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ORIGINAL RESEARCH PAPER

The Effect of Social Conditions on Students' Academic Achievement in Physics Teaching

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ABSTRACT

This study aims to identify the effect of social conditions, especially the classroom, on adolescents' achievement in learning physics. The main approach is the integrated and multi-dimensional theory of social order, because it focuses on the strong connection between the central points of educational theories and avoids conventional reductionism. According to the facilities and nature of the research, the research method is social measurement and most reports are based on the survey results. The samples include 398 adolescents from 6 different high schools. The results confirm the research hypotheses by explaining 67% of the changes in students' physics scores. The results of multiple regression analysis suggest that mathematical intelligence, accountable academic achievement in the last year, interest in physics, and the teaching methods used by physics teachers play the most important role in reinforcing the physics score. Also, the friendly behavior of the physics teacher and the teaching methods used by the math teacher will weaken the physics teaching process and reduce students' physics learning ability.

Keywords:
Physics teaching, Physics learning, Social conditions, Social measurement.

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Introduction: Problem Statement

Physics has all the characteristics of a pure science due to its nature and methodology. This science has long been known as the mother of all sciences due to its educational dimensions and its teaching has been at the forefront of education specialists' attention. Physics, which is one of the oldest branches of science, is based on the statutory principles, precise methods of collecting data, and understanding and describing conditions, especially based on different levels of mathematics. Physics, as an analytical-content category, has the most mathematical expression in its concepts compared to other sciences and has distanced itself from abstract space and revealed content concepts and their relationship in various mathematical forms [1] Also, physics, as an analytical and content category, has been considered one of the leading sciences [2] and it has always given curious people the ability to observe and analyze the surrounding environment accurately.

Physics teachers and students are constantly exploring and reinforcing the internal consistency of their thoughts and behaviors by establishing an internal consistency and logical exploration, and ensuring their intellectual and moral development. Therefore, teachers and lecturers in courses such as physics and mathematics play a vital role. Students have special expectations from them.

For decades, people directly involved in physics education have raised a number of issues, including:1) students' low interest in physics; 2) lack of systematic study of physics by students; 3) students' gradual and severe failure in learning physics. However, now that a large amount of such reports are available on physics learning, it is thought that the issue of teaching and learning physics has taken on a strong social dimension. Therefore, this study was designed to consider the social aspects of high school physics education separately and independently. This study aimed to describe and analyze the social aspects of teaching and learning physics, and the main questions of this research are: 1) What is the level of students' interest in physics and is this interest a function of gender?; 2) What is the achievement rate of students in physics?; and most importantly, 3) What social factors, as educational factors, affect students' ability to learn physics?

This study contains as follows: At first we will review the background research and the theoretical framework. Then research model, hypothesis and methodology. We will report results and then we talk summery and conclusion.

Background Research

There are few studies addressing the issue of teaching and learning high school physics from a pathological perspective. In these studies, the social and cultural requirements of physics education are limited to two process-oriented (versus result-oriented) and student-centered (versus teacher-centered) dimensions, the important points of which are discussed below [3].

Comparative studies indicated that almost everything, from the content of the lesson to the test and assessment of students, in physics classes in Iran, Germany, the United States, France, and other societies has been teacher-centered [3,4] and teachers have been responsible for the whole process and the results, and students have been deprived of this responsibility.\\

Some of the research that can be considered as research actions are focused on group processes and results. However, it is true that according to social and cultural conditions in any society, the implementation of methods such as lesson study, both from student-centered and process-oriented dimensions has many obstacles [3-7]. Although these methods have a slow pace in students' achievement, they significantly guarantee students' knowledge and development by providing a happy and relatively laboratory social environment. In fact, these methods put students at the center of the educational process and provide them with learning concepts and making a connection between concepts [3]. Since physics lacks unique teaching and learning theories of its own, some scholars involved in the education system have tried to teach difficult concepts of physics using simple language, simplifying complex concepts, even mixed with humor, and providing clear contents. Therefore, they have provided contents that are based on the principles and methods of education [8-15]. For example, a content has been provided for teaching "density of materials and evolution of stellar packages" using the "simple to difficult" approach and its author has done well in this regard [16]. Some argue that the most important issue in physics education is that this science is intertwined with mathematics and in some cases with advanced mathematics. These scholars state that physics and mathematics are two relatively separate categories, and physics teachers must use real concepts and not engage their students' minds in mere mathematics, unless there is a need to solve problems and present mathematical models [17-19]. Also, the use of teaching aids in physics has been in line with this view and the correct use of technology addiction [20]. Some have taught gravity in a simple language with a mathematical approach. Although they use relatively advanced mathematics in their work, it is very instructive to teach how to use this mathematics. While teaching, there is a constant shift between mathematical models and real concepts of physics [21-24]. Contents have been developed in which complex concepts of "angular correlation functions" are taught according to the age of the learners [25]. There are also texts on the destruction of twin stars and general relativity written by different scientists in simple languages, and these complex concepts are explained by illustrating and presenting simple concepts, and new challenges arise [26-29]. Others have tried to simply discuss the difference between quantum perspectives and classical physics, and acquaint students with two seemingly contradictory paradigms [30-31].

As mentioned, valuable studies have been done to teach physics at the high school and college levels. However, despite these efforts, teaching and learning analytical and content sciences such as physics are still among important issues in science learning and teaching. The following are the perspectives and theories in which science teaching has been considered as a theoretical perspective or system either directly or implicitly.

Review of Literature: Theoretical Framework

Since this study focuses on the factors affecting physics teaching, it is necessary to make a fundamental distinction between teaching theories and learning theories. Learning theories are mostly descriptive. These theories describe the phenomenon as assumed to exist, and then explain how learning happens, while teaching theories on which this study focuses are essentially prescriptive. Prescriptive theories describe actions that, if teaching includes certain characteristics, will lead to certain types of learning (please see [32]: Chapter 2). The most important feature of teaching theories is their power to explain and predict. Such theories have interconnected variables that are hidden in a subtle order and reveal better learning conditions [33,34].

In line with analytical science teaching, behavioral and social sciences have dealt with relatively external conditions of science learning [35-37]. Most of these theories fall under the category of socialization theory. In this area, the school environment monitoring views and school management theories are discussed more specifically. In these theories, the moral atmosphere of the school, as a "hidden educational activity", often provides educational conditions for the students [38,39]. In this theoretical framework, in order to explain students' academic achievement in school, the spirit of cooperation is emphasized and cooperation is considered a suitable alternative to classroom discipline. Although students' cooperation often disrupts classroom discipline and learning, they insist that teachers do not have to worry about this, and instead of maintaining discipline in the classroom, they should allow students to participate in educational activities [40,41].

Regarding the effect of school environment on science teaching, we can point to the functional aspect of learning theories, which encourages teachers to use different teaching methods. Students can also benefit from various social areas and learn the relevant sciences. Accordingly, conditions are provided for students to learn various sciences, including physics, in different communication and educational areas. In short, classroom management techniques are: 1) direct transfer; 2) interaction-oriented teaching; 3) problem-based learning; 4) individual instruction (see [42], Chapters 8, 9, 10, 11). These techniques, which are inseparable from the group interaction method, are reflected in appropriate socio-cultural contexts.\\

One of the views that has been used in socialization and plays a central role in PCK formal education studies, is the view of social learning and model theory. This view holds that learning is not an individual matter in humans, but that in addition to individual factors, social factors such as observing the behavior of others and reinforcing model behaviors by others also affect learning [43-45]. Therefore, the use of examples, models, and patterns is also a key method for education thinkers. In addition to using other methods, these thinkers see coherent and integrated learning and development as dependent on the introduction of examples such as parents, teachers, and others; it is clear that in formal education, the role of teachers is more important than any other model [46-49].

Since the late twentieth century, social research has shown that the contribution of social variables, as educational conditions influencing the learning of analytical sciences, has been very significant. Some research supports this theory that social order facilitates the formation of a variety of education, including mathematics and physics. Accordingly, some cultural and scientific research based on science education has taken on a global form and has become theoretical. The comparative studies of the TIMSS International Research Group is an example in this regard. Comparative studies reveal that in the Far East, adherence to ethics, order, and hierarchy as Eastern ethics has brought them many blessings. One of these blessings is the academic achievement of students in mathematics and physics. For example, comparing Japanese students with their non-Japanese counterparts clearly demonstrates their adherence to order, hierarchy, and acceptance of parental authority (especially mothers) and school authorities [6,26,50,51].

Based on comparative studies, other variables have also been considered as conditions affecting academic achievement in mathematics and physics. Frequent research has shown that Eastern students in the US have significantly higher academic achievement than white students with the same IQ, especially in mathematics and physics. The most important reason for the superiority of these students is that they are more docile, orderly, diligent, and willing to succeed [4,6,26]).

What has come to light so far reveals that the most important social theories and research that have focused on learning mathematics and physics are clearly or implicitly the subsets of social order theory. In the following, according to the review of literature, the theoretical framework and research model are presented.

The view of social order on the process of formal education, regardless of the emphasis on teaching methods, focuses on the conditions and type of order governing the educational environment and the existing nuances [52]. In this field of study, the social order theory takes the form of PCK formal education studies while maintaining the dignity of surjective studies. Based on this view, there is a more fundamental reality in "school management" other than the realities of teaching subjects by teachers, as well as students’ success and failure in exams, which is the classroom as a moral order. In other words, the "social forms" of teacher-student and student-student communication are more than the forms of educational experiences. These relationships are induced by values, and the role of the teacher in relation to the student is to show the values of society. This is exactly the concept of "hidden curriculum" presented by contemporaries (see [53] Chapter 4).

From the perspective of social order, there are a variety of nuances in educational discipline and hidden curriculum affecting the teaching process, including: 1) Informal expectations of the school conveyed by implicit messages ; 2) Results, messages, or unwanted learning that are destructive to the educational process ; 3) Implicit messages arising from the structure of schooling ; 4) Including some learning outcomes or sub-outcomes, especially those that are not intentional and further strengthen the educational process; 5) Word of mouth pedagogy for forming stable tendencies towards liking and disliking ; 6) Illegal ethical or normative component in education [46, 54-56].

However, attributive conditions such as genetic traits are also considered in this theory, because environmental conditions are reflected in hereditary traits. With an emphasis on social conditions in teaching physics, mathematical and abstract intelligence [1]), as well as intrapersonal talent and self-assessment, are identified and evaluated as influential features on the learning of analytical and content sciences such as physics [57-61]. In the following, according to the epistemological benefit of this research, the research model and hypotheses are derived using the social order theory.

Research model and hypotheses

This research is designed with a focus on the social conditions affecting students' academic achievement in physics. According to the epistemological benefit and structural limitations in data collection, this is limited to three conditions of order at micro level, namely individual, family, and educational (school) characteristics. Figure.1 shows this model and research hypotheses are derived from the simple model.

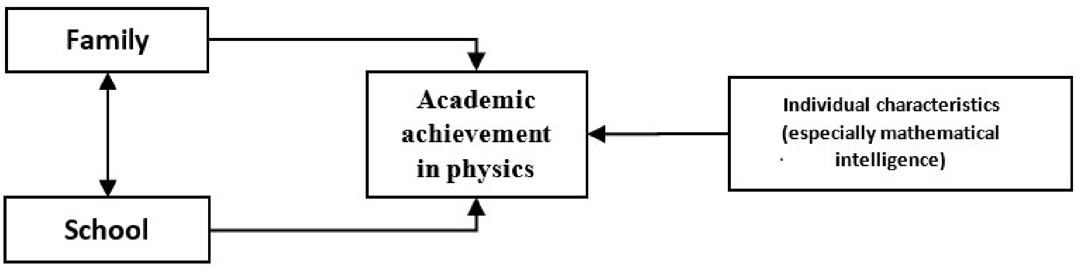

FIG. 1. (Analysis model)- Casual model of students academic achievement in physics.

Research hypotheses

According to the research model and relevant theories, the following non-directional hypotheses suggest the effect of educational conditions on students' academic achievement in physics:

Hypothesis 1

Discipline in school (including the relationship between teachers and students) affects students' achievement in physics.

Hypothesis2

Discipline in the family (similarity of fortune, compatibility, empathy, and consensus between parents and children) affects students' achievement in physics.

Hypothesis 3

Individual characteristics of students (mathematical intelligence and intrapersonal talent) affect students’ achievement in physics.

In the following, the effective components in strengthening students’ learning and the contribution of different conditions in explaining students' learning will be examined experimentally.

Methodology

In this study, due to the lack of a specific theory for learning physics as the main problem, the "social measurement” methodology was presented as the research design. The social measurement methodology has been developed as the logic of mind, instead of merely emphasizing a system of organized principles and guidelines. Thus, a social measurement researcher is a scientific element that goes beyond all analyses to address the subject of their research. In their recommendations to other researchers, a social measurer considers valuable what they have done or may be able to do, instead of what they should do (according to certain principles in classical studies). They say what order of results lies in their research, not the kind of results that are available or the kind which is not appropriate (ready). This kind of analytical perspective, on the one hand, requires self-awareness and, on the other hand, requires tolerance. A methodologists knows that the same goals can be achieved by other paths.

The main method of this study is the integrated social measurement method, because according to the researcher, getting an overview of the success status of young people in the samples requires a qualitative research and survey of the research population. The sample consisted of 400 high school students who were selected by cluster sampling method from Alborz province, Iran. The sample size was accurately calculated by Cochran’s formula. It should be noted that two of the 400 questionnaires were excluded from the total number of questionnaires due to reluctance of the respondents to participate carefully, and finally 398 questionnaires were included in the analysis stage.

The data collection tools included notes obtained by researchers from interviews with school social and cultural authorities, and a questionnaire containing systematic questions at the family, school, classroom, and individual levels, filled out by participants. This questionnaire was prepared by combining the existing questionnaires in previous research that had a high validity for measuring social order variables [61,62]. Thus, the unit of analysis is the individual. The research mathematical models were extracted using SPSS software, and the final report was presented in accordance with the principles of social survey and with the approval of qualitative research (see [63]: 215-227).

Results

Percentage	Interest Type
68.2 %	Interested
31.8%	Not Interested
100	Total

Table1. The level of student's interest in Physics

In this section, a brief description of the conditions of the participants in the research sample is provided. Then, mathematical models are presented to explain students' achievement in getting a good physics score. The most important criterion for selecting schools was the principle of random sampling. Due to the limitations of access to schools and educational environments, the access criterion was also included in these samples.

Thus, by considering the criteria of the type of existing high schools, and most importantly, access to the school, six public and private high schools were randomly selected. These high schools included two public high schools for boys, two public high schools for girls, two private Exceptional Talents high school for girls and two private Exceptional Talents high school for boys. Approximately half of the students in the sample were girls (48%) and the other half were boys (52%).

Due to the intensive curriculum content of the 12th grade students and the significant limitation for interviewing with them and attending their classes, only about 14% of the sample was selected from this grade. 44% of the participants were selected from the 11th grade and 42% from the 10th grade. However, according to recent reforms of the education system, the small number of students in the 12th grade is not a significant drawback for this study, because the 10th and 11th grades constitute the main body of the high school, and qualitatively, in 2018, these two grades have been targeted by the structural changes of the education system, as well as the fundamental reform plan of this system.

Cumulative Percentage	Percentage	Physics score
43/0	43/0	17/01to20
63/3	20/3	15/01to 17
92/3	29/0	10/01to 15/00
97/9	5/6	7/51to10/00
100	2/1	0 to 7/50

Table2. Success rate of students in the physics exam in January 2018

In the following, the main questions of the research will be answered. The first question is about the number (percentage) of students who are interested in physics. As shown in

Table. 1, 68% of students expressed their interest in physics in the questionnaire and 32% reported either a lack of interest or a feeling of hatred.

The second research question is about the achievement rate of students in physics. However, it is not very easy to answer this question and many criteria and opinions are involved in it. To avoid possible complexities and to use a relatively general criterion, students' physics scores in internal exams in January 2018 were used as an indicator of students' academic achievement in physics.

Students' scores in January are usually relatively higher than the end-of-year exam scores for two reasons: 1) the curriculum content is less intensive and 2) the teacher has more discretion to assess students. However, the reasons for this research to consider the scores of the January exam to answer the second question are: 1) the availability of students to answer the research questions, 2) limitations on research scheduling, and most importantly, 3) the teacher's more discretion for assessing students more accurately based on the January exam and taking into account all the continuous activities of the students during the semester (including short tests, answering exercises, participating in questions and answers in the class, etc.).

As can be seen in Table.2 , 43% of students obtained a score higher than 17 in physics in the January 2018 exam according to their teacher assessment. This number of students is undoubtedly considered quite successful in achieving results. About 20% of students obtained scores between 15 and 17.

Variable	Gender	Average Score	F	Sig.
Physics score	Girls	15.33	9.891	0.002
	Boys	6.42		
Total		15.92		
Interest in Physics	Girls	3.47	34.831	0.00

Table3. Variance analysis related to the physics score and the level of interest in physics based on the gender of respondent

According to the physics teacher assessment and conditions of exams in January, it can be claimed that a total of about 63% succeeded in the January exam. 29 % of students with scores between 10 and 15 have relatively unstable conditions and need more activities to pass the final exam, and about 8% of students are in critical condition in physics and are considered unsuccessful.

Science teachers are usually asked if there is a significant difference between boys and girls in the physics score and being interested in this lesson? And also, is it possible to make a significant difference between public and private school students in these two categories of the physics score and being interested in physics?

The variance analysis was used to investigate the significant difference between girls and boys in terms of physics score and being interested in it. Table 3shows that boys scored an average of 1.1 points higher than girls on the physics exam and this difference is significant at the level of 0.002.

Table 3 shows students' level of interest in physics. The score was obtained by marking students on a five-point scale, with the number 5 showing the highest score and the number 1 showing the lowest score. Table 3 shows that males are more interested in physics than females at a significance level of less than 0.001 (P<0.001). Thus, it is clear that there is a significant difference between females and males in both the physics score and level of interest in physics at the high school level.

Table 4 shows that students in private schools scored an average of 2.07 points higher than students in public high schools on the physics exam. This difference is significant at the level of P<0.001

Variable	School Type	Mean	F	Sig.
Physics score	Regular	15.25	32.080	0.00
	Special	17.27		
Total		15.92		
Interest in Physics	Regular	3.57	44.005	0.00
	Special	4.38		
Total		3.83		

Table.4 Variance analysis related to the physics score and the level of interest in physics based on the type of high school

Table 4 also shows the students' level of interest in physics. As can be seen, the interest of private high school students in physics is higher than that of public high school students, at a significance level of less than 0.001 (P<0.001).

To answer the third question of the research, it is necessary to use bivariate and multivariate statistical analysis. Bivariate statistical analyses all more or less significantly confirm the causal model of research and the hypotheses derived from it. It should be noted that the hypotheses extracted at the family level have not been empirically confirmed. It is emphasized that the existence of statistical correlation does not necessarily indicate the existence of a causal relationship between the variables.

The fact that whether these relationships are false or causal, and if they are causal, whether part of them is due to a direct effect and what part due to an indirect effect, will be somewhat clarified in a multiple regression analysis ([64]: page 174). Therefore, regression models are used to investigate the causal contribution of variables.

According to previous theories and studies, the conditions of physics and mathematics teaching process affect the learning of physics by students. For this reason, Table 5 shows the correlation coefficients of some of the relevant variables and students' physics scores. Also, it is observed that the friendly behavior of the physics teacher with the students plays an important role in reinforcing the students' learning. This is something that is constantly recommended to students and teachers in teaching method classes. Also, simple and comprehensible teaching by physics teachers is a powerful way for students to learn physics.

According to Table 5, by analyzing the correlation, the same is observed for the math teacher and the atmosphere in the math classroom. It is emphasized that in order to avoid increasing the content of the paper, we did not provide a full report on bivariate relationships, so it is recommended to see the original text for more details on bivariate relationships.

The statistical analysis of multiple regression, which reveals the causal effect of the independent variables on the dependent variable, also significantly confirms the research causal model and the hypotheses derived from it at the individual and school levels. Then, students' physics scores are analyzed multivariately by presenting two mathematical models or regression equations. For this purpose, the correlation coefficients of students' physics scores and those main variables whose significance level is greater than 0.05 are calculated and entered the regression equation. The results of this analysis are shown in Table 6.

Model 1 shows the regression coefficients of the students' physics scores that remained in the multiple regression equation step by method. This model, with seven variables, has the ability to explain 67% of the changes in the students' physics scores.

Model 1 shows that the math score, as an indicator of the intelligence and power of mathematical calculations, reinforces the students' physics scores. Given the non-standard coefficient of this variable, it can be said that in the presence of other variables, if the math score increases by one point, the students' physics scores will increase by an average of half a point.

Independent Variable	Correlation	Significance
Friendly relationship with physics teacher	0.168	0.001
Understandable and simple physics teacher	0.314	0.000
Interest in physics	0.465	0.000
Learn physics well	0.525	0.000
Friendly relationship with math teacher	0.200	0.000
Understandable and simple math teacher	0.186	0.000

Table 5: Correlation Between Physics Scores and Independent Variables:

The causal effect of the math score on the physics score can be explained in two ways. First, the math score is an indicator of students' mathematical intelligence. According to this assumption, the higher the students' mathematical intelligence, the more successful they will be in achieving results in analytical sciences and content such as physics. However, there is no relative agreement among experts about the effect of heredity and social activities on strengthening intelligence, and numerous studies have considered both to be effective in strengthening intelligence [65,66]. Second, the relationship between physics score and math score can be attributed to the way physics is taught in the classroom. The qualitative results of the research obtained from observing the teaching methods of physics teachers indicate that teaching physics by the relevant teachers is mainly focused on mathematics and its related operations. These teachers teach the concepts and relationships between the variables in physics by presenting the physics formula and modeling and follow the relevant topics as mathematical topics [67].

In this teaching method that the physics score is highly correlated with the math score, the contribution of the teaching method used by the teacher is very high. Another fact is that the analytical power of students in learning physics depends on both theoretical and mathematical intelligence, as well as thinking and perception based on the real conditions of the classroom. However, this is the teacher who chooses to reinforce both or to advance his teaching only by relying on the theoretical intelligence of the students.

According to Model 1, the more students are interested in physics, the higher their score will be. Moreover, the higher students assess their ability to learn physics, the higher their score will be. In other words, if classroom management progresses in such a way that students become more interested in this lesson and find it possible for themselves to learn physics, they will be more successful in learning this science and achieving better results.

Model 1 shows that the better the students' results on the end-of-year exam in the last year, the stronger their ability in learning physics. In fact, success in other theoretical courses creates a kind of internal consistency for students that also makes them successful in physics. However, the students' academic achievement in the last year boosted their self-confidence in learning subjects such as physics and enhanced their learning. In fact, adolescents often accept their success or failure experiences as a stigma and adjust their orientations accordingly.

Independent Variables	Model1			Model2		
	β	β	Sig.	β	β	sig
Intercept	-7.290		0.001	3.956		0.000
Math score in January	0.482	0.492	0.00	0.623	0.637	0.000
Interest in physics	0.699	0.242	0.000	0.624	0.217	0.001
Understandable and simple math teacher	-0.561	-0.183	0.000	-0.512	-0.167	0.000
Last year's average	0.711	0.268	0.000			
Learn physics well	0.599	0.184	0.000	0.488	0.150	0.048
Friendly relationship with physics teacher	-0.732	-0.224	0.000	-0.454	-0.139	0.007
Understandable and simple physics teacher	0.603	0.181	0.001	0.405	0.122	0.031
Model Characteristics	Model1			Model2		
F(sig.)	418.68(0.000)			416.65(0.000)		
R	0.818			0.784		
R-squared (R^2)	0.670			0.614		

Table 6: Regression Models for Students' Physics Scores

However, the interesting point about Model 1, while unexpected, is the weakening role of the variables of “friendly relationship between physics teachers and students” and “comprehensible teaching by math teachers”. These findings are among the nuances of the existing order that cannot be achieved solely in the light of existing theories, but more detailed research is needed to reveal the various aspects of the social system. For example, Model 1 shows that the “friendly relationship between physics teachers and students", despite having the positive statistical correlation with the physics score (Table. 5), weakens the learning process in the presence of other variables.

In other words, given the conditions of the school and classroom, no matter how hard the physics teacher tries to create a friendly and intimate atmosphere in the classroom, he should not expect students to succeed in learning physics. Rather, such an effort, in the presence of other circumstances, will make students study and learn less.

The qualitative results of this study, obtained from interviews with teachers and students, indicate the same reality among students especially those who gained relatively good scores in physics. Students who have a more friendly relationship with their teachers and love them more, do not perform well on exams as expected by their teachers. It seems that these students do not study seriously and diligently the relevant courses, as expected by their teachers.

According to the qualitative results, students mainly generalize their intimacy with their physics teacher to the interest in physics. This generalized interest, in its essence, involves a kind of consolation resulting from the connection to the content and concepts of physics. Consequently, students' sensitivity to get higher scores and make further efforts to achieve greater competencies reduces.

This situation becomes critical when the student's affection for his teacher is alienated for various reasons and turns into hatred. In such a situation, it is very likely that this hatred be generalized to physics, and the student think that he is not only not interested in this branch of science, but also hates it. Therefore, teachers should be aware that it is enough to be relatively neutral in their relationships, and not to try too hard to have friendly and intimate relationships with students in order to increase their learning.

Another interesting point about Model 1 is that it enhances our knowledge and understanding of physics and mathematics teaching. This model reveals that the simpler the students assess the teaching methods used by the math teacher, despite having a positive and significant relationship with the physics score (Table 5.), the less likely they are to achieve successful results on a physics exam. In other words, if students find the math teacher's methods comprehensible and simple, it will play a weakening role in their physics scores.

The qualitative results obtained from the observations and interviews suggest that those students who assess their teacher's teaching methods as simple and comprehensible become arrogant in their learning and are less likely to pursue further studies. In fact, they rely on what they have learned in the classroom and are reluctant to study and learn more. Therefore, these students think they can get acceptable scores in physics by relying on their incomplete knowledge of mathematics. So, they are less likely to refer to the content concepts of physics and go to the exam venue with their relatively limited knowledge and score lower than what they expected.

The constant value (y-intercept) and the significance level of Model 1 indicate that, regardless of the conditions explained in the model, the mean score of these students should be about -7.3 in physics. Thus, it can be stated that the mentioned variables played a very important role in improving the mean physics score from below zero to 15.92.

Model 2 is derived from the exclusion of the variable of “GPA in the last year” from the previous model. In fact, Model 2 shows what are the conditions for getting successful scores in physics, regardless of students’ academic achievement over the past year. This model reveals that even if 1) students do not have a specific label based on their academic success or failure, or 2) there is no information about the academic achievement of students in the last year, it is possible to explain up to 61% of their achievement in the physics exam using the conditions of this model.

The effect of the variables of Model 2 is the same as the previous model and the difference in the intensity of the variables with the previous model can be overlooked. The constant value in Model 2 merely shows that, regardless of the effect of the variables of this model, students’ mean physics score can be expected to be 4. In fact, in the absence of students' educational background, the lowest physics score of students is predicted much better than the previous model, and it is about 4. Thus, it can be stated that the variables of this model played a significant role in improving the students’ mean score from 4 to 15.92.

Given the role of independent variables in regression models, it can be predicted that if the effect of model variables on strengthening physics scores lasts until the June exams, students' physics scores will increase. However, the qualitative results of the study, obtained from interviews with school staff, as well as the quantitative results show how the educational process is weakened by passing the January exam and students’ physics scores continue to decline after that.

As the mid-year holidays approach, which last about a month, students have fun and mostly do not do any specific academic activities. After the holidays, it is worthwhile for teachers to include two important activities on their teaching agenda: 1) Reviewing past lessons to remind and retrain content, and 2) Presenting the remaining content of the textbook. However, teachers do not have enough time to deal with both. The qualitative evidence suggests that these two tasks are not performed with the appropriate quality, and some conditions are provided in which the method of "simple and comprehensible teaching” is disrupted, and subsequently the learning process of a significant number of students is deteriorated.

This impaired quality of teaching can be understood and observed by teachers. Low quality often makes the classroom a boring place for teachers and students. However, the performance of some teachers in dealing with this serious and dull environment activates another destructive mechanism. They try to provide a warm, refreshing, and ultimately tolerable environment for themselves and their students either by making a friendly relationship with some students or all members of the class or telling jokes and humors. These teachers should be aware that such a response is only useful for making a friendly communication with students, but at the same time, it paralyzes the learning process and weakens the students' strong learning in physics.

Thus, it can be observed that in the second half of the academic year, school conditions are adjusted in a way to destroy internal consistency and weaken the variables affecting the improvement of students' physics scores. As a result, students, families, and organizational agents all experience students' academic failure in physics scores at the end of the academic year.

Summery and Conclusion

It seems that the process of teaching and learning physics in Iranian formal education system follows a certain ups and downs. In the first half of the academic year, educational conditions are generally in a direction to strengthen the students' knowledge in physics, but in the second half, this process stops progressing and the process of weakening physics teaching and learning is experienced. Students get relatively good physics scores in the first half of the academic year. However, there is a significant difference between girls and boys in terms of interest and achievement in physics. Boys are more interested in this lesson and get better results than girls.

Factors affecting the strengthening of the knowledge level of high school students in physics depend on special and complex conditions. Educational conditions such as “simple and comprehensible teaching” by a physics teacher, and characteristics derived from educational conditions such as “interest in physics” and “the ability to learn physics” are among the most important factors strengthening students' scores.

The dependence of achievement in physics on mathematics provides relatively complex conditions for the teaching process. On the one hand, mathematical intelligence greatly enhances the physics exam results, and on the other hand, “simple and comprehensible teaching of mathematics” along other conditions, weakens the physics exam score. Moreover, the physics teacher's efforts to make a warm and friendly relationship with students disrupt the learning process and reduce students' ability to achieve final results. The qualitative evidence of research reveals the mechanism through which conditions affect the attenuation of teaching.

Thus, with the help of this research, conducted in the form of a social order theory, we reached a basic theoretical context, at least in the field of social conditions of physics teaching. This theoretical context includes both general and specific social aspects, which is specific to the social conditions of the research area (Alborz province). However, the development of theoretical knowledge in this regard requires 1) reliable research, 2) another assessment of social and cultural conditions, and 3) the use of different perspectives. This study has been able to provide the basics of this process to the best of its ability.

Therefore, It is recommended that various and reliable research be conducted based on different factors to gain a deeper understanding of the academic achievement of young people, which is achieved in the light of order at micro level, especially in school. Also, in order to gain a broader knowledge about effective teaching in formal and even non-formal education system, different and relevant perspectives should be investigated experimentally, so that researchers and educators can achieve more angles and subtleties of teaching and learning process.

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