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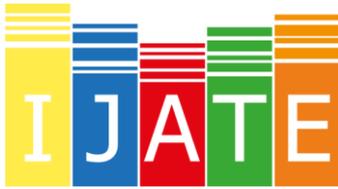
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Comparing Physics Textbooks in Terms of Assessment and Evaluation Tools

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Abstract: Assessment and evaluation instruments provide teachers the opportunity of shaping education in the beginning, contributing to education during the process and evaluating education at the end of the process. Textbooks, on the other hand, are resources that present the aforementioned contributions to teachers at first hand. Thus, the study aims to compare the distribution of assessment and evaluation instruments in the physics textbooks being used in the academic year of 2011- 2012 and 2016-2017 according to units, settlement within units and types of assessment instruments that are used. For that purpose, 9, 10, 11 and 12th grade textbooks being used in physics lessons in the academic year of 2011-2012 and 2016-2017 were examined via document analysis method. As a result of the study, it was determined that the highest number of assessment instruments in physics textbooks from two different years was encountered in the unit of force and motion. The reason for this unit having higher number of questions could be associated with higher number of mathematical operations in the unit intended for allowing students to overcome their mathematical deficiencies by practicing such questions. It was observed that the number of questions was increased especially in the books being used in the academic year of 2016-2017 and alternative assessment instruments were fewer than traditional assessment instruments. Traditional assessment instruments are still used very frequently in the textbooks, which proves the effect of traditional approaches in assessment and evaluation. Another reason for this condition is that a result-oriented evaluation is used in the university entrance exam. In the light of these results, it is suggested to make the university exam student-centered rather than making an arrangement in textbooks.

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1. INTRODUCTION

Change has an important place in human life. Individuals feel the need to develop and change themselves, depending on their environment, living conditions and cultural factors since they are born. The education and training activities carried out in the schools are important for the implementation of these changes in the lives of the individuals. Education and training institutions need to constantly renew and develop themselves in order to have the power of competition and sustain their assets, reach their goals effectively and efficiently

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(Çalık, 2003). The changes in the education programs need to be regulated in order to gain new values together with the developing society and to gain the attitudes, values, and information that are necessary for the changes taking place in relation to culture, politics and the external world (Erdoğan, 2015). For this reason, changes in educational curricula are carried out by taking into consideration learning environments, schools, teachers, students and learning materials (Küçüközer & Bostan, 2007).

A curriculum developed in line with a specified philosophy helps teachers organize teaching and learning activities while writing textbooks, selecting technology and teaching materials to use (Kaya, 2013). Textbooks play an important role in presenting to practitioners by taking changes in the industry, technology, and other fields into account. At the same time, they can be expressed as resources to help to narrate the basis of teaching programs (Yiğit, Alev, Özmen & Akyıldız, 2009). Textbooks avail not only to teachers to lecture systematically, the better use of their power and present the lesson, but also to students to review courses whenever they need and to learn by going over the lessons that are not being understood (Küçükahmet, 2003).

Since 1992, a renewal study has not been carried out in the physics curriculum and the same curriculum and textbooks have been used. However, as a result of the renovation studies carried out in primary school science courses and consequently the constructive approach-based studies practiced in the schools, renewal studies in secondary education, which is the continuation of primary schools, became inevitable and from 2007 onwards the physics curriculum gradually entered into force. It has been taken into consideration that learning experience gets easier, meaningful and permanent in natural environment when needed and that the association with real life events to teach physics concepts and laws in the physics course curriculum (Arslan, Tekbıyık & Ercan, 2012). However, due to various problems while the program is running and the need for renewal with the developing technology, the physics curriculum has been updated in 2013. Textbooks prepared in line with the updated program started to be used gradually starting from the 2013-2014 academic year. Features of the renewed physics curriculum are stated as; the clarification of the classes with accompanying units by Yiğit (2013), the step-by-step application by teachers of the models or methods mentioned in the books, the liberalization of the program structure and the decrease in the number of gains.

One of the innovations seen in physics textbooks with the curriculum renewed in 2007 has been in the part of assessment and evaluation. In addition to the traditional approach, alternative assessment and evaluation are now being used for assessment and evaluation. In the textbooks, process evaluation, authentic tasks, application of information, creation of evaluation criteria with clear and significant criteria, performance tasks and evaluation with multiple methods have come into the forefront. Those contribute to the success of the students, student-centered approach, multidimensional evaluation, evaluation of multiple truths, feedback, continuous assessment, evaluation of senior skills and clear results (Gömleksiz, Yıldırım & Yetkiner, 2011). In the physics curriculum renewed in 2013, following topics are emphasized in the area of assessment and evaluation; "to associate teaching and assessment and evaluation with each other, to make plans for assessment, to prepare valid and reliable assessment tools, to use various assessment methods, to use metrics that require the use of information instead of recall, to measure the learning and development of the learners frequently, to measure not only results but also process, to measure the goals stated in the curriculum, to make use of registration and scoring methods, to make evaluation and feedback at the beginning, at the end of and during the education" (MEB, 2013).

Due to the significant contributions to education and teaching, studies conducted in the field of assessment and evaluation also vary. However, studies are usually focused on opinions

of teachers or teacher candidates (Ataman & Kabapınar, 2012; İzci, Göktaş & Şad 2014; Öztürk, Yalvaç Hastürk & Demir, 2013; Peker & Gülle, 2011; Sağlam Arslan, Avcı & İyiybil, 2008; Tay, 2013). The way in which ideas of teachers change as much as the ideas need to be examined in terms of different variables. In this context, textbooks are the most used resources for the teachers during the course preparation (Nakiboğlu, 2009). For this reason, the examination of textbooks in terms of assessment and evaluation will be accompanied by an evaluation of teachers' opinions. In this regard, one more variable among factors that influence teachers' opinions will come to light, so a different dimension will be added to the work in this direction. Despite the fact that studies on the field of assessment and evaluation in the textbooks are not available for physics courses, they are available in Biology, Turkish, Science and Mathematics courses (Arslan & Özpınar 2009; Çetin & Çakır, 2013; Göçer, 2008; Tabak, 2007; Taşdere, 2010). However, in some of the studies, assessment and evaluation are examined in one section, while others focused on assessment and evaluation-program adaptation. Assessment and evaluation studies carried out for textbooks should be emphasized in terms of physics lecture.

The subjects such as visual evaluation, content-curriculum adaptation were investigated in the studies carried out considering the physics textbooks (Ayvacı & Devocioğlu, 2013; Çepni, Ayvacı, Şenel Çoruhlu & Yamak, 2014; Güzel & Adıbelli, 2011). Research has been carried out in the textbooks examined, focusing on only one class, without considering all levels. In the studies carried out on these books, mostly textbooks which were gradually used in 2007 were taken into consideration. The evaluations were carried out by referring to teachers' or teacher candidates' opinions. Teachers need to be supported by studies that take into consideration direct textbooks because they can initially resist to the implementation of the program and can assess it in this direction. For this reason, studies should be carried out by the researchers to examine the textbooks in line with the criteria determined in the research.

The revised physics curriculum in 2013 and studies on textbooks that have been in use since that date are still very new. In the studies carried out, the focus is mainly on comparing the structure and content of the program and examining the objectives of the program rather than examining textbooks (Göçen & Kabaran, 2013; Eke, 2016; Kotluk & Yayla, 2016; Yiğit, 2013). The comparison of the physics curriculum was carried out by taking into consideration the various items found in the curriculum. In addition, examining the gains in the program in the priority of various models or theories can be given as an example of the work carried out on the program. However, no study has been done on textbooks prepared in accordance with the 2013 curriculum.

As it can be understood from the literature reviewed, physics textbooks have not been adequately examined in terms of assessment and evaluation. The examination of physics textbooks, which are among the most important resources of teachers, in terms of assessment and evaluation is also very important for the renewal and development studies to be carried out in the programs and books. The studies carried out for the assessment and evaluation in the textbooks are an important source for the development of other teaching fields.

The main purpose of the study is to compare how the assessment and evaluation tools in the physics textbooks used in the 2011-2012 and 2016-2017 academic years are distributed according to the types of units and types of measuring instruments. The reason for choosing textbooks used in these years is due to the fact that figural arrangements have been made in the physics curriculum in previous years. Two sub-problem responses were sought in this direction.

1. What is the distribution of assessment and evaluation instruments in the physics textbooks of both years according to the units and the placement in the units?

2. Which assessment and evaluation instruments were included in the Physics textbooks of both years?

2. METHOD

The origin of the study is based on the qualitative research design. Qualitative research takes into consideration the qualitative data collection methods such as observation, interview, document analyses and takes the events and situations as a whole in their natural environment (Yildirim, 1999).

In this study, document analysis in the qualitative research category was used. In this process, the sources and the required information are examined, and then the thoughts and ideas to be reached get clearer with the syntheses made and the classification of the data according to the specific properties (Çepni, 2007). The method of document review is divided into two areas as general screening and content analysis (Karasar, 2007). Content analysis is to analyze the printed and visual materials thematically by specific categories (Saban, 2009). For this reason, in the scope of the document examination in the study, the data were analyzed in accordance with the content analysis.

In this context, the 9th, 10th, 11th and 12th class physics textbooks prepared by the Ministry of National Education in the 2011-2012 academic year and the 9th and 10th class physics textbooks belonging to Tuna Printing Company and the 11th and 12th class textbooks belonging to the Dikey publishing in the 2016-2017 academic year are taken into consideration. In the study, assessment and evaluation tools at the beginning of the units, through the units and at the end of the units with these units are examined and the results are compared.

2.1. Analysis of Document Review Data

In the analysis process of the data, the documents were analyzed using two different criteria for each textbook. In the first phase of the study, classes and units were taken into consideration and a categorization was carried out for questions. In the second stage, the examined textbooks are classified according to the assessment and evaluation tools they contain. In the data analysis process, questions in physics textbooks are classified separately according to their placements as at the beginning, through, and at the end of units. Subsequently, these questions were presented in a single table comparing the different years, taking into consideration of the units. In the second phase of the study, assessment and evaluation tools were categorized according to their types. Expert opinions were consulted at unsteady points and the question was placed in an appropriate category in this direction. After the necessary data were obtained, the assessment and evaluation tools were grouped in itself included in each class were grouped composing first tables. Thus, 8 tables belonging to different classes appeared. In the second stage, these tables were combined taking into account the assessment and evaluation tools. Here, questions at the beginning of, through, and at the end of units for all classes are shown comparatively.

In the study of physics textbooks for the 2011-2012 academic year, the electric and magnetism unit category includes electricity and magnetism in the 9th grade, electricity in the 10th grade, magnetism in the 11th grade, and electrical and electronic unit in the 12th grade. In the study of physics textbooks for the 2016-2017 academic year, the material and its properties category includes the material and its properties and heat and temperature in the 9th grade, pressure and buoyant force units in the 10th grade. In the force and motion category, there is force and motion in the 9th and 11th grades, regular circular motion and simple harmonic motion in the 12th grade. The waves category includes waves in the 10th class and wave mechanics in the 12th class. In the modern physics category, introduction to atomic physics and radioactivity, modern physics and technological applications of modern physics

grades there was only 1 question at the beginning of the unit in the old textbooks. In the new textbooks, there are 13 questions in the 9th grade and 12 questions in the 10th grade at the beginning of the unit. When through the unit evaluation questions are examined, the most of the questions are in the 11th grade of the new textbooks. In the old textbooks, through the unit most of the questions are included in the 9th grade. The number of questions in the other grades is approximately equal. Looking at the end of unit questions, there are more questions in the old textbooks than the new textbooks in the 9th grade only when compared with the textbooks in the two different programs according to the grade level. In other grades, the number of questions in the new textbooks is higher. Especially in the 11th and 12th grades, the number of end of unit questions is higher. The most questions at the end of the unit are at the 12th grade in the new textbooks.

When the unit of force and motion is examined, it appears that only new textbooks of the 10th grade do not include this unit, all other textbooks included it. In this unit, old textbooks do not include questions at the beginning of the unit, while new textbooks make use of questions at the beginning of the unit in grades 9 and 10. When the question distribution of the same unit is examined, the most questions are placed through and at the end of the new textbooks of the 11th grade. The electricity and magnetism unit is another unit that is frequently included in both textbooks and contains many questions. The unit is included in all the classes in the old textbooks while it is not in the 9th and 12th grades in the new textbooks. When the number of questions is examined, it is seen that the most question distribution is through the unit and at the end of the unit in the 11th grade new textbooks. Although matter and its properties unit are included in all grades in the old textbooks, this unit is not available in the 11th and 12th grades in the new textbooks. When the total number of questions belonging to the same unit is examined, the number of questions in the old textbooks is more. When you look at the number of questions by the grades, the most questions about this unit are at the end of the unit of the 9th grade in the new textbooks.

Waves unit is included in all classes in the old textbooks, while it is in 10th and 12th grades in the new textbooks. In the same unit, through unit questions are more in the old textbooks. End of unit questions in this unit have a higher number in the new textbooks. Whereas the modern physics unit was in the 10th, 11th, and 12th grades in the old textbooks, it is only in the 12th grade in the new textbooks. In the new textbooks, 130 questions were found at the end of the unit meanwhile in the old textbooks, there are 94 questions in all units. However, in the old textbooks, the number of questions through the unit and end of the unit is closer to each other. Introduction to science of physics unit is only in the 9th grade in the new textbooks. It is included in the 9th and 12th grades in the old textbooks. In the old textbooks, the only question that is at the beginning of the unit belongs to this unit. However, the number of questions in both units in these two textbooks is considerably less than in other units. The energy unit is only in the 9th grade in both textbooks. The total number of questions in the old textbooks is about close the number of questions in the new textbooks. In the new textbooks, there are about the same number of questions at the end of the unit and through the unit, while in the old textbooks the number of end of unit questions is about close the number of questions through the unit.

Atoms to quarks unit is in 11th and 12th grades in the old textbooks. Whereas in the 11th grade, there are only 13 questions at the end of the unit, in the 12th grade, there are five questions through the unit and 16 questions at the end of the unit. Stars to quasars unit is only in the 11th grade in the old textbooks. Although there are close numbers of questions through the unit and at the end of the unit, this unit is less than the other units in terms of the total number of questions. Optic unit is the only unit that exists in the old textbooks but not in the

new textbooks. This unit is in 10th grade. Although there are a few questions through the unit and at the beginning of the unit, there are more questions at the end of the unit than those.

3.2. Distribution of Assessment and Evaluation Tools in Physics Textbooks

In this section, the assessment and evaluation tools included in the physics textbooks are examined and presented according to their situations in the class and the unit.

As seen in Table 2, when the assessment and evaluation tools in Physics textbooks are examined, mostly open-ended questions are included in the old and new textbooks. When the distribution of this assessment tool is examined, all the questions at the beginning of the unit are in this category. Looking at the questions within the unit, open-ended questions are included in all classes and books, but it appears to be used widely in the 11th grade in the new textbooks. When examining end of unit questions of the same measuring instrument, it was not used at the end of the unit in the 9th and 10th grades in the new textbooks, but it was preferred at the end of the unit in all other books. Multiple-choice questions are the most preferred another assessment tool. This question type is found in all classes only at the end of the unit. The old and new textbooks approximately have the same number of this type, but it is less used in the old textbooks of the 10th class. Gap filling is another assessment tool that is often used in both textbooks. This measuring instrument was used only in the old textbooks at the 9th grade while it was used at the end of the unit in all other classes. True false tests are another assessment and evaluation tool used in the old textbooks of all grades and at the end of the units in the new textbooks of 10th and 11th grades.

Projects have been preferred in all grades and textbooks. Unlike other measuring instruments, however, this measuring instrument is used only through the unit in all books. Research assignments are usually preferred in the new textbooks only through the unit. In the old textbooks, only research studies were included in the 10th grade, whereas this assessment tool was used at all class levels in the new textbooks. Matching questions exist in both textbooks. This measuring tool is used only in the 9th grade in the old textbooks and 9th and 11th grades in the new textbooks. The short answer questions in both textbooks were used through the unit of the 10th grade in the new textbooks which were found in the 9th and 11th grades at the end of the units in the old textbooks. Discussion is another assessment and evaluation technique that exists in both books. This technique has been used in all books through the unit questions. The question type is found in all grades in the old textbooks but only in the 12th grade in the new textbooks. Although the problem solving technique is not used much, both textbooks include it. Despite there is one question through the unit in the old textbooks of the 10th and 12th grades, but there is one question in the 10th grade in the new textbooks at the end of the unit.

Table 2. Distribution of measurement types of assessment and evaluation tools in physics textbooks by classes.

	9 th grade						10 th grade						11 th grade				12 th grade				Total		
	At the beginning		Inside		At the end		At the beginning		Inside		At the end		Inside		At the end		Inside		At the end				
	O	N	O	N	O	N	O	N	O	N	O	N	O	N	O	N	O	N	O	N			
Open-ended	1	13	17	42	43			12	3	21	48			4	152	37	196	1	39	54	60	207	535
Multiple choice					51	53					8	65			45	20			52	60	156	198	
Gap-filling			3		40	43					21	49			38	20			30	70	132	182	
Meaning analysis table			3		3				2					10				6				24	
Project			30	4				3	4					1	2			2	1			36	11
True false tests					54						13			6	20	20			16	70	103	96	
Diagnostic branch tree					5						2				5				3		15		
Table filling			10		4			4										1				19	
Discussion			12					9						5				2	2			28	2
Poster			2					4						7								13	
Pairing					2	6										7						9	6
Short answer					6				4							4						10	4
Problem solving			1																			1	
Information map			1		1																	2	
Performance								11						23				42				76	
Discussion																		1				1	
Crossword					2																	2	
Concept cartoons					1																	1	
Research				3				8	3					4			3					8	13
Concept mapping											5				5				6			16	
Problem solving								1			1						1					2	1
Modelling									1													1	

O: Physics textbooks used in the 2011-2012 academic year

N: Physics textbooks used in the 2015-2016 academic year

Although modeling is the only assessment technique that is used in the new textbooks but not used in the old textbooks. This technique is only included in the 10th grade in a question through the unit. Assessment and evaluation techniques included only in the old textbooks are semantic feature analysis, diagnostic branched tree, table filling, posters, information map, performance, debate, puzzles, concept cartoons and concept mapping. Performance tasks are the most preferred of these techniques. This technique has been frequently used through unit questions in grades 10, 11, and 12. Meaning analysis tables were used at the end of the units in all grades, but only in grade 9 it is used through the unit. The diagnostic branched tree was used at the end of the units in all classes. Table filling was found through the unit and at the end of the unit in the 9th grade, while it was never used in the 11th grade. It was preferred at the end of the units in the 10th and 12th grades. Posters were in the 9th, 10th and 11th grade, although they were not in the 12th grade. Concept mapping were at the end of units in grades 10, 11 and 12. The information mapping was used only in the 9th grade through the units and at the end of the units in one question, the debate was used in the 12th grade in one question through the unit, the puzzle was used in the 9th grade only in two questions at the end of the unit and concept cartoon was used only in one question in the 9th grade at the end of the unit.

4. DISCUSSION AND CONCLUSION

When the number of questions is examined, the least number of questions is in the units of stars to quasars and atoms to quarks. The mentioned units do not require much mathematical processing. In the old and new physics textbooks, most of the questions belong to the force and motion unit. In both books, this unit is followed by the units of electricity and magnetism and matter and its properties. It is known that there are many questions that require mathematical operations in these units. The force and motion unit is seen as a unit requiring the most mathematical knowledge by physics teachers (Başkan, Alev & Karal, 2010; Bayrak & Bezen, 2013). It is believed that the high number of questions in these units would allow students to practice more to close the mathematical deficiencies. Yet, Karakuyu (2008) states that students have difficulties to perform mathematical operations in physics classes. Although concept-based teaching is emphasized, It is clear that questions require mathematical processing in physics courses cannot be excluded. This result shows that physics cannot be abstracted from mathematics (Başkan, 2011).

In all textbooks, the number of questions at the beginning of the unit is very few. This number is only one in the beginning of the unit in the old textbooks, and scarcely any in the new textbooks. However, the beginning questions of the unit have an important place in the examination of the students' knowledge and in arousing interest. This is completely ignored in the textbooks. When examining the question distribution in terms of units in the old and new textbooks, the number of end of unit evaluation questions is more than the number of through unit assessment and evaluation. It may be a consequence of the traditional approach being influenced while preparing textbooks. The traditional approach is based on the narrative method and the students are evaluated by end of topic questions. Similarly, it has been pointed out that textbooks are influenced by the traditionalist approach in the study of primary school mathematics books conducted by Arslan and Özpınar (2009). It cannot be expected that the students will go beyond memorization with the courses prepared and the books used according to this approach. Particularly in newly prepared textbooks, the number of end of unit questions is considerably higher than in the old textbooks. It is known that physics teachers do not have enough knowledge about alternative assessment and evaluation techniques and they focus on measuring results rather than process oriented assessment (Akdeniz & Paliç Şadoğlu, 2012). As a result of this situation, it can be thought that the old textbooks did not reach the aim of alternative assessment and evaluation. Teachers may also be focused on evaluating results in

new textbooks because of the feedbacks about the difficulties experienced in implementing the program.

In the new curricula implemented since the 2004-2005 academic year, the traditional assessment and evaluation methods are not completely ignored, and it has been argued that traditional and alternative assessment and evaluation tools should be used together (Yazıcı & Sözbilir, 2014). However, when assessment and evaluation instruments are examined, it is seen that old and new books mostly use open ended, multiple choice, gap filling and true false tests. Besides, the most preferred type of question is open ended questions. Especially in newly written books, the number of open-ended questions is about close that of old textbooks. A similar situation emerged in the study by Çetin and Çakır (2013) of the assessment and evaluation tools in biology textbooks. Ozturk, Yalvaç Hastürk and Demir (2013), in studying the assessment and evaluation approaches used by teachers in science and technology lessons, found that multiple choice and open ended questions were preferred mostly. One reason for this is that open ended questions are one of the most appropriate assessment tools for measuring problem solving and high level skills. Another reason for this may be that the program developed in 2013 ignores the discoveries and experiments and switches to assessment and evaluation centered on the university entrance examination system (Yiğit, 2013). However, the university entrance exam should be based on discovery (Bezen, Bayrak & Aykutlu, 2016). As a result, it is important to remember that students will improve their ability to understand and interpret by moving away from memorization. In contrast, students focus solely on memorizing, and ignore comprehension, practice, and evaluation because of existing books.

One of the goals of alternative assessment and evaluation is to spread the measure to the process instead of a result-oriented approach (Erdoğan, 2007). In the old textbooks, many alternative assessment and evaluation tools such as project assignments, performance task, discussion, concept mapping were included in the unit to reinforce students' learning of concepts. As already mentioned in NTCM (1995), one of the purposes of providing such assessment and evaluation tools in the process is to support learning in addition to revealing the knowledge of students by alternative assessment and evaluation. However, in the physics textbooks prepared in 2016-2017, alternative assessment and evaluation tools which are included in the unit and aimed at process evaluation are given little publicity compared to the old textbooks. One reason for this is that teachers and textbook authors maybe misinterpreted assessment and evaluation as a result of the fact that assessment and evaluation examples are not included in the curriculum developed in 2013 (Göçen & Kabaran, 2013). The 2013 curriculum suggests taking advantage of a variety of assessment methods and indicates them in the program. However, the assessment tools used in the 2016-2017 physics textbooks did not go beyond open ended questions, gap filling, true false and multiple choice tests. This may be a sign that new physics textbooks ignore methods that target student centered and alternative assessment.

When we look at the deficiencies in the 2011-2012 physics textbooks, it is seen that some assessment and evaluation tools such as concept cartoons and puzzle are given very little publicity, but some alternative assessment and evaluation tools such as structured grid and word association test have never been used. In addition, concepts such as concept network, concept mapping, concept cartoon, diagnostic branched tree and meaning analysis table have been used always at the end of the unit. Similar findings were also presented by Kavcar (2012). This can be interpreted as the fact that the program does not adequately understand the criterion of the alternative assessment and evaluation, and therefore the necessary value is not given.

Projects, performance tasks and table filling in the alternative assessment and evaluation approaches were frequently used in the 2011-2012 physics textbooks. However, in the 2016-2017 physics textbooks, research and questioning based assessment tools were not used

adequately. This situation can cause students to become dependent on the textbook without acquiring knowledge. In addition to this, they can prevent them from going to research and investigation studies other than the textbook. As a result, the textbooks will be confronted only as sources that have adopted the traditional approach of narration and are not used much. If program developers who want their textbooks and curriculums to be implemented and used may attach importance to evaluating the process for the interests and needs of the students, they may be able to close this gap to some extent.

Elimination of the deficiencies in the textbooks is one of the most important studies that increase the quality of education. The incomplete and difficulties in the application are corrected in line with the feedback from the current program and textbooks. However, when the old and new physics textbooks are examined, it can be seen that the deficiencies in the field of alternative assessment and evaluation in the old textbooks have not been solved in the new textbooks, on the contrary, a traditional teacher centered approach has been experienced. As a result, students will come back to memorize again and it will result in that the information will not be used or practiced again.

A successful assessment and evaluation should be at the basis of a successful physics education and this should not be forgotten in the process (Koç & Yayla, 2015). Alternative assessment and evaluation may be a good advantage for physics courses, where success is frequently poor and emphasized by students with negative attitudes. However, if the teachers are not ready for alternative assessment and evaluation, the students are directed to read and memorize because of the content of the questions in the university entrance exam. This situation presents to the students a curriculum of physics lessons that is not parallel to the elementary curriculum exhibiting constructivist and discovery-based instruction and affects their development negatively.

In the light of these results, it should not be forgotten that the university entrance exam has the key role to make students regain the experimenting and discovery which are the essence of physics. Rather than the arrangements to be made in the lessons, it is firstly necessary to regulate the university entrance exams with a student centered structure. Later, it is thought that teachers and students will embrace the student centered approach much more and use it more frequently in their lessons. As a result of this study, it is suggested that researchers analyze the content of the questions asked in the university entrance exam and compare the structure and content of these questions with the data and questions in the current curriculum and textbooks.

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