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Technology Integration in Education: Source of Intrinsic Motivation, Self-Efficacy and Performance

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Abstract

The research study is designed to investigate the effectiveness of a blended learning program through experimental setup, where 82 (45control sample and 37 experimental sample) students participated in the research activity. The researcher designed and applied blended learning program to enhance students' motivation towards achievements in the syllabus of O-levels Chemistry subject. Hypothesis testing achieved through regression analysis, Split Plot ANOVA, independent sample t-test and Bootstrapping for mediation. Results suggest significant and positive relationship between blended learning program, intrinsic motivation, self-efficacy, and academic achievements. Furthermore, female participants were found to be more motivated in comparison with male participants. The researcher has further discussed possible reasons for insignificant relationships among variables. It is recommended to apply training to pupils before engaging students in online learning programs. In addition, in future course of study longitudinal research design with large sample size should be adopted to develop more valid and reliable normative instruments for South Asian context.

KEYWORDS: Blended Learning, Chemistry, Self-Efficacy, Intrinsic Motivation, Grade Motivation

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1. Introduction

Science education is among the most important subjects taught in school and its importance are mainly due to its application in solution of real-world problems as well as its relevance to students' lives in enhancing their critical thinking skills. Among the branches of science, Chemistry is the one that is found everywhere, every time in our surroundings and it interrelated with other branches of sciences as well. Students' discouragement towards learning chemistry is visible and highlighted by many researchers because of the study of plentiful amount of hypothetical concepts, those requires substantial effort and time commitments from the students (Akram, Ijaz & Ikram, 2017; Salta & Koulougliotis, 2015; Sharaabi, Kesner & Shwartz, 2014; Sirhan, 2007). Furthermore, students' perception and confidence to score well in this subject usually decreases over time, as the complexity level increases, especially when subject provides less information about the importance and/or usefulness of the chemistry course (Aregawi & Meressa, 2017). Wu and Foos (2010) reported that most of the learners studying chemistry were not interested and motivated to pursue a career in chemistry. Students usually opt these courses to fulfill the requirement of a degree in fields of their interests such as medical or engineering. This lack of motivation is alarming as chemistry is the most important subject connecting all the sciences together. Furthermore, the field of chemistry, science, and technology have an impact on the economic heart of every industrialized, and technologically progressive society (Burmeister, 2012).

The researcher of the current study designed and experiment blended learning approach to influence students in terms of motivation and interest to learn chemistry. Keshta and Harb (2013) defined blended

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learning as "a natural evolution of e-learning towards a complete program of various multimedia applied in an ideal way to solve problems, taking care of the individual differences and achieving distinguished teaching". Though blended learning is challenging (Kihoza et al., 2016; Florian & Zimmerman, 2015), it has positively influenced students motivation and shown positive results (Zainuddin & Perera, 2019; Edward, Asirvatham & Johar, 2018).

Deci and Ryan (2000) presented self-determination theory and explained that that pupils are naturally active and engaged, if their motivation level is high. Within self-determination theory, intrinsic motivation keeps people engaged in learning, knowledge gain exercises without any greed of reward or fear of punishment. Taylor and colleagues (2014) studied self-determination theory and connected relation of motivation to academic achievements in a cross-cultural study between Canadian and Swedish students and found robust results. Ferrell, Phillips, and Barbera (2016) studied self-efficacy, interest and effort beliefs as a course of motivation among 170 chemistry students and found that self-efficacy was the strongest influencer for academic achievement. Similarly, Husain (2014) research on 135 Pakistani business students in Karachi in 2012-2013 found a significant positive relationship between self-efficacy and academic motivation.

Thus, in this study, the researcher has applied blended learning approach to the students of grade IX, chemistry, in order to facilitate them and to provoke their motivation in terms of self-determination, intrinsic motivation, self-efficacy, career motivation and grade motivation towards better academic scores.

It has been tried to explore the use of blended learning with the help of EDMODO portal, to create ambiance and to create self-determined, intrinsic, career and grade motivated students with higher level of self-efficacy, ready to learn and explore world of chemistry and show their potential towards scientific progress of the country. In this study, a quantitative approach has adopted for computation of variables with the aim to establish connections between trends and research variables. Regression Analysis, independent sample t-test, Split-Plot ANOVA, Mediation through bootstrapping used for analysis and interpretations using SPSS version 20 and smart PLS version 3.

Researches based on application of motivational strategies to learn chemistry is usually found with university level students (Ferrell, Phillips & Barbera, 2016; Rosenzweig & Wigfield, 2016) but limited research with school level students are seen. Similarly, blended learning or use of Learning Management Systems has penetrated effectively in tertiary level of studies (Wiyarsi, 2017; Sun et al., 2017; Waheed et al., 2016), however its application with secondary classes, especially in the field of chemistry, is yet to be explored. Therefore, the researcher designed this computer-assisted instructional program at the secondary level of school for students to enhance their motivation towards achievements in O-levels Chemistry, to make this study unique and novel especially in the South Asian region.

2. Literature Review

Below is a review of the literature identified applications, limitations, challenges and influences of blended learning program at various levels of education in different regions.

Lee, Lau, and Yip (2016) studied the impact of the use of the Moodle learning management system on students of three tertiary level universities in Hong Kong, and demonstrated positive outcomes for qualities such as keenness, understanding of concepts and self-assurance in learning science. Similarly, studies conducted in Pakistan by Waheed and colleagues (2016) found that blended learning has a positive impact on motivation. In continuation, a study conducted by Hashemyolia et al. (2014) established a strong relationship between Learning Management System, and enhanced self-regulated learning strategies and improved performance. Use of multimedia in educating science and its impact on academic achievement and attitude of 60 students of Grade 8 in Karachi, highlighted by Shah and Khan in 2015. Findings showed that students taught through multimedia produced higher scores as compared to students learned through traditional teaching method.

Boiché and colleagues (2008) inspected and compared the impact of the level of self-determination among 215 participants in 10 weeks gymnastic class and found students with higher level of self-determination had shown higher capability to achieve higher grades.

Lin-Siegler, Dweck, and Cohen (2016) pointed out the fact that students' motivation, can be influenced by many factors such as extrinsic incentives, personal beliefs, personal goals and interests. Thus, working with students' beliefs' can potentially enhance students' academic motivation and performance. Similarly, Dev (1997) in her review article explored that those with higher academic intrinsic motivation function effectively than children with poor motivation. In continuation, Ferrell, Phillips, and Barbera (2016) in their research design highlighted motivational precursors required to study chemistry. The researcher studied self-efficacy, interest and effort

beliefs as predictors of motivation among 170 chemistry students. Multiple regression and path analysis explored that self-efficacy was the strongest variable towards better grades.

Salta and Koulougliotis (2015) evaluated motivation and the interest of students regarding learning chemistry at Athens during 2012-2013. Sample comprised of 163 boys and167 girls from secondary school. Results showed that male students' self-determination was lower than female participants while age comparison revealed that lower grade students had a higher motivation than secondary students.

Husain (2014) conducted a research on 135 Pakistani business students in Karachi in 2012-2013 to highlight relationship between self-efficacy and academic motivation. Pearson Product Moment Correlation test showed significant and positive relationship between self-efficacy and academic motivation, however, t-test showed no gender differences in the motivation of the participants.

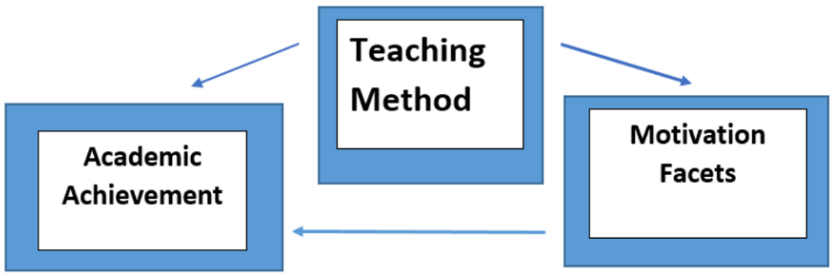

Figure 1 - Impact of Blended learning on Motivation and Achievement.
Source: Developed by Author

3. Research Methodology

Researcher in the current study has adopted a quantitative research pattern aligned with the quasi-experimental and pre-post experimental design, which aimed to examine, direct and indirect influence of the blended learning program on motivational indicators (Figure 1). The researcher has used a blended approach to develop skills regarding comprehension and calculations, required to get expertise with Cambridge O-Levels Chemistry syllabi. Purposive sample design has been adopted due to the accessibility of the researcher to chemistry students as a teacher in a well-known convent school at Karachi. It is supported by the literature that the complexity of the content (Tilahun & Tirfu, 2016; Zusho, Pintrich, & Coppola, 2003) has an influence on the motivation of the students. To maintain the uniformity of the content, similar syllabus was taught and tested, based on the topics of Particulate model of matter, Laboratory practices and Separation Techniques. The researcher invited student on EDMODO portal by emails. Experimental Group consisted of 37 (23 boys and 14 girls) students, started participating in activities on the online program; however, 45 (15 boys and 30 girls) students did not join the portal and preferred studying in regular classes and became the part of the control group. The students in both groups were similar in their general achievement and were studying chemistry as a separate subject for the very first time, in the first term of the scholastic year (2018-2019).

3.1 Activities in Blended and Traditional Classroom

Students from both groups studied via traditional lecture method; however, experimental group students also participated in online activities. Virtual learning classes were conducted using EDMODO portal. Demographic information of the experimental group showed that the most common activity that students engaged in during the blended learning environment were attempts to practice quizzes at the end of each topic. Some of the other common activities included responding to academic-related messages from teacher and fellows, watching videos posted by the teacher, personal inquiry-based messages to the instructor, participation on poll questions and discussion forums. The researcher tried to make students self-efficient and grade motivated by involving students in online quizzes and discussions and through providing them

feedback along with the comments and achievement badges for active learners and performers. These cheering badges are built in by default and available on EDMODO's online portal. To create students' career-based motivation, the researcher recordings and media connecting content's application with real life situations. Similarly, postings and poll questions by the royal society of chemistry were replicated in online classes to create awareness chemistry as a subject application and its importance. This research experiment continued for 10 weeks from August 2018 till October 2018.

3.2 Research Variables

The study comprised of the following variables:

A- The independent variables represented in the teaching program:

1. Blended learning program
2. Traditional method

B- The dependent variable represented in:

1. Motivation to learn Chemistry
2. Achievements in Standardized Test

3.3 Research Instruments

1. *Chemistry Motivation Questionnaire*: This is modified form of Self-Reported Science Motivation Questionnaire developed by Glynn, (2011). This scale based on 22 questions with 5-point Likert scale (0= Never, 1= Rarely, 2= Sometimes, 3=Often, 4=Always) to measure students' motivation to learn chemistry at the end of the research program.
2. *Achievement Test*: This test was designed by the researcher to check and compare the academic achievements of both groups. This test was based on 20 multiple choice questions, and 20 marks open-ended questions. These questions were designed by the researcher from syllabus taught by tradition and blended learning methods, to check, understanding, memorization, concepts and analytical skills of students.
3. *Pre-test*: This test was based on 10 objective based questions with 10 marks, but marks were then converted to 40 for analysis purpose and to maintain similarity with post standard test. Participants from both groups appeared for pre-test at the start of the experimental program.

4. Data Analysis and Results

Before testing hypothesis, and establishing relationships among the variables, researcher run factor analysis to ensure reliability and validity of the tool used.

4.1 Kaiser–Meyer–Olkin (KMO) and Bartlett's tests

The results shown in Table 1 is representing that the items within each factor are adequate for factor analysis (Kaiser, 1974) and matrix is not identity and factor analysis is possible (Table 1) (Bartlett, 1950). Average variance extracted is 59 % which is making it fit for further factor analysis.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin	Measure of Sampling Adequacy.	.708
	Approx. Chi-Square	924.643
Bartlett's Test of Sphericity	Df	300
	Sig.	.000

Table 1 - KMO and Bartlett's Test.

4.2 Factor Analysis

Final factor structure designed by using PLS version 3 (Table 2) for the Chemistry Motivation Questionnaire comprised of

- *Factor 1*: Intrinsic Motivation - 4 items
- *Factor 2*: Self Determination - 5items
- *Factor 3*: Self Efficacy - 5 items
- *Factor 4*: Career Motivation - 5 items
- *Factor 5*: Grade Motivation - 3 items

Operational definitions of the variables are:

Self Determination: self-determination has been defined as "the ability to identify and achieve goals based on a foundation of knowledge and valuing oneself" (Field, Hoffman & Cornell, 2016).

Intrinsic Motivation: it is like an autonomous behaviour, performed with a full sense of inclination towards completion of the task (Ryan and Deci, 2000)

Self-Efficacy: Albert Bandura (1982) defines it as a personal judgment of "how well one can execute courses of action required to deal with prospective situations".

Career Motivation: author defined career motivation as an extrinsic motivation representing achievement in career objectives and goals.

Grade Motivation: author defined grade motivation as a kind of extrinsic motivation to achieve better credentials and accomplishments in the form of better scores.

Item	Intrinsic Motivation	Self Determination	Self-Efficacy	Career Motivation	Grade Motivation
Intrinsic Motivation 1	0.802				
Intrinsic Motivation 2	0.739				
Intrinsic Motivation 3	0.767				
Intrinsic Motivation 4	0.847				
Self Determination 1		0.686			
Self Determination 2		0.726			
Self Determination 3		0.766			
Self Determination 4		0.732			
Self Determination 5		0.690			
Self Efficacy 1			0.783		
Self Efficacy 2			0.539		
Self Efficacy 3			0.665		
Self Efficacy 4			0.623		
Self Efficacy 5			0.666		
Career Motivation 1				0.872	
Career Motivation 2				0.875	
Career Motivation 3				0.781	
Career Motivation 4				0.416	
Career Motivation 5				0.511	
Grade Motivation 1					0.407
Grade Motivation 2					0.796
Grade Motivation 3					0.796

Table 2 - Factor Analysis.

Reliabilities	No. Of Items	Cronbach's Alpha (From PLS)	Composite Reliability
Intrinsic Motivation	4	0.798	0.869
Career Motivation	5	0.884	0.831
Self Efficacy	5	0.685	0.792
Self Determination	5	0.790	0.844
Grade Motivation	3	0.527	0.718

Table 3 - Reliability of the Instrument.

	Career Motivation	Grade Motivation	Intrinsic Motivation	Self Determination	Self -Efficacy
Career Motivation					
Grade Motivation	0.346				
Intrinsic Motivation	0.391	0.314			
Self Determination	0.354	0.542	0.608		
Self-Efficacy	0.340	0.541	0.777	0.693	

Table 4 - Heterotrait-Monotrait ratio of correlations (HTMT).

4.3 Reliability of the Instrument

Data reliability is measured through Cronbach's alpha using smart PLS version 3. In the reliability test, the value of Cronbach's alpha should be greater than 0.5 (Cronbach, 1951) (Table 3).

4.4 Construct Validity

Tseng et al., (2006) suggested that value of composite reliability greater than 0.6 confirms convergent validity of the instrument (Table 3).

Heterotrait-Monotrait ratio of correlations **(**HTMT) are used to check discriminant validity. Henseler, Ringle and Sarstedt (2015) explained that if the HTMT value is below 0.90, discriminant validity is established (Table 4).

4.5 Split-Plot ANOVA

Split-plot ANOVA is a statistical test, used to identify differences between control and experimental groups' achievements, before and after different teaching strategies applied for a fixed duration of time. It is usually represented with a graph (refer to Figure 2).

The plot of the means (shown on vertical axis) across pre-post academic achievements (shown on horizontal axis) shows evidence the results on the experimental group being higher than those on the control sample. Thus, it shows a significant improvement in students' performance in terms of academic credentials and concepts building with the experimental group participants as compared to control group. To further investigate this relationship, independent sample t-test is applied in later part of analysis.

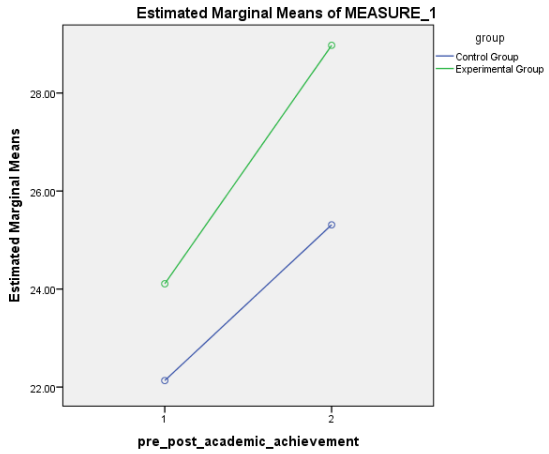

Figure 2 - Pre-test and Posttest Academic Achievement. Source: Developed by Authors

4.6 Independent sample t-test

Independent Sample t-test is used to define means comparison between 2 groups. If the value of significance is greater than 0.05, means are considered equal (Keselman, Othman, Wilcox, & Fradette, 2004). Levene's test of equality indicated that in all relations equal variances were found. In this study, teaching method has shown no significant relationship with career motivation, grade motivation, and self-determination. However, a significant difference between two groups in terms of intrinsic motivation, self-efficacy, and academic achievement are evident (Table 5).

4.7 Regression Analysis

Regression Analysis was run to establish impact of motivational factors on academic achievements. The model used to determine impact of motivational facets on academic achievement is:

Academic Achievement= $\alpha + \beta 1$ (intrinsic motivation) + $\beta 2$ (Self Efficacy) + $\beta 3$ (Self Determination) + $\beta 4$ (Career Motivation) + $\beta 5$ (Grade Motivation) + error

A significant relationship is established between intrinsic motivation and academic achievement where significant values are lower than 0.05 (Table 6). The

	Groups	N	Mean	Std. Deviation	Mean Difference	t-value	df	Sig, (2-tailed)
Self-Efficacy	Control	45	3.6489	.65249	-0.44300	-3.003	80	0.004
	Experimental	37	4.0919	.67921				
Intrinsic Motivation	Control	45	3.0389	.87249	-0.52868	-2.597	80	0.011
	Experimental	37	3.5676	.96941				
Career Motivation	Control	45	2.9600	1.33253	-0.16973	-0.625	80	0.534
	Experimental	37	3.1297	1.07416				
Self Determination	Control	45	3.4844	.75014	-0.25069	-1.393	80	0.167
	Experimental	37	3.7351	.87946				
Grade Motivation	Control	45	4.4222	.67570	0.16096	1.063	80	0.291
	Experimental	37	4.2613	.69003				
Academic Achievement	Control	45	25.3111	5.20412	-3.66186	-3.040	80	0.003
	Experimental	37	28.9730	5.68862				

Table 5 - Independent sample t-test, Probability $\leq$ 5%.

Model	B	t	Sig.	Collinearity Statistics		R	R Square	Adjusted R Square
				Tolerance	VIF			
(Constant)	24.735	4.997	.000					
Intrinsic_Motivation	2.135	2.522	.014	.585	1.710			
Self_Efficacy	.130	.113	.910	.591	1.692			
Self_Determination	-.534	-.564	.575	.634	1.578	.340[a]	.116	.058
Career_Motivation	.055	.101	.920	.864	1.158			
Grade_Motivation	-.808	-.842	.402	.880	1.136			

Table 6 - Regression Analysis, Dependent variable: Academic Achievement. Probability ≤ 5%

	Gender	N	Mean	Std. Deviation	Mean Difference	T	Df	Sig. (2-tailed)
Academic Achievements	Male	38	27.5000	6.21137				
	Female	44	26.5000	5.24072	1.00000	.791	80	.431
Intrinsic_Motivation	Male	38	3.3882	.99271				
	Female	44	3.1818	.91079	.20634	.981	80	.329
Self_Efficacy	Male	38	4.0053	.67781				
	Female	44	3.7136	.69201	.29163	1.921	80	.058
Self_Determination	Male	38	3.4632	.86381				
	Female	44	3.7136	.76237	-.25048	-1.395	80	.167
Career_Motivation	Male	38	2.9632	1.11098				
	Female	44	3.1000	1.31361	-.13684	-.505	80	.615
Grade_Motivation	Male	38	4.1667	.75834				
	Female	44	4.5076	.57281	-.34091	-2.315	80	.023

Table 7 - Independent Sample t-test (Gender Differences). Probability ≤ 5%

	Original Sample	Sample Mean	Standard Deviation	T-value	P-values
Intrinsic Motivation → Academic Achievement	0.253	0.266	0.105	2.422	0.015
Teaching Method →Academic Achievement	0.254	0.249	0.118	2.142	0.032
Teaching Method →Intrinsic Motivation	0.274	0.288	0.104	2.642	0.008

Table 8 - Path Coefficients.

	Original Sample	Sample Mean	Standard Deviation	T-value	P-values
Intrinsic Motivation → Academic Achievement					
Teaching Method →Academic Achievement	0.069	0.076	0.042	1.648	0.099
Teaching Method →Intrinsic Motivation					

Table 9: Indirect Effects.

	Original Sample	Sample Mean	Standard Deviation	T-value	P-values
Intrinsic Motivation → Academic Achievement	0.253	0.266	0.105	2.422	0.015
Teaching Method →Academic Achievement	0.322	0.325	0.108	2.972	0.003
Teaching Method →Intrinsic Motivation	0.274	0.288	0.104	2.642	0.008

Table 10 - Total Effects.

coefficient of intrinsic motivation is 2.135 and is significant which shows that 1 degree increase in intrinsic motivation results in 2.15 degree rise in academic achievement. To check mediating effect of intrinsic motivation bootstrapping technique is used using PLS-version 3.

4.8 Multicollinearity

Multicollinearity is calculated through variation inflation factor, where it is suggested that VIF of 5 or lower (i.e., Tolerance level of 0.2 or higher) is robust to avoid multicollinearity issue (Hair et al., 2006) (Table 6).

4.9 R-square value

The R-squared, (also called the coefficient of determination) determines strength of a relationship and model fitness and it is used to predict chances of error. In Social Sciences low R square values are often expected (Neter et al, 1996). However, according to Cohen (1992) R-square values more than 0.1 are acceptable that shows small to medium effect size (Table 6).

4.10 Gender Differences

Independent sample t-test showed no differences among females and males in terms of self-efficacy, intrinsic motivation, career motivation, self-determination and academic achievements (Table 7). On the contrary, a significant difference is observed among different genders in terms of grade motivation. It is concluded from the mean values that grade motivation or thrust to achieve better grades is higher or profound among the female participants.

4.11 Mediating Effect of Teaching Methods on Academic Achievement through mediation of Intrinsic Motivation

Bootstrapping for 5000 sample size was run and Table 8 is formulated for path coefficients. Robins and Greenland (1992) explained direct and indirect effect as in Figure 3. The product of path coefficients "A" and "B" is termed indirect, however, coefficient "C" is used to highlight the direct effect of the research model. The total effect is defined as the addition of the direct and indirect effects (C' + AB in the model).

Path coefficients have indicated that intrinsic motivation has an impact on academic achievement (p-value <0.05). Similarly, the teaching method has also influenced on intrinsic motivation as p-values are less than 0.05. But, intrinsic motivation impact as a mediator on academic achievement is not established as p-value is > 0.05 (Table 9 and Table 10).

5. Discussion and Suggestions

Aligned with the studies conducted by Zainuddin and Perera (2019); Edward, Asirvatham and Johar (2018); Ain, Kaur and Waheed (2016), Tang and Chaw (2016), Cheng and Chau (2016), Gambrari, Yusuf and Thomas (2015) and research conducted by Waheed et al. (2016) in Pakistan, findings of the current study have revealed that the use of LMS has a significant influence on improved performance and academic achievements. Thus, as highlighted by Shah and Khan (2015); Iqbal and Bhatti (2017); Vasileva-Stojanovska et al. (2015), technology integration in education setup results in improved performance and better academic achievements. However, as pointed out by Wiyarsi (2017) continuous training guidelines are needed regularly for further development of teachers'

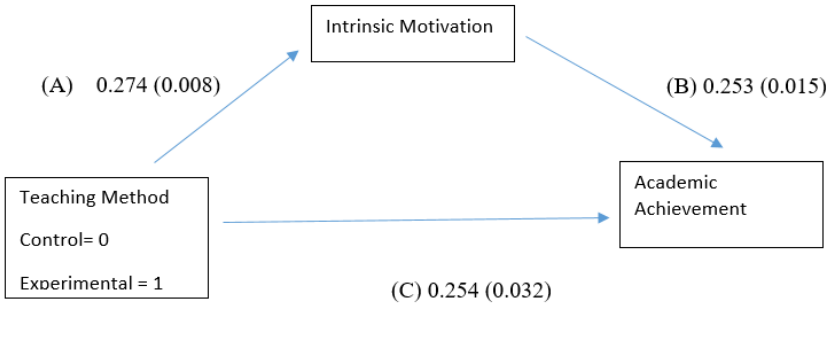

Figure 3 - Model 2, Mediating Effect of Intrinsic Motivation on Academic Achievement.
Source: Constructed by the Author(s)

competencies and abilities for improved resource management and successful execution of technology-oriented classroom lessons.

In succession with the conclusions of Ho et al. (2016), current study represented that use of the blended learning program has a positive impact on self-efficacy of the students. Literature has supported the fact that improved self-efficacy results in increasing willingness to put efforts from students' side to deal with the situation. However, in continuation of the study conducted by Baanu, Oyelekan, and Olorundare (2018) and in contrast with the study of Ferrell, Phillips and Barbera (2016) and Husain (2014) improved self-efficacy has not shown any significant impact on academic achievement. Thus, as highlighted by Baanu, Oyelekan, and Olorundare (2018), it is recommended that self-efficacy alone cannot predict performance and should be accompanied by other motivational factors for robust results.

In continuance of the research conducted by Waheed et al. (2016); Noour and Hubbard (2014), computer-based learning has found a significant relationship with intrinsic motivation in the current study. Furthermore, as highlighted by Deci and Ryan (2000); Yousaf, Yang and Sanders (2015), the current study has proven that intrinsic motivation is acting as strongest herald towards better academic achievements. Use of blended learning approach to enhance career motivation, grade motivation, and self-determination has found insignificant in the current study and as highlighted by Rosenzweig and Wigfield (2016), it is suggested that variables should be aligned with motivational theories for successful interventions and educational policies and systematic reviews of strategies should be achieved vigorously before applying these into new contexts.

Persistent with the results of Husain (2014); Wang, Degol and Ye (2015), and in distinction to the results of Salta and Koulougliotis (2015); Glynn et al. (2011); Guo et al. (2015) no significant difference was found in intrinsic motivation, self-efficacy, self-determination and career motivation. However, a significant difference in grade motivation among male and female students recognized, which has opened a new dimension of research to find why females' grade motivation is higher than male participants. It is recommended to further explore reasons behind these differences.

To overcome limitations of blended learning as highlighted by Appana (2008), it is recommended to have training sessions to make students familiar with the environment and making them technology savvy, before applying the technology-based lessons and activities.

6. Recommendations for Future Research

The key limitation of the present study is small sample size with a shorter span of experimental duration which usually do not accurately capture the true assessment of measurement invariance over a longer period of time. Thus, it is suggested that the similar research should be replicated using longitudinal research design with modification of sample size and incorporating data from more institutions from different areas of Karachi or Pakistan. Furthermore, it is recommended to explore reasons for gender differences in terms of grade motivation, in order to highlight basic provocateurs responsible for such variations.

As highlighted by Nausheen (2016), it is recommended to develop new tools or translate already developed tools to measure motivational facets targeting larger population from the society, especially from underprivileged backgrounds where the Urdu language or Vernacular is used as the main medium of communication.

Tynan, Ryan and Mills (2015) emphasized the fact that international literature though focused on outcomes of blended learning but very limited literature is available on the increase workload of teachers due to e-learning or technology integration. Thus, it is recommended to explore more about the workload on teaching in e-learning programs especially in South Asian regions.

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