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Teacher and Low Achievement in Physics in Tripoli, Libya

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ABSTRACT

This study attempts to investigate if there is any relationship between selected teacher related factors and academic achievement in physics of high school students in Tripoli, Libya. A sample of 100 science students, 50 males and 50 females from two randomly chosen high schools in Tripoli, Libya. Two instruments were used in the study. The physics achievement test (PAT), was designed to assess student performance in physics. The second was a student questionnaire (SQ), designed to obtain information of teacher factors. Main findings of the study show that making students understand of what were taught and Teacher's provision of adequate exercises were highly related to students achievement. Recommendations regarding the need for a multivariate study on a national scale and the need to rethink pre-service and in-service teacher education programs were made.

KEYWORDS*:* students achievement in physics, teacher understanding

1 INTRODUCTION

Teacher has always been key player in the system of education as it greatly affect students 'learning in the classroom. That the world today is changing rapidly, and produces new challenges in all areas of development, and in order to deal with these challenges, deservedly, requires preparation and qualification of human cadres educated and trained , capable and functionally to successfully perform the tasks entrusted to them both in their respective fields .

The objective of this study sheds light on a substantive reason, that hurt to find a phenomenon in the low level of academic achievement of learners at different levels of education in general, and especially physics, namely how the teacher and his performance in the classroom.

Science education has become a major concern in almost all countries and its development has been accorded a high priority. Libya is no exception. Science is taught in Libyan schools at the preparatory level as General Science and as separate subjects - Physics, Chemistry and Biology - at the high school level. The impact of scientific progress, proceeding at a rapid pace, demands that children should receive a sound education in the sciences.

Thus, physics, the science of the properties of matter and energy, is recognized as an essential component of a child's education. Education in physics helps the child to understand the physical universe and also develops skills such as observing accurately and completely, analyzing, thinking and judging. In addition, it fosters and develops interest, positive values, curiosity and creativity. All these acquired through education in physics are required to satisfy the needs of socioeconomic development in Libya such as energy, natural resources and productivity. Another important reason for the inclusion of physics in the child's education is that the ideas and results of physics are relevant to society and everyday life.

Hence physics is of utilitarian value to the child and the society. For the nation to develop economically, it necessitates that the children are literate in physics and technology.

Teacher effectiveness is typically measured by traditional teacher qualification standards, such as experience, education, and scores on licensure examinations. RAND researchers found no evidence that these standards have a substantial effect on student achievement in the Los Angeles public elementary, middle, and high schools. Alternative measures of teacher qualifications and different kinds of reward systems might be more effective at improving teacher quality

Adodo (2007) argued that one key overriding factor for the success of students' academic achievement is the teacher. In the same vein, Ibrahim (2000) believed that teachers' qualifications and exposure can go a long way to bring about pupils' high academic achievement. It is probably for this reason; Ibukun (2009) asserted that no education system can rise above the quality of its teachers.

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Considering the assertions of Ibrahim (2000), Adodo (2007), and Ibukun (2009), it implies that teachers' role in the preparation of students to succeed in examinations cannot be undermined.

Usman (2003) argued that the shortage of qualified teachers is responsible for the poor academic achievement observed among the students while Ademulegun (2001) argued that students taught by more qualified and experienced teachers in terms of knowledge of the subject matter perform better than those taught by less qualified but experienced teachers. The educational analysis recently carried out in Nigeria by the National Economic Empowerment and Development Strategy (NEEDS, 2005) indicated that more than forty nine percent (49%) of the teachers, in Nigeria, is unqualified. This revealed the quality of teachers teaching various school subjects to the secondary school students. The teachers teaching biology as a subject in the various secondary schools would probably be among the said over forty nine percent unqualified teachers.

Apart from the quantitative expansion in the education system, the Libyan government has made efforts to improve the quality of education at all levels. In the area of science education, including physics education, at the lower secondary and high school level, the teaching of General Science and pure Sciences including Physics has been upgraded. Teachers have been trained, laboratories and facilities have been provided in each school and, to support the teaching staff, laboratory assistants have been employed. Since physics is an experimental science, the importance of laboratory activities has been stressed.

However, in spite of the attention given, it is common knowledge that student performance in physics examinations is poor.

Research findings, to date: on student academic achievement (performance in examinations) have suggested a number of different factors as influencing student performance. This is evident from the mention of the findings of these few studies. For instance, the Coleman et.al report (1966) suggested that academic achievement was affected by family background factors (eg. Socioeconomic status of parents) and that per pupil expenditure and school factors had little relationship to achievement.

Anderson (1987, p.83) found 'the prior learning and attitudes that students bring to particular classrooms and courses influence what they learn in these classrooms'.

Bourke (1986) found that a teacher effect was stronger than all other school inputs, with the effects becoming more pronounced with increasing grade level. Further, according to the review by Glasman and Biniaminov (1981), some studies have suggested a relationship between performance and the availability and use of the school library.

The findings of past studies, in certain cases, have suggested the same factor as having a different effect in different countries or context. For example, Heyeman and Loxley (1983), contrary to the earlier study mentioned by Coleman et. al. (1966), found that, in lower income countries, the influence of pupils ' social status on achievement was not significant and that school factors had greater influences. It is clear therefore that attention needs to be paid to research on factors determining student performance in a particular country or context in order to be useful to educators in improving the educational processes towards better student performance.

1.1 statement of problem: The problem is the poor performance and achievement in physics by the students studying in high schools in Tripoli, Libya.

1.2 The factors causing the problem: More specifically, the researcher sought to answer the following questions:-Is there any relationship between student achievement in physics and the teacher factors in terms of?

i) Students' Perception of Qualification of Teachers?
ii) Students' Understood Physics from Teacher?
iii) Students' Need for Extra Explanation?
iv) Students' Demand for Extra Exercises in Physics?
v) Teacher turnover?

1.3 Objectives Of The Study: This study concerned itself with the levels of performance in physics and the factors associated with it.

The specific objectives of the study were to:

1. Determine the level of achievement in physics among high school students in Tripoli, Libya, in terms of their performance in a physics test, designed by the researcher.

2. Determine whether there is any influence of qualified or unqualified teachers, teacher turnover and teacher quality on students' achievement in physics.

1.4 Significance of The Study: The research is of dual significance. Firstly, it adds to our knowledge in the area of determinants of academic achievement. Specifically, the results of the study will provide us with information as to whether the factors such as teacher factors influence academic achievement in physics in the Libyan context.

Secondly, it is hoped that the findings will enable better planning of education in Libya, in terms of the teacher training.

1.5 Limitation Of The Study The investigation is limited to students in Tripoli and to final year high school students. The sample of the study comprised only 100 science students. It does not adopt a causal model which will entail a large sample and a more sophisticated analysis, which is not within the resources of time and money of a single researcher. Further, the study only deals with a few factors, in other words, it is not a multi-varieties study. The instrument used to measure academic achievement in physics only dealt with a limited content area of Electricity and Magnetism and not the whole domain of physics.

1.6 OPERATIONAL DEFINITION OF TERMS

Academic achievement in physics: The percentage mark obtained by students in the physics test designed by the researcher.

Teacher factors: The teacher factors are specifically:-

i) Students' Perception of Qualification of Teachers?
ii) Students' Understood Physics from Teacher?
iii) Students' Need for Extra Explanation?
iv) Students' Demand for Extra Exercises in Physics?
v) Teacher turnover?

High school: This level follows the three years of preparatory school. Admission to the University is based on the successful completion of this level of education, which is three years. The certificate earned at the end of the high school is termed Taugihia.

2. REVIEW OF RELATED LITERATURE

The influence of diverse variables such as gender, school facilities and experiences (including teacher quality) and student variables on academic achievement of students have been and is continuing to be an area of interest to educators and educational planners both in the developing and developed countries. In other words, many researchers have focused on the important issue of factors influencing student achievement. The question of whether genetic factors, and educational investment of resources into schooling make a difference in educational achievement has been tested by many researchers in many countries at various levels of education. Educational achievement has been taken to mean general school achievement or achievement in specific subject areas.

From among all the factors researched into, in the search for the determinants of academic achievement, it was decided in this study to focus on four groups of factors of interest to the researcher, namely"

i) Gender of students.
ii) School inputs, specifically availability of a physics laboratory, availability and use of a library and certain teacher characteristics
iii) Students' interest in physics and their perception of the role of physics in society

Hence, this review will consider briefly the researches on the relationship or association of the three above-stated groups of factors to academic achievement, particular achievement in the sciences.

2.1 The Relationship between School Variables and Academic Achievement: The identification of school variables, which influence student achievement, has been a concern of researchers even before the 60s. For example, Goodman (1959) found that per pupil expenditure, teacher experience, number of specialist teachers, classroom atmosphere was significantly associated with achievement. However, increased activity in this field of research ensued with the report by Coleman et al (1966) that school characteristics had little or no impact. The IEA study (Comber and Keeves, 1973) also indicated that school variable effects on science achievement was only minimal. These findings are contradicted by Heyneman (1976), who, from data collected in Uganda, showed that school inputs, especially school resources, account for a high proportion of variance in achievement.

Further, Heyneman and Loxley (1982) conducted a re-analysis of the data collected for the IEA study and showed that for the developing countries, a much larger proportion of the variance in science achievement is explained by school effects. The regression analysis produced the proportion of explained academic achievement variance due to school effects (material resources and teachers) as 90.0 % for India, 88.0 % for Columbia, 81.0 % for Thailand and Brazil, 22.0 % for Australia, 26.0 % for Scotland and 27.0 % for Sweden.

School effects research focused on a variety of school inputs which include school physical facilities (school library, science laboratory and equipment), overall expenditure, textbooks, average class size, teacher characteristics (qualifications, experience, teacher quantity and quality, teaching method, nature of teacher-pupil interactions), existence of science society or clubs and curriculum.

With regard to research on the effect of teacher characteristics on academic achievement the reviews of studies in the area by Rossi (1961) and Simmon and Alexander (1978), state that the findings seem to be equivocal. For example, Simmon and Alexander (1978) found that in 19 out of 32 studies, students taught by teachers without teaching qualifications performed as well as those taught by professionally trained teachers.

However, other researchers suggested that there is substantial evidence that professionally trained teachers do make a difference in students' performance and attitude formation, especially in developing countries (Husen et al, 1978, Rutter et al, 1979 and Brophy and Good, 1986).

For example, Husen et al (1978) found that motivation to learn science is influenced by teachers and extent of exposure to science experiences.

Rutter etal (1979), from data collected from schools in England, demonstrated that the school plays a significant role in enhancing academic development of children. An early study by Mayeske (1972) suggested that teacher characteristics, such as number of teachers with a higher degree, types of undergraduate preparation, teacher experience and teachers' verbal score, exert a stronger influence on student achievement than physical facilities and programs in the school.

Gallagher (1987) listed the quality of instructional experience, which is dependent of school resources (both human and material), as one of the nine factors having a significant effect on variance in achievement and attitudes in science. Further, Simmon and Alexander (1978) indicated that assignment of homework (a teacher variable) demonstrated a positive relationship with achievement.

Anderson (1987) concluded that students' perception of their classroom and the instruction they experience influences their achievement and attitudes. Specifically, he found that the extent, to which students perceived their classrooms as having an academic orientation, has a weak but consistent influence on student achievement across the countries studied. In addition, students' perception of the degree to which their teachers provide the necessary structure for their learning (an aspect of teacher quality) also exerts a weak but consistent influence on student achievement. In terms of classroom activities and teacher behaviors, he reports that students achieve lower in classrooms in which more time is spent on activities related to classroom management. According to Heyneman (1976) and Theisenetal (1983), school material resources and human resources are considered important factors in school learning. The teacher is important in that he or she is the person who selects plans and provides the educational experiences in line with the curriculum guidelines. The material resources aid the teacher in organizing learning experiences, which the student can benefit from. The effect they posited however depended on the implementation.

2.2 Summary: In summary, research on the factors contributing to differences in achievement reveals a complex picture, owing to the many diverse variables that interact in the teaching and learning processes and how these variables affect achievement. Socio-economic variables have been consistently found to be a source of variation in academic achievement at least in the developed countries. Gender emerged as another source of variation in achievement. Certain teacher and student variables also seem to exert an influence on academic achievement. However, the effect of the laboratory which is accepted and perceived as beneficial to science learning has not been demonstrated to influence achievement.

3.RESEARCH METHODOLOGY

3.1 Design Of The Study: The influence of selected factors on high school students' performance in physics was investigated empirically on the basis of a survey of students in terms of their academic achievement in physics (dependent variable) and selected influencing factors.• The data on the influencing factors (independent variables) were obtained from the students using a questionnaire. The variables examined are listed in the figure below.

Figure 1: Variables in the Study

Independent Variables	Dependent Variables
-Students' Perception of Qualification of Teachers - Students' Understood Physics from Teacher - Students' Need for Extra Explanation - Students, Demand for Extra Exercises in Physics - Teacher turnover	Students' achievement in science in physics test

3.2 Population and Sampling: The population of the study was the high school students in city of Tripoli, Libya. The sample of students was restricted to final year high school students. There were 20 high schools in Tripoli and only 2 high schools were selected for the study. The 2 high schools were selected by cluster random sampling. It was found that in the 2 high schools, the number of year three classes ranged from three to seven. The researcher then selected two classes of students from each school by simple random sampling making a total of 100 students from the two schools. This represented about 10% of the total student's population (100 students of students).

3.3 Instrumentation: Two instruments were used in the study. The first, the achievement test, was designed to assess student performance in physics. The second was a questionnaire, designed to obtain information on teacher characteristics and factors.

3.3.1 The Physics Achievement Test (Pat): The Physics Achievement Test (PAT) a pencil-and-paper test was developed by the researcher. The test consisted of 25 multiple choice items, based on the first four chapters of the grade three physics text book entitled "General Physics Electricity and Magnetism" for the Libyan High Schools. The test items were drawn up to cover the content and objectives of the area of physics already taught by teachers in Tripoli by July 20.

3.3.2 Validity of Pat: PAT consisted of 25 question items. The question items were contracted such that they were representative of the whole domain of content of the four chapters and in accordance with the emphasis given the specific content topics by the teachers. Both the lower (i.e. knowledge and understanding) and higher (application and analysis) levels of cognitive processes were tested by these items. The table of specification of the final form of the test is presented in Figure 2.

Figure 2: Specification of the Test

Content	Low level	High level
Forces & Electric Fields	1,2,3,4,14	5,6,8,9
Electric Strain	7,11,12,22	10,17,25
Electric Capacity & Capacitors	13,16,21,24	18,19,20
Electric Instruments	15	

The draft test comprising 25 items was given to two physics lecturers in the department of physics of the Tripoli University in Tripoli. The lecturers were asked to judge and comment on these 25 items in terms of coverage, phrasing, ambiguities, difficult vocabularies and distractors. This test of 40 items was also pilot tested with a group of 30 high school final year students in one Tripoli school, not included in the sample of the study.

The responses were item analyzed revisions were made based on the comments of the judges and students and the item analysis results. Some items were discarded and the amended test of 25 items was judged by the judges as content valid.

3.3.3 Reliability of The Test: For reliability, a random sample of 30 students from one school in Tripoli was chosen for the test-retest procedure, the test being administered two weeks apart. The Spearman correlation r had a calculated value of 0.84.

3.4 Data Collection Method: At the beginning of the administration of the test and questionnaire, the purpose of the study was explained to the students. The students were not permitted to consult each other during the conduct of the test. The students were given only 30 minutes to complete the test. Upon completion of the PAT, the students were given the questionnaire. The students were given 20 minutes to complete the questionnaire. The administration of the test and the questionnaire to all the sampled students was completed within two weeks.

3.5 Analysis Of Data: The data collected were coded and analyzed. The researcher used the Statistical Package for Social Science (SPSS/PC+) Norusis (1988) for the analysis of the data. Each item of the

questionnaire was separately analyzed and cross-tabulated for factors, that is, gender, school variables and student variables.

The following analytical procedures were conducted on the coded data:

1. A t-test was carried out to determine whether there was any significant difference in the performance of male and female students.
2. Since the data utilized for determining the relationship were of nominal nature, the Chi square test was employed to determine whether students' achievement in physics was related to the independent variables, qualification of teacher, teacher quality, and teacher turnover.
3. A measure of association, Cramer's V (referred to by Norusis, 1988, p.283), was employed to determine the strength of the relationship of the factors to students' achievement in physics.

4. RESULTS AND DISCUSSION

This study focused on the influence of a number of independent variables on students' achievement in physics. This presents and discusses the results of the analyses of data collected through a student questionnaire (SQ) and an achievement test in physics (PAT).

4.1 Students Achievement In The Physics Test (Pat): Students' achievement in the PAT was varied. The highest score obtained in PAT was 88 marks and the lowest was 16 marks. Therefore, the range of marks for the sample of students was 72. The sample of students was categorized into three groups in terms of their performance in PAT.

Table 1: Student Achievement in PAT

Achievement levels	Average Score	Number	percent %
High	65-88	29	29.0
Medium	41-64	40	40.0
Low	16-40	31	31.0
Total		100	100

Students who obtained scores of 65 marks and above were categorized as high achievers. Students who scored between 41 and 64 marks were categorized as medium achievers. Low achievers were students who scored 40 marks and below. The number and percentage of students in each category was obtained and are as presented in Table I.

The majority, 44.0% (44) of students appear to fall in the medium level of achievement, though there was a fair proportion 24.0% (24) of students who obtained high scores, while the remaining 32.0 % (32) of students obtained lower than 40 marks.

4.2 Teacher Variables and The Pat: The teacher variables considered in this study include teacher qualification, students' perception of teacher quality and teacher turnover.

4.3 Teacher Qualification and The Pat: In order to answer Research Question, Is there any relationship between students' achievement in physics and the teachers qualification, the data on teachers qualifications were obtained from responses to Item 2 of the student questionnaire (SQ). Table 2 presents the data of investigate the relationship between students' achievement in the PAT and the students' perception of their teachers' qualification.

Table 2: Cross-tabulation of Students' Achievement Levels In Physics by Students' Perception of Qualification of Teachers

Qualification of Teacher	Students' Achievement Level							
	High		Medium		Low		Total	
	N	%	N	%	N	%	N	%
Qualified	24	48.0	25	50.0	13	26.0	62	62.0
Unqualified	5	10.0	15	38.0	18	32.0	38	38.0
Total	29	29.0	40	40.0	31	31.0	100	100.0

Chi square = 0.31755, not significant, Cramer's V = 0.0254

From Table 2 above, which presents the data on whether the students perceived their teachers as qualified or not, it is observed that of the 62.0% (62) of students who indicated that their teachers are qualified, 24.0% (48) of these students obtained high achievement in the physics test, and 26.0% (13) of these students obtained low achievement.

However, Chi Square computed was found to be 0.31755 and was not significant at the 0.01 level. There appears to be no significant relationship between students' achievement in physics and students' perception of their teachers' qualification.

4.4 The Teacher Quality and The Pat: In order to answer Research Question, Is there any relationship between students' achievement in physics and the teacher quality, the students' perception of the quality of their teachers was obtained from their responses to Items. Students were asked to respond to whether they understand what was taught, whether they needed further explanation in physics and whether they needed more exercises in physics.

Table 3 presents data on whether or not the students understood what was taught to them in physics. Table 3 shows that a large proportion, 56.0% (56) of students indicated that they understood physics taught by teacher while 43.0% (43) of students stated that they did not understand physics taught to them.

From Table 3 below, it is observed that a higher proportion, 58.0% (29) of students, who indicated that they understood physics taught by the teacher, obtained high achievement in the physics test as compared to 6.0% (3) of students who obtained a low level of achievement.

On the other hand, at 43.0% (43) of those who stated that they did not understand physics as taught by the teacher, only 0.0% (0) obtained high achievement, while 56.0% (28) obtained a low level of achievement in the PAT.

Table 3: Cross-tabulation of Students' Achievement Levels In Physics by Whether Students' Understood Physics from Teacher

Understood Physics from Teacher	Students' Achievement Level							
	High		Medium		Low		Total	
	N	%	N	%	N	%	N	%
Yes	29	58.0	25	50.0	3	6.0	57	56.0
No	0	00.0	15	38.0	28	56.0	43	43.0
Total	29	29.0	40	40.0	31	31.0	100	100.0

Chi square = 35.27 at P 0.001, Cramer's V = 0.2680

The Chi square was found to be 35.27 and was significant at the 0.001 level. It is therefore clear that there is a significant relationship between perceived teacher quality with respect to teacher's ability to make students understand and students' achievement in physics.

Table 4 presents the frequencies and percentages of students' in the high, medium and low achievement categories by students need for further explanation. From Table 4 below, it is observed that a larger proportion, 54.0% (27) of the students who indicated that they needed extra explanation in physics obtained low achievement in the physics test, but only 20.0% (10) of the students obtained high achievement in the physics test.

On the other hand, while 38.0% (19) of the students who indicated that they did not need extra explanation in physics obtained high achievement in the physics test, 8.2% (4) of the students obtained low achievement.

Table 4: Cross-tabulation of Students' Achievement Levels In Physics by Students' Need for Extra Explanation

Need for Extra *Explanation*	Students' Achievement Level							
	High		Medium		Low		Total	
	N	%	N	%	N	%	N	%
Yes	10	20.0	20	40.0	27	54.0	57	57.0
No	19	38.0	20	40.0	4	8.0	43	43.0
Total	29	29.0	40	40.0	31	31.0	100	100.0

Chi square = 12.37554 at P 0.001, Cramer's V = 0.1588

The Chi square computed (12.38) was found to be significant at the 0.01 level therefore, be inferred that of significance. It may, there is a significant relationship between achievement in physics and teacher quality in terms of the students' need for extra explanation.

Table 5 presents the frequencies and percentages of students in the high, medium and low achievement categories by students' demand for extra exercises in physics. Table 5 shows that a high proportion of students 61.0% (61) indicated that they needed extra exercises in physics, in other words that the teachers did not give them enough exercises in physics. From the same Table 5 below, it is observed that a smaller proportion 28.0% (14) of students who expressed that they needed extra exercises in physics

obtained high achievement in the physics test, compared with 46.0% (23) of students who obtained low achievement in physics.

Further, a larger proportion, 30.0% (30) of students who expressed that they did not need extra exercises in physics obtained a high achievement, while only 16.0% (8) who indicated that they did not need extra exercises obtained low achievement.

Table 5: Cross-tabulation of Students' Achievement Levels In Physics by Students, Demand for Extra Exercises in Physics

Need Extra Exercises in Physics	Students' Achievement Level							
	High		Medium		Low		Total	
	N	%	N	%	N	%	N	%
Yes	14	28.0	24	48.0	23	46.0	61	61.0
No	15	30.0	16	32.0	8	16.0	39	39.0
Total	29	29.0	40	40.0	31	31.0	100	100.0

Chi square = 102.58 at P 0.0001, Cramer's V = 0.4571

The Chi square computed (102.58) was found to be significant at the 0.0001 level of significance. It may, therefore, be inferred that there is a significant relationship between student achievement in physics and extent of exercises given by teacher. To conclude, teacher quality in terms of teacher explanation and teacher provision of enough exercises appears to be significantly related to students' achievement in physics.

4.5 The Teacher Turnover and The Pat: The effectiveness of physics teaching may be affected by teacher turnover and hence one of the questions of this study was whether there is any relationship between students' achievement in physics and teacher turnover. In order to answer this question one of the statements in Item required students to indicate whether physics teachers are changed during the period of the year.

Table 6 presents the relevant data to investigate the relationship between students' achievement in the PAT and students' perception of teacher turnover.

Table 6: Cross-tabulation of Students' Achievement Levels In Physics by Teacher Turnover

Physics Teacher Turnover	Students' Achievement Level							
	High		Medium		Low		Total	
	N	%	N	%	N	%	N	%
Yes	9	18.0	7	14.0	9	18.0	25	25.0
No	20	40.0	33	66.0	22	44.0	75	75.0
Total	29	29.0	40	40.0	31	31.0	100	100.0

Chi square = 4.91612 at P < 0.01, Cramer's V = 0.1001

About a quarter of the students sampled indicated that their physics teachers were changed during the year. Hence, there is a fair amount of teacher turnover. From Table 6 above, it is observed that only 18.0% (9) of students whose physics teachers were changed throughout the year obtained high achievement in the test, while 18.0% (9) of students obtained low achievement in the test.

However, the Chi square analysis on the data given in Table 6 produced a non-significant result. Teacher turnover therefore, does not appear to influence students' achievement in physics.

4.6 Summary of the Relationship between the Teacher Factors and Student Academic Achievement

Table 7 summarizes the aspect of the relationship of teacher variables and students' achievement in physics. As shown by the values of Cramer's V correlation, given in Table 7, it is clear that the teacher variable appears to be the more important factor influencing physics learning. The perceived quality of the teacher in terms of making students understand physics and providing students with extra exercises appear to be the important teacher variables influencing students' achievement in science. This seems reasonable since the teacher is the person who provides the learning experience for the students.

Table 7 :Relationship between School Variables and Students' Achievement in PAT

Variables	Cramer's V correlation
Teacher qualification	0.0254
Teaching towards understanding	0.2680
Need for extra explanation	0.1588
Need for extra exercises in Physics	0.4571
Teacher turnover	0.1001

5. CONCLUSIONS

This study set out to examine certain variables which might have some bearing on the level of performance of students in the high schools in Tripoli, Libya in the field of physics. The performance of students measured was restricted to cognitive development in physics. The population of the study was final year high school students. There were 37 high schools in Tripoli and only 2 high schools were selected for the study. The 2 high schools were selected by cluster random sampling. A total of 100 students took part in the study. The sample used represented about 10% of the total student population (1009 students). Two instruments were used in the study. The first, the achievement test, (PAT), was designed to assess student performance in physics. The second was a student questionnaire, (SQ), designed to obtain information on personal characteristics of the student, school factors and student factors. The performance of students was found to be varied (the range being 72 marks). The determinants of this variability in achievement in physics were the interest of this research. In this section, the major conclusions derived from the study will be summarized. In addition, the findings will be related to past research studies, and their implications will be discussed. Among the teacher factors, the factor which emerged as influencing students' achievement in physics was the teacher factor. Specifically two elements of teacher factor, that is, clarity of presentation, in other words, making students understand what they are taught and teacher provision of adequate exercises were found to be significantly related to students' achievement in physics. The results of these analyses might perhaps be taken as indicators for the need for a more detailed study to be carried out on the problem of students' level of achievement in physics in Libya. The present work, devoted to certain High Schools in Tripoli, could only be considered as an exploratory study. It is to lay the ground work touching on certain pressing issues while leaving the more deep-seated questions to be tackled in a more elaborate study.

The study, specifically, only concerned itself with the relationship between selected variables and student growth in the cognitive domain. Hence, student growth in areas other than the cognitive area needs to be studied. Since school learning, specifically physics learning, is a complex phenomenon with many variables involved and the variables interacting with one another, a multi-variate study on a national scale is recommended. This multi-variate study will be invaluable to shed light on the ways the social, political and educational factors operate and influence student learning.

The main concern, as it is with every educationist, had been the child's performance. The child's learning being the central focus, the educational process needs more attention, hence the influence of teacher-student interactions in the classroom on physics achievement needs to be undertaken through use of survey and observational strategies. Further, the teacher factor, specifically teacher quality in terms of clarity of presentation and provision of adequate work exercises for students to practice and consolidate the application of knowledge and skills, emerged as an important variable influencing students' achievement. These points to a need to rethink the preserves and in-service teacher education curricula and teacher preparation methods. Variables demonstrated as important such as teacher clarity of presentation need to be broken down into specific behaviors which are presumed to comprise them and these specific behaviors need to be developed in the teachers so as to improve the quality of teachers.

Further, it is recommended that special courses, seminars and workshops for the teachers be provided, on a regular basis, to encourage them to develop their knowledge and skills and hence improve student achievement in physics.

The teachers also need to be skilled in the effective use of the physics laboratory, equipments and school library to promote students ' learning. Further, the teachers should be able to develop interests in physics among their students through being able to engage students effectively in class activities and in science society activities. Gender was found to influence students' achievement within the sample studied. Nature of gender differences at all levels of education need to be examined in addition to the origins of gender related differences in the children and consequences of gender differences.

The study also raises certain socio-economic issues. Since a fair relationship between parental education and occupational levels and performance of students in physics was indicated by the study, there is a need for the authorities to restructure some of their policies so as to address the issue of the socio-economic levels of parents critically. Exposure to science-related experiences at home is a function of the socio-economic status of the family; hence it is necessary to raise the socio-economic levels of parents.

To conclude, this study on the factors contributing to differences in achievement in physics has merely scratched the surface but has identified some variables which are associated with achievement in

physics. However, further research (survey and experimental studies) is still needed to guide the practice of physics education towards improving the level of students' achievement in physics.

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