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STUDENT PERCEPTIONS ABOUT PHYSICS COURSE: AN EXAMPLE FOR HIGH SCHOOL

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ABSTRACT

This study was carried out with the aim of determining the perceptions developed by high school students towards the physics course. The universe of the study is the students who take physics lessons at the 1st grade of high school in private and public schools in the central district of a medium-development Anatolian city. As a sample, a questionnaire was applied to a total of 548 students. Although this group has differences; they also have common denominators such as having the same formal educational background, being subject to the same central qualifying exams, and having been taking physics lessons for 6 weeks at the high school level. 7 attitude sentences with positive or negative meanings were determined for the viewpoint of the physics lesson, and with these sentences, a five-point Likert type scale was formed, starting from "Strongly Disagree" to "Strongly Agree". The data obtained from the application were analyzed using the SPSS program and the reliability coefficient in terms of internal consistency of the applied scale was calculated as $\alpha=0.79$. The findings obtained by the evaluation of the data and the suggestions for their solution is presented in the discussion and conclusion part.

1. INTRODUCTION

One of the main aims of science education is to bring students to scientific literacy level. Scientific literacy; can be defined as knowing the nature of science, understanding how knowledge is obtained, expecting that knowledge in science depends on known facts and may change as new evidence is collected, perceiving the difference between scientific evidence and personal opinion [1]. Many situations that students encounter in their daily life are related to one or more of the basic sciences. If these situations can be associated with the learned information, it is an inevitable fact that students can progress in scientific literacy. However, for this, it is necessary to arouse a sensitivity and curiosity towards scientific readings on students. One of the obstacles to such a development in our education system is; there may be some prejudices arising from the student's previous educational experiences and embedded in his memory, if any.

The high school education process is the first stage in which scientific literacy can be acquired consciously. Physics courses are one of the most effective disciplines that can be used in this process. However, many problems are encountered in physics education and studies are carried out to solve these problems. In general, students have problems in understanding concepts, connecting with real life and solving physics problems in physics lessons. The basis of the conceptual learning problem is that students come to the classroom with the wrong information they have from out-of-school experiences and the difficulties experienced in replacing the concepts they learned in the classroom with this information in the context of the physics lesson. For this reason, misconceptions and prejudices have become an important part of studies to understand physics. Physics is important in learning, as it affects the general understanding of physics in both cases [2].

In the university entrance exams of the last four years; especially when we look at the placement exams, it is seen that 14 physics questions are asked and the number of correct answers to these questions varies between 0.47 and 1.40, and it has the lowest response rate among the science group lessons in general. A similar situation can be clearly seen in the science group questions in the basic proficiency exams in the same years. Despite the correct answer averages for the last four years;

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going further back, it can be seen that there have been similar tables in the university entrance system for many years and that significant changes have not been encountered.

Towards the end of the 20th century, many studies [3,4,5,6,7,8] have shown that students in physics education have many preconceived ideas due to their experiences in their environment, and that these ideas they have before entering the classroom have a negative impact on their future physics education. Many conceptual tests were conducted, developed and applied to identify students' preconceived ideas. When examined, studies on physics education; it is seen that it is concentrated in two groups, namely due diligence and development studies [9,10] in general. In this study, it was tried to determine the emotional views of high school students towards the physics course in general and their thoughts towards the above-mentioned table, without bogging the case into technical details. The universe of the research consists of students who take physics lessons in the first grade of high school in private and public schools in the central district of a medium-development Anatolian city. The numbers of male and female students participating in this study and the schools are as in Table 1.

Table 1. Participation numbers by type of school, student and gender where the survey was conducted.

Schools	Number of male students	Number of female students	Total
public schools	185	155	340
private school	98	110	208
Total	283	265	548

2. METHODS

In order to develop the measurement tool related to the subject, firstly, an item pool was created for the purpose. While creating the attitude items to be included in the item pool, first of all, the studies in the field were reviewed and 7 attitude sentences with positive or negative meanings were written for the Physics lesson. A five-point Likert type scale was created from the attitude statements, starting from "Strongly Disagree" (from 1), to "Strongly Agree" (5). By keeping the number of attitude items as low as possible, it was tried to keep the students' attention on the subject alive.

The determined attitude statements were turned into a questionnaire and applied to the target student group in order to determine the student's approaches to the subject, and the level of participation of the students in the judgments expressed in the questions was tried to be determined by using a Likert type scale. In addition, in a separate section, the students were asked to evaluate their ideas about the attitude sentences presented to them with their own original sentences. Commentary sentences were categorized within themselves and the ideas that we thought were determinations pointing to the problem were used as supporting sentences in the processing of the study data.

The universe of the study is the students who take physics lessons at the 1st grade of high school in private and public schools in the central district of a medium-development Anatolian city. As a sample, a questionnaire was applied to a total of 548 students. 340 of these students are in public schools and 208 of them are private school students. Out of 340, 185 are male students and 155 are female students. Out of 208, 110 are female students and 98 are male students. The questionnaire was applied to the students after 6 weeks of high school education experience. In addition, the students in this group have differences such as being different types of school students—being members of families with different income levels; They also have common denominators such as having the same formal educational background, being subject to the same central qualifying exams, and having been taking physics lessons for 6 weeks at the high school level.

3. RESULTS

Participation levels of the attitudes are given below as a percentage and general evaluations are made based on these results. In addition, the data obtained from the application were analyzed using the SPSS program and Alpha (α) reliability in terms of internal consistency of the applied scale was checked. The calculated Alpha reliability coefficient was calculated as $\alpha=0.79$. The calculated reliability coefficient of $\alpha=0.79$ indicates that there is an internal consistency that can be considered close to high among the attitude items that make up the scale.

1) Looking at the AYT exams of the last four years, it is seen that the average of correct answers for physics questions (14 questions) is between 0.47 and 1.40. Even this table may indicate that there is a problem with the physics lesson.

Table 2. Percentage of participation in the statement.

Strongly disagree	Disagree	Undecided	Agree	Strongly agree
-	-	% 2,19	% 62,59	% 35,22

They stated that the students were very clear about their participation in the judgment presented to them and that they understood that this table presented to them indicates a problem. While 35.22% of the students who participated in the study definitely thought that there was a problem, 62.59% of the participants stated that they agreed with their friends, even if they had a different tone (Table 2). In addition, in their personal sentences about this judgment, students; They made some determinations that we think are important: "As students, we start the lesson one zero behind when we look at this table...", "The table above is not nice, the physics concepts in middle school science classes were difficult for me anyway...", "Upper graders already have a very difficult time in this course. He said he was..."

2) Physics is a class that appeals to students.

Table 3. Percentage of participation in the statement.

Strongly disagree	Disagree	Undecided	Agree	Strongly agree
% 23,22	% 59,14	% 1,19	% 16,45	-

Looking at the answers given; It can be easily understood that the students have an idea about this judgment by looking at the frequency of choosing the undecided option. However, in the evaluation they made with their current experience, the students mostly stated that they did not find the Physics course sympathetic, even in different tones. However, 16.45% of the students stated that they had a positive attitude towards the lesson (Table 3). This ratio may actually show that these students may have acquired regarding the content of the judgment presented to them. If so many students can be encouraged to think positively, it can be thought that the rate can be increased with the right approaches in the education process. In addition, in their personal sentences about this judgment, students; They made some determinations that we think are important: "My ideas about the course are starting to take shape, they are negative for now...", "We always solve test questions, is this physics?"

3) Guidance studies related to physics course are sufficient.

Table 4. Percentage of participation in the statement.

Strongly disagree	Disagree	Undecided	Agree	Strongly agree
% 19,02	% 62,29	% 2,09	% 15,45	% 1,15

Considering the ratios, it is understood that the guidance activities for the students related to the course are not sufficient. Students expressed this with 19.02% "strongly disagree" and 62.29% "disagree" answers (Table 4). However, the frequency of positive responses is also noteworthy. It can be thought that this may be due to the different approaches of individual teachers. In addition, in their personal sentences about this judgment, students; They made some observations that we think are important: "I wish we hadn't started the lesson right away...", "Classes are very boring, I wonder what we've seen will be useful..."

4) The source of the students' judgments about the Physics lesson is related to how well the basic physics concepts encountered in secondary school science lessons can be understood before they reach high school.

Table 5. Percentage of participation in the statement.

Strongly disagree	Disagree	Undecided	Agree	Strongly agree
-	% 13,97	% 9,43	% 66,35	% 10,25

Considering the participation rates in this jurisdiction; it is seen in table 5 that there is an increase in the rate of undecided people. The fact that this change is related to previous experiences can be perceived as the student's difficulty in remembering these experiences. Apart from this, it is seen that the positive participation in this judgment actually parallels the negative participation in the judgment number 3. In middle school science lessons, students are actually welcome to physics with topics such as pressure, force, friction, simple machines, energy and electricity. At this point, it can be thought that the experiences experienced may be important for the future. When we look at the answers, it can be understood that the experiences in the secondary school stage are negative at a rate of 76.60%, albeit with different intensities. In addition,

in their personal sentences about this judgment, students; They made some determinations that we think are important: "I couldn't solve the questions of this course in LGS anyway...", "I wish I had listened to my science teacher more carefully...".

5) The low level of success of the class in the physics course negatively affects the motivation of the student to the physics course.

Table 6. Percentage of participation in the statement.

Strongly disagree	Disagree	Undecided	Agree	Strongly agree
-	% 14,72	% 4,48	% 70,25	%10,55

Considering the participation rates in the judiciary, it is seen that there is a positive participation rate of 80.80% in table 6 with the combination of different tones. This may actually indicate that the climate of the educational environment may be important. The application of this study to students was right after the students' first exams. Therefore, the participation status here may also refer to the exam results in the physics course of the class. In addition, in their personal sentences about this judgment, students; They made some determinations that we think are important: "Why was there so much pressure in the first exam...", "I could not solve the classic questions anyway...".

6) Not knowing the application areas of the subjects taught negatively affects the motivation of the student to the physics lesson.

Table 7. Percentage of participation in the statement.

Strongly disagree	Disagree	Undecided	Agree	Strongly agree
-	% 12,55	% 1,52	% 75,70	%10,23

When the participation rates in this judgment are examined, it is seen in table 7 that there is a positive participation rate of 85.93%, albeit with a different tone. It is a fact accepted by every physics educator that the concepts of physics that are tried to be taught are important in terms of what they do, in what kind of events these concepts can be observed, that is, that the concepts are concretized and made tangible, that these concepts that are tried to be taught are important in terms of keeping them in mind and being permanent. The fact that his students agree with this fact may be an important finding. It can be said that it will be important for every figure of education to pay attention to this issue in order to motivate them to the physics lesson and prevent them from leaving the lesson. In addition, in their personal sentences about this judgment, students; They made some determinations that we think are important: "Sometimes I think the stories are too airy...", "We listen to them, but why do we learn..."

7) The information learned in physics lessons can be easily interpreted by the student in solving questions and understanding daily life.

Table 8. Percentage of participation in the statement.

Strongly disagree	Disagree	Undecided	Agree	Strongly agree
% 34,25	% 45,50	% 3,58	% 16,67	-

Considering the participation rates in the judgment presented to the student; It is seen in table 8 that there is a negative participation of 79.75% in the judgment presented, albeit in a different tone. However, the most striking result for us here is the 34.25% agreement with the statement "I strongly disagree".

About one of the three students who participated in our study stated very clearly that they could not make physical interpretations in solving questions and understanding daily life. This idea was supported by the participating students, albeit in a different tone, with an additional rate of 45.50%. This may indicate that there is a problem in the process of transforming the knowledge learned in the course into a product. In addition, in their personal sentences about this judgment, students; They made some determinations that we think are important: "I can't fully understand while reading

the question so that I can interpret it...”, “The system should contribute to our ability to comment instead of constantly having to test us...”.

4. DISCUSSION AND CONCLUSIONS

The aim of this study is to determine the general viewpoints of the students who have reached the high school level on the physics course and to determine the general acceptance that they think may be a problem. For this, first-year students were taken as a sample. Because, they are in the position of a mass that has encountered some physics concepts at the secondary school level and experienced them in their education processes, and formally encountered a course under the name of "Physics" for the first time in the 1st grade of high school. 7 judgments that were thought to be a problem were presented to the evaluation of the students with the survey study. The number of judgments was limited in order to prevent distraction in the evaluation of the subjects, but the chance to make open-ended comments on the subject was given to the students in the same survey study so that the students could freely express their ideas. Considering the student participation rates given above, a number of problems can be mentioned, which can be listed as follows.

- The students state that there is a problem when looking at the physics net answer averages in the exams used in central placement.
- Physics is not generally seen as a pleasant course for students.
- It is thought that the guidance studies offered to the students related to the physics lesson are not sufficient in general.
- In general, students think that their previous experience in science lessons can also be effective in their judgments about physics.
- The general perception of failure in the physics course and the low average success in the central exams are generally seen as one of the reasons for loss of motivation by the students.
- Not knowing the application areas of physics (not being able to understand - not being able to see - not being able to interpret - not being able to present) is generally seen as one of the reasons for loss of motivation by students.
- Students have a problem that the information they learn in the Physics course cannot be associated or interpreted with current events.

Although these problems were not identified for the first time, they were partially identified in different studies using different perspectives, different analysis and survey techniques, and different sample groups [11, 12, 13, 14, 15, 16, 17]. In this study, the detection of similar problems in a different sample group will contribute to the world of educational science in terms of the prevalence and accuracy of the problems. However, we think that our suggestions for the solution of the problems can contribute to the solution recommendation pool.

The data we obtained from this study show us that one of the important problems is at the stage of informing the students. That is to say, it is seen in the results obtained that there are some problems such as "not being able to understand-learning-not being able to interpret" in terms of students related to physics lessons, especially in science lessons in our country. According to the data, it is understood that some of these problems are caused by the inadequacy of the course guidance studies. For this reason, we think that a more professional guidance service can be given in secondary school science lessons and high school physics lessons.

Course guidance service; prepared in formats such as animation-documentary-short film suitable for age groups; we think that it would be more appropriate to present it with content that triggers permanent-interesting-thought-provoking behaviors in students' memory. It is thought that the implementation of these practices at the beginning of the education stages, within the scope of a plan and under the guidance of the teacher in the classroom, will arouse curiosity in the students and that the introduction of the course will partially prevent the prejudices that may arise from various factors during the education process. In addition, using this application with classical lecture methods, it will not be given in an efficient and permanent way; we think that with the visualization of the physics application fields-the laws of physics in life, permanent acceptances can be created in the students about the necessity of the physics course. We think that it would be appropriate to make such applications at the beginning of the semester or at the beginning of a new subject with shorter applications. Thus, it is thought that the curiosity to be aroused in the student and the visual satisfaction to be provided will also contribute to the motivation of the student to the lesson.

According to the results obtained; the general perception of failure in the physics course and the low average success in the central exams are generally seen as a problem or one of the reasons for loss of motivation by the students. We think that success in central exams for physics course can change with long-term and multi-dimensional education policy applications. However, we think that the first written exams are important in order to connect students to the lesson in the short term or

to prevent them from leaving the lesson. We think that these exams can be held locally or jointly on a school basis, and it will be important to create the levels and contents of these exams in a way that will win the student over. We consider that this type of application can also be applied for other exams of the course.

According to our findings in this study; not knowing the application areas of physics and not being able to associate the learned information with current events are generally seen as one of the reasons for loss of motivation by students. In this problem, we have previously suggested; we think that the content that will be prepared in formats such as animation-documentary-short film suitable for age groups and presented to the students can be a solution to the identified problems. But the difference from our previous suggestion will be about timing. We think that this application can be done this time after the end of the topic, not before starting the new topic. Thus, the order of handling the subject; after the stages of explaining the theoretical information, giving examples and solving the questions, adding this step will ensure that the learned information is embedded in the visual memory, so that associating the subjects with real life or interpreting the information through daily events will contribute to the solution of the mentioned problems.

It is evaluated that such practices will not have a clear effect in the short term, but will make a positive contribution to the solution of the problem in the medium and long term. It is thought that if a physics course that will be more sympathetic to the student can be created with such applications, the overall success of the course can be increased in the process.

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