The functioning of context-based physics instruction in higher education

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Contents

Abstract

The effects of the context-based approach have been discussed in educational settings as one of the innovative instructional approaches. Many countries throughout the world have implemented context-based physics projects or programs to make physics more relevant to students' lives. This paper examined the effects of context-based physics instruction on undergraduate students' achievement compared to traditional physics instruction at a university. Three topics were utilized: potential energy, kinetic energy, and rotational kinetic energy. Also, it was determined the effect of context-based physics instruction about students' attitudes towards physics. And, it was investigated what students think they have gained with context-based physics instruction. The present study has both qualitative and quantitative dimensions in terms of using achievement test and the interview. The sample of this study consists of second year undergraduate students of Primary School Teaching Program. The findings from this study show the context based approach application on the subjects created no significant effect on students' exam scores. However, students' attitudes were positive.

Keywords: Academic achievement, context-based instruction, higher education, physics

Introduction

The needs of the present century are associated with information and communication technologies. This century is widely referred to as a knowledge economy, which necessitates a more diverse repertoire of teaching, learning, and assessment methods than is currently common in higher education (Williams, 2008). Physics can be seen in every area of our lives and plays a great role for developing countries. But, the number of post-16 participation students taking physics courses is declining day-by-day in these countries (Gorard & See, 2008). Abstract concepts in physics courses makes it too difficult for students to comprehend the subject matter. At the same time, more often students believe physics subject matter is difficult (Saleh, 2012; Whitelegg & Parry, 1999), boring and irrelevant to their lives (Efthimiou, 2006; Lye, Fry, & Hart, 2002). So, information learned is forgetten quickly as students are unable to associate it with life in general.

In the traditional physics classroom, generally teacher-centered types of instruction actualize. Students listen to lessons, take notes, and solve problems centered on memorization and computation. Traditional teaching approache contributes to the problems of misconception and unsatisfactory conceptual understanding in introductory physics (Cahyadi, 2004). Looking at current education programs in developed countries, we see innovative instructional approaches. Studies (e.g. Redish & Steinberg 1999; Shieh, Chang, & Tang, 2010; Whitelegg, 1996; Whitelegg & Parry, 1999) show learning university physics via innovative learning environments ensure positive attitudes and a higher learning gain.

The context-based approach is one of the common innovative instructional approaches utilized as a basis for education programs in many countries such as the Netherlands, USA, Germany, UK, Canada, Australia. Also, curriculum for secondary schools in Turkey has been developed according to contextual approach. According to contextual learning theory, learning occurs only when students (learners) process new information or knowledge in such a way that it makes sense to them in their own frames of reference (their own inner worlds of memory, experience, and response) (Center for Occupational Research and Development [CORD], 1999, p. 1). This approach to learning and teaching assumes the mind naturally seeks meaning in a context that is in relation to the person's current environment and it does so by searching for relationships that make sense and appear useful (CORD, 1999, p. 1).

Real world contexts take part in innovative projects like CHEMCOM in USA, LORST in Canada, SATIS and Salters' Science and Chemistry in England and Wales, and PLON Physics in The Netherlands. Also the PISA assessment instrument, a profile of knowledge and skills among 15-year-olds, consists of real world contexts involving Science and Technology in 2000, 2003, 2006 (Fensham, 2009) and 2009 (Organisation for Economic Co-operation and Development [OECD], 2010). In the literature there are applications of both instruction and assessment processes for context-based approach (e.g. Benckert, 2005; Cooper, Yeo, & Zadnik, 2003; Demircioğlu, 2008; Harbach & Fechner, 2011; Heller & Hollabaugh, 1992; Enghag, Gustafsson, & Jonsson, 2007, 2009; Kaschalk, 2002; Murphy, Lunn, & Jones, 2006; Park & Lee, 2004; Rayner, 2005; Rennie & Parker, 1996; Rioseco, 1995; Schwartz-Bloom & Halpin, 2003; Tekbıyık & Akdeniz, 2010; Wierstra & Wubbels, 1994). Some of them (Demircioğlu, 2008; Murphy et al. 2006; Rayner, 2005; Rioseco, 1995; Schwartz-Bloom & Halpin, 2003) show positive effects of contex-based learning in academic achievement. But some studies (Harbach &

Fechner, 2011; Wierstra & Wubbels, 1994) show no change. Similar to research on the effect of context-based instruction to achievement, researches reveal a positive effect of context-based instruction on students' attitudes and motivations to science (Barker & Millar 1999; Barker & Millar 2000; Belt, Leisvik, Hyde, & Overton, 2005; Demircioğlu, 2008; Ng & Nguyen, 2006; Ramsden, 1997). The available studies (Akpınar & Tan, 2011; Perkins, 2011) also indicate context-based instruction provides no change in students' attitude towards physics.

Taasoobshirazi and Carr (2008) examined existing reresearch on context-based physics. They identified three major limitations of these studies. The first limitation is difficulty to implement context-based physics instruction. A second limitation is the dearth of research examining the effects of this instructional method on students' achievement in physics compared to traditional physics instruction. The third limitation is significant methodological problems in the research. One of the methodological flaws they defined is studies integrating group work, making it difficult to determine whether improved strategy use was the result of materials on context-based or the use of group work. Also, they noted there is insufficient research to support the recommendation that teachers should use context-based instruction. This study considers these critiques of research on the context-based approach in physics and examines the effects of context-based physics instruction on students' achievement compared to traditional physics instruction for topics of potential energy, kinetic energy, and kinetic energy of rotation. Energy is one of the fundamental and complex concept in science and students from all grades have difficulties in scientific understanding of it (Liu & McKeough, 2005). The central role of energy in life has attracted much attention to its teaching in science education. And research findings suggest alternative instructional approaches for functional conceptual understanding of energy (Brook, & Wells, 1988; Fry, Dimeo, Wilson, Sadler, & Fawns, 2003; Heuvelen, & Zou, 2001; Huis, & Berg, 1993; Papadouris, Constantinou, & Kyratsi, 2008; Solbes, Guisasola, & Tarin, 2009;Trumper, 1990,1991).

Additionally curriculum, instructional strategies, prior physics knowledge and grade level variables, students' attitude toward physics is also related to their physics achievement (Lawrenz, Wood, Kirchhoff, Kim, & Eisenkraft, 2009). The present study also determines the effect of context-based physics instruction about students' attitudes towards physics. And, it investigates what students think they have gained with context-based physics instruction.

Reviewing Studies Related to Context-Based Physics Instruction

In looking for the context-based physics studies, the author entered the keywords ‘context-based’, ‘contextual learning’, ‘physics and context’, ‘physics and context-based’, context-based project’, and ‘context-based program’ in the following databases: Academic Search Complete, Education Research Complete, Education Resources Information Center: ERIC, Springer LINK Contemporary, Taylor and Francis Journals, Wiley InterScience Journals, ScienceDirect Journals, Cambridge Journals Online, PROQUEST Dissertations and Theses Full Text, Emerald Journals, Oxford Journals Online, Google Scholar, Social Science Research Network. In the review process, the criteria for inclusion included studies that had implemented context-based physics instruction in classrooms. Context-based physics projects or programs have been implemented in different countries (e.g. SLIPP in UK, piko in Germany, PLON in the Netherlands, VCE in Australia, LCP in Canada, ECL in Brazil and UK, Applications-Led Approach in Scotland, see Table 1). For example, The Supported Learning in Physics Project (SLIPP) is an Open University-led curriculum directed by Elizabeth Whitelegg. It provides a text-based learning program for post-16 students and contains real-life contexts of interest to students when teaching physics concepts. The main purpose of the project is to increase students’ motivation for learning physics. The project consists of eight units and each unit means the context defines physics content. The titles of the units are: “Physics, Jazz, and Pop,” “Physics on the Move,” “Physics for Sport,” “Physics of Food,” “Physics of Space,” “Physics of Fields,” “Physics in the Environment,” and “Physics of Flow.” Assessment is achieved through short simple questions that relate directly to the proceding text with longer self-assessment questions that require more detailed answers and serve the function of checking physics understanding (Whitelegg, 1996; Whitelegg & Parry, 1999).

Table 1. A Summary of the Context-Based Physics Projects or Programs

Context-based physics projects/programs	Aim/description	Age/level	Country
Supported Learning in Physics Project (SLIPP)	• To increase students' motivation for learning physics (Whitelegg, 1996, p.291)	Post-16 students	UK
Physics Curriculum Development Project (PLON)	• Preparing students for further education and/or future employment and for coping with their (future) life roles as a consumer and citizen in a technologically developing, democratic society (Kortland, 2005, p.75-76)	Secondary	The Netherlands
Victorian Certificate of Education (VCE)	• Use of physics as one of the tools for (more) thoughtful decision making at a personal and societal level (Kortland, 2005, p.76)	Year 11 and 12	Australia
Event-Centered Learning (ECL)	• Making physics more relevant to students (Hart, 1995; Hart & Boydell, 1988)	• Undergraduate physics students in Brazil • Student teachers and pupils in secondary schools in the UK	Brazil and UK
Large Context Problem (LCP)	• A particular event, occurence or set of circumstances drawn from real life and used as the basis for modules in the teaching of science (Watts, Alsop, & Zylbersztajn, 1997, p. 341)	Secondary	Canada
Applications-Led Approach	• LCPs are contextual settings that generate questions and problems that seem inherently more		Scotland

	interesting than similar problems presented in traditional textbooks (Wilkinson, 1999)	Secondary	
Physik im Kontext (piko)	• Applications-led approach is concerned with physics in action; it attempts to integrate pure and applied physics, to show the relevance of physics to society and to develop practical problem solving and technological skills (Wilkinson, 1999) • Developing a new (constructivist) culture of teaching and learning (Duit, Mikelskis-Seifert, & Wodzinski, p. 121) • Improving students' competencies of thinking and working like scientists and to use physical knowledge in everyday life contexts (Duit et al., p. 121) • Integrating topics of modern physics and technologies (Duit et al., p. 121)	Secondary	Germany

Addition to theoretical studies on context-based physics instruction or assessment, many studies (e.g. Astin, Fisher, & Taylor, 2002; Colicchia, 2005, 2007; Colicchia, Waltner, Hopf, & Wiesner, 2009; Kaschalk, 2002; King & Kennett, 2002 a,b,c; Rayner, 2005; Waltner, Wiesner, & Rachel, 2007; Wierstra & Wubbels, 1994; Testa, Lombardi, Monroy, & Sassi, 2011) in this area focused on developing contexts to apply in physics. However, looking at these studies researchers generally don't examine the effect of these developed contexts in their classrooms. There are a limited number of studies (e.g. Cooper et al., 2003; Finkelstein, 2005; Murphy et al., 2006; Peşman & Özdemir, 2012) exploring the effectiveness of context-based physics instruction especially included a pre-posttest design. For example, Waltner et al. (2007) developed contexts relating to locomotion of fish and sperm in a way which can be used to teach in physics classes. But, there is no finding on applying these contexts in physics class and about examining their effects on academic achievement related to subject. Similarly, Colicchia (2005) developed a model providing a biomechanical basis to estimate loadings on the cervical discs under various postures. The model shows forces and torques involved to maintain static posture in the cervical spine. He stated that it is useful to discuss the concepts force and torque in a simplified neck model for students who do not have a mathematics and physics background. King and Kennett (2002) developed Earth contexts in physics for 11-16- year old students as introductory science curricula around the world contains little or no Earth science. The areas of physics for 11-14- year old pupils are “Electricity and magnetism,” “Forces and motion,” “Light and sound,” “The Earth and beyond,” and “Energy resources and energy transfer.” For 14-16-year old pupils the areas of physics are “Electricity,” “Waves,” “Earth and beyond,” “Energy resources and energy transfer,” and “Radioactivity.” Astin, Fisher, and Taylor (2002) provided a local visit to motivate and help students use their physics in a real, working context. In the study their experiences from visits and value of visits to teach physics effectively are shared.

All of above studies are related to only developing physics contexts. They do not include a comparison to determine whether the context-based physics instruction resulted in better learning than traditional physics instruction. A study includes pre-posttest design was conducted by Finkelstein (2005). He examined graduate students’ understanding of the basic concepts in electricity and magnetism within the framework of the physics course in context. The mean pre-test and post-test scores were, respectively, 54 and 74%. The average for individual student gains was 51%. Similarly, Cooper, Yeo, and Zadnik (2003) investigated the conceptual understandings of 78 16-year old Australian high school students and their knowledge about several issues related to nuclear energy. A context-based instruction was implemented for nuclear technology that consisted of about 25 hours. Seventy-eight students in three schools responded to both a pre-test and post-test of nuclear physics concepts. At the end of the instruction, students’ understandings or beliefs about some of the issues changed. No comparison group from a traditional physics course was included in these studies so it cannot be concluded that context-based physics instruction produces better learning than traditional one.

Importance of the Study

Examining above studies, we see they refer activities about context-based physics instruction but generally they don't focus on its effects on both students' academic achievements and their attitudes towards physics. This study considers above critiques of research on the context-based approach in physics as Taasoobshirazi and Carr (2008) stated and examines both effects of context-based physics instruction on university students' academic achievement compared to traditional physics instruction and their attitudes towards physics. So, this research will make a significant contribution to the literature on this field.

Research Questions

The following questions are the frame for this study.

1. Are there any effects of context-based physics instruction on undergraduate students' achievement for potential energy, kinetic energy, and rotational kinetic energy topics?
2. Are there any effects of context-based physics instruction on undergraduate students' attitude towards physics?
3. How do the students assess context-based physics instruction application about gains?

Method

In this study, both quantitative and qualitative research methods were utilized. In the quantitative part of the study, pre-posttest design include control group was used and physics problems were asked to both control (traditional physics instruction) and experimental group (context-based physics instruction) before and after application. In the qualitative part of the study, a structured interview with fifteen randomly selected students from the experimental group was used at the end of the application.

Participants

The research group of this study consists of 110, second year undergraduate students of Primary School Teaching Program from a Black Sea University in Turkey during the 2011-2012 academic year. The number of students in the experimental and control groups in two classes are given in Table 2 below. Researcher was not created these classes. They were created previously.

Table 2. The Number of Students in the Groups

Groups	N
Control (traditional physics instruction)	54
Experimental (context-based physics instruction)	56

Data Collection

Data were collected from two classes of the general physics course during fall semester. To determine the success of these two classess on potential energy, kinetic energy, and rotational kinetic energy, a measurement instrument consisting of five traditional problems was applied to both classes after application and the mean scores were compared. The problems were generated from physics books by this researcher. At the end of the study, a structured interview with fifteen randomly selected students from the class that context-based physics instruction was applied. Interview questions were generated in order to see functioning of context-based physics instruction in higher education with the perspective of students participated this application. This interview questions were: Q1. Did the lessons based on context-based approach change your attitude towards physics? Please explain. Q2. What do you think you gained from the lessons conducted utilizing the context-based approach?

Data Analysis

The data obtained from achievement instrument of the two classes were examined with a *histogram plot* and the *Kolmogorov Smirnov Test* to determine if the data show a normal distribution. The homogeneity of group variances were examined with Levene's Test. As a result of these analyses with the SPSS 17.00 package program, it was determined the data show a normal distribution and the variances are equal. Therefore, parametric tests were used to analyze the data.

Students were encoded in the form of S1, S2,… Descriptive analysis was adopted for the qualitative data. Transcripted interviews were coded as first level code (inductive codes), then the related first level codes were grouped as themes and recoded regarding the questions (deductive codes). Using these thematic codes, the data was presented in tables (Tables 6 and 7). These themes led to explain interview questions. The findings drawn from the tables were supported by presenting sufficient excerpts from the students' interviews.

Validity and Reliability

After researcher (physics teacher educator) generated problems on potential energy, kinetic energy, and rotational kinetic energy, they were also examined by two physics instructors to determine content validity of measurement instrument. A consensus was reached on the problems among instructors. An answer key consisting scores for each answer steps was created together to ensure data realiability. To ensure the validity and reliability following measures were also taken:

1. Researcher conducted this application in her physics course for both classes. There was no effect from existence of another researcher. So the application was conducted in a natural and trust environment.

2. In the study, the participants, data collecion tools, the process of data analysis and the application was reported in detail.

3. Following the presentation of the encoded data (interviews), direct quotations were presented by returning the data in order to make codes more explicit.

4. Researcher coded interview data again after three weeks for reliability and calculated agreement percentage with Agreement Percentage (P)=Consensus (Na) / ((Consensus (Na) + Dissidence (Nd)) X 100 formula introduced by Miles and Huberman (1994). P = 75 value was acquired, thus results was accepted reliable.

Application

This researcher applied the traditional instruction to one of the classses (control group) on potential energy, kinetic energy, and rotational kinetic energy topics. The context-based instruction was applied to the other class (experimental group) incorporating the same topics by the same researcher. Classes were equal to each other in general physics achievement (Table 4), based on a measurement instrument at the beginning of the semester. The application for both groups was three weeks (six hours). In the course conducted with the traditional instruction, the lecture method and the question-answer method were used. Physics problems related to topics were solved. Afterwards, examples from daily life were presented. In the course conducted according to the context-based instruction, the researcher began all lessons with contexts. The contexts and the contents of physics subjects are provided in Table 3.

Table 3. The Contexts and Physics Content Areas

Working titles	Contexts	Physics content areas
Physics in the news	• *110-meter world record with snow motor* • *Bead gun caused a coma*	Potential energy, kinetic energy
Physics in the sports	• *Archery* • *Pole vault*	Potential energy, kinetic energy
Physics in the films	• *The Lord of the Rings-The Two Towers* • *Ice Princess*	Potential energy, kinetic energy, rotational kinetic energy
Physics in the entertainment	• *Ferris Wheel* • *Roller coaster*	Potential energy, kinetic energy, rotational kinetic energy

All contexts were shown via projector in classroom. Each context was introduced to the students in a form of discussion. After providing context, researcher raised several questions to initiate discussion. In the films, only related scenes to topics were shown in classroom. In “Ice Princess” film scene of a student’ skating attempts, and in “The Lord of the Rings-The Two Towers” film scene of using trebuchet were shown. Also after showing trebuchet scene, a text contains history of the trebuchet was read. And a constructed trebuchet mechanism (Figure 1) was examined and was applied with students in classroom. So students saw how a trebuchet works.

Figure 1. A wooden trebuchet used in physics classroom

Findings

Findings from the Achievement Test

The general physics achievement results of the control and experimental groups before application (Table 4) were determined with the two independent-sample t-test. The t-test results are interpreted according to the 5% significance level.

Table 4. The General Physics Achievement Results of the Control and Experimental Groups

Groups	N	Mean	St. Deviation	t	p
Control	54	28,35	12,81	0,792	0,430
Experimental	56	26,21	15,34		

The achievement results for the control and experimental groups before application are ($t=0{,}792$; $p=0{,}430$; $p>0{,}05$). Thus, before application classes were equal to each other in terms of general physics achievement.

After the application two independent-sample t-test was applied to determine whether a significant difference in terms of achievement between control and experimental groups existed. The achievement results for the control and experimental groups after application are provided in Table 5.

Table 5. The Achievement Results of Control and Experimental Groups After Application

Groups	N	Mean	St. Deviation	t	p
Control	54	28,41	19,47	0,087	0,931
Experimental	56	28,73	19,70		

As seen from the results (t= 0,087; p= 0,931; p>0,05); there is no significant difference between the control and experimental groups in terms of achievement in potential energy, kinetic energy, and rotational kinetic energy topics.

Findings from the Interviews

At the end of the application, two questions in a structured interview with fifteen students randomly selected from the experimental group were asked about the effects of context-based physics application. The codes and themes (Tables 6 and 7) provide the students'responses. Also, excerpts from students' statements are presented below.

Q1. Did the lessons based on context-based approach change your attitude towards physics? Please explain.

Table 6. The Codes and Themes from Students' Responses to the First Question

Theme	Code
Positive change of attitude	*Curiosity and interest in issues of physics (S1, S2, S3, S4, S9) Busy with physics (S1) *Enjoy physics course (S2, S7, S8, S10, S13) Warm-up physics course (S5) Willingness to practice the new knowledge (S6) Awareness of the contribution of physics to everyday life (S7, S11, S15) *To start seeing physics as funny (S7, S8, S9, S14) Get away from prejudices against physics (S10, S14) Awareness of the necessity of learning physics (S11)

No change of attitude	Cannot get away from prejudices against difficulty of physics (S12, S15)

The context-based instruction created no difference in academic achievement on physics topics studied in the present study. However, examination of Table 6 showed, positive thoughts of students to the physics course after application. Most thoughts were expressed by students as follows: After application, "curiosity and interest in issues of physics," "enjoy with physics course," and "to start seeing physics as funny." The excerpts from some of the students refer to these expressions:

- To start the lessons with events from daily life increased my interest and curiosity to the physics course. (S2)
- Executing the lessons over the news, movies, and sports made the lessons funny. We learned on one hand and the on other hand we had fun. We understood better as we enjoyed the lesson. (S8)
- In the lesson using such materials changed my perspective to the physics course. The physics course stopped being boring and turned out to be fun. (S14)

Two students stated that with this application their prejudices against physics disappeared, but another two students said they could not get away from their prejudices. They still see physics as a difficult science. Excerpts from the expressions of these students are as follows:

- The physics lesson with this approach is not boring anymore. Having physics lessons in this way destroyed all my prejudices. (S14)
- Having physics lessons taught in this way helped us get away from our prejudices against physics. (S10)
- My prejudice against physics comes from my high school years, causing the most important obstacle for me to learn physics science. All of these materials have remained poor to learn physics because of my prejudice. Einstein said: "It is more difficult to break down a prejudice than an atom." If I had no prejudice, learning physics with these materials would be more enjoyable and instructive. (S12)

- The materials used in the physics course did not change my opinions about difficulty of the physics. But, of course, they had a positive effect. (S15)

Q2. What do you think you gained from the lessons conducted with the context-based approach?

Table 7. The Codes and Themes from Answers of Students to Second Question

Theme	Code
Cognitive outcomes	*Establish a relationship between physics and daily life (S1, S2,S4, S5, S7, S8, S10, S11, S12, S13, S14, S15) *Permanent learning of the issues (S1, S3, S4, S6, S9, S10, S14) Learning the issues without memorization (S5,S6) Can transfer knowledge learned from the lesson (S7)
Enter behavior for course	*A better focus to the lesson (S2, S3, S4, S13)

Examining Table 7, it is seen that students mostly state the cognitive outcomes as "establish a relationship between physics and daily life" and "permanent learning of the issues" they gained. Excerpts from the students are as follows:

- Learning issues with this approach provided us to look at daily life through a physics window. For example, while watching a football match. I think whether the free kick will be a goal or not, and I think about the angled shot. (S8)

- In the past, I had been seeing the physics as a whole of complicated processes, but now I can establish a relationship between physics and daily life. (S4)

- The lessons with this approach provided permanent learning to me. I am sure I will not forget the ice skating in the movie, the trebuchet in the film (The Lord of the Rings-The Two Towers), the events on the news, and the physics related issues for a long time. (S9)

- ….For example, I have noticed many things related to physics that I will not forget and I have not noticed before in the movie section of "The Lord of the Rings-The Two Towers." (S14)

- The students state their focus on physics lessons is better with the context-based approach. The excerpts from the students' statements referring to this opinion are as follows: My attention is distributed too quickly, so such an application attracted me to the lesson. (S3)

- The approach helped me to intensify my attention to the lesson. (S4)

Discussions and Conclusion

The literature on effect of context-based instruction, generally it is cited as having positive impact in success. However, there are some studies that reveal no increase in academic achievement. The findings from this study show the context based learning application on potential energy, kinetic energy, and rotational kinetic energy topics created no significant effect on undergraduate students' exam scores. This conclusion is valid for this research group. These students had a traditional instruction system before they came to the university. The participants first experienced application of this approach in the researcher's physics course. So, the films, news, etc., in the course may have drawn their attention to visuals rather than content. Also, using traditional problems in assessment process for both groups may create this result. Therefore, future research need to examine context-based physics instruction on these topics with context-based physics problems.

Students' negative attitude towards physics will affect their physics achievement negatively. It can be said from interview with students also researcher's experiences in two classes throughout the term, some students have prejudice about physics. So, for this study negative physics attitude of students may affect their achievement. However, students said they learned the subjects more permanently, and could establish a relationship between physics and daily life with the context-based instruction. The permanence of information and adapting it to daily life is difficult with the traditional approach to learning. If we execute the physics course theoretically, we lead the students to memorization. This causes to forget the information as soon as possible. As a result, we can say students gained important cognitive outcomes as *"permanent physics learning"* and *"connection with physics and daily life"* with context-based approach in physics course.

One of the goals for context-based science instruction is more student engagement and development of more interest in science (Fensham, 2009). After application, students' expressions through positive attitudes attract attention. The most prominent expressions among these are *"curiosity and interest in issues of physics," "enjoy with physics course,"* and *"to start seeing physics as funny."* Such an outcome is exciting on behalf of physics at the university level. We want teacher candidates to apply innovative instruction in their classrooms. Therefore, we should set an example for them as faculty members with our courses consisting of modern teaching methods instead of traditional teaching methods. If we change our teaching practices from traditional to innovative, teacher candidates will be affected in positive way both in their learning related content and teaching approaches in their classrooms as future teachers. It can be too late to change their conceptions of teaching and their teaching approaches when they are teachers. Some educationalists pointed out (Ho, Watkins, & Kelly, 2001; Ramsden, 1992) , tertiary teachers' conceptions of teaching will change their teaching practices and thus affect their students' learning outcomes. Thus, firstly we should review our teaching approaches and conceptions of teaching as faculty members. This application of the researcher as an education faculty member will serve as an example for teacher candidates and encourage them to apply such innovative approaches in their classrooms as teachers. Utilizing this manner, they will know how to apply these approaches.

Ng and Nguyen (2006) investigated the extent to which physics teachers in Vietnam high schools integrate practical work and context-based approaches into their teaching. They explored the how, what, and why they do it. And found the vast majority of the teachers think using everyday contexts help students understand physics concepts better and learn physics in a meaningful way. In turn, this also helps students develop good attitudes towards the study of physics. Akpınar and Tan (2011) examined the effect of context-based physics instruction to 9th grade students'attitude towards physics. Force and motion was the topic of the course for eight weeks. A Likert-type scale consisting of 36 statements on students' attitude towards physics was applied before and the after the course. They found no significant attitude change towards the physics after the course. Limitations of the studies may generate these different results. So, many new studies are needed to determine if using the context-based approach in the courses provides higher achievement and positive attitude. This study focused on only potential energy, kinetic energy, and rotational kinetic energy topics. Therefore, a similar study for other physics topics at the university level can be achieved to determine the effects of context-based instruction on physics students' academic achievement.

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