

**Modern Fiziğe Karşı Negatif Algılar ve Yabancılaşma Algısının  
Nedenleri: Lisans Öğrencileri Üzerine Nitel Bir Araştırma**

**The Reasons of Alienation Perception Occurring Against Modern  
Physics: A Qualified Research on Bachelor Students**

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**Extended Summary**

Modern physics is one of the many sub-fields in physics. Modern physics is the basis of solid state physics, nuclear physics, theory of laser, molecular physics, and all the practical uses presented in the light of these science fields. However, it has never been fully understood and not explained at all; therefore, never been a popular field even it has deserved. Niels Bohr has said that “Anyone not shocked by quantum mechanics has not yet understood it” related to quantum physics, which is one of the most important cornerstones of modern physics, and similarly, Heisenberg said that “I repeated to myself again and again the question: Can nature possibly be as absurd as it seemed to us in these atomic experiments?”. These sayings present how the phenomenon related to modern physics contradict with our common sense.

Many problems are experienced during the education of modern physics. The main ones can be listed as follows:

1. Students fail in mathematical solutions, because they cannot stimulate the necessary concepts of modern physics in their minds.
2. The negative concept images of the students regarding modern physics make this course less important from their point of view.
3. The traditional teaching method of this course makes it more difficult to understand as needed.
4. Students are not able to adopt the concepts of modern physics sufficiently due to the failure to establish the connection between modern physics and daily life.
5. The knowledge of the students regarding classical physics is an obstacle

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against learning the concepts of modern physics. Because they don't know the difference between classical physics and modern physics very well.

6. The preconceived approach of the students to modern physics concepts causes confusion in the minds and results in failure in this course.
7. Since the instructors of the course don't know the extent of negative conceptual images of the students regarding modern physics, they may apply non-scientific ways of simplifications during presentation of the course. In this case, the compelling factors encourage students to learn disappear and the conceptual background of the course cannot be created.

As mentioned above, one of the reasons cause students to fail in the modern physics course is their preconceptions. Students may have negative perceptions related to modern physics. These negative perceptions are dragging the students to failure. Thus, it is important to identify the negative perceptions and present the causes of these perceptions. In this study, it has been aimed to identify where the perceptions of alienation of bachelor students which is negative perception occurring towards modern physics is resulted from.

In this study, qualitative research method was used. In the study, focus group interview form and the semi-structured interviews were used as the data collection tools. The study was conducted with undergraduate students who are taking physics course. First, focus group interview was conducted with 36 students. And then, 13 students were interviewed in person.

In this research, analysis of the collected data consisted of three steps. In the first step, focus group interview form was analyzed and then frequency of alienation was calculated. In the second step, the data which gathered from individual interviews were analyzed as the descriptive. In the third step, it was used content analysis.

When the focus group interview form was analyzed that seven perceptions were found:

- Concern
- Abstract
- Prejudice
- Alienation
- The difficulties of concept
- The difficulties of mathematics
- The difficulties of visualization

Alienation was the most repeated perception inside all of these perceptions. When individual interviews analyzed, it was found that four main factors which caused perception of alienation. These factors as follows:

- The effect of lecturers
- The effect of textbooks
- The effect of curriculum
- The effect of teaching methods

To bring out perception of alienation terms of lecturers; lack of knowledges, not to use analogies were determined. According to findings; lack of communication between students and lecturers was caused perception of alienation. Also, intense mathematical content in textbooks and not to give examples to relations with daily life were caused alienation. Curriculum given rise to the alienation because of not to following the correct sequence from simple to difficult in curriculum.

According to findings, to minimize of perception of alienation may be suggested by the researchers as follow suggestions;

- Lecturers should prevent perception of alienation.
- Lecturers should update their knowledge about modern physics.
- Lecturers should communicate with students better.
- Curriculum of modern physics should be updated.
- Mathematical content in textbooks should be increased.
- Teaching methods in modern physics course should be diversified.