

The Effects of Intrinsic and Extrinsic Motivation on Test Performance in Secondary Schools.

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Abstract. Learning motivation is a key factor affecting academic performance. This study aims to explore the effects and relationship between intrinsic motivation and extrinsic motivation of York secondary school students on their academic test's performances. The results show that students' academic motivation becomes positively correlated with English, math and science tests scores. Although extrinsic motivation can promote students' short term academic performance to a certain extent. In long term, intrinsic motivation has a positive and significant impact on students continues learning or affect students' academic performance. This study provides important implications for educators and emphasizes the importance of stimulating learning motivation to improve the academic performance of secondary school students. Thus, educators and parents should encourage students to find interest in learning and encourage students to have an intrinsic drive in learning. Learning motivation can determine students learning attitude and mastery degree and can help students stimulate interesting in learning new knowledge in academic.

Keywords: Intrinsic motivation, Extrinsic motivation, Tests performances, Secondary school students.

1. Introduction

The topic of intrinsic and extrinsic motivation on the test scores of secondary school students has remained a central topic of interest in educational psychology studies. Secondary school was a good time for student to learn. student in the process of learning can not only help students enhance the learning motivation and academic scores, but also may improve study habits and efficiency. However, in the real life, many secondary school students were faced with negative motivate in learning which affects students' academic performance. Therefore, this aims to study the correlation between secondary school students' learning motivation and students' academic performance and investigate the influencing factors between the two variables. Early research on learning motivation focused on the theoretical structure of motivation. Harter (1978) identified intrinsic and extrinsic motivation as the true motivational force of human nature and the rewards that encourage people to overcome new challenges [1]. Intrinsic motivation refers to motivation that comes from within a learner, where the learner is driven to take an active role in learning [2]. Conversely, extrinsic motivation helps the students to get better in focus, efforts and interests in learning depending on need to learn. For instance, external incentives can not only build up corresponding intrinsic motivations, but also enhance students' confidence over the learning environment[3]. Motivators that exist outside learners, including those from parents or teachers, help boost the sense of self-worth and accomplishment of a student in class [4]. Nevertheless, students with low intrinsic motivation may be inclined to use extrinsic learning strategy consisting in memorization, which is less effective in terms of long-term performance. Similarly, when teachers or parents overuse extrinsic rewards to encourage students to learn in the short term, these extrinsic motivations can be withdrawn [5]. Therefore, this study aims to investigate and analyze the influence of intrinsic and extrinsic motivation on secondary school student's tests scores from different perspective.

2. Method

2.1. Research Design

In this research, the study chooses a quantitative analysis method to study the influence of intrinsic and extrinsic motivation on secondary school students' tests scores (ranging from one to seven points), aiming at quantifying the relationship between learning motivation and academic performance. Quantitative research employs precise tools to measure and analyze data objectively, allowing for a clearer understanding of facts and phenomena [6]. Quantitative research can describe the characteristics of research objects through data collection and analysis, to provide objective data support. Unlike qualitative research, which provide deeper and more insightful results to explore the research problems [7]. In addition, the study using data analysis to investigate the relationship between two continuous variables: students intrinsic and extrinsic motivation, and student secondary school test performance. The processing of data and interpretation of the results can be done through correlation analysis to investigate this relationship.

2.2. Research Tool

This study used a standard questionnaire to assess the level of motivation of participants. Intrinsic and extrinsic motivation were assessed using the scale developed by Vallerand et al., [8]. The Academic Motivation Scale of academic motivation consists of 28 items, including 14 intrinsic motivations and 14 extrinsic motivations. Each item was scored on a 7-point Likert scale, ranging from 1 ("completely incorrect") to 7 ("completely correct"). The internal motivation items focus on the pleasure and satisfaction of learning, while the extrinsic motivation items assess the impact of external rewards or pressures on students' learning behavior. Meanwhile, Students' academic achievement was measured using their General Certificate of Secondary Education (GCSE) results in math, English, and science. GCSE exams are taken by students in the UK when they complete secondary education at the age of 16. These qualifications cover a wide range of subjects including English, math, science, history, geography, modern languages to guide students in their future studies and work. Scores range from 1 (lowest) to 9 (highest). By analyzing, the minimum and maximum scores from the students GCSE results, this study aims to objectively assess the relationship between intrinsic and extrinsic motivation and academic performance. In addition, the reliability was positive scale, the Cronbach's' Alpha was .081, and the mean test- retest correlation was 0.79. The sale of influence of intrinsic motivation and extrinsic motivation on students test scores was reliable, and the scale was high applicability, and the scale was reliable.

2.3. Sampling

In this study, 50 York High School students, aged 12 or 15 were invited to explore the relationship between intrinsic and extrinsic motivation and students' tests performance. The distribution of samples collected is half of male and half of female students and the average age of male and female students was 13.5.

3. Results

3.1. Reliability Analysis

According to the present data results, this study used Alpha's reliability and validity, mean value, correlation and regression line analysis to analysis data. As can be seen from the Table 1, Cronbach's' coefficient of each variable is greater than 0.6, indicating that the reliability of this study is better(Alpha intrinsic motivation and tests performance is 0.846; Alpha extrinsic motivation and tests performance is 0.770). Compared with the research tools, the relationship between intrinsic motivation and extrinsic motivation and test scores ranges from 0.7 to 0.9, so the reliability between the two variables is appropriate.

Table 1. Two sets of Reliability analysis were used to analyze the effects of intrinsic and extrinsic motivation on students tests scores.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Intrinsic .846	.828	4
Extrinsic .770	.688	4

3.2. Correlation Analysis

3.2.1. Intrinsic motivation

The study employed Spearman's correlation to examine the relationship between intrinsic motivation and student test scores in Math, English, and Science in Table 2. Results revealed a weak to moderate positive correlation between intrinsic motivation and math scores ($r = 0.269$, $p = 0.005$), suggesting higher intrinsic motivation corresponds to better math performance. Similarly, a positive correlation was observed between intrinsic motivation and English scores ($r = 0.294$, $p = 0.002$), albeit less pronounced than in science. The strongest correlation was found between intrinsic motivation and science scores ($r = 0.388$, $p < 0.001$), indicating a significant positive relationship. Furthermore, significant correlations were observed between test scores: Math and English ($r = 0.893$, $p < 0.001$), Math and Science ($r = 0.683$, $p < 0.001$), and English and Science ($r = 0.652$, $p < 0.001$). These findings suggest a consistent pattern where students excelling in one subject tend to perform well in others. In summary, intrinsic motivation positively correlates with academic achievement across Math, English, and Science, with the strongest association observed in science.

Table 2. Spearman's Correlation Coefficients between intrinsic motivation and test scores

		Correlations				
			Intrinsic	Maths	English	Science
Spearman's rho	Intrinsic	Correlation Coefficient	1.000	.269**	.294**	.388**
		Sig. (2-tailed)	.	.005	.002	<.001
		N	106	106	106	106
	Maths	Correlation Coefficient	.269**	1.000	.893**	.683**
		Sig. (2-tailed)	.005	.	<.001	<.001
		N	106	106	106	106
	English	Correlation Coefficient	.294**	.893**	1.000	.652**
		Sig. (2-tailed)	.002	<.001	.	<.001
		N	106	106	106	106
	Science	Correlation Coefficient	.388**	.683**	.652**	1.000
		Sig. (2-tailed)	<.001	<.001	<.001	.
		N	106	106	106	106

3.2.2. Extrinsic motivation

The study used Spearman's correlation to examine the relationship between extrinsic motivation and test scores in Math, English, and Science in Table 3. No significant correlations were found (Math: $r = -0.016$, $p = 0.873$; English: $r = -0.057$, $p = 0.559$; Science: $r = -0.046$, $p = 0.640$), indicating that extrinsic motivation does not predict academic achievement in these subjects. However, strong positive correlations were observed among the test scores themselves: Math and English ($r = 0.893$, $p < 0.001$), Math and Science ($r = 0.683$, $p < 0.001$), and English and Science ($r = 0.652$, $p < 0.001$). This suggests that students who perform well in one subject tend to excel in others. In summary, extrinsic motivation did not significantly relate to academic performance, but strong inter-subject correlations indicate common factors affecting overall achievement.

Table 3. Spearman's Correlation Coefficients between extrinsic motivation and test scores

		Extrinsic	Maths	English	Science	
Spearman's rho	Extrinsic	Correlation Coefficient	1.000	-.016	-.057	-.046
		Sig. (2-tailed)	.	.873	.559	.640
		N	106	106	106	106
	Maths	Correlation Coefficient	-.016	1.000	.893**	.683**
		Sig. (2-tailed)	.873	.	<.001	<.001
		N	106	106	106	106
	English	Correlation Coefficient	-.057	.893**	1.000	.652**
		Sig. (2-tailed)	.559	<.001	.	<.001
		N	106	106	106	106
	Science	Correlation Coefficient	-.046	.683**	.652**	1.000
		Sig. (2-tailed)	.640	<.001	<.001	.
		N	106	106	106	106

** . Correlation is significant at the 0.01 level (2-tailed).

3.3. Regression analysis

3.3.1. Intrinsic motivation

This study used regression analysis to investigate the impact of intrinsic motivation on test scores in Math, English, and Science. As can be seen from Table 4 in Anova. F value of intrinsic motivation was 0.683, and the p value was less than 0.01, indicating that the global regression model was more significant. However, as can be seen from table 1, the P- value of intrinsic motivation was <0.01, indicating that the regression model is significant. Math: $r = -0.247$, $p = 0.05$, which was not significant. But the null hypothesis was accepted. $r = 0.230$, $p = 0.38$; Science: $r = 0.204$, $p = 0.11$. English scores $r = 0.230$ and P-value of English score is 0.38, which was not significant, and the original hypothesis H1 should be accepted. Science score $r = 0.204$, and P-value of science achievement was 0.011 which was not significant, and the null hypothesis should be accepted.

Table 4. Overall parameters of Intrinsic motivation and students' tests scores

a. ANOVAa						
b. Model		c. Sum of Squares	d. df	e. Mean Square	f. F	g. Sig.
h. 1	i. Regression	j. 21.760	k. 3	l. 7.253	m. 6.863	n. <.001b
	o. Residual	p. 107.807	q. 102	r. 1.057	s.	t.
	u. Total	v. 129.567	w. 105	x.	y.	z.
aa. Dependent Variable: Intrinsic						
bb. Predictors: (Constant), Science, English, Maths						

Table 5. Regression model for students test scores

	Unstandardized Coefficients	Standardized Coefficients	t	Sig.			
	B	Std. Error	Beta				
Model	1	(Constant)	4.294	.377		11.394	<.001
		Maths	-.247	.124	-.428	-1.985	.050
		English	.230	.109	.440	2.102	.038
		Science	.204	.078	.359	2.602	.011
a. Dependent Variable: Intrinsic							

As can be seen from the table 5, the P- value of intrinsic motivation is <0.01 , indicating that the regression model is significant. Math: $r = -0.247$, $p = 0.05$, which is not significant. But the null hypothesis is accepted. $r = 0.230$, $p = 0.38$; Science: $r = 0.204$, $p = 0.11$). English scores $r = 0.230$ and P-value of English score is 0.38, which is not significant, and the original hypothesis H1 should be accepted. Science score $r = 0.204$, and P-value of science achievement is 0.011 which was not significant, and the null hypothesis should be accepted.

3.3.2. Extrinsic motivation

The study used regression analysis to examine the effects between extrinsic motivation and tests scores in Math, English and Science (Math: $r = 0.94$ $p = 0.469$ English: $r = -0.130$, $p = 0.255$; Science: $r = -0.000$, $p = 0.977$). As can be seen from Table 6, the F value of extrinsic motivation (0.597) was higher than the significant level (0.05). It can be concluded that extrinsic motivation has no positive effect on students' tests scores in Math, Science and English.

Table 6. Overall parameters of Extrinsic motivation and students tests scores

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.049	3	.683	.597	.618b
	Residual	116.694	102	1.144		
	Total	118.743	105			
Dependent Variable: Extrinsic						
b. Predictors: (Constant), Science, English, Maths						

Table 7. Regression model for students test scores

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.325	.392		8.481	<.001
	Maths	.094	.129	.171	.728	.469
	English	-.130	.114	-.261	-1.146	.255
	Science	.000	.082	-.001	-.004	.997
a. Dependent Variable: Extrinsic						

As can be seen from Table 7 coefficients analysis. Math was 0.469, which is significantly greater than the commonly used significance level of 0.05, there was no significant relationship between extrinsic motivation and math achievement. The Hypothesis need to be accepted. Similarly, as can be seen from the picture, the P values of English tests scores was 0.255, which indicate that there is no significant level between extrinsic motivation and English tests scores. P value greater than 0.05 means that the data does not have a significant level with the original hypothesis. Thus, the hypothesis should not be rejected. The P value of science tests scores was 0.977, which indicate that the P values was greater than 0.05, there was no significant level between science tests scores and extrinsic motivation, thus the null hypothesis should not be rejected.

4. Discussion

This study aimed to investigate the effects of intrinsic and extrinsic motivation on secondary students' test scores. The results indicated a significant positive impact of intrinsic motivation on students' performance in Math, English, and Science, emphasizing the importance of intrinsic motivation for academic success. This aligns with previous findings that intrinsic motivation fosters a deep and lasting interest in learning [9]. Whereas the extrinsic motivation was found not to be correlated to the test scores implying that mere external incentives do not guarantee high standards of performance. This finding is in line with the argument presented by Ryan and Deci [10] which asserted that although extrinsic motivators improve short term performance but does not improve educational gains in the long run.

In study, the results show that the reliability test of intrinsic motivation was high and in regression analysis, there was not significant relationship between intrinsic motivation and English and Science score. There was a significant relationship between intrinsic motivation and math scores. $P=0.05$. Therefore, null hypotheses should be rejected. In correlation analysis, the Correlation analysis does not consider the strength of the relationship as causality but between two variables and the correlation coefficient [11]. To overcome the limitation, there is a need to employ the longitudinal designs or empirical methods that can investigate the causal relationships in more extent. Future research should incorporate these paradigms to more fully comprehend the mechanisms behind motivation and academic achievement.

In addition, extrinsic motivation was associated with higher reliability tests of student's math, English, and Science tests scores. In the regression model, the linear relationship between mathematic and extrinsic motivation is strong, and the R-value is close to -1 to 1. But the p-value is greater than 0.05. Therefore, there is no significant relationship between the two variables. The results show that there is a weak correlation between extrinsic motivation and English test scores, which means that P value was not significant (P was less than 0.05). The P-value between extrinsic motivation and science achievement was greater than 0.05. Thus, the relationship between the independent variable and the dependent variable was not obvious.

The significant correlations observed among test scores in Math, English, and Science suggest that students who perform well in one subject tend to excel in others. This pattern echoes a holistic approach to increasing students' motivation and overall academic success where enhancing intrinsic motivation within subjects can enhance performance across subjects.

5. Conclusion

In conclusion, this study showed the importance of intrinsic motivation in successes that secondary students posted. Although the extrinsic motivation may work to give short-term benefits, it's the internal motivation that will help students sustained academic achievement. These findings have important implications for educational practices, indicating that the approaches to increase the motivation from within could be beneficial in improving the results achieved in education. However, a significant limitation of the study is bases on a correlation analysis and regression analysis of extrinsic motivation and students' academic performance, which does not determine the causation and influencing factors. To solve the inaccurate in this study, the future development direction is proposed: Firstly, the study need to expand the sample size, accurately sample the research objects, conduct more in-depth research, and try to ensure the objectivity of the collected data, as to make the research results more realistic. Secondly, increase the practical prospect of data analysis and survey analysis. Thirdly, the sample size should be increased in future studies to improve the credibility of research results. The fourth study may consider multiple regions to explore the potential influence of geographical factors on the study results.

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