

Comparative Analysis of Rote Learning on High and Low Achievers in Graduate and Undergraduate Programs

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Abstract

A survey was conducted to study the preferred learning strategies; that is, surface learning or deep learning of undergraduate and graduate male and female students and the impact of the preferred strategy on their academic performance. Both learning strategies help university students to get good scores in their examinations to meet the demands of industry in workforce. Quantitative research method was used to determine the impact of learning strategy on academic achievements. The R-SPQ2F questionnaire was sent to 103 students through Google forms and hard copies through snowball sampling technique. The results show that rote learning and academic performance are inversely related to each other. In high achievers, deep learning is significant as compared to low achievers. Furthermore, comparative analysis of learning styles on males and females showed that both preferred deep learning strategy equally. Learning strategy is not related to education level of students because there is no difference among preferred learning strategies of graduate and undergraduate students.

Keywords: academic performance, deep learning, rote learning, surface learning

Introduction

The approaches to learning play a significant role in determining the outcomes of educational endeavors (Hasnoor, Ahmad, & Nordin, 2013). There are three essential elements that influence learning of students: (a) students, (b) course, and (c) teaching strategies (Mayya, Rao, & Ramnarayana, 2004). Each of the elements has an impact on students' adopted approach to learning (Hasnoor, Ahmad, & Nordin, 2013). Teaching and course produce a variety of environments for students and to cope with pressure they adopt learning strategy according to the situation (Hasnoor, Ahmad, & Nordin, 2013). There are many factors that promote surface learning strategy among students. These include assessments, process of rewarding, teaching, work overload, reproduction of content knowledge as well as student perceptions about the relevance of the content (Hasnoor, Ahmad, & Nordin, 2013).

Researchers have shown interest in students' learning approaches, how they learn and why they chose a particular approach for learning. According to a study of Marton and Saljo (1976), there are generally two strategies of learning: surface learning approach and deep learning approach. Surface approach is memorizing information without understanding the deeper knowledge, also known as rote learning; whereas in deep approach, the students involve themselves in the study process to grasp the deeper understanding of the content (Duff, Boyle, Dunleavy, & Ferguson, 2003).

Marton and Saljo (1970) proposed the idea of student approach to learning, which then becomes part of student approaches to learning concepts (Hasnoor, Ahmad, & Nordin, 2013) this learning approach is a vital and essential element as it helps students to get good scores in their examinations. Students' learning approaches have a significant impact on the quality of learning and academic achievements. To make students better graduates they should be encouraged to develop deeper research strategies (Hasnoor, Ahmad, & Nordin, 2013).

In Pakistan, teaching in most cases is teacher centered where students are passive learners and their main role is to memorize the content accurately; what the teachers present in their lectures is assessed on the basis of knowledge reproduction because credit is given on the foundation of correct recall of information in exams (Safdar, 2013). Rote learning is the only mode to assess students in SSC (Secondary School Certificate) and HSC (Higher Secondary Certificate) examination (Christie & Afzaal, 2005) and this approach continues when they move towards tertiary education. The ways of students' learning play a crucial role in determining the outcomes of any education. Courses and teaching practices produce a variety of learning environments for students and due to these pressures students adopt different approaches of learning (Mayya, Rao, & Ramnarayana, 2004).

Contrary to surface learning approach, deep approach is considered as the desired approach in tertiary education (Duff & Anguss, 2015). Students who get involved in deep approach are more successful in academics as compared to those involved in surface approach (Mayya, Rao, & Ramnarayana, 2004). Previous

researches have stressed on the importance of deep learning for the academic performance as well as students' learning approaches; therefore, educational context should promote deeper learning approach (Hamm & Robertson, 2010).

Traditional learning styles and minimal use of modern assessments are some of the key factors contributing towards low quality of education in Pakistan (Christie & Afzaal, 2005). According to the National Research Council (2002), education is divided into three categories in Pakistan: elementary education, secondary education and higher education. Rote learning is a well-practiced approach at all educational level, where education and assessments emphasize on memorization of content rather than comprehension and application of content in real life events. Due to globalization there is an increased demand of emerging skills and accelerating growth of knowledge which has resulted in a significant increase in the necessity of 21st century skills. Due to preference of rote learning, development of critical thinking skills, lifelong learning skills, problem solving skills and creativity skills are getting undermined.

Although memorization skills are declining in west, the education system in Pakistan continues to push rote learning technique in its pedagogy. This is 21st century and the needs and skills of the century include deeper understanding of content through experiential learning and inquiry based learning. Besides rote memorization of content, deep learning skills should be developed in students to help them to become lifelong learners, but the prevailing education system only fosters rote memorization ability in the students at all levels of education (Christie & Afzaal, 2005;

Hasnain & Bhamani, 2014). Although rote memorization of content is essential and vital in early grades of childhood and probably in certain specific disciplines, yet academic performance is inversely related to surface approach at the tertiary level (Hasnoor, Ahmad & Nordin, 2013).

The main objective of conducting this research was to study the preference of surface and deep learning styles of undergraduate and graduate male and female students and the impact of the preferred learning style on their academic performance. Thus three hypotheses were derived for this study:

1. Rote learning is significant in high achievers as compared to low achievers.
2. Rote learning is significant in undergraduate and graduate students.
3. Rote learning is significant in female and male students.

Literature review

Learning can be defined as the process of acquisition of knowledge (Meyer, 2002). There are different approaches adopted by students during learning in which student approach learning process plays a vital role in education (Subasinghe & Wanniaichchi, 2003). The two important goals of education are retention of knowledge and transfer of knowledge. Retention is the remembrance of knowledge by the learner; whereas, transfer involves students' ability to impart that knowledge effectively (Meyer, 2002). According to Biggs (1987), there are two elements involved in student's relationship to learning: One is learning motive and the other is environmental

influence. Therefore, the overall learning strategy depends upon motivation and the context of teaching and learning. Knowledge acquisition emphasizes upon one kind of cognitive processing that is known as rote learning (Meyer, 2002), which is achieved through repetition and rehearsal of content for the promotion of academic success (Morton, 2011). Nevertheless, there is a negative connotation attached to rote learning. Sinhaneti and Kyaw, (2012) are of the view that although rote learning is considered as negative, yet it is an effective way to get knowledge and is also a cultural preference such that Burmese learners particularly use rote learning for accuracy in exams.

Rote learning does not have to be meaningless repetition and may help in deeper understanding as well as in accuracy of knowledge (Sinhaneti & Kyaw, 2012). Even though the western world looks at rote learning negatively as they believe that it leaves no room for understanding; but, in eastern philosophy it is regarded as an essential tool to support deeper understanding because it would develop students' critical thinking skills (Sinhaneti & Kyaw, 2012).

There are two types of motivation that lead to the approaches of learning: extrinsic motivation and intrinsic motivation (Draper, 2013). Fransson (1977) studied both types of motivation with relation to achievement. He took two groups of students from first year studying in education department, where one group was interested in reading the given text and the other group was not interested in reading the given text. He further divided these groups into sub groups. One group was told to present the information; whereas, other group was not told to present the information. Fransson (1977) identified that those students who were told to

present the information and were not interested in the text, moved towards surface approach; whereas, those students who were not told to present information, but were interested in the text were more intrinsically motivated and adopted deep approach.

Even though the students use surface approach as a shortcut, yet due to inefficiency of surface approach it takes a longer duration to prepare for assessments as compared to deep approach (Kember, Jamieson, Pomfret, & Wong, 1995). There are three stages of learning: input, process and output. Input involves curriculum, processing includes information process of content and output is the measure of performance (Biggs, 1989). In examinations, those students who are involved in deep learning strategy are more successful in comparison to those who are involved in surface learning strategy (Mayya, Rao, & Ramnarayana, 2004). According to previous studies, learning strategies and success in educational programs are related to each other (Duckwall, Arnold, & Hayes, 1991) and there is an inverse relation between academic performance and surface approach (Mayya, Rao, & Ramnarayana, 2004). According to results of a study conducted in Belgium on students of education and psychology courses, students who used surface approach to learning in their pre-university setting did not change their learning strategy from surface to deep approach. Whereas, it was found that in Malaysian universities, deep learning approach is prevalent among students (Hasnoor, Ahmad, & Nordin, 2013).

Furthermore there is inverse relationship between surface approach and academic achievements of university students (Hasnoor, Ahmad, & Nordin, 2013). According to Cano, 2007 (as cited in Hasnoor, Ahmad, & Nordin, 2013), learning strategies and

their intelligence together predict the academic achievement of the students. Trigwell and Prosser (1991), Minbashian et al, 2004 (as cited in Hasnoor, Ahmad, & Nordin, 2013) opine that deep approach in learning does not lead to higher grades in assessments, but it results in a high quality of learning. Despite all the scientifically proved evidences about the superiority of deep learning strategy, at some instances surface learning approach is necessary for the students. According to Atherton (2011), memorization of content is an essential element before the mastery of subject in some courses at tertiary level like medicine and law (Draper, 2013).

Moreover, studies conducted on gender and preferred approaches show different results, for example, in one research male students scored higher on surface approach as compared to females; whereas, another research on accounting students showed that female students scored higher than males in surface approach (Veloo, Hariharan, & Harun, 2015). There are also studies that suggest that male students prefer deep approach as compared to female students (Ahmed, Ahmed, Waheed, Shoaib, & Khan, 2014; Lie & Angelique, 2007). The reason for this diversity may be explained through the meta-analysis conducted by Severiens and Dam, (1994) that consisted of 26 studies upon surface and deep approach. The results of meta-analysis showed that the female students learnt for the sake of learning by reproducing surface approach; whereas, male students more often used deep approach.

According to Asikainin, (2014 as cited in Dolmens, 2015), for successful learning at tertiary education level, students should be involved in deep learning strategy. Students approach to learning depends upon the type of assessment, teaching learning strategy and

course expectations (Donnison & Edwards, 2012). Previous studies have shown that students' approach to learning varies significantly and these approaches have significant impact on the performance of students at tertiary level. This study examines the impact of rote learning on academic performance at tertiary level as well as students' preferences to surface learning approach.

Methodology

This study followed a causal research approach, which tends to reveal cause and effect relationship of variables. The main purpose of causal research is to identify the variable that is the cause and its effects on other variables. In this study, surface learning approach effectiveness was compared with the effectiveness of deep learning approach.

Research tool

The data were collected through a revised two-factor Study Process Questionnaire (R-SPQ2F), developed by Biggs (2011) consisting of two factor study process. A demographic section was added to the revised questionnaire. The questionnaire had 20 statements and it was ensured that all the statements met the objectives of the study. Out of 20 statements, two constructs were formed to assess the approach of learning in students. The constructs consist of surface strategy and deep strategy. The questionnaire (R-SPQ2F) was sent to students of undergraduate and graduate programs in two private universities of Karachi to determine the preference of students' learning.

Sample

The sampling technique was non probabilistic because the population was unknown. In this study, only undergraduate and graduate students were considered. The sample was collected through Google forms and hard copies using snowball sampling technique. The sample size consisted of 103 students, out of which 71 were female and 32 were male students. The students of undergraduate program were from BBA and BS discipline; whereas, graduate students were from MBA discipline. Students' performance was assessed through their cumulative GPA.

Variables

Rote memorization was considered as independent variable; whereas, academic performance, gender and level of education were considered as dependent variables because the aim of the study was to determine the impact of learning approaches on students' academic achievement, gender and educational level.

Model and data analysis

In this study, Likert scale, which is a psychometric scale and is commonly used in quantitative questionnaires, was used to investigate the hypotheses. To determine the impact of rote learning on academic performance, regression model was used; whereas, to determine the prevalent learning approaches in female and male undergraduates and graduates, paired sample t-test was used. SPSS version 24 was used to analyze the data.

Results

Hypothesis 1: Rote learning is significant in high achievers as compared to low achievers.

Regression model was used to determine the impact of surface and deep learning on the academic performance of the students.

Table 1

Impact of deep and surface learning on academic achievement

CGPA*		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
2=<GPA<2.5	Intercept	-0.445	3.653	0.015	1	0.903			
	Surface learning	1.138	0.879	1.674	1	0.196	3.12	0.557	17.485
	Deep learning	1.722	0.787	4.786	1	0.029	0.179	0.038	0.836
2.5=<GPA<3	Intercept	-0.615	1.988	0.096	1	0.757			
	Surface learning	0.165	0.447	0.136	1	0.712	1.179	0.491	2.83
	Deep learning	-0.212	0.406	0.273	1	0.601	0.809	0.365	1.792
3=<GPA<3.5	Intercept	1.309	1.388	0.889	1	0.346			
	Surface learning	0.047	0.313	0.022	1	0.881	1.048	0.568	1.934
	Deep learning	-0.297	0.285	1.091	1	0.296	0.743	0.425	1.298

The reference category is: GPA=>3.5.

The results show that those who achieve high CGPA (greater than 3.5) are more towards deep learning; whereas, those with low CGPA are more towards surface approach. This signifies that meaningful learning helps students in better understanding and retention of material. Therefore, hypothesis 1 is rejected.

Hypothesis 2: Rote learning is significant in undergraduate and graduate students.

Paired sample t-test was performed on preferred learning approaches of students with respect to their education level as shown in Table 2.

Table 2

Learning approaches of students with respect to their education level

Education		Mean	N	Std. Deviation	Std. Error Mean	Sig	Correlation
Undergraduate	Pair 1 Surface learning	2.912	86	0.754	0.081	0.628	-0.053
	Deep learning	3.413	86	0.776	0.084		
Graduate	Pair 1 Surface learning	2.688	17	0.504	0.122	0.256	-0.292
	Deep learning	3.512	17	0.991	0.240		

The mean value of deep approach in both undergraduate and graduate students is similar, which reflects that all students prefer deep approach. The sig value of graduate and undergraduate students is insignificant, but at undergraduate level, students correlation is stronger as compared to graduate students.

Hypothesis 3: Rote learning is significant in female and male students.

To determine the extent of rote learning strategy in female and male students, paired sample t- test was performed as shown in Table 3.

Table 3*Gender-wise significance of rote learning*

Gender			Mean	N	Std. Deviation	Std. Error Mean	Sig	correlation
Female	Pair 1	Surface learning	2.897	71	0.694	0.082	0.613	0.061
		Deep learning	3.435	71	0.843	0.1		
Male	Pair 1	Surface learning	2.825	32	0.789	0.140	0.015	-0.427
		Deep learning	3.416	32	0.747	0.132		

The mean value of deep learning approach in female and male students is similar. Both female and male students prefer deep learning strategy. The previous notion which says that females are rote learners is proved incorrect in this study; therefore, hypothesis 3 is rejected. Both male and female students scored high in deep learning strategy.

Discussion

Firstly, the results of this study support the research findings of other studies that students who get involved in deep approach are more successful in academics as compared to those who are involved in surface approach (Mayya, Rao, & Ramnarayana, 2004). The results of present study are congruent with a study conducted by Mayya, Rao and Ramnarayana (2004), which showed that the students who adopted deep approach have CGPA greater than 3.5. Their second study identified the learning approaches and learning difficulties of physiotherapy students of bachelor program by administering approaches to learning inventory on a sample of 233 students. Spearman's correlation showed significant negative correlation of academic performance with surface learning approach.

Students prefer deep learning approach as compared to surface learning approach and those students who adopt surface learning approach have low CGPA as compared to high achievers, who adopt deep learning approach. Deep learning approach has a significant relationship with high academic achievement in grades. These findings oppose the findings of Trigwell and Prosser (1991), according to which deep learning approach does not lead to higher grades in academics, but it does lead to high quality of learning.

Severiens and Dam (2004) performed a meta-analysis on 262 studies on gender and education. Men were more interested in the courses for the sake of qualification; whereas, females learnt for the sake of learning. They mostly used surface approach; whereas, male more often used deep approach. The results of this study show that deep learning is the more adoptable strategy among male and female students. Both males and females students tend to lean towards deep learning strategy; therefore, the notion that females are rote learners holds no significance.

The results of current study show that students' prefer deep learning strategy at all levels of education, whether they belong to undergraduate level or graduate level. Hence, level of education has no impact on preferred learning style of the students. According to Ramsden (2004), the purpose of higher education is basically to foster deep learning in students. Draper (2013) states that despite the superiority of deep learning strategy, surface learning cannot be ignored at tertiary level in some disciplines like law and medicine, where surface learning to some extent is the key element to master the subject.

From the above discussion we can conclude that although deep learning is essential to some extent, surface learning has a key role in the mastery of subject because rote learning does not need to be meaningless repetition of content. The role of rote learning in Burmese EFL(English as Foreign Language)course indicated that rote learning is a useful strategy in the learning of second language vocabulary, but at times the learners relate content with meaning as well (Sinhaneti & Kyaw, 2012). Hence, rote memorization does not have to be a meaningless repetition of words (Sinhaneti & Kyaw, 2012). Nonetheless, rote learning helps students to become lifelong learners by motivating them through assessments on which they can score well in early years of higher education (Donnison & Edwards, 2012).

Students at tertiary level adopt deep learning strategy in all disciplines. Furthermore, learning strategies have significant impact on academic achievements of students. Deep learning strategy is related to high academic achievement; whereas, surface leaning strategy is related to low academic achievement in relation to high achievers. Deep learning strategy is favored by all students. Females are not the reproducer of content and knowledge, but they also relate their knowledge with their life experiences to make it meaningful.

Conclusion

This study investigated the preference of undergraduate and graduate students towards different learning approaches and the impacts of surface learning approach (rote learning) on their academics. The study suggests that deep learning strategy is a useful strategy and academic performance is highly dependent upon

this strategy. High achievers and low achievers both prefer deep learning strategy; therefore, teachers should promote deep learning strategy in their lectures to enhance the academic performance of students at all levels. In addition, deep strategy is not the prevalent approach in male students only, but it is also a common strategy in females too which; therefore, rejects the notion that females are rote learners. Despite all the scientifically proved evidences about the superiority of deep learning strategy, at some instances surface learning approach is necessary for the students. Surface learning does not need to be rote memorization of content, but it could help in deep understanding of content too.

This study shows the preferred learning approach of students at tertiary level. The findings suggest that teachers should promote deep learning in their pedagogy to meet the needs of students and society from primary to tertiary level. Proper training sessions should be organized to train teachers in identifying students learning styles and to embed deep learning strategies in them. Students should be encouraged to use their cognitive skills more to develop deep learning abilities. Future research should be conducted in other disciplines to determine whether learning approaches vary or not.

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