

## **Tracing the Effects of Teachers' Centered Teaching Methods on Students' Achievement Scores: Secondary Level Study**

Mehboob Ul Hassan\* and Razaqat Ali Akbar\*\*

---

### **Abstract**

Teaching is a profession that requires commitment to make difference in the lives of human beings. This prophetic profession is accompanied through nation builders and architecture of societies; teachers. Teachers bring into play different teaching methods to meet educational objectives to foster learning for students' achievement scores. Current study was conducted to explore the effect of teachers' teaching methods on students' achievement scores. Study was quantitative in nature and researchers applied *ex-post-facto* research design. Sample of the study consisted of 800 randomly selected tenth grade students enrolled in public-sector schools of District Kasur of Lahore Division. Data were collected by self-constructed questionnaire having fifteen items mode of 5-point Likert type options. Students' achievement scores were obtained from Gazette Notification of Board of Intermediate and Secondary Education, Lahore. Content validity of self-constructed questionnaire was ensured from experts and Cronbach's Alpha reliability was censured in SPSS; .864. Researchers personally collected data from respondents after ensuring ethical consideration prior to collect data. Results of linear and multiple regression analysis report that overall secondary schools' teachers teaching methods have affected 52% on students' achievement scores whereas lecture method 65.6%, question answer 49.2%, discussion 49.5% and demonstration method have affected 39.6% on students' achievement scores. On the basis of results, it is recommended that heads of public sector educational institutions and secondary schools teachers make sure to apply teaching methods as their continuous usage indulged students towards effective learning that put significant effect on students' achievement scores.

**Keywords:** Demonstration, discussion method, lecture method, question answer, secondary level, students' achievement scores, teaching methods

---

\* PhD Scholar, Institute of Education and Research, University of the Punjab, Lahore, Pakistan.  
Email: hassanbhattig@hotmail.com

\*\* Professor, Institute of Education and Research, University of the Punjab Lahore, Pakistan.  
Email: rafaqat.ier@pu.edu.pk

## Introduction

Teaching is a multifaceted phenomenon; medium of transferring ideas, knowledge, values, experiences and concept to bring positive change in students' behavior. Teaching is an art that requires practice. Continuous practice is done through applying diversity of teaching methods by dynamic personalities; teachers (Ayers, 2010; Umer & Siddiqui, 2013). Teaching methods are teachers' tactics used in classroom to make effective teaching learning process. Teachers impart their knowledge, inculcate factual information and evaluate them as well. Teachers make proper use of teaching methods for students' better achievement. Teachers' teaching methods are good predictors toward students' success (Casado, 2000; Hosal-Akman & Sigma-Mugan, 2010; Martínez-Clares & González-Morga, 2018). Empirically literature reports that teachers use lecture, question answer, discussion and demonstration method in classroom for the sake of students' better achievement scores (Banerjee & Vidyapati, 1997; Ekeyi, 2013; Falode, Adewale, Ilobeneke, Falode, & Robinson, 2015; Hussain, Hamdani, Quraishi, & Zeeshan, 2010; Rahman, Khalil, Jumani, Ajmal, Malik, & Sharif, 2011).

Lecture method is a traditional method of imparting instruction among students. It refers to one way traffic and globally used to impart instructions in educational institutions (Ameh & Dantani, 2012; Banerjee & Vidyapati, 2007; Giridharan & Raju, 2016). Lecture method refers to extensively and dominating practicing method of teaching, method of revolutionize (Okebukola, 1997), act as spoon feeder among students (Onweh & Akpan, 2014) and oral presentation of fact, thoughts, realities and generalities (Giridharan & Raju, 2016). Question answer technique is interlinked with Socratic Method of teaching (Paul & Elder, 2008; Yang, Newby, & Bill, 2005). Teachers ensure the use of question answer techniques for students' advanced topic preparation. Teachers taught lesson by means of questioning and arousing thought rouse inquiry to encourage students' concrete mind state. Effective questioning requires advance preparation; students and teachers (Mtunda & Safuli, 1997; Ndirangu & Udoto, 2011). Teachers apply this technique to strengthen open conversation and make students attentive in classroom. Ultimate of aim of application of question answer technique in class room is to master students in; investigatory, natural and listening carefully aspect (Tofade, Elsner, & Haines, 2013). Discussion methods are used to tackle students' intentions, enhance their curiosity, strengthens' students' learning and to foster their critical thinking abilities (Ekeyi, 2013). Method refers to systematic way of sharing instructions in which teachers act as mediator in conveying their considerations and opinions of respondents (Falode et al., 2015). Teachers remain in premises of set standards; impart instructions for the sake of students' learning and more liable towards innovation of facts remaining in set paradigm (Abdu-Raheem, 2011). Teachers impart instructions and learners ensure its delivery by means of active participation and innovative ideas (Friesen, 2012).

Demonstration is effectual component of teaching used that stimulates students' learning for their better achievement scores (Crouch, Fagen, Callan, & Mazur, 2004). Methods of imparting instructions through demonstration challenge students' learning how they learn by means of functioning considerably in fellows, peers and assign groups to sort out solution of actual dilemmas happening in current day (O'Donoghue, McMahon, Doody, Smith, & Cusack, 2011). Application of demonstration method claims that teachers need to encounter ideas timely for production of new-fangled understanding among students for their better achievement scores (Paimin, Hadgraft, Prpic, & Alias, 2011).

Teaching methods have own uniqueness during and remain supportive teaching learning process. Teachers' centered methods are best options that enhance students' achievement scores (Usmani & Dawani, 2013; Wood & Gentile, 2003). A number of studies reported that teachers' centered approaches put significant influence on students' social and educational performance. Ultimate purpose of teachers' teaching methods in classroom is to enhance students' achievement scores (Banerjee & Vidyapati, 1997; Ekeyi, 2013; Falode et al., 2015; Giridharan & Raju, 2016; Martínez-Clares & González-Morga, 2018; Umer & Siddiqui, 2013).

Banerjee and Vidyapati (1997) conducted a study to explore the effect of lecture and cooperative method on chemistry students' achievement scores in India. The study was quantitative in nature and researchers applied experimental research design on sample of 68 male and female respondents divided in two groups: 35 students were imparted instructions through lecture methods and; 33 were taught through cooperative methods. Authors themselves were imparting instructions till two months as having vast teaching experience. After imparting instructions self-constructed test was administered among respondents to collect data. Results show overall significant differences between lecture and cooperative method and students' achievement scores,  $t(66) = 2.61, p < .01$ . Results further demonstrate significant difference between lecture, cooperative method and gender wise students' achievement scores,  $t(66) = 27.78, p < .01$ ; male students obtained better scores in lecture method as compared to female students whereas female students had better scores in cooperative teaching method as compared to male students.

Hussain et al., (2010) conducted a study to find out the effect of direct teaching methods on students' achievement scores on a sample of 60 students of 9th grades selected from public sector secondary schools of Pakistan. Study was quantitative in nature and researchers used Solomon four groups pre-test and post test group design by dividing students in two groups; traditional teaching method and direction instructions. Two teachers were requested to impart instructions among students for two weeks. A self-developed questionnaire was used to collect data from respondents. Results of independent sample t-test declared that students obtained more achievement scores through direct teaching method as compared to traditional teaching method.

Rahman et al., (2011) conducted a study to explore the effect of discussion method on students' achievement scores in Pakistan. Sample consisted of 62 students randomly selected from 10th class enrolled in public sector schools of Rawalpindi. Students were equally divided in two group; 31 discussion method and 31 lecture method. Class teacher having better professional qualification and enriched teaching experience was requested to impart instruction among two groups till one month. Data were collected by administering self-developed achievement tests. Questionnaires were validated from experts. They omitted ambiguous items from instruments. Initial questionnaire was pilot tested. Collected data were analyzed in SPSS by applying independent-sample t-test technique. Findings revealed significant difference between discussion method and lecture method and students' achievement scores,  $t(60) = 1.7, p < .01$ ; students were taught through discussion method obtained better scores ( $M = 9.2$ ) as compare to those students who were imparted instructions through lecture method ( $M = 8.1$ ).

Study conducted by Ekeyi (2013) to explore the effect of demonstration method on students' achievement scores in the subject of agriculture on sample consisted of purposively selected 480 students; categorized in two groups: demonstration method; pre-test and conventional method; post-test. After consecutive treatment for two months among both groups, researcher administered self-constructed *Agriculture Science Treatment Test*; ASTT, among respondents having dichotomous items to collect data. Kuder-Richardson reliability was assured of self-constructed questionnaire .780. Results of pre-test show that those students who were taught through demonstration method obtained more scores ( $M = 47.77, SD = 4.48$ ) as compare to those who were taught through conventional method ( $M = 46.33, SD = 4.30$ ). Whereas results of post-test reflect that students taught through demonstration method also obtained more achievement scores ( $M = 66.57, SD = 7.75$ ) as compared to traditional teaching method ( $M = 61.47, SD = 6.25$ ). Those male students who were taught through demonstration method obtained more scores ( $M = 70.30, SD = 5.36$ ) as compared to female students ( $M = 62.44, SD = 7.98$ ). Findings further depict significant difference between students' achievement scores taught through demonstration teaching method and conventional teaching method ( $F(4, 476) = 273.73, p < .01$ ).

Falode et al., (2015) conducted a quantitative study to explore the effect of discussion method on students' achievement scores and their retention in Minna state of Nigeria on randomly selected 60 students. Researchers divided students in two groups: 30 students were taught through discussion method and; 30 students were imparted instructions through traditional teaching method. Data were collected by administering *Geography Achievement Test*; GAT; adopted from West African Examination Council. Questionnaire was pilot tested on small sample of 10 respondents to ensure reliability statistics by applying test re-test reliability method in extension of *Pearson Product*

*Moment Correlation (r)* that was .830. Data were analyzed in SPSS by calculating mean, median and independent sample t-test. Results report no significant difference between discussion and lecture and pre-test students' achievement scores,  $t(58) = 0.217, p > .05$ ; students were taught through lecture method obtained same scores ( $M = 27.12, SD = 13.28$ ) as compared to those who were imparted instruction through discussion method ( $M = 26.35, SD = 12.29$ ). Results depict significant difference between discussion method and lecture and students' post-test achievement scores,  $t(58) = -6.53, p < .01$ ; students were taught through discussion method obtained more scores ( $M = 72.23, SD = 11.89$ ) as compared to those who taught through lecture method ( $M = 60.58, SD = 8.41$ ). Results further claim significant difference between discussion method and lecture method and students retention scores,  $t(58) = -7.09, p < .01$ ; students were taught through discussion method acquire more scores ( $M = 68.46, SD = 8.58$ ) as compared to those students who were imparted instruction through lecture method ( $M = 52.88, SD = 7.24$ ).

Stakeholders are constantly complaining that students' achievement scores of public sector secondary schools are going to be reduced with the passage of time (Adu, Tadu, & Eze, 2012). Stopping current burning dilemma, states take precautionary measures in this regards. States hire teachers with excellent educational and professional degrees, offer good salary packages, invest maximum resources on schools' infrastructure to maximize educational opportunities for students but students' poor enrollment and educational achievements are going to be declined gradually. Researchers are interested to explore the effect of secondary schools teachers' teaching methods used in classroom to enhance students' educational achievement scores. Current study is entirely focused on male public sector secondary schools of district Kasur of Lahore Division of Punjab-Province.

### **Research Objectives**

Researchers famed following objectives of the study

1. To explore the effect of secondary schools' teachers' teaching methods on students' achievement scores.
2. To investigate the effect of secondary schools' teachers' lecture, question answer, discussion and demonstration method on students' achievement scores.

### **Research Questions**

Following research questions were focused in current study

1. What is the effect of secondary schools' teachers' teaching methods on students' achievement scores?
2. To what extent secondary schools' teachers' lecture, question answer, discussion and demonstration method effect on students' achievement scores?

## Research Methodology

Research methodology deals with methods and procedures used in study. Study was quantitative in nature and researchers used *ex-post-facto* research design. Research design is mapping strategy. This design provide real picture of current situation. It facilitate researcher in data collection and data analysis techniques (Fraenkel & Wallen, 2009; Fraenkel, Wallen, & Hayun, 2012). Questionnaire was self-developed to get information from students on teachers' teaching methods usage in classrooms on sample of randomly selected 800 students of 10th grade. Students are best observers of their teachers' teaching methods used in classrooms (Van der Zouwen, 2000).

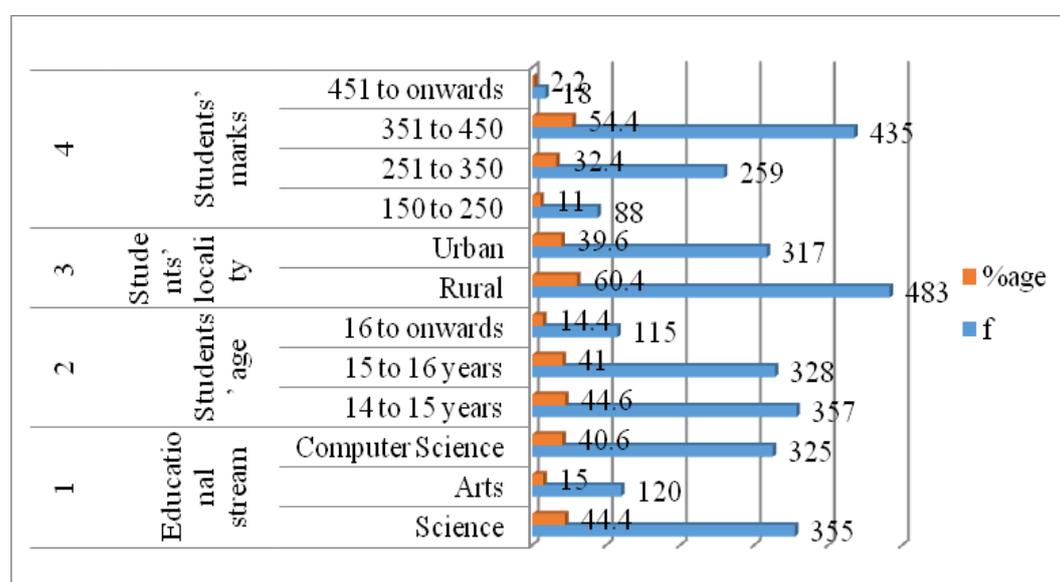


Figure 1. Sample of students with demographic information

Self-constructed consisted of four sub-scales; lecture method = 3 items, question answer = 4 items, discussion = 4 items and demonstration method consisted of 4 items based on 5-point Likert type responses mode of never, rarely, sometimes, often and always, already used in other studies as well (Hass, 2014; Vagias, 2006). Items of the questionnaire were constructed focusing guidelines stated in National Curriculum 2006 and secondary schools' students' cognitive level. Initial questionnaire was checked from experts to ensure content validity. Experts changed incomprehensible items from questionnaire. Factor wise Cronbach's Alpha reliability of questionnaire was confirmed; lecture method, .827, question answer, .867, discussion, .877 and demonstration method .883. After ensuring ethical considerations from head teachers, teachers and students, final questionnaire was distributed among ninth grades students enrolled in public sector secondary schools of district Kasur. Respondents were motivated and ensured their

collected data will be used for research purpose only. Students' achievement scores were obtained from notification of Board of Intermediate and Secondary Education, Lahore after ensuring students' enrollment during data collection. Collected data were entered in SPSS for smooth analysis applying statistical techniques.

### Data Analysis and Interpretation

Following section consist of data analysis. Researchers applied simple and multiple regression analysis techniques to explore the effect of teachers' teaching methods on students' achievement scores. Data analysis is appropriate method to present the relevance of deductive and inductive reasons of exploring phenomenon (Best & Kahn, 2006; Cronk, 2012; Montgomery, Peck, & Vining, 2001).

**Table 1**

*Effect of Teaching Methods on Students' Achievement Scores*

No	Model	B	SE	$\beta$	t	p
1	SAS (Constant)	626.348	9.015		69.482	.01
2	Teaching methods	3.960	.135	.721	-29.406	.01

Note:  $R = .721^a$ ,  $R^2 = .520$ ; ( $F(1, 799) = 864.705$ ,  $p < .05^a$ )

As established in Table 1, linear regression was applied to effect of teachers' teaching methods on students' achievement scores. Interpretation established formation of significant regression equation ( $F(1,799) = 864.705$ ,  $p < .01$ ) having .520 value of  $R^2$  with 52% increased variance were seen with standardized regression coefficient ( $\beta = .721$ ). Reporting results of regression coefficient, interpretation of independent sample t-test reveals that teachers' teaching methods were a significant predictor on students' achievement scores,  $t(798) = -29.406$ ,  $p < .01$ . Secondary schools' students' achievements were equal to 626.348+3.960 scores where teachers' teaching methods were measured in account of their pedagogical potential used in classrooms. It is concluded that students' achievement scores were increased 3.960 by using teachers' teaching methods.

**Table 2**

*Effect of Lecture, Question Answer, Discussion and Demonstration Method on Students' Achievement Scores*

No	Model	F	R	$R^2$	B	SE	$\beta$	t	p
1	SAS (Constant)				607.722	10.862		55.952	.01
2	Lecture method	274.509	.506 <sup>a</sup>	.656	.645	1.083	.020	.596	.551
3	Question answer	773.811	.701 <sup>a</sup>	.492	4.793	7.214	.264	.664	.507
4	Discussion	783.247	.704 <sup>a</sup>	.495	14.034	7.228	.773	1.942	.053
5	Demonstration	523.755	.629 <sup>a</sup>	.396	4.137	.587	.251	7.043	.01

Note:  $R = .726^a$ ,  $R^2 = .527$ ,  $\beta = .327$ ; ( $F(4, 796) = 588.830$ ,  $p < .05^a$ )

As ascertained in Table 2, multiple regression technique was applied to explore effect of lecture, question answer, discussion and demonstration method on students' achievement scores. Results confirm formation of significant regression equation ( $F(4, 796) = 588.830, p < .01$ ) with .527 value of  $R^2$  were calculated with 52.7% increased variance observed with standardized regression coefficient ( $\beta = .327$ ). Results also show construction of significant regression equation in favor of lecture method, ( $F(1, 799) = 274.509, p < .01$ ) possessing .656 value of  $R^2$  with 65.6% increased variance were seen with standardized regression coefficient ( $\beta = .020$ ); question answer, ( $F(1, 799) = 773.811, p < .01$ ) having .492 value of  $R^2$  with 49.2% increased variance were observed with standardized regression coefficient ( $\beta = .264$ ); discussion method ( $F(1, 799) = 783.247, p < .01$ ) having .495 value of  $R^2$  with 49.5% increased variance were detected with standardized regression coefficient ( $\beta = .773$ ) and demonstration method ( $F(1, 799) = 523.755, p < .01$ ) having .396 value of  $R^2$  with 39.6% increased variance were observed with standardized regression coefficient ( $\beta = .251$ ). Reflecting results of standardized regression coefficient, interpretation of independent sample t-test expose that teachers' lecture method,  $t(798) = .596, p > .05$ ; question answer method,  $t(798) = .664, p > .05$  and discussion method,  $t(798) = 1.942, p > .05$  was non-significant predictors while demonstration method,  $t(798) = 7.043, p < .01$  was significant predictor on students' achievement scores. Secondary schools' students' predicted achievements were equal to  $607.722 + .645 + 4.793 + 14.034 + 4.137$  scores where teachers' lecture, question answer, discussion and demonstration methods were measured by their educational potential used in classrooms. It is concluded that students' achievements increased 23.609 scores by applying teachers' lecture, question answer, discussion and demonstration methods.

## Discussion

Methodology plays an imperative role during imparting instructions for a better outcome. Methodology may sharpen students' cognitive level and arouse their curiosity level. Teachers' adopt teaching methodology that work as an appetizer in students' thought provoking, self-sufficiency and strengthen teaching learning process (Ameh & Dantani, 2012). Applications of teaching methods during teaching learning process put long-lasting affect on students' social and progress. Teaching method are teachers strategies used in the classroom for the sake of effective teaching learning process. Students become more skilled and well-informed (Umer & Siddiqui, 2013). Lecture, question answer, discussion and demonstration are teachers' centered methods that significantly affect on students' achievement scores. Students become curious, motivated and social in this regards (Wood & Gentile, 2003). Affective usage of teaching methods put imperative influence on students' achievement scores (Umer & Siddiqui, 2013).

Pakistani secondary schools' teachers' make maximum use of lecture method to enhance students' achievement scores. Ultimate aim of lecture method is to convey factual information, create curiosity and strengthen students' understanding (Walker, 2003). Results of present study depict that lecture method put 65.6% effect on students' achievement scores with significant regression equation ( $F(1, 799) = 274.509, p < .01$ ). Findings of the study consonance with the results of other studies that lecture method is suitable strategy to enhance students' achievement scores (Adekoya & Olatoye, 2011). Other quantitative study conducted by Omwirhiren and Ibrahim (2016) to measure the impact of lecture and cooperative method on learners' achievement scores on sample of 100 students applying self-developed questionnaire. It was validated from relevant experts and was pilot tested to ensure its reliability. Results of independent sample t-test and ANOVA declared no significant difference between teachers' use of lecture and cooperative teaching on students' achievement scores,  $t(49) = .771, p > .05$  and also found no significant difference between teachers' lecture and cooperative teaching and male and female students' achievement scores ( $F(1, 24) = .728, p > .05$ ) that contradict with the findings of the study that reflect significant effect of teachers' lecture method on students' achievement scores.

To acquire students prescribed targets teachers apply different teaching methods to achieve assign objectives; question answer is better one among others (Alabekee, Samuel, & Osaat, 2015; Chianson, Kurumeh, & Obida, 2010; Gull & Shehzad, 2015; Yang et al., 2005). Teachers have to introduce topic and / or lesson among students through asking different questioning and use ideas arousing strategies that actually inspire students' potential (Chin & Chia, 2004; Feldt, 1993; Oyler & Romanelli, 2014; Tofade et al., 2013; Willingham, 2008). Question answer technique is used to foster students' critical thinking abilities and foster teaching learning process. Technique refers to Socratic Method of teaching that is used to acquire students view point according to students' mental abilities (Paul & Elder, 2008; Yang et al., 2005). Teachers' used it to arouse students' hidden abilities during classroom teaching (Tofade et al., 2013). Results of current study claims that secondary schools' teachers put 49.2% effect with construction of significant equation ( $F(1, 799) = 773.811, p < .01$ ) on students educational achievements.

Discussion method is other teachers' centered methods used in classroom for effective teaching learning process. Rahman et al., (2011) conducted quantitative study to investigate the impact of discussion and lecture method on students' achievement scores on sample of 62 respondents. Self-constructed academic achievement test was administered to collect data from respondents. Instrument was validated from experts and was pilot tested on a sample of 45 students. Difficult and ambiguous items were omitted from final questionnaires. Results report significant difference between teachers' use of

lecture method and students' achievement scores,  $t(60) = 1.7, p < .05$ ; students obtained better achievement scores ( $M = 9.2$ ) when taught through discussion method as compared to those who imparted instructions other method ( $M = 8.1$ ) that support with the findings of the study that discussion method put 49.5% effect with formation of significant regression equation ( $F(1, 799) = 783.247, p < .01$ ) on students' achievement scores and also consonance with the results of the study conducted by Falode et al., (2015).

Demonstration enhances students' cognitive abilities and put long-term affect on their achievement scores (Adekoya & Olatoye, 2011; Ekeyi, 2013; Uhumuavbi & Mamudu, 2009). Demonstration confronts students to "study how to study" stimulates them to compose mutual effort in peers to find out answer of actual problems (O'Donoghue et al., 2011). Demonstration used to increase students' mounting interests in obtaining diversity of subjects. Ameh and Dantani (2012) conducted a study to investigate the impact of demonstration method on students' achievement scores. Study was quantitative in nature and sample of the study consisted of randomly selected 50 students; 25 male and 25 female. Teacher delivered information among both groups as prescribed scheduled. Post-test was used to collect data from students by administering self constructed *Chemistry Achievement Test*; CAT. Self-developed instrument was validated from experts. Results of independent sample t-test report no difference between discussion method and students' post-test achievement scores,  $t(56) = .258, p < .05$  and found significant difference between discussion method and students' pre-test achievement scores,  $t(56) = 4.011, p < .05$ . Results further shows that secondary schools' teachers demonstration method put 39.6% affect on students' achievement scores with significant regression equation ( $F(1, 799) = 523.755, p < .01$ ) and support with the results of Ameh and Dantani (2012).

## Conclusions

Teaching methods are teaching techniques used by teachers to impart instructions among students to make teaching learning effective. Secondary school teachers have the responsibilities to make effective teaching and learning for students better achievement scores. Present study was conducted to explore the effect of public sector secondary schools teachers' teaching methods on students' achievement scores. Present study concludes that male secondary schools' teachers working in public sector secondary schools were 48 % in applying teaching methods among students. It is common observations that public sector secondary schools teachers take less pain towards students' better achievements as they have job securities, poor salary packages and some public sector schools lack physical facilities and schools infrastructure. Furthermore, they impart instructions through lecture method, question answer technique, discussion and demonstration methods in this regards. Lecture method is refereed as one way traffic in

which students only write down important points. Lecture method is widely used method in most of educational institutions. Current study concludes that public sector secondary schools' teachers were making 34% less use of lecture method among students. Students entirely remain passive and teachers provide bulk of information in limited span of time. Question answer is other way of imparting instructions among students. It refers to Socratic Method of teaching. Secondary schools teachers use this method to make students active during teaching. Teachers ask questions among students focusing their cognitive abilities then properly guided them. Results of the study conclude that public sector secondary schools teachers were 51% deficit in applying instructions by means of question answer technique. Most of the teachers just impart instructions among students and less focus to ask question. They secure their time, just make formality and left the class that is cause of students' poor achievement scores. Discussion is important method that made students' energetic and enhance students' confidence. Results of the study report that 50% teachers were deficit in making discussion in classroom. Some teachers make pain, spend their time and tried their best to strengthen students' confidence level applying classroom discussion. Demonstration refers to show some sort of topic related material to put concrete concepts on students' cognitive abilities. It is common observation that students remember more rapidly when they are demonstrated. Results of the study conclude that public sector secondary schools' teachers were 60% deficit in demonstration. There were less feasibility of instructional material, poor head teachers cooperation, extra burden on teachers, shortage of teaching staff, extra departmental responsibilities and students-teachers poor attitudes towards educational institutions are the main hurdles that cause students' poor achievement scores enrolled in male public sector secondary schools of Punjab province.

### **Recommendations**

Teachers' impart instructions using diversity of teaching methods for the sake of students' better achievement scores but students' attainment level is going to be decline gradually. On the basis of the results of the study, it is recommended that Quaid-e-Azam Academy for Educational Development; QAED may train head teachers and teachers in teachers' centered teaching methods; lecture, question answer, discussion and demonstration and also make them bound to implement these methods in classroom for students' achievement scores.

### **References**

- Abdu-Raheem, B. O. (2011). Effects of discussion method on secondary school students' achievement and retention in social studies. *European Journal of Educational Studies*, 3(2), 293-301.

- Adekoya, Y. M., & Olatoye, R. A. (2011). Effect of demonstration, peer-tutoring, and lecture teaching strategies on senior secondary school students' achievement in an aspect of agricultural science. *The Pacific Journal of Science and Technology*, 12(1), 320-332.
- Adu, E. O., Tadu, R., & Eze, I. (2012). Teachers' self-efficacy as correlates of secondary school students' achievement in southwestern Nigeria. *Discovery*, 2(4), 8-16.
- Alabekee, E. C., Samuel, A., & Osaat, S. D. (2015). Effect of cooperative learning strategy on students learning experience and achievements in mathematics. *International Journal of Education Learning and Development*, 3(4), 67-75.
- Ameh, P. O., & Dantani, Y. S. (2012). Effects of lecture and demonstration methods on the achievement of students in Chemistry in Nassarawa local Government area of Kano State. *International Journal of Modern Social Sciences*, 1(1), 29-37.
- Ayers, W. (2010). *The journey of a teacher* (3rd ed.). New York: Teachers College Press.
- Banerjee, A. C., & Vidyapati, T. J. (1997). Effect of lecture and cooperative learning strategies on achievement in chemistry in undergraduate classes. *International Journal of Science Education*, 19, 903-910. doi: 10.1080/0950069970190804.
- Best, J. B., & Kahn, J. V. (2006). *Research in education* (10th ed.). New York: Pearson.
- Casado, M. (2000). Teaching methods in higher education: A student perspective, *Journal of Hospitality & Tourism Education*, 12, 65-70. doi:10.1080/10963758.2000.10685283
- Chianson, M. M., Kurumeh, M. S., & Obida, J. A. (2010). Effect of cooperative learning strategy on students' retention in circle geometry in secondary schools in Benue State, Nigeria. *American Journal of Scientific and Industrial Research*, 2, 33-36. doi:10.5251/ajsir.2011.2.1.33.36
- Chin, C. & Chia, L. G. (2004). Problem based learning using students' questions to drive knowledge construction. *Science Education*, 88, 707-727. doi:10.1002/sc.10144
- Cronk, B. C. (2012). *How to use SPSS statistics: A Step-by-step guide to analysis and interpretation*. London: Pyrczak Publications.
- Crouch, C., Fagen, A. P., Callan, J. P., & Mazur, E. (2004). Classroom demonstrations: Learning tools or entertainment? *American Journal of Physics*, 72, 835-838. doi: 10.1119/1.1707018.

- Ekeyi, D. N. (2013). Effect of demonstration method of teaching on students' achievement in agricultural science. *World Journal of Education*, 3, 1-7. doi:10.5430/wje.v3n6p1.
- Falode, O. C., Adewale, I. A., Ilobeneke, S. C., Falode, M. E., & Robinson, A. O. (2015). Effects of discussion instructional strategy on achievement and retention of secondary school students in human Geography in Minna, Nigeria. *Journal of Scientific and Engineering Research*, 2(4), 78-84.
- Feldt, C. C. (1993). Becoming a teacher of mathematics: A constructive, interactive process. *Mathematics Teacher*, 86(5), 400-403.
- Fraenkel, J. R., & Wallen, N. E. (2009). *How to design and evaluate research in education* (7<sup>th</sup> ed.). London: McGraw-Hill.
- Fraenkel, J. R., Wallen, N. E., & Hayun, H. H. (2012). *How to design and evaluate research in education* (8th ed.). London: McGraw-Hills.
- Friesen, N. (2012). Report: Defining blended learning. In Garrison, D., & Vaughan, N., (2008). *Blended learning in higher education: Frameworks, principles and guidelines*. San Francisco, CA: John Wiley.
- Giridharan, K., & Raju, R. (2016). Impact of teaching strategies: Demonstration and lecture strategies and impact of teacher effect on achievement in engineering education. *International Journal of Educational Sciences*, 14, 174-186. doi:10.1080/09751122.2016.11890491.
- Gull, F., & Shehzad, S. (2015). Effects of cooperative learning on students' academic achievement. *Journal of Education and Learning*, 9(3), 246-255.
- Hass, M. S. (2002). *The influence of teaching methods on student achievement on virginia's end of course standards of learning test for algebra I* (Published Doctoral Dissertation). Virginia Polytechnic Institute and State University, USA.
- Hosal-Akman, N., & Simga-Mugan, C. (2010). An assessment of the effects of teaching methods on performance of students in accounting courses. *Innovations in Education and Teaching International*, 47, 251-260. doi:10.1080/14703297.2010.498176
- Hussain, I., Hamdani, S. N. H., Quraishi, U., & Zeeshan, M. (2010). Effect of direct teaching method on the achievement of high and low achievers in the subject of English at the secondary level. *Journal of College Teaching & Learning*, 7(7), 45-50.

- Martínez-Clares, P., & González-Morga, N. (2018). Teaching methodologies at university and their relationship with the development of transversal competences. *Culturay Educación*, 30, 233-275. doi:10.1080/11356405.2018.1457610
- Montgomery, D. C., Peck, E. A., & Vining, G. G. (2001). *Introduction to linear regression analysis*. (3rd ed.). New York: John Wiley.
- Mtunda, F. G., & Safuli, S. D. D. (1997). *Theory and practice of teaching*. Southeastern Africa: Malawi, Dzuka Publishing
- Ndirangu, M., & Udoto, M. O. (2011). Quality of learning facilities and learning environment: Challenges for teaching and learning in Kenya's public universities. *Quality Assurance in Education*, 19(3), 208-223.
- O'Donoghue, G., McMahon, S., Doody, C., Smith, K., & Cusack, T. (2011). Problem-based learning in professional entry-level therapy education: A review of controlled evaluation studies. *Interdisciplinary Journal of Problem-Based Learning*, 5, 54-73. doi:10.7771/1541-5015.1218
- Okebukola, P. A. (1997). Some factors in students' under-achievement in senior secondary school biology. *Journal of Science Education*, 2(1), 1-9.
- Olatoye, R. A., & Adekoya, Y. M. (2009). Effect of four teaching strategies on senior secondary students' achievement in an aspect of agricultural science. *African Journal of Educational Studies in Mathematics and Sciences*, 7(1), 1-16.
- Omwirhiren, E. M., & Ibrahim, K. U. (2016). The effects of two teachers' instructional methods on students' learning outcomes in chemistry in selected senior secondary school in Kaduna Metropolis Nigeria. *Journal of Education and Practice*, 7(15), 1-9.
- Onweh, V. E., & Akpan, U. T. (2014). Instructional strategies and students' performance in electrical installation in technical colleges in Akwa Ibom state: Instructional skills for structuring appropriate learning experiences for students. *International Journal of Educational Administration and Policy Studies*, 6(5), 80-86.
- Oyler, D. R., & Romanelli, F. (2014). The fact of ignorance revisiting the Socratic method as a tool for teaching critical thinking. *American Journal of Pharmaceutical Education*, 78, 144-153. doi:10.5688/ajpe787144

- Paimin, A. N., Hadgraft, R., Prpic, K., & Alias, M. (2011, January). *Learning strategy, motive and intention: Predicting performance of engineering undergraduates*, Proceedings of IETEC'11 Conference on the Research in Education Symposium, Kuala Lumpur, Malaysia.
- Paul, R., & Elder, L. (2008). Critical thinking: The art of Socratic questioning, part III. *Journal of Developmental Education*, 31(3), 34-35.
- Rahman, F., Khalil, J. K., Jumani, N. B., Ajmal, M., Malik, S., & Sharif, M. (2011). Impact of discussion method on students' performance. *International Journal of Business and Social Science*, 2(7), 84-94.
- Tofade, T., Elsner, J., & Haines, S. T. (2013). Best practice strategies for effective use of questions as a teaching tool. *American Journal of Pharmaceutical Education*, 77, 155-163. doi.org/10.5688/ajpe777155
- Uhumuavbi, P. O., & Mamudu, J. A. (2009). Relative effects of programmed instruction and demonstration methods on students' academic performance in science. *College Student Journal*, 43(2), 46-57.
- Umer, S., & Siddiqui, J. A. (2013). Improving trends of teaching methods used in the concept schools of Karachi: An evaluative study. *Educational Research International*, 2(2), 146-154.
- Vagias, W. M. (2006). *Likert-type scale response anchors*. Clemson International Institute for Tourism & Research Development, Department of Parks, Recreation and Tourism Management, Clemson University.
- van der Zouwen, J. (2000). An assessment of the difficulty of questions used in the ISSP-questionnaires, the clarity of their wording, and the comparability of the responses. *Central Archive for Empirical Social Research*, 46(1), 96-114.
- Walker, G. H. (2003). *Lecturing with style*. The University of Tennessee. Chattanooga.
- Willingham, D. T. (2008). Critical thinking: Why is it so hard to teach? *Arts Education Policy Review*, 109, 21-32 doi:10.3200/AEPR.109.4.21-32
- Wood, W. B., & Gentile, J. M. (2003). Education enhanced: Teaching in a research Context. *Science*, 302, 1510-1510. doi:10.1126/science.1091803
- Yang, Y. T. C., Newby, T. J., & Bill, R. L. (2005). Using Socratic questioning to promote critical thinking skills through asynchronous discussion forums in distance learning environments. *The American Journal of Distance Education*, 19, 163-181 doi:10.1207/s15389286ajde1903\_4