

Art. #1679, 9 pages, <https://doi.org/10.15700/saje.v40ns2a1679>

Association of teacher feedback with scholastic attainment at secondary level in Pakistan

Tariq Javed 

Federal Government Public School No 2 (Boys) Tariqabad, Rawalpindi, Pakistan
tariqjavedmiu@gmail.com

Muhammad Aslam Asghar 

Mohi-Ud-Din Islamic University, Nerian Sharif AJ&K, Pakistan

Nazneen Nazak 

Government Girls High School Daultala, Tehsil Gujar Khan, District Rawalpindi, Pakistan

In this article we report on the association between teacher feedback and scholastic attainment at Secondary School Certificate (SSC) level in Pakistan. The study was conducted with data collected from Pakistani secondary school teachers and students through a survey study using multistage sampling. The objectives of the study were (1) to explore the possible differences in the effect of feedback by male and female teachers on the academic achievement of students in large, medium, and small secondary schools; (2) to compute the relationship of teacher feedback on the scholastic accomplishment at secondary level. The research instrument (questionnaire) with 14 closed-ended statements was developed, validated through experts in the field of education, and internal consistency of the tool was measured using the Statistical Package for Social Sciences (SPSS) – the calculated Cronbach Alpha was 0.814. Two hypotheses for the study were formulated and tested by using non-parametric statistical tests in order to achieve the objectives of the study. The results show that teachers' feedback during the teaching-learning process has a positive association with academic achievement of students. Furthermore, formative feedback, diagnostic feedback, gestural feedback, immediate feedback and feedback on classroom discussion are used to overcome the behavioural and learning issues of low and high achievers. The findings of the study suggest that variety in teacher feedback techniques during the teaching-learning process should be promoted to enhance the quality of students' academic achievement.

Keywords: learner/student achievement; scholastic attainment; teacher feedback

Introduction

Written feedback from teachers to students in the learning process has been ignored due to teachers' workloads. Proper written feedback can stimulate learning and enhance performance without negatively effecting students' self-esteem (Siewert, 2011).

Teacher feedback is considered as an essential ingredient of the teaching-learning process, because both instructor and learner can benefit. As a result of teacher feedback, learners are motivated to correct their task while the instructors are inspired to enhance the learners' academic achievement. The effective teaching-learning process is based upon constructive teacher feedback which enhances students' feeling autonomous in the learning process. The effective use of teacher feedback in a systematic way of making the learning environment more interesting for learners to feel motivated and to achieve high performance (Ovando, 1994).

Amadi and Paul (2017) state that the teaching process is not as uncomplicated as people think; in fact, it is a complicated process, which is a combination of reality, intention, devotion, life experiences, knowledge, skills and abilities that flow from teacher to student to create the learning process. Teacher feedback is a process of communication, which is meaningless until it is perceived by students. Therefore, teacher feedback is a tool to interest students in learning through two-way communication. Many students like teacher feedback that is enthusiastic, motivating, devoted and displays a sense of humour (Tan, Whipp, Gagné & Van Quaquebeke, 2019).

Teacher feedback is an effective tool to encourage students to reach higher levels of academic achievement. The teacher's feedback in the form of advice, praise or encouragement helps keeps students to remain focussed in their learning and to overcome obstacles (Santrock, 2007). Receiving written feedback from the teacher on homework tasks makes students happy and motivates them to achieve better (Crisp, 2007). Thus, the mode and style of teacher feedback provide the basic foundation for the educational achievement of young learners in the learning environment.

Quality education is a fundamental right of every child in the classroom environment, but may not be achieved without proper feedback from teachers. When teachers are not aware of the types of feedback and feedback techniques and strategies, students may not receive quality education, which is reflected in low-level scholastic attainment. Most of the teachers use motivational words like good, very good, excellent, poor and weak. However, these motivational remarks cannot be considered as proper teacher feedback. Teacher feedback is a form of information about students' learning task that flows from teachers to students; it should thus be positive, actable, achievable, and on the same level as the students' mental ability to achieve the learning objectives (Qu & Zhang, 2013).

Statement of Research

The research was undertaken in Pakistan to explore the mode and style of teacher feedback and its effectiveness on the educational achievement at secondary level.

Objectives

The objectives of the study were designed by taking teacher feedback as independent variable and academic achievement as dependent variable. The objectives were (1) to explore the possible difference in effect of male and female teachers' feedback on the academic achievement of students in large, medium, and small secondary schools; (2) to compute the relationship of teacher feedback on the scholastic accomplishment at secondary level.

Hypotheses of the Research

The following two null hypotheses were framed to attain the objectives of the research:

Hypothesis 1: There is no significant effect of male and female teachers' feedback on the academic achievement of students in large, medium, and small schools.

Hypothesis 2: There is no significant relationship between inclusive teacher feedback and scholastic attainment of students at secondary level.

Significance

The study may be beneficial to educational readers in developing countries as the provision of quality education is an important aspect in the 21st century. However, the provision of quality education may not be possible without improvement in the teaching-learning process, which directly involves the teacher using different feedback techniques to provide students with proper feedback. There are 123,081 Pakistanis living in South Africa (Ministry of Labour, Manpower & Overseas Pakistanis, 2014) who form part of the human resources in the country

and thus participate in the national economy of the country in various capacities. Moreover, teachers' professionalism and expertise can be contextualised and transcend national boundaries, and may be used towards continuous professional development of teachers through new research approaches (Robson & Wihlborg, 2019). This article may also benefit overseas Pakistanis and education policy makers in developing countries regarding the quality of the teaching-learning process, which ultimately contributes to economic growth of that country.

Review of Literature

Teacher feedback becomes a more powerful tool when students understand the objectives of classroom learning. Without being aware of the learning objectives, students are in a confused state; therefore, it is necessary to create awareness about objectives prior to teaching and learning (Lee, 2008). At different stages of the teaching-learning process, teacher feedback is provided either in oral or written form. Inspiration and dedication are considered as two basic elements of feedback. The first element relates to intrinsic motivation of students, which provides the stimulus towards achievement of objectives. The second is associated with further challenging objectives, which establishes the appropriate conditions for the teaching-learning process (McGarrell & Verbeem, 2007; Truax, 2018). Feedback provides the opportunities to adjust expected standards on the basis of previous achievement (Clarke & Boud, 2018; Hattie & Timperley, 2007). These authors further suggest that teacher feedback is based on three fundamental questions: When to move? How to move? and Where to move? It facilitates curiosity during the learning process (Hattie & Timperley, 2007). Teacher feedback is a combination of gestural, written, verbal, formative and summative feedback, which is shown in Figure 1.

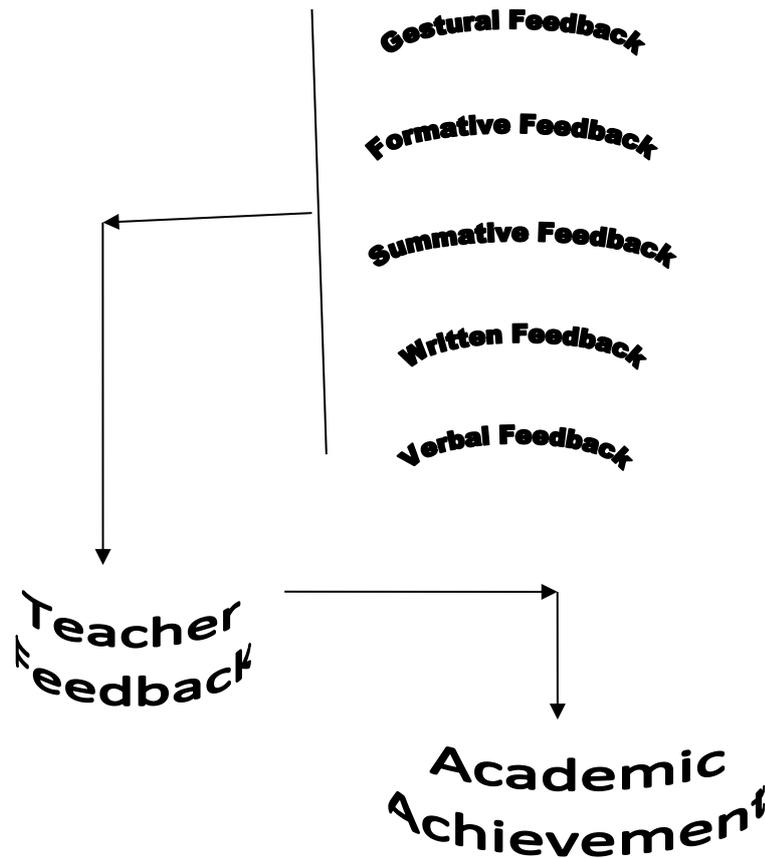


Figure 1 Ingredients of teacher feedback

The educational performance of students at school level can be intensified through proper and timely teacher feedback (Hattie, 2009; Pollock, 2012). The gestures and feedback by the teacher is considered as the most substantial instrument to enhance academic achievement in educational environments (Hattie, 2009). In the same context, Wiggins (2010) states that teacher feedback must be used to obtain learning objectives, it should be more friendly, clear, accurate, specific, stable, concrete, measurable, motivational and understandable as per the mental age of learners.

Fluckiger, Vigil, Pasco and Danielson (2010) describe the planning of formative feedback in relation to time and engagement of students in the learning process as one of teachers' challenges. Students' thinking and perception can be modified in order to enhance the level of learning through formative teacher feedback, by considering students as partners during formative feedback. Teacher feedback can be made more effective with the involvement of students during formative feedback. There are four kinds of formative feedback through which students are involved as partners in the learning process:

- 1) Formative quiz presentation on process and product.
- 2) Mid-term consultations during the semester on the basis of discussions.

- 3) Sharing of students' questions, statements and formative ideas among the students.
- 4) Providing immediate feedback with collaborative approaches.

Wiggins (2010) has observed that the most common practices of teacher feedback during the teaching-learning process, consists of identical written remarks, i.e. good, very good, poor performance, poor, weak, or excellent. Some teachers use symbols like one star, two stars and three stars, and on the other hand, some present feedback in the form of questions like Why? Where? and When? None of these comments provide proper guidelines towards the attainment of learning objectives; however, they may create extrinsic motivation among learners towards learning. Teacher feedback is information that flows from teacher to student, and information cannot be represented in eliciting form.

Studies show that the Grade Point Average (GPA) in school subjects can be enhanced through periodic meetings of parents and through proper teacher feedback (García Bacete & Remírez, 2001). Active involvement of parents and verbal or written feedback from teachers are essential for the learning process, which enhances academic achievement (Grolnick, Price, Beiswenger & Sauck, 2007). In the same context, Lezotte and McKee Snyder (2010) describe the correlation between academic

achievement and teacher feedback. The direction of teacher feedback can be managed by subject command, management of anecdotal record, guidance and supervision during the teaching-learning process.

Hattie and Timperley (2007) state that according to the nature of tasks, feedback can be classified in four levels:

- 1) Engagement of students towards learning new knowledge, which is fact focused and creates the awareness about right or wrong, true or false etc. This level of feedback is done through questions during learning, which assembles surface knowledge among students. The whole class is involved at this level.
- 2) Proceeding tasks of students towards the attainment of goals. At this level feedback is provided to reduce the cognitive load, anxiety, error recognition and re-evaluation, and also suggests some strategies to

overcome the errors. This level of feedback is based on the individual as well as in group form, which enhances deeper learning among students.

- 3) Self-evaluation of students is carried out on this level of feedback, which provides confidence, encouragement and self-regulation among the students to accept challenges in acceptable mode. The third level of feedback is considered as effective because it enables students to remove inconsistency.
- 4) Students' intrinsic feelings about the task should be kept at this level, which can be carried out through praise. The expectations about tasks can enhance the level of learning. Critical remarks should be avoided in this phase.

Methodology

In this study we used descriptive (survey) research. The survey design is presented in Figure 2.

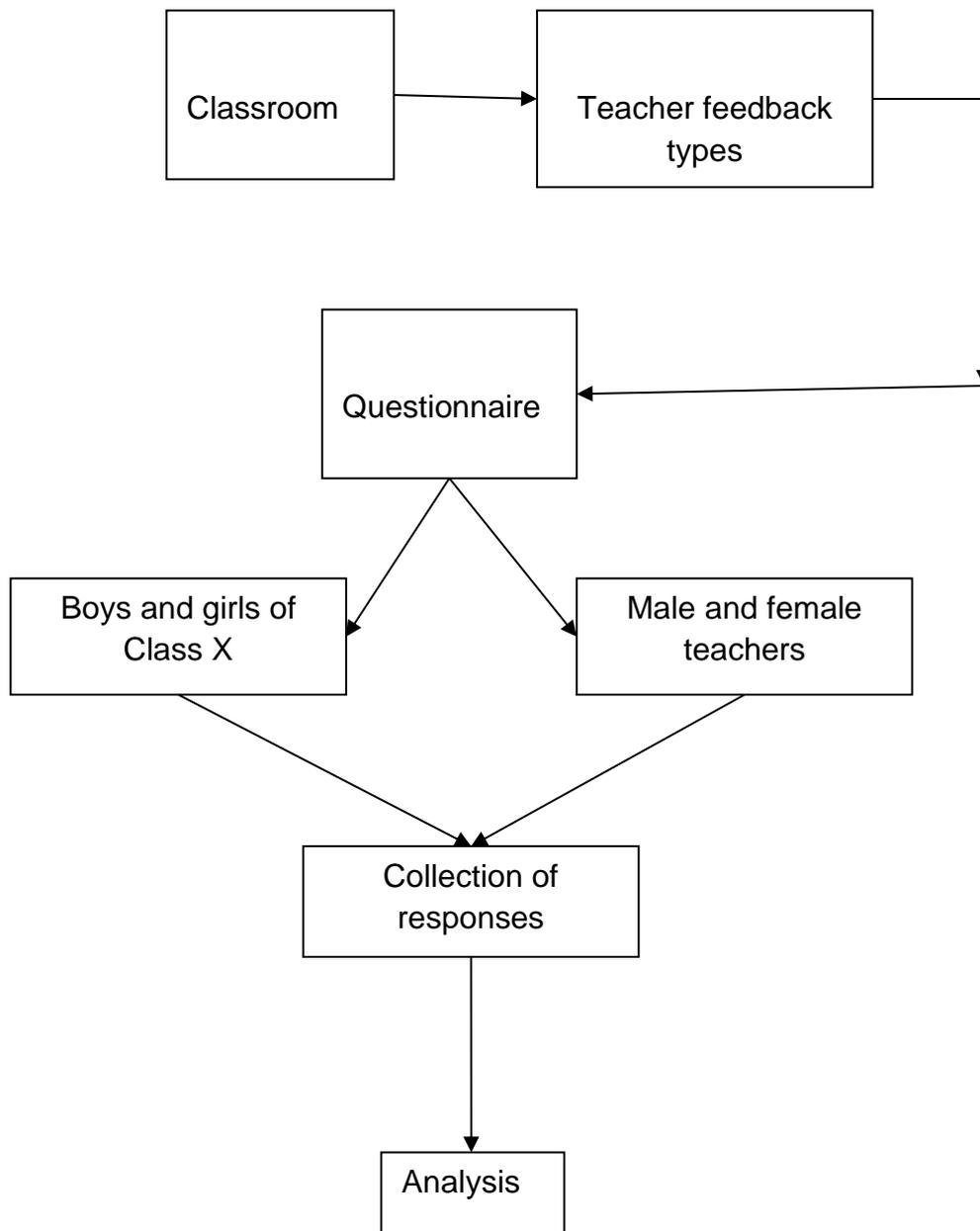


Figure 2 Research design of the study

Data regarding gestural feedback, formative feedback, verbal feedback, written feedback, and summative feedback were gathered. The data were gathered through a survey method from male and female secondary school teachers and from boys and girls in the 10th grade from sample schools. The survey consisted of a closed-ended questionnaire on a five-point Likert scale, (Shields & Tajalli, 2006).

Population

The population of the study comprised of 2,375 high school teachers (male = 1,271, female = 1,104), and 12,648 high school boys and girls (boys = 7,020, girls = 5,628) in 134 high schools of federal

government educational institutions of 10 regions in four provinces of Pakistan (Federal Government Educational Institutions (C/G), n.d.).

Sample and Data Sources

In this study data were gathered from high school teachers and students in the 10th grade during the academic sessions of 2013 to 2015 under multistage sampling techniques. The sample of the study consisted of 380 secondary school teachers (male = 190, female = 190), 430 secondary school students (boys = 215, girls = 215) in 39 secondary schools (schools for boys = 20, schools for girls = 19). An autonomous organisation, the Federal Board of

Intermediate and Secondary Education (FBISE) Pakistan was the examining and assessing body of all the secondary schools. The overall response rate in large, medium and small category schools was

93.44%. The tree for sampling in the four stages of the multistage sampling for the study is shown in Figure 3 below.

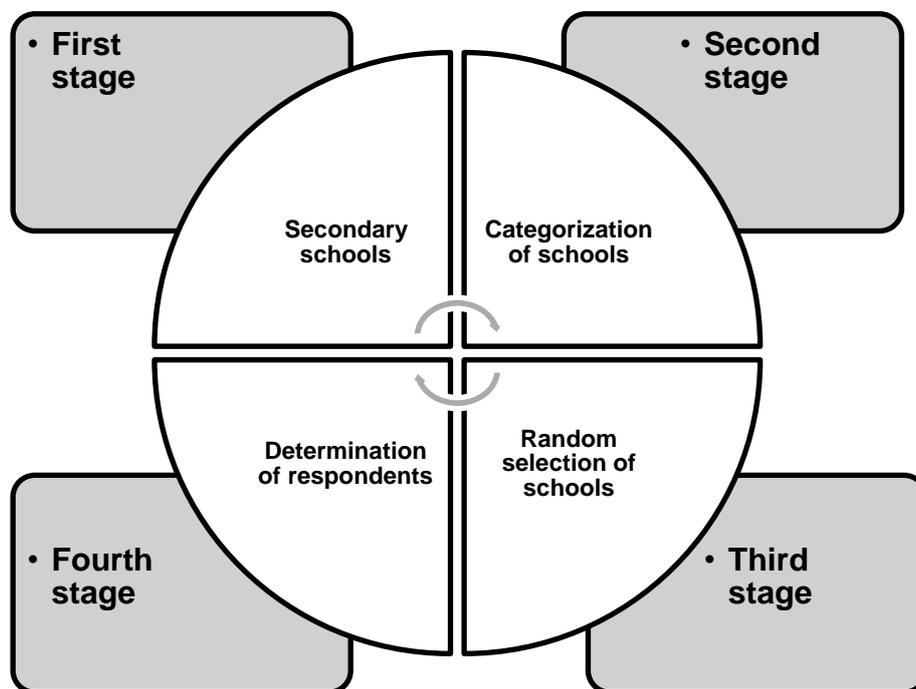


Figure 3 Stages of multistage sampling

Categories

Three categories (see Table 1) were framed for the research purpose on the basis of the number of students who took the Secondary School Certificate part one (SSC-I) annual examination 2014.

Table 1 Area-wise categories

S. No.	Categories of schools	Regions	Number of students
1	Large	Rawalpindi Wah	8,597
2	Medium	Lahore Multan Peshawar	2,308
3	Small	Kharian Gujranwala Bahawalpur Karachi Quetta	1,743

Multistage sampling is a type of cluster sampling in which the whole population is divided into small clusters for research purpose (Wolter, 2007). In the first stage of multistage sampling, 10 regions were selected for the research purpose. In the second stage, secondary schools were sampled randomly and in the third stage secondary school teachers were sampled to facilitate research.

Initially, category-wise results of the association between feedback by teachers and the

scholastic attainment of students were presented. In Table 5 the three categories were integrated and results obtained in toto, which has led to the generalisation that in all categories teachers' feedback and scholastic attainment of secondary school students have significant association.

Development of Research Tool

Using descriptive (survey) research techniques, a 14-statements questionnaire was developed using a five-point Likert scale for data collection. The questionnaire was designed to cover the aspects of feedback including the attitude of students towards teacher feedback, clarity of feedback, detail of feedback, immediate or delayed feedback, teacher feedback on assignments, formative feedback during the teaching-learning process, taking care of individual differences, reduction of students' cognitive load, and behavioural problems in class. The survey was conducted to solicit the respondents' opinions. The survey was translated into the national language, Urdu, to obtain accurate responses from the students. The reliability (the quality of being trustworthy) of the research tool was measured by using the SPSS, while the validity of the tool was also validated by four experts in the field of education. The statistical Cronbach Alpha value was calculated as 0.814, which reflects internal consistency.

Analysis

Non-parametric distribution free statistical tests were applied for the analysis. The mode (techniques) and style of feedback (teacher) were explored through statistical chi square values, while

the Mann Whitney *U* Test was used to associate educational attainment with inclusive teacher feedback. The information about the analysis is given below.

Table 2 Net teacher feedback result in high schools (large category)

Respondents	SA	A	UD	DA	SDA	Total	χ^2
FT	340	404	21	352	283	1,400	
SSG	343	382	47	385	243	1,400	
MT	322	507	21	166	314	1,330	157.78
SSB	354	490	27	416	253	1,540	

Note. Significance level 0.05. Female teachers = FT, Secondary school girls = SSG, Male teachers = MT, Secondary school boys = SSB, Strongly agreed = SA, Agreed = A, Undecided = UD, Disagreed = DA, Strongly disagreed = SDA.

Table 2 depicts the sum of responses for the 14 items of the questionnaire under each category of responses for each level of the Likert scale on all feedback-related items. Accordingly, the total shown in the table is the sum of responses for all five categories of the scale (FT = 1,400; SSG = 1,400; MT = 1,330; SSB = 1,540), which relates to the number of respondents for each type of school. Male and female teachers and boys and girls in the 10th grade participated in the research. The

non-parametric chi square test explains that the responses in the nature of the mode and style of feedback (teacher) in the large category, was calculated at 12 degrees of freedom and at the 0.05 significance level. Table 2 shows that the calculated value of the chi square was 157.78, which is much higher than the table value (21.03). Therefore, the hypothesis for the large category, H_{01} , was not accepted.

Table 3 Net teacher feedback result in high schools (medium category)

Respondents	SA	A	UD	DA	SDA	Total	χ^2
FT	303	335	64	44	24	770	
SSG	291	202	83	41	41	658	
MT	273	388	71	45	21	798	86.27
SSB	334	231	60	34	41	700	

Note. Significance level 0.05.

Table 3 shows the association between teacher feedback and educational attainment of the participants in the medium category institutions. The non-parametric chi square test explains that the responses on the nature of the mode and style of feedback (teacher) in the medium category, was

calculated at 12 degrees of freedom and at the 0.05 significance level. The calculated value of the chi square was 86.27, which is much higher than the table value (21.03). Therefore, the hypothesis for medium category, H_{01} , was rejected.

Table 4 Net teacher feedback result in high schools (small category)

Respondents	SA	A	UD	DA	SDA	Total	χ^2
FT	137	127	16	21	07	308	
SSG	292	179	90	32	37	630	
MT	119	152	22	14	01	308	78.91
SSB	359	247	66	44	40	756	

Note. Significance level 0.05.

Table 4 explains the association between teacher feedback and educational attainment of the participants in the small category institutions. The non-parametric chi square test explains that the responses on the nature of the mode and style of feedback (teacher) in the small category, was calculated at 12 degrees of freedom and at the 0.05 significance level. The calculated value of the chi square was 78.91, which is much higher than the

table value (21.03). Therefore, the hypothesis for small category, H_{01} , was also rejected.

Relationship between feedback (teacher) and academic achievement

The relationship between the dependent variable (academic achievement) and the independent variable (teacher feedback) from participants in the research in all three categories, i.e. large, medium and small, is given in Table 5.

Table 5 Teacher feedback and academic achievement of large, medium and small categories of schools

Responses “A”	Academic achievements level		Ranks for “A”	Ranks for “B”
	“B”	Values for “A”		
3,467	485	588	4	1
3,644	628	1,305	8	2
588	858	1,594	9	3
1,594	632	3,467	11	5
1,305	119	44	12	6
-	0	-	-	7
	1,903	-	-	10

Result detail of A

Sum of ranks = 44, Mean of ranks = 8.8, Expected sum of ranks = 32.5, Expected mean of ranks = 6.5, U value = 6, Expected U value = 17.5.

Result detail of B

Sum of ranks = 34, Mean of ranks = 4.86, Expected sum of ranks = 45.5, Expected mean of ranks = 6.5, U value = 29, Expected U value = 17.5.

Combined results of A and B

Sum of ranks = 78, Mean of ranks = 6.5, SD = 6.1577.

Result A – z-ratio

The z -score is -1.7864. The p -value is 0.07346.

Result B – U -value

The U -value is 6. The critical value of U at $p \leq 0.05$ is 5.

Table 5 explains the influence of teacher feedback on the academic achievement of secondary school students. The computed u value of the Mann Whitney U test is greater than the table value. So, the second hypothesis, H_{02} , was not accepted.

Findings

It was observed that teacher feedback correlates positively with the scholastic achievement of boys and girls in 10th grade. Teacher feedback is a constructive tool through which students at secondary level boost their academic achievement, and learn more enthusiastically. The findings were consistent for all boys and girls in secondary schools (Tables 2–5).

Twenty-first century people are living in a global village because education, including aspects like curriculum, instruction, management, evaluation and mentoring are global phenomena. Therefore, most developing countries are trying to improve the quality of their education system through sharing of ideas, thoughts, issues, problems and solutions among the nations to produce human resources as needed and demanded in the 21st century. This article should prove helpful to any country to improve its instructional process – the enhancement of the education system will result in better human resource development and ultimately translate into economic benefits of the country.

Conclusion

Ahmad, Saeed and Salam (2013) studied the association between teacher feedback and the performance of students in examinations, which was found to be highly significant. They stated that improper teacher feedback leads students towards a state of confusion. In the same context, Siewert (2011) has observed that written teacher feedback enables the students to positive academic achievement (significant effect). The results of our study agree with those of both the afore-mentioned studies. According to Tables 2 to 4, the calculated values of the chi square and the Mann Whitney U test (Table 5) were greater than the tabulated values, therefore, neither hypothesis was accepted, which illustrates the significance of teacher feedback in boys' and girls' secondary schools. It can be concluded that the significant effect exists between the variables of the study.

Recommendations

A more effective and objective classroom learning environment might be created through the right type of teacher feedback. Teachers may use verbal or written feedback to motivate students to achieve learning objectives at secondary level. In this way awareness can be created among the learners about their weaknesses and strengths to elevate the teaching-learning process.

Authors' Contributions

Dr Tariq Javed wrote the manuscript and provided the data for the tables. Prof. Dr Muhammad Aslam Asghar analysed the data, and Dr Nazneen Nazak participated in the discussion of the manuscript. All authors reviewed the final manuscript.

Notes

- Published under a Creative Commons Attribution Licence.
- DATES: Received: 20 March 2018; Revised: 23 November 2019; Accepted: 26 January 2020; Published: 31 December 2020.

References

- Ahmad I, Saeed M & Salam M 2013. Effects of corrective feedback on academic achievements of students: Case of government secondary schools in Pakistan. *International Journal of Science and Research*, 2(1):36–40. Available at <https://d1wqtxts1xzle7.cloudfront.net/57475328/Ef>

- fects_of_Corrective_Feedback_on_Academic_Achievements_of_Students_Case_of_Government_Secondary_Schools_in_Pakistan.pdf?1538327439=&response-content-disposition=inline%3B+filename%3DEffects_of_Corrective_Feedback_on_Academ.pdf&Expires=1603361838&Signature=gGOsc~F5vGcrAsv6N2IJwlNdJrw3Iq0QHfH4q4IOufuasHgtXFQ2mCQ9TA7onqJgcS4gB1j-n3dr8gDeY8gjsG7f56-19uMF34OSwXP3O5tLjl7FEu6C2fZ-PmEs-ahRE1TG8IXx0ZHAOWfQKrMRc5GAKyScyAvDIN8CykVYRgO~Jxl~xkZddufjlbGfQX357izYbDunLbLcSJgYNJhGrrJOxTcfPeDmRkigOLQU7BW~dDw4V2wi8pd0SSSy51ZpvPNO-SETbsq8tXVmbWbEiQfwW9oXAlbedbDYhsjlngr7kbwnfwr~zS2VVI1hT1oCfhGltInEGckBngGw_&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA. Accessed 22 October 2020.
- Amadi G & Paul AK 2017. Influence of student-teacher communication on students' academic achievement for effective teaching and learning. *American Journal of Educational Research*, 5(10):1102–1107. <https://doi.org/10.12691/education-5-10-12>
- Clarke JL & Boud D 2018. Refocusing portfolio assessment: Curating for feedback and portrayal. *Innovations in Education and Teaching International*, 55(4):479–486. <https://doi.org/10.1080/14703297.2016.1250664>
- Crisp BR 2007. Is it worth the effort? How feedback influences students' subsequent submission of assessable work. *Assessment & Evaluation in Higher Education*, 32(5):571–581. <https://doi.org/10.1080/02602930601116912>
- Federal Government Educational Institutions (C/G) n.d. Available at <http://www.fgei-cg.gov.pk/>. Accessed 28 October 2020.
- Fluckiger J, Vigil TY, Pasco R & Danielson K 2010. Formative feedback: Involving students as partners in assessment to enhance learning. *College Teaching*, 58(4):136–140. <https://doi.org/10.1080/07567555.2010.484031>
- García Bacete FJ & Remírez JR 2001. Family and personal correlates of academic achievement. *Psychological Reports*, 88(2):533–547. <https://doi.org/10.2466/2Fpr0.2001.88.2.533>
- Grolnick WS, Price CE, Beiswenger KL & Sauck CC 2007. Evaluative pressure in mothers: Effects of situation, maternal and child characteristics on autonomy supportive versus controlling behavior. *Development Psychology*, 43(4):991–1002.
- Hattie J 2009. *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. London, England: Routledge.
- Hattie J & Timperley H 2007. The power of feedback. *Review of Educational Research*, 77(1):81–112. <https://doi.org/10.3102/003465430298487>
- Lee I 2008. Understanding teachers' written feedback practices in Hong Kong secondary classrooms. *Journal of Second Language Writing*, 17(2):69–85. <https://doi.org/10.1016/j.jslw.2007.10.001>
- Lezotte LW & McKee Snyder K 2010. *What effective schools do: Re-envisioning the correlates*. Bloomington, IN: Solution Tree Press.
- McGarrell H & Verbeem J 2007. Motivating revision of drafts through formative feedback. *ELT Journal*, 61(3):228–236. <https://doi.org/10.1093/elt/ccm030>
- Ministry of Labour, Manpower, and Overseas Pakistanis 2014. *Year book 2013-14*. Islamabad, Pakistan: Author. Available at <http://www.cabinet.gov.pk/cabinet/userfiles1/file/NYearBook-2013-2014%20>. Accessed 30 January 2018.
- Ovando MN 1994. Constructive feedback: A key to successful teaching and learning. *International Journal of Educational Management*, 8(6):19–22. <https://doi.org/10.1108/09513549410069185>
- Pollock JE 2012. *Feedback: The hinge that joins teaching and learning*. Thousand Oaks, CA: Corwin Press.
- Qu W & Zhang C 2013. The analysis of summative assessment and formative assessment and their roles in College English assessment system. *Journal of Language Teaching and Research*, 4(2):335–339. <https://doi.org/10.4304/jltr.4.2.335-339>
- Robson S & Wihlborg M 2019. Internationalization of higher education: Impacts, challenges and future possibilities. *European Educational Research Journal*, 18(2):127–134. <https://doi.org/10.1177%2F1474904119834779>
- Santrock JW 2007. *Educational psychology* (2nd ed). New Delhi, India: Tata McGraw-Hill.
- Shields PM & Tajalli H 2006. Intermediate theory: The missing link in successful student scholarship. *Journal of Public Affairs Education*, 12(3):313–334. <https://doi.org/10.1080/15236803.2006.12001438>
- Siewert L 2011. The effects of written teacher feedback on the academic achievement of fifth-grade students with learning challenges. *Preventing School Failure: Alternative Education for Children and Youth*, 55(1):17–27. <https://doi.org/10.1080/10459880903286771>
- Tan FDH, Whipp PR, Gagné M & Van Quaquebeke N 2019. Students' perception of teachers' two-way feedback interaction that impact learning. *Social Psychology of Education*, 22:169–187. <https://doi.org/10.1007/s11218-018-9473-7>
- Truax LM 2018. The impact of teacher language and growth mindset feedback on writing motivation. *Literacy Research and Instruction*, 57(2):135–157. <https://doi.org/10.1080/19388071.2017.1340529>
- Wiggins G 2010. Why we should stop bashing state tests. *Educational Leadership*, 67(6):48–52.
- Wolter KM 2007. *Introduction to variance estimation: Statistics for social and behavioral sciences* (2nd ed). New York, NY: Springer.