

Predicting Students' Performance in Senior Secondary Certificate Examinations from Performance in Junior Secondary Certificate Examinations in Ondo State, Nigeria

T.O. Adeyemi

Department of Educational Foundations and Management,
University of Ado-Ekiti, P.M.B. 5363, Ado-Ekiti, Nigeria

Abstract: In this article, the predictive strength of the Junior Secondary Certificate (JSC) examinations in predicting the performance of students in the Senior Secondary Certificate (SSC) examinations in Ondo State, Nigeria was examined. The study explored a correlation design. The study population comprised all the 257 secondary schools in the State. Out of this population, a sample of 206 schools was selected through the stratified random sampling technique. Data were collected through an inventory and analysed with the use of z-test, correlation analysis and multiple regression. The findings revealed that the JSC examinations were a good predictor of performance at SSC examination. Since the performance level was generally low in both examinations, it was recommended that the State government should intensify more efforts in ensuring better teaching and learning strategies in schools through effective supervision and monitoring of schools.

Key words: Predicting • Students' • Performance • Secondary • Certificate • Examination

INTRODUCTION

Examinations in Nigerian schools dated back to the advent of formal education. The 1887 Education Ordinance made provision for public examinations in schools [1]. Thus, the National Policy of Education [2] stipulated that all secondary schools should gear their programmes to meet the requirements of examinations being conducted for the Senior School Certificate. The pattern of grading candidates' scores in the examinations was such that the distinction grades were represented by A1 to B3. The credit grades were represented by C4 to C6. The ordinary pass grades were represented by D7 and E8 while the failure grade was represented by F9 [3]. It needs to be mentioned however, that the distinction and credit grades are the only requisite qualifications for admissions into universities in Nigeria and candidates must have at least credit in five subjects including English Language in order to qualify for admission [4].

Thus, examinations occupy a unique position as a measure of quality within the educational system of Ondo State, Nigeria. They are either internal or public. Internal examinations are the examinations that are set by teachers within a school system. These could be in the form of tests and end of term examinations. Public examinations

on the other hand, are examinations that are conducted by recognised examining bodies. As such, the examinations such as the Senior Secondary Certificate (SSC) examinations and the Junior Secondary Certificate (JSC) are regarded as external examinations. This is in the sense that the examining boards conducting these examinations did not themselves organize instructional courses nor prepare students for the examinations. They are examinations that are designed and organised under specific terms and conditions and are based on norms that were regarded as standards [5]. They are designed to evaluate performance at the end of a course of study or programme. However, despite the unique position of examinations in the educational system, there have been conflicting reports on the predictive strength of the JSC examinations at predicting performance in the SSC examinations [6, 7].

Literature review: The term 'academic performance' has been described as the scholastic standing of a student at a given moment. It refers to how an individual is able to demonstrate his or her intellectual abilities. This scholastic standing could be explained as the grades obtained in a course or groups of courses taken [8 9]. Thus, in predicting academic performance [8] emphasized

the use of grades in examinations and reported that grades could serve as prediction measures and as criterion measures. They argued that a prediction of a future examination result could be made with reasonable success on the basis of the results of a previous examination. Findings made by [1, 10] led credence to this point. These findings supported the findings of other researchers that the GCE and Secondary School Certificate examination results provided the best predictor of university performance [11].

Findings made by [12] confirmed the validity of the number and grades of passes in the Scottish Certificate of Education in predicting first year and final year university performance [13] also reported that high school grades could be used to predict college grades. These findings were however contrary to [14] findings that the Scholastic Aptitude Test (SAT) is unable to predict examination performance as effectively as the Leaving Certificate Examination (LCE) point scores.

In Nigeria, researchers have had divergent findings on the predictive validity of some examinations [15, 16]. In other developing countries, the index of academic performance varied from one country to another [17] found that the Kenya Certificate of Primary Education scores had a moderate positive linear relationship with the Certificate of Secondary Education grades. In some other States, performance in JSC examinations has been found to be significantly related to the performance in SSC examinations [16, 18]. However, some researchers have found no significant relationship between the performance in JSC examinations and performance in SSC examinations [19]. Considering the divergent views and findings of previous researchers on the predictive validity of the JSC examinations, this study intended to examine the JSC examinations in Ondo State, Nigeria to determine whether or not it could effectively predict students' performance in the SSC examinations.

Statement of the problem: The predictive strength of certain examinations has been a matter of concern to many researchers [10]. While some researchers were of the opinion that certain examinations such as the Scholastic Aptitude Test (SAT) could predict university grades in some courses [10], others argued that certain low-level examinations could not effectively predict performance at higher level examinations [18]. The problem of this study therefore was to determine how effective the performance of students in the JSC examination in predicting the performance of the same students in the SSC examinations. In addressing this problem, the following research questions and hypotheses were raised.

Research questions

- What is the level of performance of students in the Junior Secondary Certificate (JSC) examinations in secondary schools in Ondo State, Nigeria?
- What is the level of performance of students in the Senior Secondary Certificate (SSC) examinations in secondary schools in Ondo State, Nigeria?

Research hypotheses

Ho 1: There is no significant relationship between students' performance in the overall JSC examinations and the performance in the overall SSC examinations in Ondo State, Nigeria.

Ho 2: There is no significant relationship between students' performance in JSC English Language examinations and students' performance in SSC English Language examinations in Ondo State, Nigeria.

Ho 3: There is no significant relationship between students' performance in JSC Mathematics examinations and students' performance in SSC Mathematics examinations in the State.

Ho 4: There is no significant relationship between students' performance in JSC Integrated science examinations and students' performance in SSC Physics examinations in the State.

Ho 5: There is no significant relationship between students' performance in JSC Integrated science examinations and students' performance in SSC Chemistry examinations in the State.

Ho 6: There is no significant relationship between students' performance in JSC Integrated science examinations and students' performance in SSC Biology examinations in the State.

Ho 7: The performance of students in the JSC examinations is not a significant predictor of the performance of the same students at the SSC examinations in Ondo State, Nigeria.

MATERIALS AND METHODS

Research design: This study was designed along the lines of a correlational research [13] described correlational research as that involving the collecting of data in order to determine whether and to what degree, a

relationship exists between two or more quantifiable variables.

Population and sample: The study population comprised of all the 257 secondary schools that presented candidates for the year 2000 Junior Secondary Certificate (JSC) examinations and the year 2003 Senior Secondary Certificate (SSC) examinations in Ondo State, Nigeria. The population is made up of 110 urban school and 147 schools. It also embraced all the 13 single-sex schools and 244 mixed schools. A sample of 218 schools (85% of the population) was drawn from the study population. The method of selection was through the stratified random sampling technique taking into consideration the location of the schools. Thus, the sample was made up of 94 urban (43%) and 124 (57%) rural secondary schools.

Research instrument: The instrument used to collect data for the study was an inventory. The inventory requested among other things, data on enrolment figures and students' grades in three major subjects in schools' curriculum namely English Language, Mathematics and Integrated Science in the 2000 JSC examinations as well as students' grades in English Language, Mathematics, Physics, Chemistry and Biology in the 2003 SSC examinations. The choice of the subjects was in accordance with the National Policy on Education [2] which regarded these subjects as core subjects in the secondary school curriculum. Thus [20] reported that the Nigerian science curricula are subject-based with Physics, Chemistry and Biology being the important core science subjects. The data collected were analysed with the use of percentages, correlation analysis and multiple regression.

RESULTS

Research question 1: What is the level of performance of students in the Junior Secondary Certificate (JSC) in secondary schools in Ondo State, Nigeria?

In answering this question, data on the grades obtained by students in junior secondary certificate class three (JSC3) were collected from the principals of the

sampled schools for years 2000 to 2003. Table 1 shows the performance level in the Junior Secondary Certificate (JSC) Examinations in the State. In computing performance in the Junior Secondary Certificate (JSC) examinations, the frequency counts of the number of students who obtained credit grades A to C in each subject in the junior secondary certificate examinations were transformed from discrete data into continuous data through secondary analysis. Table 1 shows the credit performance level of students in the JSC examinations.

As indicated in Table 1, the performance level of students in the three subjects in the JSC examinations in the State was low in each of the three subjects. There was no year where the performance level reached 50% in any subject.

Research question 2: What is the level of performance of students in the Senior Secondary Certificate (SSC) in secondary schools in Ondo State, Nigeria?

In answering this question, data on the grades obtained by students in the senior secondary certificate class three (SSC3) were collected from the principals of the sampled schools for years 2000 to 2003. In computing performance in the examinations, the frequency counts of the number of students who obtained credit grades 1 to 6 in each subject were transformed from discrete data into continuous data through secondary analysis. The weighted average performance is computed using the formula [21]

$$p = \frac{n_1A_1 + n_2B_2 + n_3B_3 + n_4C_4 + n_5C_5 + n_6C_6}{N}$$

Where:

p = performance; n_1, n_2, \dots, n_6 = number of times each grade occurs; while A_1, B_2, \dots, C_6 = numeric weights of each grade.

Table 1: Credit performance in JSC examinations in Ondo State, Nigeria

Years	English language (%)	Mathematics (%)	Integrated science (%)
2000	29.8	14.2	22.3
2001	31.3	26.1	29.1
2002	38.5	36.2	38.9
2003	38.6	38.9	39.2

Table 2: Credit performance in SSC examinations in Ondo State, Nigeria

Years	English language (%)	Mathematics (%)	Physics (%)	Chemistry (%)	Biology (%)
2000	8	12	9	24	13
2001	9	14	11	26	19
2002	13	16	17	28	25
2003	20	19	21	30	31

Table 3: Performance in the overall JSC and SSC examinations

Variable	N	Mean	SD	df	r cal.	r table
Overall Performance at JSCE	206	1.47	0.81	204	0.68	0.1946
Overall Performance at SSCE	206	1.38	0.84			

p<0.05

Table 4: Performance in JSC english language and SSC english language

Variable	N	Mean	SD	df	r cal.	r table
Performance in English Language at JSCE	206	0.512	0.16	204	0.62	0.1946
Performance in English Language at SSCE	206	0.509	0.15			

p<0.05

In this regard A_1 was weighted as 9, B_2 as 8, B_3 as 7, C_4 as 6, C_5 as 5, C_6 as 4 while $N_1 - N_6$ represent the number of candidates who obtained such grades [3]. In the SSC examinations, low-level results were also obtained. Table 2 shows the performance level in the examinations.

As indicated in Table 2, the performance level of students in the five subjects was low and almost the same in all the subjects. There was no particular year where the percentage of performance was up to 40%.

Hypothesis 1

Ho 1: There is no significant relationship between students' overall performance in the JSC examinations and the performance in the overall SSC examinations in Ondo State, Nigeria.

In testing this hypothesis, data on the grades obtained by students in the overall Junior Secondary Certificate (JSC) examinations for year 2003 were collected from the principals of the sampled schools. Data on the overall performance students in the senior secondary certificate (SSC) examinations were also collected from the principals of the sampled schools. In computing performance, the frequency counts of the number of students who obtained credit grades 1 to 6 in each subject were transformed from discrete data into continuous data through secondary analysis. The hypothesis was tested using the Pearson Product Moment correlation analysis. The findings are shown in Table 3.

As indicated in Table 3, the calculated r (0.68) was greater than the table r (0.1946). Hence, the null hypothesis was rejected. This shows that there was a significant relationship between the students' performance in JSC examination and the performance in SSC examinations in the State.

Hypothesis 2

Ho 2: There is no significant relationship between students' performance in JSC English Language examinations and students' performance in SSC English Language examinations in Ondo State, Nigeria.

Testing this hypothesis, data on the grades obtained by students in JSC English Language examinations and students' performance in SSC English Language examinations in Ondo State, Nigeria were collected from the principals of the sampled schools for year 2003. The hypothesis was tested using the Pearson Product Moment correlation analysis. The findings are shown in Table 4

In Table 4, the calculated r (0.62) was greater than the table r (0.1946). Hence, the null hypothesis was rejected. This shows a significant relationship between students' performance in JSC English Language examination and students' performance in SSC English Language examinations.

Hypothesis 3

Ho 3: There is no significant relationship between students' performance in JSC Mathematics examinations and students' performance in SSC Mathematics examinations in the State.

In testing this hypothesis, data on the grades obtained by students in JSC Mathematics examinations and students' performance in SSC Mathematics examinations in Ondo State, Nigeria were collected from the principals of the sampled schools for year 2003. The hypothesis was tested using the Pearson Product Moment correlation analysis. The findings are shown in Table 5

In Table 5, the calculated r (0.09) was less than the table r (0.1946). Hence, the null hypothesis was accepted. This shows that there was no significant relationship between students' performance in JSC Mathematics examination and students' performance in SSC Mathematics examinations.

Hypothesis 4

Ho 4: There is no significant relationship between students' performance in JSC Integrated science examinations and students' performance in SSC Physics examinations in the State.

Table 5: Performance in JSC mathematics and SSC mathematics

Variable	N	Mean	SD	df	r cal.	r table
Performance in Mathematics at JSCE	206	0.51	0.16	204	0.09	0.1946
Performance in Mathematics at SSCE	206	0.38	0.09			

P>0.05

Table 6: Performance in JSC integrated science and SSC physics

Variables	N	Mean	SD	df	r cal.	r table
Performance in Integrated Science at JSCE	206	0.57	0.21	204	0.13	0.1946
Performance in Physics at SSCE	206	0.34	0.15			

P>0.05

Table 7: Performance in JSC Integrated Science and SSC Chemistry

Variables	N	Mean	SD	df	r cal.	r table
Performance in Integrated Science at JSCE	206	0.57	0.21	204	0.62	0.1946
Performance in Chemistry at SSCE	206	0.53	0.19			

p<0.05

Table 8: Performance in JSC integrated Sc. and SSC biology examinations

Variables	N	Mean	SD	df	r cal.	r table
Integrated Science at JSCE	206	0.57	0.21	204	0.65	0.1946
Biology at SSCE	206	0.54	0.20			

p<0.05

Testing this hypothesis, data on the grades obtained by students in JSC Integrated Science examinations and students' performance in SSC Physics examinations in Ondo State, Nigeria were collected from the principals of the sampled schools for year 2003. The hypothesis was tested using the Pearson Product Moment correlation analysis. The findings are shown in Table 6

In Table 6, the calculated r (0.13) was less than the table r (0.1946). Hence, the null hypothesis was accepted. This shows no significant relationship between students' performance in JSC Integrated Science examination and students' performance in SSC Physics examinations.

Hypothesis 5

Ho 5: There is no significant relationship between students' performance in JSC Integrated science examinations and students' performance in SSC Chemistry examinations in the State.

In testing this hypothesis, data on the grades obtained by students in JSC Integrated science examinations and students' performance in SSC Chemistry examinations in Ondo State, Nigeria were collected from the principals of the sampled schools for year 2003. The hypothesis was tested using the Pearson Product Moment correlation analysis. The findings are shown in Table 7

In Table 7, the calculated r (0.62) was greater than the table r (0.1946). Hence, the null hypothesis was rejected. This indicates a significant relationship between students' performance in JSC Integrated Science examination and the performance in SSC Chemistry examinations.

Hypothesis 6

Ho 6: There is no significant relationship between students' performance in JSC Integrated science examinations and students' performance in SSC Biology examinations in the State.

Testing this hypothesis, data on the grades obtained by students in JSC Integrated science examinations and students' performance in SSC Biology examinations in Ondo State, Nigeria were collected from the principals of the sampled schools for year 2003. The hypothesis was tested using the Pearson Product Moment correlation analysis. The findings are shown in Table 8

Table 8 shows that the calculated r (0.65) was greater than the table r (0.1946). Hence, the null hypothesis was rejected. This shows a significant relationship between the students' performance in JSC Integrated Science examination and students' performance in SSC Biology examinations.

Table 9: Correlation matrix of independent variables and dependent variable

Variables	Overall JSCE 2000	JSCE 2000			Overall SSCE 2003	SSCS 2003 English	SSCE 2003			
		English	Math	Integ. Sc.			Math.	Physics	Chem.	Biol.
Overall JSCE 2000	1.00									
JSCE 2000 English	0.52 p =0.00	1.00								
JSCE 2000 Math	0.09 p =0.12	-0.12 p =0.06	1.00							
JSCE 2000 Integ. Sc.	0.46 p =0.00	0.57 p =0.00	0.41 p =0.00	1.00						
Overall SSCE 2003	0.68 p =0.00	0.68 p =0.00	0.18 p =0.02	0.47 p =0.00	1.00					
SSCE 2003 English	0.45 p =0.00	0.62 p =0.00	0.31 p =0.00	0.55 p =0.00	0.63 p =0.00	1.00				
SSCE 2003 Math	0.12 p =0.06	0.10 p =0.09	0.09 p =0.19	0.08 p =0.19	-0.11 p =0.06	-0.13 p =0.12	1.00			
SSCE 2003 Physics	0.09 p =0.19	0.11 p =0.06	0.07 p =0.12	0.13 p =0.01	0.09 p =0.15	-0.12 p =0.06	-0.17 p =0.07	1.00		
SSCE 2003 Chem.	0.51 p =0.00	0.47 p =0.00	0.14 p =0.06	0.62 p =0.00	0.56 p =0.00	-0.61 p =0.00	0.43 p =0.00	0.37 P =0.00	1.00	
SSCE 2003 Biol.	0.42 p =0.00	0.46 p =0.00	0.31 p =0.00	0.65 p =0.00	0.43 p =0.00	0.26 p =0.01	0.28 p =0.01	0.21 P =0.01	0.32 p =0.00	1.00

Table 10: Multiple regression analysis of predictor variables with the criterion variable credit performance in SSC 2003 examination

Predictor variables	B	SE B	Beta	T	Signif. t
Overall credit Perf. in 2000 JSCE	0.4127	6.1736	0.3534	1.3649	0.0000
Credit Perf. in 2000 JSCE English Lang.	0.4534	0.0010	0.3045	1.2066	0.0000
Credit Perf. in 2000 JSCE Mathematics	0.3163	0.1365	0.2421	-18.3600	0.1000
Credit Perf. in 2000 JSCE Integrated Science	0.4203	0.0167	0.2078	2.7450	0.0200
(constant)	2.5162	0.0316		96.4680	0.0000

Hypothesis 7

Ho 7: The performance of students in the JSC examinations is not a significant predictor of the performance of the same students at the SSC examinations in Ondo State, Nigeria.

In testing this hypothesis, data on the grades obtained by students in JSC examinations and students' performance in SSC examinations in Ondo State, Nigeria were collected from the principals of the sampled schools for year 2003. In testing this hypothesis, correlation analysis was used and a correlation matrix was derived showing correlation coefficients and probability values for each pair of variables. The findings are presented in Table 9.

In Table 9, the correlation matrix shows the correlation coefficients between each pair of variables. Since the larger the value of 'r', the stronger the association between the two variables [22], it means that the pairs of variables with large correlation coefficients had strong association with each other. In order to determine the inter-correlation among variables put together, multiple regression analysis was conducted. The criterion variable was the credit performance in 2003 SSC examinations while the predictor variables included year 2000 JSC examination performance in the English Language, Mathematics and Integrated Science. The findings are shown in Table 10.

Thus, the regression equation derivable from the Table 6 is:

$$Y = 2.5162 + .4534 (\text{JSCE English Lang.}) + .4203 (\text{JSCE Integrated. Sc}) + .4127 (\text{JSCE Overall Performance}).$$

As indicated in Table 10, all the variables entered the regression equation. The multiple R was .7145, the R Square was .6142 and the adjusted R Square was .6101 while the standard error was .0674. Table 11 shows the significant t values derived from the regression analysis.

As shown in Table 11, the variables that entered the regression equation at 0.05 level of significance included JSC 2000 English Language, JSC 2000 Integrated Science and the overall JSCE 2000 performance. The best predictor of performance was the JSC 2000 English Language. It contributed 45% to the criterion variable. Other predictors included the JSCE 2000 Integrated Science which contributed 42% to the criterion variable and the overall Performance in the 2000 JSCE examination which contributed 41%. The relative effects of the independent variables (JSCE 2000) on the dependent variable (SSCE 2003) are indicated in Table 12.

In Table 12, the probability was less than 0.05 in the overall performance of students and in English Language, Chemistry and Biology. This shows that there was a significant relationship between all the predictor variables and the credit performance of students in these subjects in the 2003 SSC examinations. The regression equation has also predicted a significant amount of the adjusted R^2 . In the overall performance, the variables predicted 24% of the variance, that is, the value of adjusted R^2 . The

Table 11: Output of the multiple regression analysis

Predictor variables	Credit Perf. 2003 SSCE					
	English Signif. T	Math Signif. t	Physics Signif. t	Chemistry Signif. t	Biology Signif. t	Overall Perf. Signif. t
Overall Credit Perf. in 2000 JSCE	0.02	0.03	0.04	0.02	0.02	0.03
Credit Perf. in 2000 JSCE English Lang.	0.01	0.03	0.50	0.03	0.01	0.00
Credit Perf. in 2000 JSCE Math	0.02	0.12	0.08	0.09	0.06	0.10
Credit Perf. in 2000 JSCE Integrated Sc.	0.05	0.03	0.10	0.03	0.01	0.00
(constant)	0.01	0.12	0.10	0.01	0.00	0.00

Table 12: Effects of the independent variables (JSCE 2000) on the dependent variable (SSCE 2003)

Subjects	Sum of squares		Mean squares		Multiple R	R ²	Adjusted R ²	F	Sig. F
	Regression	Residual	Regression	Residual					
English Lang.	0.56	3.72	0.13	0.02	0.41	0.25	0.23	12.1	0.00
Math	0.57	7.10	0.12	0.02	0.37	0.24	0.18	3.4	0.10
Physics	1.37	3.95	0.34	0.03	0.38	0.29	0.21	18.3	0.06
Chemistry	2.31	7.41	0.48	0.03	0.43	0.27	0.25	20.5	0.01
Biology	1.12	5.97	0.24	0.03	0.47	0.25	0.23	11.3	0.00
Overall Perf.	22.8	87.20	5.10	0.37	0.45	0.28	0.24	12.5	0.00

variables also predicted 23 % of the variance in English Language, 18 % of the variance in Mathematics, 21 % of the variance in Physics, 25% of the variance in Chemistry and 23% of the variance in Biology. This shows that the JSC performance was a fairly low predictor of academic performance in the SSC examinations.

DISCUSSION

In the foregoing, the predictive strength of the JSC examinations in predicting performance at the SSC examinations in Ondo State, Nigeria was examined. Although the performance level was low in the examinations thereby supporting earlier findings [23-25], the performance varied considerably from one subject to another. The findings tend to agree with those of some previous researchers [26]. In some cases, the findings tend to disagree with those of some other researchers [7, 19, 27]. The findings indicating significant relationship between the performance of students in the JSC 2000 and the performance of the same students in the SSC 2003 examinations agreed with those of [17] who found that the Kenya Certificate of Primary Education (CPE) had a moderate linear relationship with the Cambridge secondary certificate (CSE) examination grades. The findings were in consonance with the findings made by [11] that students with high number of credits in Nigerian secondary school examinations performed well in higher institutions.

The findings were, however, contrary to the findings made by [28] who found no significant relationship between students' overall performance in the JSC and the SSC examinations in Ekiti State, Nigeria. The findings were at variance with the findings made by [29] who reported that the Osun State JSC examination is a poor predictor of students in the SSC examinations. This suggests that further research should still be conducted in this area. The findings on indicating that performance in JSC Integrated Science could effectively predict performance in SSC Chemistry and Biology were however, contrary to the findings made by [19] who reported that the JSC Integrated Science could not singly predict the performance of students at the SSC Chemistry and Biology. The findings indicating that the JSC Mathematics was not a good predictor of performance in SSC Physics negated the findings made by [7] who claimed that JSC Mathematics examination was a good predictor of performance at the SSC Physics in secondary schools in Ekiti State, Nigeria. The findings indicating that the JSC Mathematics was not a good predictor of performance in SSC Mathematics also negated the findings made by [30] who reported that the JSC Mathematics was the best predictor of SSC Mathematics examinations. The findings however agreed with the findings made by [1] that the JSS English Language is a good predictor of performance in the SSC English Language. It was however, noticed that multiple regression revealed more about the variables and their

relationship with students' credit performance in the SSC examinations This might be due to the fact that multiple regression provides an estimate of the variance in the criterion variable accounted for by the predictor variables.

CONCLUSION

Based of the findings of this study, it is concluded that the performance of students at Junior Secondary Certificate (JSC) examinations is a moderate predictor of academic performance of students at the senior secondary certificate (SSC) examinations in Ondo state, Nigeria. Considering the findings, it is recommended that the JSC curriculum should be reviewed in line with the SSC syllabi in the various subjects and in accordance with the provisions of the National Policy on Education [2]. Government should organize more induction courses, seminars and workshops for teachers to expose them to new strategies in teaching while the State Ministry of Education should embark upon more inspection and monitoring of schools to ensure that effective teaching and learning take place in schools.

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