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**Teachers' Conceptions of Assessment and Students' Performance in Mathematics: Investigating Links between Educators' Perceptions and Learners' Academic Achievement**

**Abstract**

*Present study is a correlational research carried out involving Pakistani secondary school teachers and students. It was aimed to investigate the links between teachers' conceptions of assessment and students' performance in Mathematics. In order to measure school teachers' conceptions, a standardized scale developed by Brown, Hui, Yu & Kennedy (2011) was used whereas students' achievement scores in Mathematics were used as students' performance indicator for the subject of Mathematics. The study found teachers as mostly agreed to "improvement" and "accountability" conceptions of assessment but disagreed to the "irrelevance" conception. Significant relationships were discovered among conceptions regarding assessment. "Improvement" conception was found positively and significantly related to "Accountability" conception of assessment. However, weak relationship of "Improvement" to "Irrelevance" conceptions were observed. Similarly, "Accountability" conception was found as negatively related to "Irrelevance" conception. The study found no significant effect of teachers' conceptions of assessment on students' achievement in Mathematics.*

**KEYWORDS:** *Conception, Conception of Assessment, Academic Achievement, Secondary Level*

**Introduction**

There is no doubt that education is the only weapon to develop human capital, raise productivity and efficiency of the individuals. It is done through the production of skilled manpower that is capable of leading economy towards development. Unfortunately, Pakistan is also suffering from low quality in public educational system such as low enrollment rate, gaps amongst various regions, inequality based on gender, unavailability of trained teachers and physical facilities etc (Memon, 2007; Kalhotra, 2013). Educational system of a country particularly at secondary level is taken as the milestone for the preparation of individuals to be able to earn living in society and get ready for higher education. It is the turning point for teenagers to enter in the institutions of higher education or society with enough knowledge to work properly and play their efficient role as a student and enlightened citizen (Eubanks & Eubanks, 2000; Keller, 2006).

In Pakistan, students are exposed to a variety of subjects at secondary level with three main combinations known as science, arts and computer. All of these combinations have different subjects with some as compulsory to be learned by students following any subject combination. These compulsory subjects include English, Urdu, Islamiyat (Ethics), Pak-Studies and Mathematics. Amongst these compulsory subjects, mathematics is considered necessary to be learned by students to make them capable of using mathematical knowledge in their practical life as it is a vital part of human thought (OECD, 2003, p. 23) and is considered necessary to learn and understand the phenomena with which they would have to interact in future (Akhter and Akhter, 2019; Gijbbers, Smits, & Pepin, 2020). Furthermore, it is helpful in getting insight about other subjects including science, social studies and even music and art. Majority of the students face math anxiety and take it as a boring and exhausting experience (Yeh et al., 2019). It is taken as a complex task to teach and learn as well. A lot of research has been carried out to identify the causes behind success and failure of students' achievement in mathematics. The identified factors included time spent on mathematics learning, parental education, socioeconomic status, physical facilities, and teacher trainings etc (Abdullah, Shahrill, Yusof, & Prahmana, 2018). Some of the abstract causes were also investigated including attitude towards mathematics learning and conceptions of students regarding mathematics and assessment. Hence,

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teachers' conceptions regarding assessment and their effect on students' achievement particularly mathematics have not been investigated to a greater extent.

We all develop beliefs regarding different entities around. Seemingly, professionals develop beliefs based on their environment and practices in the field. Therefore, teachers are not of an exception. Their working environment influence their perceptions which are then converted to varied beliefs and conceptions. These beliefs are developed during their experiences to various phenomena. It is also found assumed that teachers bring their beliefs as a result of remaining in the teaching learning situations as a student and as a student-teacher too. These beliefs get practiced when teachers come into the teaching field practically (Calderhead, 1996).

Teachers' role has always been crucial particularly after observing the shift from traditional to constructive approaches in teaching (Lord, 1999; Khalid & Azeem 2012). It is an established fact that success or failure of any intervention is dependent on its acceptance or rejection by teachers while feeling its necessity in a particular situation (Prawat, 1992; Richardson, 1996). Therefore, it is important to bring changes to teachers' perceptions before introducing any transformation in teaching (Senger, 1992; Peterman, 1993; Brown et al., 2011). In order to do it, it is required to inquire their held beliefs (Zawwal and Otting, 2013; Brown et al., 2011) so that maximum output would be achieved from modern practices in the field of teaching (Prawat, 1992; Richardson, 1996). Teachers' practices and students' learning are influenced by these beliefs (Fang, 1996; Levitt, 2002; Olafson & Schraw, 2006). Therefore scholars endorsed the need to explore the nature and expression of these beliefs (Turner, Christensen & Meyer, 2009; Richardson, 1996).

Conceptions are defined as a person's philosophy about a phenomena (Brown & Gao, 2015). It is comprised of the concept, structure and objective behind an activity in a particular phenomenon. In teaching, teachers are exposed to a variety of events such as teaching, management and assessment in a classroom setting. Assessment is an integral and worthwhile part of teaching learning process. It is necessary to monitor the performance of teachers and students with respect to the curriculum. Its main purpose is to audit teachers' effectiveness (Danielson, 2008; NCLB, 2001). Learning is a phenomena where context plays its own role while making it successful or failure on the part of student and teacher. Therefore, it is not easy to segregate the effect of a particular teaching practice without taking into account the context where it takes place (Growvs, 2000, Boaler, 1993).

For the purpose of having a systematic mechanism for the teaching and learning system in schools, policies are developed. These regulatory bodies help in controlling teaching learning processes under administrative standards. Though, the extent to which these policies are successfully implemented in schools depends on the level of acceptance by the faculty engaged in teaching learning process (Brown, 2004). For the measurement of teachers' conceptions particularly regarding assessment, it is required to ask about their purpose for having an assessment event (Brown, 2008; Black and William, 1998). Scholars have described three different purposes behind arrangements of different assessments (National Research Council, 2001; Torrance & Pryor, 1998). These include to have assessment for the purpose of improvement, and accountability of schools and accountability of students. Another fourth perception behind assessment activity is observed among teachers that is based on idea of irrelevance of assessment for teaching learning process. This anti-purpose idea has been named as irrelevance (Shohamy, 2001). According to Brown, Harris and Harnett (2012), what sort of objectives are taken behind any assessment, help in developing teachers' perceptions regarding need of assessment events.

Based on the studies carried out focusing teachers' conceptions of assessment, these are categorized into four segments naming a) assessment improves teaching and learning, b) assessment makes students accountable for learning, c) assessment makes schools and teachers accountable and d) assessment is irrelevant (Brown, 2002; Torrance & Pryor, 1998; Brown & Hirchfeld, 2005). Hence, considering these categories of conceptions, three can be classified as purposes and fourth irrelevance as anti-purpose conception of assessment (Brown & Hirchfeld, 2008; Shohamy, 2001). Here is the brief detail of the conceptions found in literature.

### **Improvement**

The improvement conception of assessment is concerned with the use of assessment for bringing positive changes in the system of teaching and learning. Its use is twofold, as for the students to focus on deficit areas in their learning and correct them as a result, while for the teachers to bring improvement in their teaching methodologies by analyzing the results of assessment events. According to scholars, assessment events are arranged to achieve

predetermined learning goals while observing and fixing students' misunderstandings and planning future instructions accordingly (Brown et al., 2011; Brookhart, 2004; Hattie & Timperley, 2007).

### **Accountability**

Accountability conception of assessment is based on the idea to use assessment for the purpose of putting pressure on school authorities to show positive performance results of their students. Seemingly teachers are made responsible to improve their instruction and play positive role in the achievement of their students shown in their assessment results. Schools are accountable before Govt and funding agencies, and stakeholders such as parents and taxpayers to show transparent and quality teaching in schools. Therefore, assessment results work as change catalyst that help teachers to transform their teaching (Smith & Fey, 2000; Linn, 2000).

### **Irrelevance**

According to Shohamy (2001), irrelevance conception of assessment is taken as the view that assessment is an external event which is not capable to provide authentic results. Therefore, it will not end up in providing any relevant and important information that can help teachers to transform their teaching as a result. In other words, assessment is an artificial event that cannot assess students' real competencies whereas teacher is the most important factor who can measure students' understandings through interaction rather than having assessments. (i.e., Airasian's (1997) 'sizing up' as cited in Brown, 2004).

These conceptions as perceived by teachers may have varied influences on their decisions in and out of the classroom. Amongst various effects, an important factor is students' learning outcomes that is proved to be affected by such conceptions in previous studies. Meta-analysis of studies showed a variety of factors related to teachers having impacts on students' learning but no conclusive results were obtained (Druva & Anderson, 1983). Therefore, it is suggested to explore conceptions held by teachers rather than their demographic characteristics. Brown (2009), argued the importance of transforming teachers' conceptions regarding assessment through which positive reforms would be brought to assessment mechanism. Studying teachers' conceptions is worthwhile due to their influences on attitudes and behaviors as a result (Levin, 2015).

Conceptions are perceived to be influenced by the context. Scholars view that countries having similar assessment mechanism would have similar conceptions amongst teachers (Hamilton, Healy, Dunstan, Zderic and Owen, 2008; Brown, lake and Matters, 2008; Brown and Gao, 2015). However, where varied systems of assessment are sustained, it is expected to view varied conceptions possessed by the teaching faculty (Brown, Hui, Flora & Kennedy, 2011; Larenas, 2013). Nature of the assessment being low or high stake also has major impact on teachers' conceptions (Brown, Hui, Yu & Kennedy, 2011). Therefore, researchers have demonstrated this through development of varied models of teachers' conceptions in different regions like Spain (Remesal, 2011), China (Brown et al., 2011) and India (Brown, Chaudhary and Dhamija, 2015). Conceptions of assessment are measured by seeking agreement of teachers with four basic purposes of assessment (a) improvement of teaching and learning, (b) school accountability, (c) student accountability, and (d) treating assessment as irrelevant (Brown, 2004). Literature showed that majority of the studies carried out focused qualitative inquiries exploring narrative explanations. These studies included smaller number of participants. Although the qualitative studies are worthwhile but their importance is established for the purpose of theory development not for the generalizability (Jong, Hodges, Royal, & Welder, 2015). Therefore, scholars suggested to carry out large scale studies exploring teachers' conceptions involving large number of samples (Adler, Ball, Krainer, Lin, & Novotna, 2005). Furthermore, it is needed to utilize standardized instruments (Grootenboer, Lomas, & Ingram, 2008).

Studies have found links between conceptions and students' learning (Crooks, 1988). Positive links have also been explored between students' conceptions and their achievement in mathematics (Brown and Heirchfeld, 2007). The study by Wilkins (2008), revealed significant relationship between mathematical knowledge, attitude, and beliefs towards inquiry based instruction and use of inquiry based instruction. Likewise, Brown et al., (2012) explored teachers' understanding and practices of feedback while discovering significant relationships.

Similarly, authors discovered positive links between students' conceptions and their achievement in reading comprehension (Brown and Heirchfield, 2008). Scholars have suggested to conduct research studies exploring conceptions as behavior oriented, where behaviors might include the effects of conceptions on study results, time on task and academic achievement.

Considering the links found in the constructs, researchers showed their interest in the exploration of such relationships. Although, the area of teachers and students' conceptions have been investigated in the present decade. Gaps are still present needed to be filled through exploration of these constructs. It was observed that most of the work cited was focused at higher education level. Similarly, much work has been reported in western culture while not enough research has been produced related to factors impacting learning in mathematics (Akhter and Akhter, 2019). Therefore, it is recommended to carry out enough studies for the purpose of examining and developing the field of teachers' beliefs. Hence, considering the importance of the phenomena, present study was planned while focusing teachers' conceptions in Pakistani schools so that to compare the results with the previously explored models in other countries. This study would also be helpful to find the nature of conceptions of assessment as possessed by teachers and their influence on students' achievement in mathematics.

### **Aims of the study**

Present study aimed to measure following objectives;

1. To explore teachers' conceptions of assessment
2. To investigate the mutual linkage of conceptions of assessment
3. To determine the effect of teachers' conceptions of assessment on students' academic achievement in Mathematics

### **Research questions**

1. What sort of conceptions are held by teachers regarding assessment in public high schools of Punjab?
2. Are teachers' conceptions of assessment mutually related?
3. Whether teachers' conceptions of assessment affect students' academic achievement in Mathematics?

### **Hypotheses of the study**

1. There is no significant relationship between teachers' various conceptions of assessment.
2. There is no significant effect of teachers' conceptions of assessment on students' academic achievement in the subject of Mathematics.

### **Methods and procedures**

The study was carried out employing descriptive correlational research design. A total of 298 teachers were selected using proportionate stratified sampling technique. The data was collected from four districts working under the jurisdiction of Lahore division. A total of 50% schools from each district were represented in the sample. Therefore, 296 schools were selected from all the four districts (Lahore, Sheikhpura, Kasur & Nankanasahib).

Before collection of research data, formal permissions were solicited from authorities such as Director Public Instructions and District Education Officers of the sampled districts. Survey forms were administered to teachers after having their consent forms and permissions from their principals. In order to get students' academic achievement, their scores in the subject of Mathematics declared by BISE (Board of Intermediate and Secondary Education) Lahore were taken from their schools. The teachers who participated in the study, scores of their class students were taken from the respective schools and were used as research data. The data was analyzed through SPSS and AMOS software. The analytic techniques including descriptive statistics, Pearson correlation and regression analysis were employed for the purpose of data analysis.

### **Instrumentation**

For the measurement of teachers' conceptions of assessment, author reviewed the scales available in the literature. The literature showed some research instruments focusing teachers' conceptions of assessment. A valid and reliable scale was found developed by Brown (2002), during his Ph.D studies and tested on primary school teachers. Following the tradition Brown (2006), adapted the developed scale into an abridged version of 27 items (TCOA-III A), which has the same structure as the full version, consisting of three items per factor and was validated with a large sample of Queensland primary teachers. This scale was pilot tested at teachers engaged at primary level. Another scale developed by Brown et al., (2011) for the measurement of secondary school teachers' conceptions of assessment in Chinese context. In order to explore school teachers' conceptions in Pakistan, this instrument was found suitable considering the construct to be measured, population targeted and context being school teachers. The

scale comprised of three major conceptions with sub factors for improvement and accountability whereas the irrelevance conception of assessment had no sub-factor.

For the improvement conception of assessment, there were three sub-factors such as a) help learning b) student development and c) accuracy. On the other hand accountability conception had two sub-factors named as a) examination and b) control. The scale was tested for reliability in Pakistani context. The complete explanation of the scale items is given in a previous article by Shehzadi and Akhtar (2020).

### Psychometric properties of the instrument

The scale comprised of two sections, one for the demographic characteristics of the respondents and the second based on items scored on a scale from 1 to 6 (1 = strongly disagree and 6 = strongly agree) mainly addressing conceptions of assessment. The response scale consisting of six categories where four as positive and two as negative response options asking agreement of the respondent. The format of having six categories with more positive is a most preferred format in situations where positive attitude is expected (Brown, 2011). The conceptions of assessment abridged survey was in fact extracted from a 31 item large scale developed by Brown et al., (2011) for Chinese secondary school teachers. For the purpose of validation in Pakistani context, exploratory and confirmatory factor analytic techniques were used which yielded 19 items measuring three conceptions of assessment. The fit characteristics were found adequate in model testing. An adequate model fit was found after confirmatory factor analysis. The fit characteristics for the conceptions of assessment scale included CMIN 495.96, Df 137, Chi-square/df 3.620, p-value 0.000, AGFI 0.921, GFI 0.943, TLI 0.915, CFI 0.932 and RMSEA 0.054. The reliability values ranged between .65 to .8 that are considered adequate for the reliability measures of subscales of an instrument.

### Findings of the study

#### Teachers' Conceptions of assessment

The descriptive statistics to explore teachers' conceptions of assessment showed a highest agreement of teachers towards improvement and accountability conceptions of assessment. The values obtained clustered around most agreement on the response scale. The values shown in table 1, shows that the "accountability" conception of assessment (M = 5, S.D = .7) obtained highest value of mean followed by "improvement" conception (M = 4.6, S.D = .5) that is also near to mostly agree response option. On the other hand, participants showed disagreement towards "irrelevance" conception of assessment. The value obtained for irrelevance conception was (M = 2.9, S.D = 1.4), that explains the disagreement of teachers expressing the necessity of assessment in teaching learning process. Therefore, the study found strong agreement for "accountability" and "improvement" conceptions of assessment and disagreement for "irrelevance" conception.

Table 1  
Mean, standard deviations for the Overall Conceptions of Assessment

Teachers' conceptions of Assessment	Mean	SD
Improvement (Improvement of teaching and learning)	4.61	.53
Accountability (Accountability of school and teacher)	5	.7
Irrelevance	2.91	1.45

#### Mutual Relationship among Conceptions of Assessment

For the measurement of relationship between three conceptions of assessment, Pearson correlation coefficient was run. The results of the analysis showed that "improvement" and "accountability" conception were moderately related to each other ( $r = 0.626$ ,  $p < 0.01$ ) as the values were positive, significant and showed linear tendency. It showed teachers' positive attitude to use assessment for the improvement and accountability purposes. However, irrelevance conception of assessment displayed insignificant and negative relationship with accountability and weak relationship with improvement conception. Therefore, it is inferred that the necessity of assessment events are endorsed by school teachers while negating the perception that assessment is irrelevant.

Table 2

*Correlation Analysis of Conceptions of Assessment*

	Mean	SD	1	2	3
1. Improvement	4.6177	.53094	1		
2. Accountability	4.9690	.69812	0.626**	1	
3. Irrelevance	2.9160	1.45973	0.020	-0.255**	1

\*\* Correlation is significant at the 0.01 level (2-tailed).

### Effect of teachers' conceptions on students' mathematics achievement scores

In order to explore the effect of teachers' conceptions of assessment on students' achievement scores in mathematics, regression analysis was run through maximum likelihood method in AMOS software. All assumptions needed to be checked before regression analysis were tested using SPSS. "...regression analysis is a set of data analytic techniques which are used to understand the interrelationships among variables in a certain environment. The task of regression analysis is to learn as much as possible about the environment reflected by the data" (Chatterjee & Hadi, 2006, p.16).

In the present study, multiple regression method is used to predict students' academic achievement based on teachers' background of assessment conceptions in public high schools of Pakistan.

### Model of Conceptions and students' achievement

To discover the effect of teachers' conceptions of assessment on students' achievement for the subject of mathematics, regression model based on structural equation modelling in the AMOS software was used that is presented in the figure 1. Figure 1 predicts the relationship between conceptions of assessment and students' achievement scores in mathematics. In the figure 1, one side head arrows show linear dependencies. The value mentioned on the path from each dimension to dependent variable shows the beta (estimate) effect of that dimension on dependent variable. The value of error is enclosed on the dependent variable in circle because it is not directly observed. The value mentioned on dependent variable presents  $R^2$ , which shows the variation in the model due to all independent variables. All the three conceptions of assessment account for 01% of the variance in the dependent variable shown in the model below.

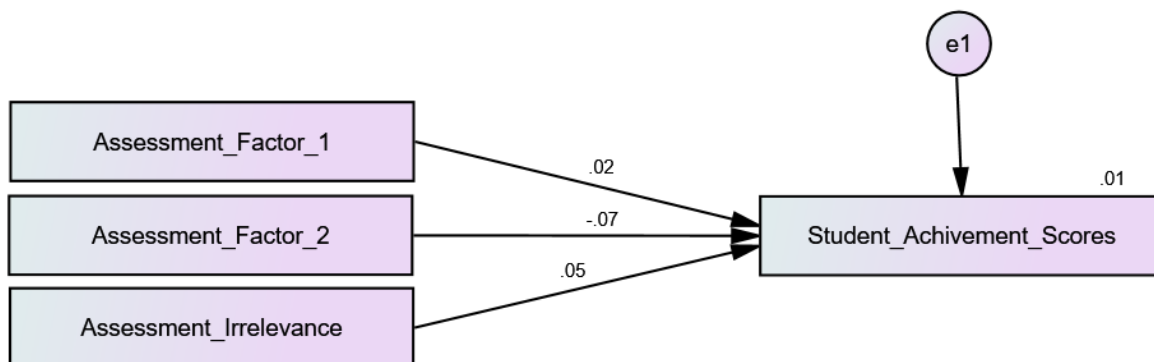


Figure 1: Model of Teachers' Conceptions and Students' Achievement Scores in Mathematics

The values obtained through regression analysis showed the effect of conceptions of assessment on achievement scores in mathematics in table 1. Interpreting the values, it is inferred that conception of assessment "Improvement" did not produce significant effect on the achievement scores of students in mathematics as the value

of estimate shown as beta is not significant at alpha value. Similarly, accountability conception of assessment is found to have no significant effect on mathematics achievement scores. The values produced are not significant at the level of alpha. Likewise, similar results were obtained while measuring the effect of third conception of assessment "irrelevance" It was observed that teachers' conceptions of assessment were not significant predictors of students' achievement scores in mathematics.

Table 3  
*Regression Weights based on teachers' conceptions of assessment and students' achievement in mathematics*

Conceptions of Assessment		Estimate	C.R.	P
Student Achievement Scores in mathematics	← Improvement	.022	.377	.706
	← Accountability	-.075	-1.283	.199
	← Irrelevance	.049	.849	.396

### Discussion

The first objective of the study was to explore the agreement of teachers' to three conceptions of assessment. The study found strong agreement of teachers to the improvement and accountability conceptions of assessment. The results of present study are comparable to the findings of previous researches by Brown (2002), Brown, (2009), Brown and Hirschfeld, (2008). All of these studies reported most agreement of teachers to improvement and accountability conceptions of assessment. The phenomena of teachers' conceptions of assessment were explored in various regions investigating the agreement of teachers to these conceptions regarding assessment. Brown, Chaudhary and Dhamija (2015), carried out the study in India while Brown and Remesal (2012), investigated teachers' conceptions in Spain and discovered similar pattern of results. In the present study, teachers reported disagreement to the "irrelevance" conception of assessment. It showed the perception of teachers to feel the necessity of assessment in teaching learning situation while negating the view that assessment is an irrelevant activity. Likewise the results were aligned found for agreement to the improvement and accountability conception to the previous findings reported for irrelevance conception of assessment. The studies by. Brown and Hirschfeld, (2008), Brown, (2009), Brown (2002), Brown (2004), Khan (2011), Brown, et al., (2015), and Brown and Remesal (2012), reported disagreement of teachers to irrelevance conception of assessment. This alignment of results to the previous literature expresses the similar pattern of perceptions of teachers even working in different regions.

The second objective of the study was to investigate the inherent links present in the three conceptions of assessment. The findings obtained to answer this objective revealed that teachers' conceptions were mutually related. The results found for the relationship of teachers' conceptions were similar to those found in the literature. The present study found improvement and accountability conceptions as positively and significantly related to each other and similar findings were reported by Brown, (2004), Brown et al., (2011), Gebril & Brown, (2013) and Barnes et al, (2017). The study found accountability and improvement conceptions having non-significant relationships to irrelevance conception of assessment while an inverse relationship was observed between accountability and irrelevance conception of assessment. Similarly, Brown (2004), discovered similar results for the relationship of accountability and improvement conceptions to irrelevance conception of assessment. Likewise, the study by Brown et al., (2011), revealed similar results for the relationship of conceptions. Findings of the present study also corroborated to the results found by Gebril & Brown (2013), and Barnes et al, 2017).

Third and the major objective of the study was aimed to find the effect of teachers' conceptions of assessment on students' academic achievement scores in mathematics. Although the study found no significant effect but analyzing the trend between conceptions and achievement scores, it was observed that a positive link was present between improvement conception of assessment and students' achievement scores in mathematics. Therefore, it is inferred that perceiving assessment for the purpose of improvement would increase the performance of students in mathematics. Although this increase was not significant enough to produce a remarkable change in students' performance. On the other hand, the trend between accountability conception of assessment and students' achievement scores was inversely related which showed that teachers' perception to have assessment event for the

purpose of accountability would decrease students' achievement in mathematics. Overall, it was concluded that mathematics performance of students in board exams was not significantly affected by teachers' conceptions of assessment. Thus, it appears as there might be other factors which affect students' achievement in mathematics more than the teachers' conceptions particularly in board exams.

These results of present study were found similar to the findings of Khan (2017), investigating the factors to predict students' achievement. He found significant effect of demographic characteristics as compared to teacher characteristics in mathematics and science subjects. Similarly, Abbasi and Mir (2012), discovered the insignificant impact of teachers' ability on students' performance while keeping teacher ability, environment and work ethics as predictor variables. The study of Koopman, Thurlings and Brok (2017), found similar trend of results between teachers' conceptions and students' achievement in mathematics. The study differed from the present work as author investigated subject related conceptions not conceptions related to assessment. Therefore, it can be concluded that there are some more hidden factors other than teacher characteristics. Scholars such as Kyriakides, Christoforou, and Charalambous (2013), argued that teachers' behavior would be more significant to produce expected results as compared to their hidden conceptions.

The results of present study showed a positive trend between teachers' conception improvement and students' achievement in mathematics so it can be expected that teachers' perception to bring improvement through assessment activities would increase the scores of students. The study by Grootenbore (2002), showed that practice of mathematics in and out of school were helpful in developing positive attitude towards mathematics. Not only the development of positive attitude is linked to the practice of mathematics but it would also decrease the level of anxiety attached to the subject of mathematics. Likewise, the results of study carried out by Sarwar, Bashir & Alam (2010), proved positive links between students' attitude and their achievement. They found the effect of teachers' attitude as a moderating variable which indirectly affects students' attitude and consequently affect their performance in exams. Their study explored high correlation among educational acceptance, teacher approval and academic performance.

Another study carried out by Mensah, Okyere and Kuranchie (2013), reported similar results. They investigated the relationship between teacher attitude, student attitude and students' performance for the subject of mathematics. Their study found weak relationship particularly between teacher attitude and students' performance. Although, the study found significant relationship between attitude of teachers as well as of students for mathematics. Therefore, it can be inferred that qualitative factors of teachers influence students' qualitative patterns in behavior but not the scores of students. Overall, it can be deduced that some other factors work behind students' achievement that are stronger than teachers' conceptions.

There might be some factors which undermine the effect of teachers' conceptions on students' achievement in mathematics. For example high stake testing events has been reported to affect students' performance. Scholars such as Gerbil and Brown (2013), endorsed that to take advantage of teachers' constructive conceptions, it is needed to bring positive reforms in examination system. It will enable teachers to use assessment events for the improvement of students learning. OECD (n.d), described the unintended negative influences of high stake exams which have the consequences of narrowing the scope of curriculum. Brown (2013), found different conceptions having varied impact in different subjects. He argued that beliefs do not play in isolation. There has always been the influence of context including subject, school policies, examination system etc. There is possibility that teachers' conceptions could not play their role effectively in the presence of other factors such as students learning style, study habits, demographic characteristics and students' affiliation to particular subject such as mathematics.

In the present study, the third conception of assessment as an irrelevant activity also has not proved to be effective for influencing students' achievement. It was quite similar to the results reported in literature as Brown (2013), revealed a negative relationship between students' conception of assessment and their performance in high stake exams so the results of his study validated the present study's findings. Seemingly, in present study, we found teachers focusing improvement to bring students achievement to a better grade rather than making them familiar to exam patterns or taking it as an irrelevant activity.

### **Implications and future studies**

1. This was a complete quantitative research design involving survey of teachers' conceptions linking to students' achievement scores in mathematics. Future studies should be based on mixed method research approaches involving classroom observations, interviews of teachers and students and content analysis of



students' classroom works. This would shed light on conceptions and students real world practices in classrooms.

2. Another suggestion for future studies might be to use students' qualitative learning outcomes such as approaches to study and their linkage to teachers' conceptions of learning and assessment.
3. In order to study the effect of context, future researchers might conduct comparative studies involving public and private school teachers' conceptions. It would help to explore the influences of school policies on development of teachers' conceptions.

### Limitations

Present study aimed to discover the influence of teacher' conceptions on students' achievement scores. Its design lacked the inclusion of other facets of students' performance (e.g, metacognitive skills, learning strategies). Therefore, future studies should include other aspects of students' performance.

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