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Exams Washback and Academic Achievement in Mathematics: Investigating from Students' Perspective at Secondary School Level

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Abstract

The study was quantitative in nature and aimed to see the sights about washback of the final exams and its effects on students' academic achievements. Washback is about the consequences, influences or impacts of final examinations on learning as well as on the teaching process. Therefore, key objective of this investigation was to sightsee students about important effects caused by final examination on their academic achievements at Azad Jammu and Kashmir. The population as a Target of the investigation was all the learners of Mathematics at secondary school level in district Jhelum Valley. As this was a quantitative study, quantitative data analysis techniques were adopted. Tool in the form of a questionnaire as 35Likert scale items with 8 sub items were used to collect the data. The questionnaire aimed at measuring the students' perceptions regarding Washback of final exams along with its effects on academic achievements in terms affect Resided final exams washback, classroom exams (formative assessment)resided washback, learning strategies resided final exams washback, extra material resided final exams washback, washback techniques resided final exams washback, text book resided final exams washback, curriculum resided final exams washback, time resided final exams washback, Final exams washback as a factor of innovation and some students' factors. The findings of the research revealed that washback of final exams had very strong level of effects on perceptions of Mathematics students. The findings also pointed out that various student-related factors, alongside the domains of the washback, contributed to its increased complexity.

***Keywords*:** Washback, Perceptions, Students and Academic Achievement
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Introduction

In recent educational system of Pakistan both teaching-learning process and exams go side by side and are closely intertwined. They cannot be separated. In literature different terms like assessment, class tests, examinations, evaluations and term are used for exams. These terms are exchangeable. Exams are integral parts of educational teaching learning process. Exams are used to serve multipurpose at secondary level. Exams are considered as device of measuring students' learning and as a tool of management. Different stakeholders used them as tool for measuring learning outcomes of learners and for gaining statistics of learning and teaching progresses (National Education Policy of Pakistan 2017). Wash Back of final exams is the impact of final examination on the teaching and learning process (Wall, 1997). This quantitative nature research aimed to investigate the perceptions of students regarding washback of final exam and its impacts on learners' academic achievements at secondary school level of Mathematics.

An important feature of final examinations is that it affects not only teachers but also learners and other stakeholders like administrators, curriculum developers, and policy makers. They were all experienced by the various impacts of washback of final exams. Final examination washback effects can manifest in two major ways: inside the classroom and also exterior the classroom. The impact of final exams on teaching and learning process is termed as Washback (Hughes, 1989). While the influences or effects of final exams on the stakeholders which are other than the stakeholders of classrooms are termed as impact (Wall, 1997). The Exams impact talk about the various influences produced by an exam on individuals, policymakers and or on other educational components. There are two essential and direct participants inside the classroom who are called learners and teachers who are most immediately affected by the final exams.

Final exams produce not only positive or beneficial impact but also negative or harmful ones. Positive impacts of final exams can enhance and support the teaching-learning process, whereas negative impacts can hinder or weaken it. The final exams washback, therefore, may be mixed as positive or negative, either promoting or slowing down students' academic achievement and outcomes of learning (Bailey, 1996). Consequently, for the enhancement and overall advancement of the educational arrangement, the final exams process should primarily serve to support the process of teaching-learning rather than simply functioning as a mechanism for passing or failing students in the final examination.

Numerous studies relating exams washback has been bring into being in the literature. Moreover, two important types of studies were also found regarding length of time as: cross-sectional researches and longitudinal researches. Also, literature revealed that less numbers of researches were dealings with general education and more numbers of researches were done in field of English education. Generally, washback researches were found to deal with the teaching process but little researches were found to deals with the learner and learning process. This research tries to fill the gap of limited researches of washback of final exams in Pakistan.

Literature Review

Consciousness and awareness of the importance and impact of exams date back to the inception of modern examination systems (Latham, 1877). Literature review indicates that Kellaghan, Madaus & Airasian, (1982) were among the first researchers to systematically investigate this phenomenon, using the term "the effects of standardized testing". A series of researches on the impacts of final exams in education began around 1990s (Cheng, 2008). An important contribution was the article, titled *"Does Washback Exist?"*, which acted as a catalyst in this field. The Washback states about the impact of final exams on teaching-learning (as mentioned in Sumera, Barua and Navamoney, 2015). Also another word "backwash" was used for widespread impacts of exams on teaching-learning (Hughes, 1989).Exams are often referred to as high-stakes because the critical decisions are made based on exams results, which directly affect various stakeholders, particularly the test-takers (Madaus, 1985).Exams conducted inside the classroom are often stated as "low-stakes" exams and are a common form of assessment in educational settings (Linn, 1992).Final exams impact is among six qualities of exams. Whereas, washback is a subdivision of exams' impact, affecting individuals, or influencing on the whole(Bachman and Palmer, 1996).

Positive or Favourable, Negative or Unfavourable and Mixed Washback

Hsu, (2009), seen washback with positive effects as changes in examinations bring positive or beneficial changing in teaching and learning process. In an important research Ahmad and Rao (2012) pointed out the negative washback from Pakistani context as "the students learn only to pass the final examination". Alderson and Wall

(1993: 17) stated that "tests can be powerful determiners both positively and negatively of what happens in the classroom".

Washback models

The Model presented by Alderson and Wall (1993), along with important suggestions proposed by Hughes (1993), served as a foundational basis for subsequent researchers looking for to develop washback models that clarify the mechanisms underlying the phenomenon. Bailey (1996) proposed a washback model (Appendix A) which did not provide an empirical foundation. Cheng (2008) proposed a washback model on empirical evidence. Her model comprised of three key constituents: **participants**, **process**, and **product**. Model (Appendix B) proposed by Shih (2009) were on empirical background. This model deal with the effects of final exams washback on students learning with three foremost factors: as intrinsic factors, extrinsic factors, and test factors.

Some Students Factors in exams washback

Cheng and Curtis 2004, clearly defined various students factors as: "test factors, prestige factors, personal factors, micro-context factors and macro-context factors", afford the investigators several other means to investigate the final exams washback.

Key Washback Studies: Methodologies And Results

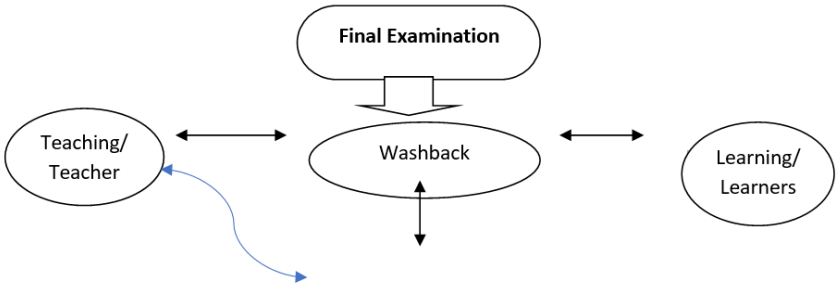
Researchers used survey methods, interview techniques, self-reports, classroom observations and document analysis. There were some researchers who used experimental methods to deal with washback. Also, cross-sectional studies and longitudinal studies were found. Study by Sabio, et el. (2015) on "Backwash Effects of testing on Learning Mathematics" deals with the effects of Washback on learning of Mathematics. Participants were 1159 students of 8 private and public secondary schools in province Calabarzon. Washback effects of before, during and after the periodical examination were determined. Survey questionnaire was used to collect data. "Content related, method related, affect related, test related, faith related and social related" positive and negative washback were found on students learning Mathematics. Study on implication of new national standard-based assessment system with functions as assessment for learning and assessment of learning in New Zealand about mechanism of washback of NCEA (National certificates of Education Achievement) on teaching and learning by Satomi Mizutani (2009), composed of three quantitative researches. Study first was from teachers' point of views, study second was from students point of views and in the study third the role

of contextual factors and beliefs were determined. First study identified both positive and negative beliefs of teachers about washback. Seven positive beliefs were as: "focus teaching and learning, self-directed learning, lower achiever students becoming more confident, motivation of students, fairness, more communicative approach and leaving out what is not assessed". Whereas five negative beliefs or washback effects were as: confusion, anxiety among students, heavy work load on teachers, teat over load and Japanese losing out on students.

Second study identified five positive beliefs and washback effects as: "focused teaching and learning, self-directed learning, lower achiever learners become more achievers, motivation among students and satisfaction" with NCEA. Whereas five negative beliefs and wash back effects were as: "confusion, anxiety among students, demonization, dissatisfaction with NCEA and focusing on collecting credits". Six contextual factors were identified in study three as: "subject, desire ranking of school, length of teaching career (only teachers), student's expectation of achievement (only students) and first language (only students) were studied. The study of Watanabe (2013) dealing with the effects of achievement test. Watanabe (2013) looked the validation and macro level effects of the Centre test for university admission. The national Centre for university entrance examinations system designed and produced the tests consisting of writing, listening and other skills. |The Centre test at the University had positive washback on the teaching and learning materials. Therefore, researchers adopted four types of instruments namely: Mathematics Content Completion Inventory, Teaching Depth Rating Scale, Classroom Observation Checklist and Mathematics Learning Task to collect data from 1719 students and 53 teachers of Mathematics. Washback of exams distorts the process of teaching, not allowed them to use active teaching methods (Sama, Adegbuyi & Ani, 2021).

Figure 1

A Conceptual Framework of the Study prepared by Researcher from Literature Review, Tayyeb, Aziz, Ismail, & Khan, (2014).



Affect Resided final exams Washback
Classroom Exams Resided final exams Washback
Learning Strategies Resided final exams Washback
Extra Material Resided final exams Washback
Washback Techniques Resided final exams Washback
Textbook Resided final exams Washback
Curriculum Resided final exams Washback
Time Resided final exams Washback
final exams Washback as a Factor of Innovation
Students Factors
Others

Objectives of the |Study

This investigation study set out to find out how the students are affected by the final exams washback. In particular, the research aimed:

1. To explore the perceptions of students regarding final exams Washback.
2. To explore the perceptions of students regarding final exams, Washback and its impact on low academic achievers.
3. To explore the perceptions of students regarding final exams Washback and its impacts on high academic Achievers.

Research Questions

Following research questions were formulated for this study.

1. What are the perceptions of students regarding final exams Washback?

2. What are the perceptions of students regarding final exams Washback and its impacts on low academic achievers?
3. What are the perceptions of students regarding final exams Washback and its impact on high academic Achievers?

Research methodology

This survey study was quantitative in nature. All students of Mathematics at secondary level, both in Government and private sector institutions from three Tehsils of District Jhelum Valley AJ&K constituted the population from which samples were drawn for this survey study. For convenience Mathematics students of grade 10 were taken. Numbers of students in each cluster were estimated as 1120, 230 and 150 respectively. Total 562 students were selected. The beginning of five Point Likert Scale questionnaire as instrument, important information is taken from the participants as: age, gender, marks in previous exams. Questionnaire was developed and translated into Urdu with the help of linguists. Collected data was analyzed with the help of SPSS software. Percentage %, arithmetic means, and t-value were calculated.

- Simple mean and percentage values were used to give answers to the first part of the Research Questions. Also range and perception means were calculated.
- The p-value values were used to give answers to the second parts of the Research Questions.

Research Instrument

After a deep study of related literature of washback, constructs for each domain mentioned in the framework are defined. Constructs are defined such that each construct covers all the aspects of that domain in the framework. A five Points Likert Scale in the form of questionnaire was developed and translated into Urdu with the help of linguists.

Validity and reliability of the instruments

To validity the questionnaire, opinions of the five educational experts from AIOU Islamabad were added to improve it. Questionnaires were improved in the light of suggestion given by the experts. Content validity index were found with the help of statistical experts. Also, pilot testing was conducted by the researcher before administrating the questionnaires to the participants of sample. There were 70 items of the questionnaire about washback study. To 70 students studying

Mathematics at grad 10 and to 10 teachers teaching Mathematics at grade 9 were the participants of pilot testing. Reliability co-efficient (Cronbach's Alpha) values were calculated before piloting of the instruments as .787 for questionnaire. After reviewing the items one by one, several items were found to be weak: in terms of Reliability Principal Components Analysis (PCA). After deep observation, the researcher formed the modified versions of questionnaires. Reliability co-efficient (Cronbach Alpha) numeric values were calculated after piloting of the instruments as .873 for questionnaire. All the items of five Point Likert Scale were constructed.

Results

Total 56.6 % of student participants were male and 43.1% were female.

Research Question: What are the perceptions of students regarding final exams Washback

For <60% or in case of means <3 the final exams washback was called as strong washback. For ≥60% and < 80% or in case of means ≥3 and < 4was called very strong washback and for ≥to 80% or in case of means ≥to 4 was called very strong washback.

Table 1
Analysis of Affect Resided Washback

Statements	Disagree %	Agree %	Mean
1. Learners feel stress due to the annual Mathematics examinations.	15.5	78.5	3.81
2 A. Learners' worry level increases due to the horror of weak results in the annual exams.	8.2	84	4.06
2 B. Mathematics Teachers act in a different way due to the fear of poor results in the annual exams.	19.4	71	3.76
3. Annual exams' stress makes the learners use rote memorization of course contents.	14.4	73.3	3.78
4. Due to the fear the learners plan to practice unfair means like cheating in the annual exams,	34.5	42	2.83

5. Achieving getting reward in annual exams of Mathematics has pleasurable effects on learners.	5.2	84.4	4.29
6. Mathematics annual exams is challenging for learners in a positive manner.	6.9	77	3.88
7. Want of annual exams of Mathematics urges the learners to learn each and every thing.	6.4	83.2	4.09

n= 562 Mean=3.81

Statements 1, 2, 3 and 4 showed the negative or harmful effects of washback. Very strong, strong and very strong negative washback in the form of pressure, increase in anxiety level, change in teachers' behavior, use of rote memorization and use of unfair means like cheating in exams were found. Statements 5, 6 and 7 Showed positive or pleasant affect resided washback. Very strong, strong and very strong positive washback existed in the form of competition for getting award, challenge of exams and desire of learning each and very thing of Mathematics. Very strong Affect Resided Washback was influenced by students.

Table 2
Analysis of Classroom Exams Resided Washback

Statements	Disagree %	Agree %	Mean
8. During the classroom tests, Teacher asks questions that are important for annual exams of Mathematics.	8.6	80.6	4.04
9. In Classroom paper practice of Mathematics make the learners aware with the question's types of annual exams paper.	12.2	55.1	3.88

n= 562 Mean=3.96

Classroom Exams Resided Washback existed in the form of asking annual exams related important questions by the teacher and students' familiarity of question types of annual exams due to the papers practice in classroom exams. Very strong Classroom Exams Resided Washback was influenced by students.

Table 3
Analysis of Learning Strategies Resided Washback

Statements	Disagree %	Agree %	Mean
10. Learners adopt the learning strategies that confirm their better results in annual exams in Mathematics.	4.6	88.8	4.34
11. According to the annual exams pattern papers, I study selective texts for Mathematics annual exams.	17.1	70.6	3.74
12. Group study strategy with classmates supports learners to prepare for annual examination.	15.9	76.3	3.88
13. Alone study strategy supports learners to prepare for annual papers of Mathematics.	20.1	64.8	3.69

n= 562 Mean=3.91

Very strong negative, very strong negative, very strong positive and very strong positively learning strategies resided with washback existed in the form of adopting those learning strategies that confirm better results in the annual exams, study selective texts, group studies and also study alone respectively. Very strong Learning Strategies Resided Washback was influenced by learners.

Table 4
Analysis of Extra Material Resided Washback

Statements	Disagree %	Agree %	Mean
14. Learners work on the earlier annual exams' papers during classroom exams of Mathematics.	13	67.7	3.76
15. Mathematics teacher endorses learners to study from additional assisting material for annual examination.	18.5	71.3	3.83

n= 562 Mean=3.79

Very strong mixed negative and positive extra material resided washback exited in the form of learners work on earlier annual exams papers and math's teachers' endorsements for study additional assisting material for annual examination. Very strong Extra Material Resided Washback was experienced by students.

Table 5
Analysis of Washback Techniques Resided Washback

Statements	Disagree %	Agree %	Mean
16. Math's teachers provide guidelines to the learners about attempting the annual exams of Mathematics.	4.6%	90%	4.37
17. Math's teachers propose strategies for achievement in the annual examination of Mathematics.	3.3	91.8	4.33

n= 562 Mean=4.35

Very strong mixed positive and negative (It is negative if teachers ignore other aspects of real learning) and very strong negative washback existed in the form of teacher's guidelines about attempting the annual exams papers and proposals for attainment in annual exams of Mathematics. Also, very strong Washback Techniques Resided Washback was experienced by the students.

Table 6
Analysis of Textbook Resided Washback

Statements	**Disagree** %	**Agree %**	**Mean**
18. Learners skip insignificant areas from the textbook, according to the Mathematics annual papers' point of view.	37	46	3.14
19. Learners concentrate on essential questions only near the annual examination of Mathematics.	31	56.8	3.34

n= 562 Mean=3.24

Strong negative washback and Strong mixed positive and negative washback (It is negative if teachers ignore other aspects of real learning)

existed in the form that learners skipped insignificant topic of the textbook and focused only on important topics near final examination. Very strong Textbook resided washback was experienced by the students.

Table 7
Analysis of Curriculum Resided Washback

Statements	Disagree %	Agree %	Means
20. Inspiration of annual Maths exams does not permit the learners to cover whole learning outcomes of curriculum.	35.1	39.9	3.07
21. Immediate aim of learning is to gain high marks in annual exams of Mathematics.	22.2	65.8	3.67

n= 562 Mean=3.87

Negative washback and Strong negative washback existed in the form that inspiration of annual Maths exams does not permit learners to insurance all learning outcomes and learner's immediate goal of learning Mathematics is to gain high marks in annual exams. Strong Curriculum resided washback was experienced by the students.

Table 8
Analysis of Time Resided Washback

Statements	Disagree %	Agree %	Means
22 A. Teachers are found superfluous regular near the Mathematics annual exams' period.	8.5	86.7	4.23
22 B. Learners are found superfluous regular near the Mathematics annual examination.	5.5	90.3	4.37
23. Annual Mathematics exams assured learners to superfluous organize their schoolwork moments.	7.7	87.2	4.32

n= 1520 Mean=4.31

Very strong positive washback was found in each three statements: due to the superfluous regularity of teachers, due to learners superfluous

regulatory near annual exams and superfluous organization of study moments by learners of Mathematics. Very strong positive Time Resided washback was found.

Table 9
Analysis of Washback as a Factor of Innovation

Statements	Disagree %	Agree %	Means
24. For the superior preparation of annual Mathematics exams, learners use more notes prepared by their teachers and companions for learning.	6.8	82.3	4.08

n= 562 Mean=4.08

Very strong positive innovative effect, in form as learners use more notes prepared by their teachers and companions for learning Mathematics, was experienced. Very strong Innovative Washback was experienced by the learners.

Table 10
Analysis of Students Factors

Statements	Disagree %	Agree %	Mean
25. Owing to the weak learning contextual of Maths, learners cannot achieve better in annual exams of the Mathematics.	23.8	55.1	3.41

n= 562 Mean=3.41

Strong evidence of student's contextual factor was found as Owing to the weak learning contextual of Maths, learners cannot achieve better in annual exams of Mathematics. Strong evidence of Washback factor was found.

Overall Comparison

Table 11
Analysis of Students Perceptions about washback

Numbers of students	Perceptions Mean
562	3.93

n= 562

Results showed that there were found very strong impacts of final exams washback. The perception level and mean values (87052.2 and 3.93) were sources of verification of very strong impacts of final exams washback.

Based on data collected from survey questionnaire of Grade 10 Mathematics learners, the following findings were drawn:

- Students—regardless of prior final exams, low or high scores—experienced very strong positive or negative Affect Resided Washback from final exams.
- A very strong Classroom Exam Resided Washback was influenced and both negative, positive and mixed, was observed. All students with low or high previous scores were equally affected.
- Students showed very strong positive and negative Learning Strategies Resided Washback influencing them in structure their learning, regardless of their low or high scores.
- Very strong Extra Material Resided Washback with type mixed was influenced by all students.
- Very strong Washback Techniques Resided Washback with two types negative and mixed (positive and negative) was influenced by the students regardless of their low or high marks.
- Very strong Textbook Resided Washback with two types negative and mixed (positive and negative) was influenced by the students with low or high marks in their previous exams.
- Strong Curriculum Resided Washback with type negative was influenced by the low or high achievers students.
- Very strong positive Time Resided Washback was influenced by both types of students.
- Very strong, with type as positive, final exams Washback as a Factor of Innovation was influenced by the students regardless of their low or high scores.
- Students Factor with very strong evidence was influenced by all the students with low or high marks.
- Overall perception level and mean values showed very strong impacts of final exams washback on students.
- Final exams washback affected low and high achievers equally. The p-value revealed no significant difference between the low achievers and high achievers students.

Discussion

The inspiration for this research arose from the researcher's decade-long teaching learning experience as a secondary school teacher. Informal interviews with newly admitted students revealed that most had involved in unfair means during their Grade 8 Mathematics examinations, including many high achievers. This highlighted the powerful role of final examinations as high-stakes assessments, which significantly shape teaching and learning practices (Qi, 2005). Findings from the study show that final examinations produced strong, very strong, and very strong washback effects across multiple constructs. Affect-related washback was particularly intense, with students experiencing pressure, anxiety, fear of failure, and reliance on rote memorization. Teachers also faced pressure to complete the syllabus quickly and improve students' scores. At the same time, some positive affective washback emerged, such as motivation through competition and exam challenges. These results are consistent with Sabio, Balagtas and David (2015), who describe affective washback as influencing students' emotions, attitudes, and values. Classroom examination practices showed very strong negative and mixed washback, as teachers focused primarily on questions expected in final exams. Learning Strategies Resided Washback also revealed very strong negative effects, with students adopting selective study strategies, although some positive strategies like group learning and individualized help were evident. Cheng, Watanabe and Curtis (2004) explained that this is the only use of tests that shapes learning, not the tests themselves. Extra Material and Washback Techniques demonstrated strong mixed and negative washback, with heavy dependence on past papers and exam-oriented materials, supporting Shah (2006).Textbook and Curriculum Resided Washback indicated narrowed study focus and skipping of non-exam topics, reflecting Cheng (1999) and Ching (2009), who found similar exam-driven instructional adjustments. Positive Time Resided Washback appeared as students became more disciplined and regular near exam periods, aligning with Shohamy et al. (1996). Positive innovation-related washback also emerged, as exams encouraged new methods of teaching and learning, echoing (Abdulhamid,2019).

Across all constructs, the t-test results revealed no significant differences between low and high achievers, indicating that final examinations exert equally strong washback on all students. Overall, the study concluded that washback from final exams is widespread, powerful, and influences all aspects of teaching-learning.

Conclusions

The results of the study revealed that the final Mathematics examination exerted a very strong washback effect across all domains, including affective responses, classroom practices, learning strategies, use of extra materials, textbook engagement, curriculum coverage, time management, and innovative learning approaches. Students consistently reported high levels of pressure, exam-oriented study behaviors, selective use of textbooks, dependence on past papers, and increased regularity and discipline as exams approached. Teachers' instructional techniques and exam-related guidance also contributed to very strong or very strong washback, shaping how students prepared for the subject throughout the academic year.

Overall mean scores confirmed that students perceived the washback of final exams as highly influential and deeply embedded in their learning processes. Importantly, statistical results showed no significant difference between low and high achievers, indicating that washback affected all students equally, regardless of their previous performance. This demonstrates that high-stakes examinations create a uniform pattern of behavior, motivation, and learning adjustments among secondary school students.

Recommendations

Research recommendations are as follows:

Utilize the strong positive washback effects to improve teaching and learning while minimizing negative influences through greater awareness among students, teachers, administrators, and curriculum designers. Training programs, workshops, and the inclusion of washback concepts in teacher education should be prioritized to help educators understand and apply effective washback techniques. Examination authorities should take steps to enhance fairness in the assessment system to reduce harmful washback. Future research should explore inter-washback perspectives, contextual student factors, and conduct experimental or observational studies to better understand the relationship between washback and academic achievement, including its effects on average performers.

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