from a variety of domains. From each of these five strategies, formative assessment techniques can be traced back over time to numerous assessment techniques. It is argued that applying one is successful, yet this entire approach is applied to actual formative assessment. Teacher, student and mentor collaborate to ensure that everyone understands where the training is going, where the student is right now and how to get there. The five main techniques are discussed in greater detail below.

- Defining, communicating and figure out the learning intentions and accomplishment criteria
- Generating debates, queries and coursework in the class that produce evidence of learning
- Provided that productive feedback that encourages learners to improvement.
- Activating learners to serve as one another's instructional resources
- Empowering learners to take charge of their own education (Babinčáková et al. 2020).

Formative Assessment Techniques are useful in the classroom for a variety of reasons. FATs have been demonstrated to:

- Engage learning through activating thinking.
- Help students communicate their ideas to themselves as well as instructor.
- Promotes participation by making it more comfortable to express one's ideas in front of others, especially among more reserved students who are less prone to speak up in class.
- Offer a subject for discussion and rational argument.
- Check to see if pupils can use scientific principles in new contexts.

Students' aptitude and confidence in their ability to conduct independent inquiry and study are greatly enhanced by formative assessment. All classroom activities require active participation from the students, and depending on the input received, these activities can be changed to help the students meet their learning objectives. It is generally accepted that students' competencies can be demonstrated during their learning process, allowing lecturers and students to modify their actions in order to meet their objectives depending on response. In order to improve performance, formative assessment helps students to show off their innate skills and manage their learning process (Ahmed, 2022).

Students who are engaged in the learning process, who are motivated to learn, who maximize the numbers of additional information they receive in a given period, who exercise, who keep pursuing descriptive responses, who test and reflect on their learning performance significantly better than someone who is in a detached learning

situation. The school's and teacher's roles are to "control the learning/ teaching environment and utilize dynamic and self-learning " (Serig, 2011).

Academic achievement refers to the quantity to which an individual has met certain goals that were the center of attention of activities in educational settings, such as school, college and university (Steinmayr, Weidinger, Schwinger, & Spinath, 2019). Academic achievement refers to the proportion of pupils in a certain institution whose education at present meets or surpasses grade-level norms.

On the basis of the literature, the objective of the study is to find the Relationship between formative assessment techniques and students' learning and academic achievement at university level.

Hypotheses

$H_0$1: There is no significant relationship between formative assessment techniques, students' learning and academic achievement at university level.

Material and Methods

The nature of the research was descriptive and quantitative data collection procedures were used to conduct it. Quantitative research is based on a positivistic philosophical framework/paradigm. All of the public and private universities in the Lahore district were represented in the population. There are 37 universities in Lahore overall, 16 of which are public and 21 privates. A sufficient sample of teachers and students should be included in the study. Sample was selected from the desired population in different steps. Sample was chosen using a multistage sampling method. First, the researcher used the stratified sample technique to identify two strata (public/private). The researcher then used the cluster sampling technique to divide the entire population into three zones (clusters) based on according to their location. From each cluster two private and one public university was selected by using simple random sampling. A Sample of 600 students (100 from each public university and 50 from each private university) and 60 teachers (10 from each public university and 5 from each private university) was selected through simple random sampling techniques.

Instrumentation

A questionnaire was used in this study to gather data. The five-point Likert scale structure of the questionnaire was deemed to be effective for data collecting. Options of the scale consisted of strongly disagree to strongly agree. There were two main parts of the questionnaires: Part one consisted of demographic information like gender, university type, GPA, Part two consisted of statements relevant to the research objectives of the study like formative assessment techniques and learning. Options of the respondent were demanded on the five-point Likert Scale.

The tool was validated using both professional judgement and pilot testing. Questionnaires about the instrument's language, applicability, and organization were given to three specialists. After revising instrument in the light of expert opinion, students' instrument was distributed to 30 participants for pilot testing. During the pilot testing, the researcher handed out the questionnaires to the participants. The respondents were asked about the statement's difficulty level and intelligibility. These respondents were not included in the study's final sample. In order to assess the reliability of the instrument, Cronbach's Alpha was determined. The overall score

of the student's instrument was 0.912, while the minimum dependability requirement for Cronbach's Alpha is 0.75. This demonstrated the instrument's reliability.

Data Analysis and Findings

Data analysis employed both descriptive statistics (mean, standard deviation) and inferential statistics (Pearson r and independent sample t-test). To find out the relationship among formative assessment techniques, students' learning and academic achievement, Pearson r correlation techniques was used.

Table 1

Formative assessment techniques	1		
Learning	.767**	1	
Academic achievement	.023	-.009	1

Significantly correlated at 0.01 level (2-tailed).

The correlation of the main variables used in this study are presented in Table 1 Pearson product correlation among techniques of formative assessment, learning and academic accomplishment were all shown to be highly positive and statistically significant (r=.767, p<.001), consequently, $H_0$1 was rejected. These illustrates that a more used techniques of formative assessment, learning and academic accomplishment increase.

Table 2

Teacher asks questions	1		
Learning	.643**	1	
Academic achievement	-.098	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation among Teacher asks questions during class, students learning and academic achievement was shows to be statistically significant and moderate positive (r=.643, p <.001), consequently $H_0$1 was rejected. This means that a more teacher asked questions during class, students' learning and academic achievement increase.

Table 3

Multiple choice questions	1		
Learning	.655**	1	
Academic achievement	.042	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation among multiple choice questions teacher give during class, students learning and academic achievement was shows to be statistically significant and moderate positive (r=.655, p<.001), consequently $H_0$1 was rejected. This means that when teacher gives multiple choice questions during class, students' learning and academic achievement increase.

Table 4

Think pair share	1		
Learning	.650**	1	
Academic achievement	.045	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation think pair share technique, students learning and academic achievement was shows to be statistically significant and moderate positive (r=.650, p<.001), consequently $H_0$1 was rejected. This means that when teacher give time to students to think in pairs during class, students' learning and academic achievement increase.

Table 5

Ask student for discussion	1		
Learning	.522**	1	
Academic achievement	-.025	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation when teacher asks students for discussion during class, students learning and academic achievement was shows to be statistically significant and moderate positive (r=.522, p<.001), consequently $H_0$1 was rejected. This means that when teacher asks students for discussion during class, students' learning and academic achievement increase.

Table 6

Encourage positive behavior	1		
Learning	.513**	1	
Academic achievement	.023	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation when teacher encourage positive behavior of students during class, students learning and academic achievement was shows to be statistically significant and moderate positive (r=.513, p<.001), consequently $H_0$1 was rejected. This means that when teacher encourage positive behavior of students during class, students' learning and academic achievement increase.

Table 7

Feedback	1		
Learning	.987**	1	
Academic achievement	.055	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation when teacher give feedback to students during class, students learning and academic achievement was shows to be very high statistically significant and moderate positive (r=.987, p<.001), consequently $H_0$1 was rejected. This means that when teacher give feedback to students during class, students' learning and academic achievement increase.

Table 8

Sharing personal experience	1		
Learning	.446**	1	
Academic achievement	.099	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation when teacher sharing his/her personal experiences during class, students learning and academic achievement was shows to be low statistically significant and moderate positive (r=.446, p<.001), consequently $H_0$1 was rejected. This means that when teacher sharing his/her personal experiences during class, students' learning and academic achievement increase.

Table 9

Use one minute paper	1		
Learning	.579**	1	
Academic achievement	.065	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation when teacher use one-minute paper technique during class, students learning and academic achievement was shows to be statistically significant and moderate positive (r=.579, p<.001), consequently $H_0$1 was rejected. This means that when teacher use one-minute paper technique during class, students' learning and academic achievement increase.

Table 10

Portfolio	1		
Learning	.543**	1	
Academic achievement	-.023	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation when teacher use portfolio technique during class, students learning and academic achievement was shows to be statistically significant and moderate positive (r=.543, p<.001), consequently $H_0$1 was rejected. This means that when teacher use portfolio technique during class, students' learning and academic achievement increase.

Table 11

Appraise good values	1		
Learning	.796**	1	
Academic achievement	.012	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation when teacher appraise good values among students during class, students learning and academic achievement was shows to be high statistically significant and moderate positive (r=.796, p<.001), consequently $H_0$1 was rejected. This means that when teacher appraise good values among students during class, students' learning and academic achievement increase.

Table 12

story telling	1		
Learning	.230*	1	
Academic achievement	-.074	-.009	1

Significantly correlated at 0.01 level (2-tailed).

Pearson product correlation when teacher use story telling technique during class, students learning and academic achievement was shows to very low statistically significant and moderate positive (r=.230, p<.001), consequently $H_0$1 was rejected. This means that when teacher use story telling technique during class, students' learning and academic achievement increase.

Discussion and Conclusion

It is concluded that with respect to eleven factors (teacher asks questions, multiple choice questions, think pair share, asks students for discussion, encourage positive behavior, feedback, sharing of personal experience, use one-minute paper, portfolio, appraise good values, storytelling) there is a positive correlation between

techniques of formative assessment, learning and academic accomplishment at higher level. Correlation among formative assessment techniques, academic accomplishment and learning was found to be high positive and statistically significant (r=.767, p<.001). When teacher used these factors in class during students' learning, learning improves and also students' academic achievement increase. Correlation among Teacher asks questions during class, students learning and academic achievement was shows to be statistically significant and moderate positive (r=.643, p <.001), Asking questions is necessary in order to ensure that students understand the topic and remain engaged in the activity. It is essential for pupils' ability to receive and interpret information as well as to encourage autonomous and reasoning skills.

Students are provided with an open-ended query to consider and time to "think" and, if required, scribble down their solutions using the think pair share approach. Learners are then paired with a colleague with whom they will converse and refine their ideas. Correlation among multiple choice questions teacher give during class, students learning and academic achievement was found to be moderate positive and statistically significant (r=.655, p<.001), According to Robertson (2006), The Think-Pair-share approach is tactic that allows pupils to construct and share students' individual thoughts with a different learner. It is instruction approach in which the instructor works with pupils to give confidence to take part in class. Rather of utilizing a traditional presentation method in which the educator inquires queries and the pupils respond, the Think-Pair-Share methodology encourages a high level of student participation and can help students stay on track and increase their learning (Dwigustini and Widiya 2020).

When teacher asks for discussion, students share their ideas to each other and actively involved in learning process. The purpose of a class discussion is to get learners to reflect about the course content. Correlation when teacher asks students for discussion during class, students learning and academic achievement were shows to be statistically significant and moderate positive (r=.522, p<.001), There is encouraging association between teaching and learning when instructor encourages positive behavior of students and sharing his/her personal experiences in class. Correlation when teacher give feedback to students during class, students learning and academic achievement was found to be very high positive and statistically significant (r=.987, p<.001). Feedback can help in better understanding and learn new things: it delivers valuable learning thoughts that are critical for a student's enlargement and skill improvement. The individual gets the chance to become attentive of his own power as well as the abilities on which he has to improve through properly-formulated suggestions or feedback (Minnoni and Collini 2017).

Correlation when teacher sharing his/her personal experiences during class, students learning and academic achievement was found to be low positive and statistically significant (r=.446, p<.001), Sharing personal experiences was a crucial beginning point for identifying and explaining the major characteristics of successful, useful feedback vs those that are characteristic of ineffective, useless input (Minnoni and Collini 2017). Sharing personal experiences was a critical first step in defining and expressing the primary qualities of effective, helpful feedback versus those of ineffective, worthless input (Stead 2005).

Correlation among when teacher use one-minute paper technique during class, students learning and academic achievement was found to be moderate positive and statistically significant (r=.579, p<.001), The minute paper is classroom

assessment approach in which students are asked to answer two questions in one minute (or more): what was the major thing they learned in the classroom at the moment. The instructor's purpose is to gain a sense of whether students grasped the most significant ideas and to determine which areas require more explanation. The focus of the minute paper on understanding; the instructor gives pupils a limited opportunity to describe the main issues (Angelo & Cross, 1993).

Correlation among when teacher use portfolio technique during class, students learning and academic achievement was found to be moderate positive and statistically significant (r=.543, p<.001), The term "portfolio" refers to a compilation of a student's work in class. It improves students' learning and academic achievement. Paulson and Mayer (1991: 60) define that compilation of a student's work is called portfolio that demonstrates the learner's hard work, development and accomplishments in more than one field. The collection must contain information about learner involvement in selection of materials, eligibility requirements, merit grading standards, and learner 's self-evidence (Birgin & Baki, 2007).

Correlation among when teacher appraise good values among students during class, students learning and academic achievement was shows to be high statistically significant and high positive (r=.796, p<.001), Teacher appraises good values in students. It gives pupils a positive direction to shape their learning while also assisting them in being more responsible and understanding the goal of their learning. The most crucial instrument in a student's learning and achievement is feedback.

Correlation among when teacher use story telling technique during class, students learning and academic achievement was shows to be statistically significant and low positive (r=.230, p<.001), Storytelling in class improves students' learning because it helps students to build their critical thinking skills and enhance their self-esteem. Overall, there is encouraging association between techniques of formative assessment and learning and academic achievement of students. If teacher used different techniques in class, students learning improve and their grades automatically improve. Overall, there is encouraging association between techniques of formative assessment and learning and academic achievement of students. If teacher used different techniques in class, students learning improve and their grades automatically improve.

Recommendations

For the future study following are the recommendations:

- The administration and instructors may collaborate to establish a formative assessment plan that will help them to enhance their learning and teaching quality.
- It is hard, but not unfeasible, to change the assessment system all at once, thus seminars on assessment use, teacher training and a supportive environment particularly in the classroom are required.
- It is suggested that the study be used by university teachers to create various appropriate formative assessment strategies to improve students' learning and achievement level.
- More research on how adult foundation skill learner's advance from basic to more sophisticated may be undertaken by researchers using particular formative assessment techniques and validated measurement tools.

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