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The Use of REACT Strategy for the Incorporation of the Context of Physics into the Teaching English to the Physics English Prep Students[1]

Ali Şükrü Özbay[2], Mustafa Naci Kayaoğlu[3]

Abstract

The present study explores department of Physics prep students' (department of Physics students attending English preparatory program) relative performance in English grammar by the use of contextual learning materials in the actual classroom instruction based on the contextual learning theory. Thus, the purpose of this study is to investigate the effect of teaching grammar in physics context for the physics prep students to increase their interests in learning English. Another primary goal of the study is to evaluate the teaching activities which are developed in accordance with the REACT (relating, experiencing, applying, cooperating and transferring) strategy in context based approach. The study was with 25 students of Physics at an English prep-school in Turkey. With the aim of determining the effect of contextual teaching materials, sample lessons based on the contextual knowledge and the target grammar points were made. Following the lessons, a structured interview was delivered to the five of the participants. One result is that the incorporation of REACT strategy into the teaching of English to the Physics students proved to be useful for the learners who took part in the study, adding that relating, experiencing, applying, cooperating and transferring the knowledge respectively helped them use and retain the knowledge far more than the traditional classroom teaching methods in grammar teaching. Another specific outcome of the overall findings is that students were able to establish connections between what they learn and how that knowledge can be utilized in physics, which, in turn, has increased their motivation to a higher level.

Keywords: Contextual Learning, REACT, Physics Students.

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[2] Karadeniz Technical University, alisukruozbay@gmail.com
[3] Karadeniz Technical University, naci@ktu.edu.tr

1. Introduction

It is a fact that from the foreign language as a burden to foreign language as an advantage, a number of urgent issues related to the way it can be taught and learnt in some specific contexts have received significant attention since foreign language learning has become an urgent necessity in today's increasingly interdependent and English-dominated world. English has become lingua franca in the modern world. The language of science, technology and academic information has long been English, which is why people have an increasing tendency and urgency in learning English for academic purposes. This urgency has also fuelled the attempts to incorporate foreign language teaching and learning activities into different context.

In the traditional language learning classroom, the dominant method appears to be a teacher-centred one. The traditional teaching approaches focusing on memorization of certain structures and phrases cause the misconceptions and unsatisfactory conceptual understanding in the acquisition of language (Tural, 2013). The current education programs in schools and in the universities apply new instructional approaches. Context based learning is one of them as an innovative instructional approach in teaching and learning. It is a learning process that enables students to develop their individual competence in learning that occurs in close relationship with actual experiences (Hadley, 2003). In contextual learning theory, learning occurs when the content of the knowledge creates meaning in learners' mind, making connection between the context to be studied and real world situation (Hubball & Kennedy, 2009). Learners construct the knowledge in their own frame of experience and have an access to the knowledge in an active process of learning in terms of selecting, deciding and interpreting the knowledge (Williams & Burden, 1997). Learners' cognitive structure determines their experiences in learning, which is why they use various abilities while acquiring that knowledge and they have self-cognitive capacity to reach it. The cognitive capacity effects learners' way of acquisition. Learners' pre-judgment against the knowledge and their experiences, their physical and mental maturity affect their motivation in learning (Wijarwadi, 2008). In the process of contextual learning, learners create opportunities to discover their own ideas and they consciously implement their own strategies of learning. In context based learning theory, learners are able to reach the knowledge only when they discover the knowledge in their own individual world and they make sense of the meaning of the teaching materials and construct their own understanding. The learner takes a central

position and role in the learning process and learning occurs when the learner acquires the language, real world situations, interaction and collaboration among themselves (Williams & Burden, 1997).

The fact that most universities in Turkey have their English prep programs both at undergraduate and graduate level has made it necessary to take English teaching and learning outside its conventional context. This conventional context presents very little active student engagement and very little interaction with the knowledge and information presented in the text on which the learner is studying. Instead, a more authentic context in which the learner can have the opportunity to combine language study with the subject matter s/he studies is needed. In a sense, context-based learning can be taken as a way of filling the linguistic and semantic gap with scientific knowledge and with the language it uses.

In an effort to enable students construct and use knowledge in science, Crawford (2001) defines five strategies, namely contextual teaching strategies, which are also called as REACT strategy. It includes relating, experiencing, applying, cooperation and transferring steps. Teaching activities based on the REACT strategy foster the learners to analyse the information and comment on the knowledge in their individual comprehension abilities (Tural, 2013). "Contextual learning theory says that learning occurs only when students process new information or knowledge in such a way that it makes sense in their frame of reference" claims Hull (1993) and adds that when learners use this approach they try to create meaning in context and search for semantic relationships between the language units in a given text (p. 23). Thus, the learner relates language knowledge to scientific or contextual knowledge. According to Crawford (2001), *relating* refers to the act of learning in the context of a person`s life experiences or pre-existing knowledge. *Experiencing* is learning by practice, exploration, discovery and invention. *Applying*, on the other hand, is learning by using the concepts and pieces of knowledge in the field. *Cooperating* refers to learning in the context of sharing, responding and communicating with other learners, and *transferring* is using knowledge in a new situation. Learning occurs in the context of existing knowledge and learners transfer, use and build upon what they already know. The process of learning in Context Based Learning (CBL) is a central activity focusing on discovering individual differences, new ideas and constructing self-knowledge (Weaver, 1976). Learners discover meaningful relationship between the practical applications and the context of the real world that appears useful for learners. Context based learning theory supplies the knowledge in

various contexts related to the students' own field. The students make a connection between the content of given knowledge and their real lives, therefore, the students acquire the knowledge rather than memorizing it (Acar and Yaman, 2011). Contextual learning, focused on seeking information in an individual relationship with learning activities, help learners to acquire the knowledge naturally (Johnson, 2002). Context based learning built upon real world's materials is proved to be useful, especially for science students. The contexts, based on science instruction, increase students' interests and effect their motivation positively. Students discover the meaningful relationship between content of the instructions and their practical applications in the real world (Tural, 2013).

Learning process based on REACT strategy has positive effect on students' attitudes and increase their success. Students develop meaningful connections between the academic content and the context of their field and experience individual activities with collaboration (Fensham, 2009). Learners organize themselves as learners who improve their skills individually and collectively. Students generally pose negative attitudes to learning grammar. However, grammar learning plays an important role for students to improve language learning and grammar skill helps students in terms of organizing words, building meaningful structure of sentences and communicating effectively (Mart, 2013). According to Thornbury (1999) "grammar is a description of the rules for forming sentences, including an account of the meanings that these forms convey'' (p.13). Grammar is defined as the basic structure of a language. Learning grammar rules provides learners to use language systematically. Grammar instruction facilitates learners to use components of language structure consciously and comprehend the meaning of sentences correctly. Many researchers argue the language learning requires the knowledge of grammar instruction. Grammar knowledge enables students to develop their competence in forming the order of words in a semantic and syntactic harmony. Learning grammar provides learner to improve their understanding of language and increase their awareness about the parts of language (Mart, 2013). Grammar competence helps learners to combine words, form sentences and communicate meaningfully. Learning grammar rules is important for learners to improve their language skills, nevertheless, learners who know the rules of grammar explicitly, are unable to apply the rules in practical activities. Their knowledge about the rules of grammar does not help them to understand the meaning of sentence and the function of grammar items in sentences.

Memorizing grammar rules prevents learners from using language skills correctly (Weaver, 1976). Learning grammar rules in separated and isolated sentences hinders learners'

language skills in practical activities. Learning grammar in context helps learners analyse the structure of sentence consciously. Grammatical instructions that are given in interesting and meaningful context enhance learners' competence in using language in a correct way (Blanchard, 2003). Language learners realize the real function of grammar items and increase their comprehension ability in making out the intended meaning of the words in sentences (Mart, 2013). Grammatical items that are placed in related context provide learners to make relationship between the word and the meaning, the items and the functions. Syllabus, based on the context based learning theory, provides teacher to teach grammar inductively. Learners enable to acquire the grammar rules in real life context rather than memorizing them.

In classroom activities, teachers guide the learners to discover the knowledge of grammar in their individual abilities. Teaching process is applied with authentic materials that are related to learners' own field. Learning is achieved with learners' practices and using their knowledge in different activities and applications (Khan, 2007). Wajnryb (1990) argued that "context gives a more precise understanding of how to use the grammar, and provides accuracy in the studied language both in oral and written skills'' (p. 6). Learning grammar in context provides learners to use grammar structures function in sentences correctly and increases their competence in their comprehension of the grammar rules. Studies have shown grammar is best taught when taught in the context of its language use. Practical activities that involve the use of grammatical skills in related context lead to better retention of forms.

1.1. Literature Review

Research argues that teaching methods based on learning through memorizing definitions and practicing isolated rules result in learners' loss of motivation and interest in learning. Context based language teaching is a relatively new approach that focuses on student's experience and interest (Sounders, 1999). Teaching and learning strategies in CBL are determined by the view of progressivism. Bern and Ericson (2001) argue that progressivism is a teaching and learning theory based on the principle that learning occurs as a result of links established between stimuli and response through the application of rewards. In learning process based on progressivism, students show observable behaviours in order to response to the stimuli. The theory of progressivism puts much emphasis on the experiences and interests of the learners. Learning becomes a system that stimulate the brain to generate meaning by making connection between the academic content and the context of a learner's daily life (Johnson, 2002). Learners' previous experiences facilitate them to deal with the approaching circumstances. Students relate their knowledge of classroom activities to their

real world applications. Context based learning also exploits the principles of constructivism. The constructivist theory is based on the study of John Dewey. According to Dewey (1956) students are able to understand what they learn if the knowledge is familiar to them. Students feel motivated if they directly get participated in classroom activities. The theory relies on the view that learning occurs in the process of self-construction. Learners acquire the knowledge in their own frame of capacity (Berns and Ericson, 2001). Learning process based on constructivism encourages students to create their own knowledge with the help of their own experience, which leads to the application of the newly acquired knowledge to new situations by relating it with the pre-existing knowledge.

In constructivism theory, also called student-centered instruction, learning process emphasizes the roles played by students rather than the ones played by teachers. Learning activities in constructivism consist of authentic assessment conducted in group work. Students develop critical thinking techniques in order to find solutions to and from the problem to be studied. According to Zahorik (1995) humans create their knowledge when they bring meaning to their experience. This is because knowledge cannot be defined as consisting of a group of truths to be revealed or discovered, knowledge exists independently and is constructed by man based upon new experience. However, Piaget's view of constructivism argues that knowledge structure in human brain is developed with different information that becomes meaningful through experience. Contextual learning and teaching philosophy based on the theory of behaviourism and constructivism emphasizes the students' interest and experiences. Accordingly, Hudson and Whistler (2007) states that CBL theory based on constructivism and behaviourism is student centered and learning takes place if the students construct their own learning by making connection with the knowledge and its application.

Actually, context-based courses first designed in the UK and the USA in order to promote positive attitude towards science studies at schools. These courses, according to Bennet et al, aim to "use context and applications of science as a means of developing scientific understanding (p. 347). The interaction and cooperation between research and curriculum and material development in ELT have resulted in significant changes in approaches to foreign language learning and teaching strategies and classroom activities. Given the widespread interest in the context-based approaches to science courses at schools the last quarter century has seen linguistic and language studies have been attracted to the claims that context-based approaches had motivating effects on students, enhanced the learning of scientific terms and concepts and pushed and pulled students into a more active

learning environment. Such studies aim to incorporate the qualities and characteristics of the learning environment created by context-based approaches into foreign language learning environment.

Context-based learning theory has received considerable support from a wide range of research fields such as Task-based Learning Theory, Theme-based Learning Theory, Project-based Learning Theory and Problem-based Learning Theory. Support for CTL comes from Project-based Learning Theory that emphasizes the connection between the study and application of the language (Fried & Booth, 1997). As a combination of these theories, Johnson (2000) suggests eight mainstream characteristics of CBL:

1. In context based classroom, students become self-regulated and active learners and develop individual interests separately or collaboratively.
2. In learning process based on CBL, students make connection between the context of the study and their real life.
3. Students perform in a significant work that has a purpose and they make decisions individually or negotiate with the other students for possible outcomes.
4. Students develop their critical thinking and creativity. This is because, in problem solving activities, students use their logic by analysing, synthesizing and making decisions.
5. The principle of collaboration provides students to work effectively in groups and helps them understand how they affect each other and how they communicate with each other.
6. Context based learning theory emphasizes learning individually. Students understand the importance of the study and pay attention to the learning process.
7. The theme of the lesson motivates the student because they are aware of the meaningful connection between the context and their interest.
8. In CBL learning process, teacher needs to identify the demanding objectives and motivates students to attain them. Teacher shows how to learn and students themselves find the way to acquire the knowledge (p.102).

Receiving such strong theoretical support from other research fields dealing with language teaching and learning, CBL seems to be a powerful innovative theory and strategy in language teaching.

2. Method

2.1. Participants and Setting

The study was conducted in the intensive English preparatory program at the School of Foreign Languages at Karadeniz Technical University, Turkey. The participants included seventeen (17) prep-year physics students aged between17-20 and currently studying in the preparatory program. That is, all the participants, who are 12 females and 5 males, were taught intermediate grammar, reading, writing and speaking skills. At the time of the study, the students were having intermediate grammar course. The aim of the preparatory school is to equip its students with the abilities to understand and comprehend the subjects related to their own field of study and express themselves both speaking, listening, reading and writing.

2.2. The research method

This is a mixed method research study that addressed the following two research questions.

1. Does learning through context based materials increase the level of learning in EFL classroom?

2. Do the teaching activities based on REACT strategy effect the motivation for learning in EFL classroom?

This study was conducted to find out whether or not REACT strategy model of Context-based Instruction is applicable in the prep-school of Karadeniz Technical University. Contextual learning theory states that for learning to take place there is a need for learners to process newly acquired knowledge in a way as to make it sensible and comprehensible in the learners` own frames of reference. That's why, this study sought to find out whether REACT strategy of CTL could meet the language needs of the students in the preparatory school of KTU. The qualitative data was analysed through the content analysis, as suggested by Miles and Huberman (1994) and Weber (1990) which involves the coding for themes, looking for patterns, and making interpretations. The quantitative data was analysed through the frequencies of each item. The use of both qualitative and quantitative data helped to the understanding of the phenomenon from different perspectives of the participants.

2.3. Data collection instrument

The data collection instrument in this study was a semi-structured interview form purposefully designed for the participants for this study and pre-test and post-test records for the analysis. Interviews are, according to Best and Kahn (1998) in a sense oral questionnaires during which the subjects give the needed information orally and face-to-face. The oral information that the subjects are giving can provide the researchers with insights and a true understanding of the topic s/he is investigating. In educational research "semi-structured interviews are favoured most since they allow depth to be achieved by providing the opportunity on the part of the interviewer to probe and expand the interviewee' responses" (Hitchcock and Huges, 1994, p.49). For this purpose in the course of this study a semi-structured interview using open-ended questions was used. Open-ended questions, according to the Cohen and Manion (1994), are flexible and allow the researcher to ask further questions to gain insight. They also prevent misunderstandings and encourage good rapport between the researcher and the subject, which leads to a truer assessment of what the subject really believes.

2.4. Data collection procedure

This research study was implemented in the intermediate grammar course that aims at enabling students to learn grammar rules. The instructor of the class was also the one of the researchers of the study. The first term (Fall/2013) was allocated to traditional grammar teaching through a standard grammar reference book. The students were asked to use their grammar reference books while learning the rules. At the beginning of the second term the students were introduced to contextual materials that were previously compiled by the course instructor for use (see Appendix A). The students received two-hour instruction four days a week for three weeks incorporating physics context into the learning of grammar rules. An instruction on how to incorporate a contextual reading text into the grammar learning was also given. To help students learn this process, in the first few weeks of the spring term the students were divided in pairs and asked to learn the contextual information related to the physics from various other sources as well. The classes were done in the computer lab at the School of Foreign Languages and the each student used the computer allocated to her/his use as well as investigating the content of the contextual materials used in the instruction.

Table 1: Texts used in the study

Contextual Text Titles	Source Writer	Source Reference	Date
Introduction of the Context- based Grammar Sample Sentences	Instructor		
Impulse , Friction, Developing a Charge Model, Momentum Weight of the Matter	Paul G. Hewitt.	ConceptualPhysics, Pearson/Addison-Wesley, 10th Edition, 2006.	2006
The role of Gravitional Force on Earth`s Tides. Newtons`s Law of Universal Gravitation. Motion in two Dimensions	James E. Ackroyd, Mark Anderson, Carmen Berg, Brian E. Martin, Barry L. S. McGuire, Cliff Sosnowski, Mike Szojka, Elgin Wolfe	Pearson Physics ,Pearson Education Canada,	2009
Components of Vectors	Randall D. Knight	Physics for Scientists and Engineers: A strategic Approach,2nd Edition, Pearson/Addison Wesley	2008

Contextual learning materials and the principles of REACT strategy were applied. The sample lessons models were prepared. With a purpose to determine the effect of contextual teaching materials and in between the pre-test and post-test, sample lessons based on the contextual knowledge and including the target grammar points were made. The sample lessons were made with the incorporation of REACT strategy. The students were observed to be exploring the contextual reading materials themselves, search for the related grammar patterns. The texts used for grammar teaching purposes are given above in Table 1. The treatment period lasted for three weeks and a total of 24 class hours were done. The students used contextual reading materials in order to learn the grammar. At the end of the treatment, a grammar revision test which was prepared according to the target grammar points was administrated. The results of the grammar revision were compared with the results of the students' previous exams. The students were also delivered a semi-structured interview, containing four open ended questions regarding the use of physic context while learning grammar. The items were related to students` general feelings about using contextual materials in grammar learning, perceptions and possible benefits of the use of context. A total of 5 students were interviewed.

3. Results

This study aimed to find out whether REACT strategy of CTL could meet the language needs expectations of the physics students in the prep-school of SOBE, KTU. In

order to determine the effect of contextual teaching materials several sample lessons were made for three weeks. Following the lessons, a grammar revision test was made and a semi-structured interview was delivered to the students in order to find out the effectiveness of REACT strategy. The results of the interviews were discussed to assess the physics students' attitudes toward language learning that based on contextual learning and teaching strategy.

3.1. Comparison of the Pre and Post Results

The study was conducted with 17 students in physics department. Contextual teaching materials and in between the pre-test and post-test, sample lessons based on the contextual knowledge and including the target grammar points were made throughout a week. The sample lessons were made with the incorporation of REACT strategy. At the end of the program, a grammar revision which was prepared according to the target grammar points was made. The results of the grammar revision were compared with the students' previous exam results. Table 2 presents the students' success levels in before and after the treatment.

Table 2: The Results of the Pre-test and the Post-test

Students	Pre-test (First week)	Post-test (Last week)	Relative Frequency
1	55	72	% 17
2	83	92	% 9
3	59	66	% 7
4	48	52	% 4
5	53	66	% 13
6	49	59	% 10
7	68	72	% 4
8	57	66	% 9
9	43	52	% 9
10	64	72	% 7
11	45	52	% 7
12	32	39	% 7
13	48	52	% 4
14	29	33	% 4
15	25	26	% 1
16	48	52	% 4
17	33	39	% 6

It is obvious from Table 2 that the participants post results show an increasing tendency. This tendency is best observed in the several post-test scores. During the treatment period the participants expressed their positive outcomes related to the integration of context and language teaching and the post test results show that they did better when they are asked questions in familiar and interesting contextual topics of their interest.

3.2. Analysis of the Interview

Table 3: Encoded categories and the common themes emerged in the interview

1. QUESTION	Codes/ Themes	Responses
What do you think about context and language interaction while learning grammar?	Increase motivation to study the language	1-2-3
	Context provides knowledge of the field	1-2-3-4-5
	Learn field-specific terms about physics	2-3-4-5
	Realize our deficiency in vocabulary	3-4
	Learn different English structure	1-3-5
	Understand relationship between the language and the physics	2-3-4
	Develop our practical ability	4-5
	Increase the level of success	1-3-4
	Using physics context is very helpful	**3-4-5**

The first interview question (Table 3 above) asked the participants` opinions related to the context and language integration. The participants reported very positive outcomes related to this question. All the participants agreed that "contextual learning" help them learn more about their field. Almost an equal number of participants concluded that they learn "field-specific terms and structures" when the context and the language learning are integrated. The increasing motivation and the level of success were the other important findings that are reported by the interview participants.

Table 4: Encoded categories and the common themes emerged in the interview

2. QUESTION	Codes/ Themes	Response
What elements of this process did you find the most difficult?	Lack of vocabulary knowledge	1-2-3-4-5
	Difficulty in understanding complex structures of English sentences	1-2-4-5
3. QUESTION		
What aspects of this process did you find the most pleasing?	Entertaining activity	1-2-3-4
	Studying in group is very helpful	3-4
	Teachers invest all their time to carry out the program	4
	Related context increases motivation	1-2-3-5
	Learning a lot of terms of physics	1-2-3-4-5
	Learning language is very enjoyable	2-3
	Learning is seen as an experience	5
	Understanding the complex structure of sentences	2-3-4-5
	Studying in group increases the level of understanding	**4-5**

Table 4 above presents the responses of the participants related to their difficulty areas. The participants reported that they lacked vocabulary knowledge and had difficulty understanding the complex sentence structures. The participants found context and language learning integration as an "entertaining" activity and very helpful in group work. They also reported that they learn a lot of field-specific terms and the group works increased their motivation. They consider language learning process as an experience and all the more enjoyable.

Table 5 below summarizes the responses the participants gave to the question four. The participants think that integrating context based language learning/teaching activities will help create "productive learning", "increase the level of success and motivation" and connect "the physics content with the language learning process", thus making language teaching and learning processes more productive and motivating.

Table 5: Encoded categories and the common themes emerged in the interview

4. QUESTION	Codes/ Themes	Response
Do you recommend context based language learning activities to be integrated to the school curriculum? Why?	Create productive learning process	1-2
	Increase the level of success	4-5
	Teach the terms of physics in practical activities	3-4
	Connect the physics and the language	5
	Related context is very is helpful for learning language in academic level	4-5
	Increase the motivation to study physics contexts	**2-3-4**

4. Discussion and Conclusion

The purpose of this study is to investigate the effect of integrating context and language learning through REACT strategy with a focus on Context based learning theory. This study has shown that language learning strategies based on Context-based learning theory contribute to the many of the EFL students' comprehension positively.

First of all, overall findings indicated that EFL learners present various beliefs with varying degrees and these beliefs are likely to affect the use of their language learning strategies remarkably. Secondly, students were able to establish connections between what they learn and how they utilize the knowledge in physics, which, in turn, has increased their motivation to a higher level. Interview results obtained from the students in the prep-

programme have indicated that the students want to learn English to be successful in their own departments and use it in their further studies.

Almost all of the students have indicated that their motivation to learn English increased since they started studying something relevant to their interest and academic fields. They also have found the units beneficial for their future studies since they knew they would meet such texts in the lectures in their departments. Students could understand the meaningful connection between the physics and the language. In the contextual learning process, learning occurs when the content of the knowledge creates meaning in learners' mind, making connection between the context to be studied and real world situation. This is because students could learn a lot of physics terms in the learning process. Students think that these terms would be very helpful when they study the physics. That's why these activities have contributed their knowledge of physics. They also have enjoyed learning language through context about which they already have had limited background knowledge. They argue that the context they are familiar with has helped them understand the main point of the text although they did not know all vocabulary in the text. They also argue that such texts would help them learn grammar and vocabulary better than the other texts in course books. Besides, they say that the content helped them remember what they studied. The findings also yield that the incorporation of REACT strategy into the teaching of English to the Physics students proved to be extremely useful for the learners who took part in the study. It is also the case that relating, experiencing, applying, cooperating and transferring the knowledge respectively helped them use and retain the knowledge far more than the traditional classroom teaching methods in grammar teaching.

Activities based on REACT strategy increase students' interest and affect their learning positively. According to physics students, learning process gained more meaning because they could enjoy the learning process by directly apply it in real activities and know the implementations of what they learned. Learning process remained as a real experience.

This study has also showed that REACT strategy of CBL enabled students to develop their individual competence in learning that occurs in close relationship with actual experiences. Students could reach the knowledge only when they discovered the knowledge in their own cognitive capacity. The learning activities strengthened the students' memory and their understanding of the concepts. This is because; students could easily memorize the terms and understand the concepts by experiencing and applying the knowledge with the authentic materials. Learning process that based on REACT strategy promotes students to put the concepts into new situations with experimental and problem-solving activities. Students could

practice what they learned in meaningful application. Learning was progressed individually and collaboratively in a powerful learning environment. Students selected, decided and discovered the knowledge in their own individual word and interpreted, transferred and applied it collaboratively in realistic classroom activities. Studying in group activities increased the students' motivation because they could discuss the knowledge with each other. Learning was achieved in the context of existing knowledge and learners transferred and built upon what they learned. Students also added that, they enjoyed the reading and writing activities, and found them useful for their future studies. They argued that the language skills they would gain through these activities would help them be successful in their departments. The students stated that they were very anxious about the lectures to be taught in English in the departments before they studied these strategies of CBL. They added that the learning process that prepared according to the REACT strategy relieved them to some extent and gave them confidence about the lectures in the departments because they read texts that they could meet the terms when they took courses in their departments, studied them carefully and learnt how to study such texts to some extent. The context of existing knowledge and learners transferred and built upon what they learned.

Considering the fact that grammar is very helpful for effective language learning and that teaching grammar is a difficult process in language learning it becomes obvious that context-based grammar teaching plays an important role in language learning. Teaching grammar in context provide learners to understand the structure of the language clearly. Context- based teaching is seen as an effective process in which learners enable to create their own understanding of grammar rules. Byrd (1998) argues that learners develop different forms of expressions when they learn the grammar in a variety of contexts. Learning grammar in context improve learners' acquisition of the target language. Presenting different concepts of grammar in authentic contexts gives opportunity for learners to apply new grammar structures. Byrd (2005) also adds that "it's not just that different types of verbs are related to each other, but that in particular kinds of discourse the idea of relationship must be expanded to include the bond among verbs, nouns, adverbs, textual order and even particular vocabulary'' (p.546). Learning grammar rules in context motivates learners to apply grammatical concepts in communication. Grammar structures which are presented in context facilitate learners' acquisition of language correctly and provide learners to use grammatical concepts in new contexts.

As can be seen from the attitudes of the students, REACT strategy of CBL theory which was applied for a short time increased the motivation and confidence of the students. If REACT strategy of CBL theory is implemented in the preparatory program, the program may help students be more successful in the lectures after they complete the program.

4.1. Limitations and suggestions for further research

In this study due to the limited time, only students from Physics departments were distributed questionnaires. Other students and subject specialists from the other departments could have been included into the data collection procedures in order to find out their ideas and opinions about the program of preparatory school. The same study or another similar study may be extended to more departments and conducted with more students and lecturers in the prep-school of KTU, and with more students and subject specialists from various departments. If context based learning strategy is applied in the program, a further study can be conducted on the validity of assessment tools in the context- based courses, attitudes of lecturers towards CBL and traditional syllabuses, effects of CBL syllabus on students' motivation on language learning and students' attitudes towards different context.

Appendix A

Targeted Grammar Structures

1. that clauses
2. although
3. when
4. if (type 1)
5. because / becauses of
6. however

1. Adjective clases: (that / which)

1. Physics is an area that is very complicated.
2. Gravity is something that is related to the physics
3. The forces that causes objects to fall is gravity
4. Heat waves are the eloctro-magnetic waves that are able to pass through an emty space.

2. Adverbials (Although……)

1. Although physics is an interesting subject, it is also very comlicated.
2. Although heat can not be seen we feel its existence in a given space,
3. Although sound waves disappear, they actually remain somewhere in the space

When……., ……

1. When a surface slides over another a force of friction acts.
2. When you apply a force to an object fricton occurs.
3. When you learn the physical rules of the earth, yuo will be surprised.
4. When the heat travels on air, we say that it is radiated.

If (type one …….. …..)

1. If you heat the liquid, it will boil.
2. If you exert a force to an object, there will be friction
3. If there is no gravitional force exerted by the world, all objects will fly.
4. If you learn the physical rules you will beter understand the complexity of the universe.

Because… (of)…

1. Because gravitional force acts over any distance, the range of its effect is infinite.
2. Because you study physics you must learn these rules.
3. Because of the rules of gravity, we can walk on the earth.
4. Because of the friction, objects need force to be moved.

However…….

1. Physics is an important field. However, many students do not know this.
2. An object does not move on its own. However, if a force is applied to it, then it can move.

Appendix B

1. Course Content

Impulse

If the momentum of an object changes, then either the mass or the velocity or both change. If the mass remains unchanged, as is most often the case, then the velocity changes and acceleration occurs. What produces acceleration? We know the answer is *force*. The greater the force acting on an object, the greater its change in velocity and, hence, the greater its change in momentum.

But something else is important in changing momentum: time—how long a time the force acts. If you apply a brief force to a stalled automobile, you produce a change in its momentum. Apply the same force over an extended period of time, and you produce a greater change in the automobile's momentum. A force sustained for a long time produces more change in momentum than does the same force applied briefly. So, both force and time interval are important in changing momentum.

The quantity *force* × *time interval* is called **impulse.** In shorthand notation,

$$\text{Impulse} = Ft$$

FIGURE 6.3
When you push with the same force for twice the time, you impart twice the impulse and produce twice the change in momentum.

2. Course Content

Developing a Charge Model

You can receive a mildly unpleasant shock and produce a little spark if you touch a metal doorknob after walking across a carpet. Vigorously brushing your freshly washed hair makes all the hairs fly apart. A plastic comb that you've run through your hair will pick up bits of paper and other small objects, but a metal comb won't. The common factor in these observations is that two objects are rubbed together. Why should rubbing an object cause forces and sparks? What kind of forces are these? Why do metallic objects behave differently from nonmetallic? These are questions that we begin our study of electricity with.

Our first goal is to develop a model for understanding electric phenomena in terms of charges and forces. As you probably know, the modern names for two types of charge are positive charge and negative charge. You may be surprised to learn that names were coined by Benjamin Franklin. Franklin found that charge behaves like positive and negative numbers. If a plastic rod is charged twice, by rubbing, and twice transfers charge to a metal sphere, the electric forces exerted by the sphere are doubled. That is, 2+2=4. But the sphere is

found to be neutral after receiving equal amounts of “plastic charge” and “glass charge”. This is like 2+(-2)=0. These experiments establish an important property of charge.

So what is positive and what is negative? It’s entirely up to us! Franklin established the convention that a glass rod that has been rubbed with silk is positively charged. That’s it. Any other object that repels a charged glass rod is also positively charged. Any charged object that attracts a charged glass rod is negatively charged. Thus,, a plastic rod rubbed with wool is negative. It was only long afterward, with the discovery of electrons and protons, that electrons were found to be attracted to a charged glass rod while protons were repelled. Thus by convention electrons have negative charge and protons a positive charge.

There are two classes of materials that are defined by their electrical properties: insulators and conductors. Some materials hold their electrons very tightly. Electrons do not move through them very well. These things are called insulators. Plastic, cloth, glass and dry air are good insulators. Other materials have some loosely held electrons
That move through them very easily. These are called conductors. Most metals are good conductors.

Insulators are often charged by rubbing. The charge diagrams of figure 1 show that the charges on the rod are right at the surface and that charge is conversed. The charge on the rod is immobile. It can be transferred to another object upon contact, but it doesn’t move around on the rod.

Metals usually cannot be charged by rubbing, but the electrons in a conductor are free to move. Once charge is transferred to the metal, repulsive forces between the negative charges cause the electrons to move apart from each other.

Other than this very brief interval during which the electron sea is adjusting, the charges is in isolated conductor are in static equilibrium. That is, the charges are at rest and there is no net force on any charge. This condition is called electrostatic equilibrium. If there were a net force on one of the charges, it would quickly move to an equilibrium point at which the force was zero. Metals usually cannot be charged by rubbing, but the electrons in a conductor are free to move. Once charge is transferred to the metal, repulsive forces between the negative charges cause the electrons to move apart from each other.

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Appendix C

3. Course Content

Friction

When surfaces slide or tend to slide over one another, a force of **friction** acts. When you apply a force to an object, friction usually reduces the net force and the resulting acceleration. Friction is caused by the irregularities in the surfaces in mutual contact, and it depends on the kinds of material and how much they are pressed together. Even surfaces that appear to be very smooth have microscopic irregularities that obstruct motion. Atoms cling together at many points of contact. When one object slides against another, it must either rise over the irregular bumps or else scrape atoms off. Either way requires force.

The direction of the friction force is always in a direction opposing motion. An object sliding *down* an incline experiences friction directed *up* the incline; an object that slides to the *right* experiences friction toward the *left*. Thus, if an object is to move at constant velocity, a force equal to the opposing force of friction must be applied so that the two forces exactly cancel each other. The zero net force then results in zero acceleration and constant velocity.

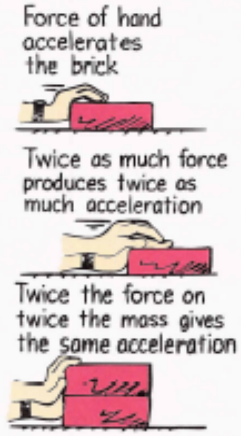

FIGURE 4.2
Acceleration is directly proportional to force.

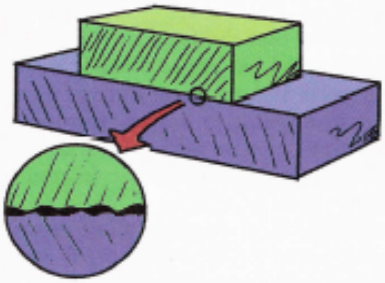

FIGURE 4.3
Friction results from the mutual contact of irregularities in the surfaces of sliding objects. Even surfaces that appear to be smooth have irregular surfaces when viewed at the microscopic level.

4. Post-test Grammar Test

1. A person can feel the existence of heat in a given space …….. it can not be seen.

a)when b) that c) because d) if e) although

2. Many professors claim that that physics is an scientific area ……. is very complicated.

a)when b) because c) that d) if e) although

3. ……. you learn the physical rules, you will better understand the complexity of the universe.

a)if b) that c) when d) because e) although

4. …… sound waves disappear, they actually remain somewhere in the space.

a)when b) that c) because d) if e) although

5. …… the exam was very difficult, many students were able to pass it very easily due to hard
work.

a when b) that c) although d) if e) because

6. One of the Newton's great success was to identify the force ….causes objects to fall near Earth's surface.

a)when b) that c) because d) if e) but

7……. you study "physics" in the university, you will be very surprised by degree of interest with the
actual life.

a)when b) if c) because d) that e) although

8. Heat waves are the electro-magnetic waves …… are able to pass through an empty space.

a)when b) if c) because d) that e) although

9. You must learn English very well …… you will need it when you go abroad.

a)because b) that c) when d) if e) although

10. …… the pre-int 20 finish the prep class, they will be able study physics in their department next year in English.

a)that b) when c) because d) if e) although

11. Physics is a very important scientific area. ……., many students are not aware of this fact.

a)when b) that c) however d) if e) because

12. All the students now know that friction occurs ……. you apply a force to an object.

a)when b) that c) because d) if e) although

13. The students can be very successful in a physics department of a university …….. they observe their environment and relate it with the rules of nature.

a)when b) that c) because d) if e) although

14. …….. the match starts, many people in the office will give a break in order not to miss it.

a)although b) that c) because d) if e) when

15. Many students want to learn English for many reasons. …… they don't study hard enough to do it.

a) when b) however c) because d) if e) that

Appendix D

Transcripts of Encoded Categories of the Interview

Subject 1:

Although it is not drawn intense interest, physics is an important branch in international areas. As students in a technical university we learn English in preparatory school of this university. This is a great advantage for us. However we are not the students in the department of English language and literature. We study topics that are related to our department and this provides us to prepare our department. We not only learn some important English terms about physics but also gain some prior knowledge about our departments. This provides us to overcome the difficulties that we will encounter next year.

This situation absolutely has some disadvantages. Some of the students have difficulties in the process learning since the context of the topics are not as easy as our traditional reading books. The only thing that I have difficulty in this learning process is writing my thoughts and knowledge about the topics that we study in English language. In the process of writing I realize that I have a little vocabulary knowledge about my department and I have to learn more vocabulary about my department. This learning process went with a swing. We not only learned vocabulary about my department but also about life. I realized that English language is a wonderful thing. This study is carried out very productively

although it was a bit delayed. I think this study should be conducted in every field. Every student should be conscious about this issue. This increases the level of success in our school.

Subject 2:

People do not interest in physics nowadays. This results from the thoughts of our people and their way of life. In fact, physics is everywhere in our life. This learning process is very helpful especially for students who will study physics in their department because we have learned stereotyped terms so far. Such learning program gains us a great deal of advantage because about % 30 per cent of terms in our branch is English. We learn a lot of vocabularies that I do not know and some different English structure about our branch. I realize that I have a lot of deficiencies in our field and I think that I achieve to fill these deficiencies with this program. In short, this program is very helpful for students like us. Such practices of language learning will be very helpful when we study in our department. We not only start with a productive preparation in our department but also we are being acquainted with the lessons that will be studied next year. I have not any negative thoughts. This program is conducted for the benefit of the students. I realize the physics includes a lot of borrowed words and we do not know these words. In this learning process, I have difficulties in the knowledge of vocabulary and sentence structures. I learned funny side of physics. I realized that studying in group is more helpful than studying individually. I understand that English has a different role in every field and learning language is very enjoyable with this program. I think this study is very beneficial for such branch students like us. Although they are related to our branch, we do not now some English terms of physics. Our teacher conducted such study although they are not enough information about our department. The only disadvantage for us is that this study is conducted a bit late. I believe that such program should be conducted right away and will be very helpful for students in such branch.

Subject 3:

I think that using physics context in language learning provides students to develop their practical ability in language learning and improve their background information about their department. We will definitely have some difficulties in this learning process. I cannot give an opinion about how to apply the program but such programs provide students to understand the relationship between the language and their department. To be truthful, I could not make a relationship between physics and English initially. As time goes by, I make sense out of this relationship. Although I could not make out completely, I understand the

relationship between physics and language with the help of this program. I think that most of my friends hold opinion with me. I have had some difficulties during this process. Especially I have difficulty in translating the long sentences because I do not get accustomed to such sentences. During this process, all our teachers have worked meticulously and invest all their time to carry out the program and they have accomplished the program pertinaciously. I think this is the most pleasing thing during this process. As I said before, this program provides us to make relationship between language and physics. Such activities provide us to apply what we have learned. We practice the academic terms in practical activities. Like most of my friends, I can make connection between physics and English. I think that if this program is applied in all branches, students will not see the language learning as a treat in academic education. Language learning that based on related branch will be helpful for students to acquire the language in academic level. I hope this program will be developed and such applications will be more helpful for all students.

Subject 4:

I think that using physics context in language learning is very useful. Because we have forgotten some physics topics and terms during our preparation process. We have forgotten what we learned in high school. This time keeps our distance from our departments. If we had studied physics context in language learning throughout the year, we would have not forgotten physics topics and we would have improved our language learning as well. Current program only provides us to improve our language learning but we have forgotten physics topics and terms. During this program, we have learned a lot of physics terms which we will encounter in our department next year. This knowledge provides us to increase our success level in physics department. During this process I have encountered a lot of terms which I do not know. I have had difficulty in searching for the meaning of some vocabularies and terms and I have often looked up the dictionary. During this process I have been pleased to see the topics that are related to our branch. I remembered that I am a physics student and I would study these topics the next year. With the aim of understanding the contexts clearly, I read the context of the physics carefully as a physics student rather than as a prep student. I try to keep in memory every word in the context and this effort provides me to learn a lot of terms and words. During the learning process, we discuss our opinions about the context with each other and write what we understand from the contexts. The application provides us to stick the information in our mind thoroughly. I think this program should be conducted for the next prep students because this application makes a great contribution to our learning process,

even in testing stage. To exemplify, I get accustomed to the lessons in preparatory school so I am anxious about studying physics. However, this program increases my motivation to study physics topics. I find opportunity to learn language and study physics context, as well. I wish this program had been applied by now.

Subject 5:

I think that context of physics should be applied in language learning. Because the physics students should know the English meaning of such words as mass, speed and momentum while studying the physics. The most favourable thing I have had in this process is that I could understand some topics which I could not understand before, even in English language. While studying English, I puzzle over the sentences in order to understand them and I puzzle out in the long run. Such applications provide students to prepare for the department. I think this program should have been applied earlier.

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