

# **Developing Augmented Reality Learning Material in Professional English Teaching and Examining Its Effect on Academic Success**

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## **Abstract**

The learning materials of the new generation technologies such as augmented reality (AR) are supposed to exhibit sufficient input for the individuals who were raised with these kinds of developments in every aspect of life. Thus, the significance of this study is developing a new learning material is not a new issue, however, creating an AR, which can be controlled and applied according to the individual learning level for professional (can be regarded as business English) English lessons, has crucial importance nowadays. In this direction, the aim of this study is to develop a self-autonomous language learning material based on AR for the university students who study Maritime or Port Management in which learning the professional English terminology or communicate, is one of the most difficult obstacle for the professional life. In this study, 4-week AR-aided application for professional English, which was developed for Maritime Faculty students (50 experimental + 50 control) according to the curriculum. Qualitative (observation and semi-structured interview forms) and quantitative (pre- & post-test) research methods were used as a mixed method research design. According to the findings, there is a significant difference between the groups in line with the academic achievement and some crucial reaction were observed in experimental group: language learning with AR technology is a captivating and innovative experience. AR transforms traditional language lessons into immersive, interactive environments where learners can engage with virtual elements, enhancing the students' linguistic skills while exploring a dynamic and engaging world of learning, making education more exciting and effective.

**Keywords:** English education, Maritime education, Augmented reality, Learning material



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## INTRODUCTION

While people learn their mother tongue from their families, they learn a foreign language mostly in an educational environment. The quality of the learning environment in question is possible only if it is based on a scientific basis. In this respect, foreign language education is a field of science that is evaluated within the scope of linguistics and pedagogy (Toprakçı, 2016). One of these languages is English as the most widely used language in the world. In the globalizing world, English is an internationally used language in fields such as economy, science, technology, medicine, military, engineering, tourism and maritime. English language teaching in these fields is referred to as Professional English as each discipline has its own specialized terminology and it is of great importance for individuals to acquire this terminology in order to work in the relevant profession. One of these professions is maritime. Supported by the work of the International Maritime Organization, the concept of "maritime English" has been developed for use at sea (Saray, 2020). Dirgeyasa (2018) defines Maritime English as follows: "1) it is the language used to communicate in all maritime-specific situations, on-board, ship to ship, and ship to shore, 2) it includes maritime-specific terminology–navigation, on-board operations, roles and responsibilities, health and safety, emergencies, 3) English which has been simplified for use by seafarers of all nationalities" (p. 42). It is essential for undergraduate and associate degree students studying at maritime faculties or maritime and port management, management as well as agency departments to acquire these maritime English concepts before starting their careers.

It is likely that the seafarer candidates may not acquire the concepts of Maritime English at the desired level when they are taught in classroom settings. To illustrate, Dirgeyasa (2018) revealed that Maritime English is still at a low level for Indonesian seafarers. Therefore, the diversity and richness of the professional English learning environment is considerable. Professional English lesson teachers are supposed to apply new methods and techniques so that they can attract maritime students' attention and increase their motivation for the lesson in the classroom environment. As Professional English is not taught/learned in the context of the culture in which English is spoken, it is most probable that seafarers experience problems in learning Professional English (Rivera, Villarroel, Miranda & Mayorga, 2019, p. 526). Therefore, it is crucial for educators to adapt technology in order to mitigate these challenges, fostering a favorable attitude towards professional English instruction and enhancing the overall learning environment. In the educational science sense, every teaching or learning activity has common and different methods, technical tools and equipment (Toprakçı, 2017). The changing and developing time, environment, and technology offer new teaching/learning methods and technical opportunities to professional English teachers and learners. "Augmented Reality" (AR) is one of these new technologies. AR is a technology used in the professional English teaching/learning process. The use of AR in the teaching/learning environment has been examined and it has been determined that it positively affects the learning process and increases students' learning motivation (Bacca, Baldiris, Fabregat, Graf & Kinshuk, 2014; Huang, Chen, & Chou, 2016). This study is anticipated to increase the usage of AR, particularly in Professional English courses during university education, and to improve the level of foreign language vocabulary acquisition in language learning.

Augmented Reality can be defined as systems having three features; 1) combining real and virtual, 2) interactive in real-time, 3) registered in 3D (Azuma, 1997, p. 19). AR is a technology that immerses its users in a more synthetic environment and that allows them to see a real world with virtual elements (images, text, etc.) overlapped upon it in real time (Cheng & Tsai, 2013). One of the main factors for AR's increasing popularity is that learning takes place without prohibiting the user from developing a relationship with the real learning environment. AR technology applications are divided into two main categories as image-based and location-based applications. Moreover, the image-based applications are divided into two 1) marker-based, which requires specific labels (eg. data matrix), 2) marker-less tracking, which includes an image for playback of multimedia content. Location-based applications are triggered by the user's arrival at a certain location (Koutromanos, Sofos, & Avraamidou, 2015). When the literature is examined, it has been noticed that AR applications provide opportunities for the students in many different perspectives. For example, AR supported applications improve the students' problem solving skills (Dunleavy, Dede, & Mitchell, 2009), increase their motivation (Sotiriou & Bogner, 2008) and are used as an effective learning tool (Wu, Lee, Chang & Liang, 2013). When the previous studies were examined in the field of teaching and learning of English as a foreign language, it has been seen that AR

technology has great potential in foreign language education (Solak & Cakir, 2015). Furthermore, Liu (2009) developed an AR application for foreign language learning at high school level and concluded that this application affects students' listening and speaking skills positively. In addition, Liu, Tan, & Chu (2010) found out that AR application, developed in the context of mobile learning, increase the students' reading, speaking and listening skills Ogata, Li, Hou, Uosaki, El-Bishouty & Yano (2011) examined the effectiveness of AR application in teaching vocabulary and revealed that this application has positive effects on vocabulary teaching. Çakır, Solak, & Tan (2015) stated that AR supported applications increase both the performance and motivation of the students. In the study of Karadayı-Taşkıran, Koral, & Bozkurt (2015) it has been conducted that AR applications allow situational learning in foreign language education and also allow the students to construct the knowledge. Furthermore, the transformations observed in the digital realm and educational settings, notably during and post the Covid-19 pandemic era, necessitated a reconsideration of the significance of incorporating information technologies and digital resources when designing educational programs and materials (Ayvaci, Özbek & Sevim, 2018; Kırmızıgül, 2020; Bakırcı, Ertuş Tunç & Cengiz, 2023; Deniz ve Bağçeci, 2022) from teachers to students.

Küçük, Yılmaz, & Gökteş (2014) conducted a study with primary school students and reported that the students were satisfied with using AR applications in English lessons, they are inclined to use it in the following lessons, and there remained a certain decrease in the students' cognitive load level. AR technology was determined to develop the students' learning performance. It was also effective in learning English vocabulary and ensuring retention. Considering the results of these studies, it is of utmost importance to use AR technology in professional English teaching/learning, and to integrate it into the context of professional foreign language learning. The development of learning materials supported with AR in professional English teaching and the analysis of its impact play a significant role by taking into account the positive attitudes of today's university students towards the use of technology in education (Akçayır, Dündar, & Akçayır, 2016), the problems encountered in language education in our country as well as the educational potential of AR technology (Küçük et al., 2014). Hence, this study is an attempt to investigate the impact of AR material in Professional English teaching on the seafarer candidates' academic achievement and their views regarding AR materials. Although numerous studies were conducted on AR application for the maritime profession (Maddikunta, Pham, Prabadevi, Deepa, Dev & Liyanage, 2022; Mallam, Nazir & Renganayagalu, 2019), there is a dearth of studies related to AR technology integrated learning material that seafarers can use in the professional English classroom learning environment. Therefore, there is a need to focus on filling this gap in the relevant field. This study is expected to shed light onto the further studies on providing an active and interactive learning environment for seafarer candidates to acquire the professional English language skills before entering the Professional workforce. The research revealed that students expressed a desire for the integration of AR technology into both teaching and learning, and they reported a more enjoyable learning experience in courses where AR was employed (Özden Çınar, Yazıcı & Kaya, 2023).

Due to the fact that it is essential for undergraduate students studying in maritime faculties to acquire these maritime English terms before starting their careers, and that maritime English terms are not acquired at the desired level in the classroom environment (Dirgeyasa, 2018), it is considered as an important reason for the research to produce AR supported course materials, which are expressed as innovative technology, and to examine their contribution to students' academic achievement. The aim of this study was to investigate the impact of Augmented Reality (AR) learning material on achievement in professional English teaching and to examine the views of Maritime Faculty undergraduate students. With this goal, a learning material supported with AR technology was designed by the researchers. A semi-experimental study was conducted to examine the effect of this learning material. The experimental group was taught through using AR learning material, while traditional methods (i.e. textbook) were used in the control group. For this purpose, answers to the following questions were sought:

1. Is there a significant difference between the experimental and control groups in terms of their academic achievement before and after the application in Professional English Teaching?
2. What are the students' views in the experimental group regarding AR learning material?

## METHOD

This study employed a 4-week AR-aided application for foreign language vocabulary acquisition within the scope of the Professional English course, which was developed for Maritime faculty students and included in the curriculum. A mixed method research design, which provides the simultaneous use of qualitative and quantitative research methods, was used to identify any difference across the academic achievement of the students who participated and did not participate in the application supported with AR, a new generation technology (Creswell, 2007). In mixed method research, qualitative and quantitative research methods are used together. In this way, the credibility of the verified data is quite high. As stated in Yildirim and Şimşek's (2013) study, the use of these methods increases the reliability of research. In order to increase both the credibility of the data obtained and the reliability of the research, mixed method was used in the study. As one of the mixed method research designs, explanatory design consists of two stages. Quantitative data is first collected and analyzed. Next, qualitative data is used to better refine the quantitative findings (Fraenkel, Wallen, & Hyun, 2012, p. 561; McMillan & Schumacher, 2010, p. 401). User-friendly AR technology developed by the researchers was deployed in the experimental group for foreign language vocabulary acquisition. In addition, the same course content was taught through the use of the traditional method in the control group. The pre-test and post-test was used to evaluate whether the scores varied across the experimental and control groups. In the Data Collection Tool section, the methods and techniques applied while collecting the data are mentioned. The same pretest and posttest were used for both groups. Qualitative data were collected through observations made during the application period and a semi-structured interview form including open-ended questions to expand upon the participants' views after the application. Thus, the effect of AR application on the acquisition of Professional English vocabulary was explained in a detailed way with qualitative data.

**Table 1.** *Experimental research design*

Groups	Pre-test	Application	Post-test
Experiment (50 students at Maritime Faculty)	Vocabulary test	Learning with AR application	Vocabulary test
Control (50 students at Maritime Faculty)	Vocabulary test	Learning traditionally	Vocabulary test

Along with the quantitative research method, the qualitative research method was also utilized to examine the participants' views on this new generation technology and Professional English course vocabulary acquisition. Incorporating the qualitative research method into the study has various positive aspects in terms of analysis. To illustrate, qualitative research method is a method in which researchers are given the opportunity to provide more detailed information since it reflects the views of the participants, their positive or negative perspectives, and their feelings towards the integration of AR technology into the course. Therefore, this study encompasses an application on vocabulary acquisition during the Professional English course by means of AR technology, which is deemed to have a positive contribution. Descriptive analysis was used during qualitative data analysis in relation to the research questions. The students were expected to share their views on the AR learning material within the scope of the questions in the interview form. The independent variable of the study was identified as the application of the course material developed in conjunction with AR technology to explore foreign language acquisition in the Professional English course. The dependent variable of the research was the acquisition of the selected words. The same pretest and posttest were applied to both the experimental and control groups before and after the application, and the views of the students in the experimental group were collected from their responses to the interview questions and from the observations during the application. The quantitative data were analyzed through the use of the SPSS program.

### **1. Study Process and Setting**

The Professional English course vocabulary acquisition application developed by using AR technology was conducted with the participation of university students in the experimental group. The participants of the study consisted of the 2<sup>nd</sup> grade students studying at Maritime Faculty. The application process lasted 4 weeks, 1 hour a week in faculty classrooms. AR application was carried out

by the first researcher. For the control group, teaching process was mainly based on classical methods such as translation into native language, or using the new vocabularies in sentences with pen-paper environment.

## 2. Participants

This study was conducted at Maritime Faculty. The participants consisted of 100 second grade students studying at the same faculty. They were selected by considering the results of the general English proficiency test performed by the researchers. Both the experimental and control group completed the application voluntarily. As a result of the proficiency test, only low-level English speakers were included in the study. This may be due to the fact that upper-level English speakers who were familiar with these words would negatively affect the study, namely, the objectivity of the results.

**Table 2.** Demographic information of the participants

Variables	Experimental Group	Control Group
<b>Gender</b>		
Female	12	7
Male	38	43
Total	50	50
<b>Age</b>		
between 18-25	44	47
between 25-35	6	3
between 35-45	--	--
<b>Daily Technology Usage Time</b>		
1-3 hours	2	3
3-5 hours	42	40
5-8 hours	6	7
8+ hours	--	--

As can be seen in Table 2, the information of the students in the experimental and control groups about the research is as above. When Table 2 is examined, the number of female students in the experimental group is 12, while the number of male students is 38. It is seen that 44 of the participants in the experimental group are between the ages of 18-25. In the control group, while the number of female students is 7, the number of male students is 43. The majority of the control group students, like the experimental group, are in the 18-25 age category.

The familiarity of the participants with the technology and their daily use levels were of upmost significance since a new generation technology like AR, was used in the application. As is seen in Table 2, the daily technology use level of both the control group and the experimental group was noted as mostly 3-5 hours.

## 3. Data Collection Tools

The study deployed various data collection tools such as English proficiency test, personal information form, AR application, achievement tests (pretest and posttest), and observation during the application and interview forms.

**3.1. English Proficiency Test:** Oxford English Proficiency Test was administered to determine the participants' English level. Only English low-level speakers were included in the study since upper-level English speakers would affect the findings negatively as mentioned before.

**3.2. Personal Information Form:** Personal information form was prepared by the researchers to reveal the demographic information regarding maritime faculty students. The form consists of questions such as age, gender and daily technology use levels.

**3.3. AR Material and Development Process:** The AR application developed within the scope of the study was conducted through the Unity program. A 3D ship found on the web was first placed on space in Unity. Next, red dots (9 pieces) were placed on the relevant parts of the ship so that the students

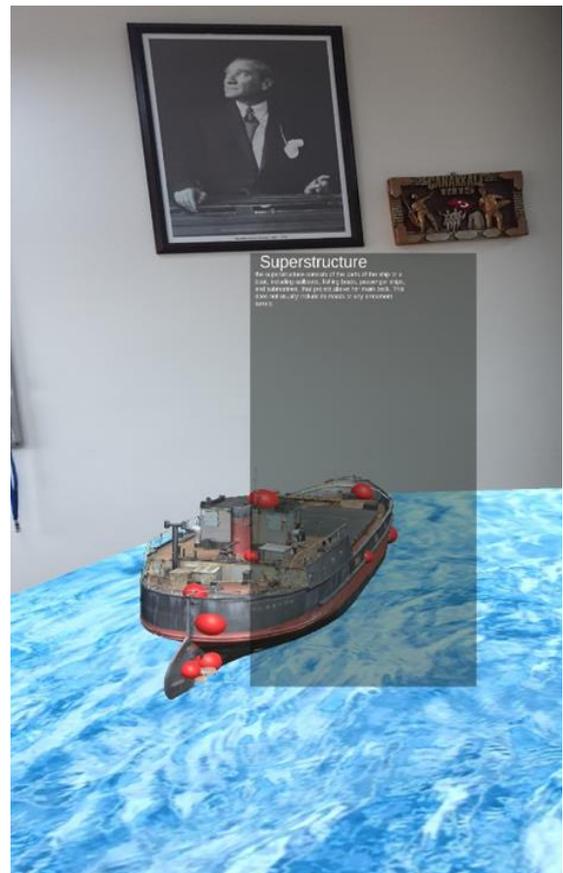
could interact with the software. Figure 1 displays a sample image related to the AR application created in the Unity environment.



**Figure 1.** Ship designed in Unity environment.

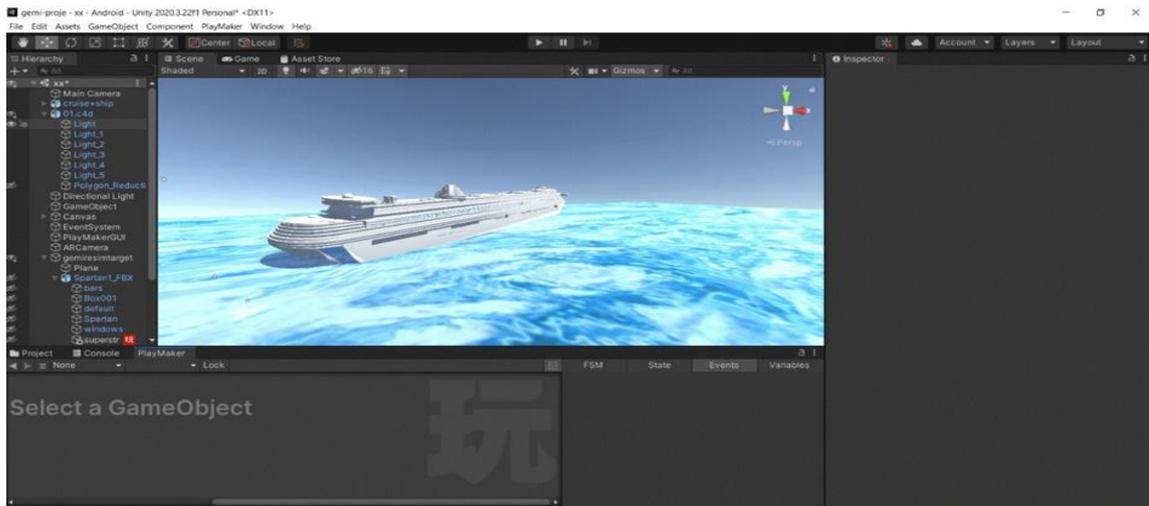


**Figure 2.** Ship Vision with AR in Real World



**Figure 3.** The Image and Text after Touching the Red Buttons on the Ship (providing sound at the same time)

Information screen about the name of the relevant ship's equipment and what that equipment does is depicted when users click on these red dots. Besides, voice notification of these vocabularies is also provided. Figure 3 shows a sample of information screen when clicking on the red dots.



**Figure 4.** Sample of Application Screen in Unity Environment (the cruise ship)

After these steps, within the Unity program, a mobile application was developed through the same program to be used on phones with android operating system. The mobile application for android phones was downloaded in order that users could effortlessly use it.

**3.4. Achievement Test:** This study included 9 comprehension questions conducted before and after the experiment to administer to both the experimental and control group students. A group of 9 words were selected since they are used specifically for various areas in the external structure of the ship according to the curriculum units for each week, and have a place in maritime terminology. In addition to these 9 words, 27 more general English words were included in the tests, but were not analyzed because they were filler in order not to cause the students to answer the questions automatically. Furthermore, the purpose was to prevent the students from directing their attention only to certain words and to inhibit the responses from becoming mechanized. Thus, the students exerted to acquire not only general English words but also those used in maritime terminology. The comprehension questions prepared by the researchers consisted of two steps. At first, the method of matching the words with their correct definitions was applied, and the second is that the students were requested to correctly choose the words given in the box to create sentences. The first step measures the student's vocabulary knowledge, and the second their production by using these words in a sentence. The Cronbach alpha values are given in Table 3, and can be understood that the achievement test has a high capacity of reliability.

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**Table 3.** Cronbach-alpha Values of the Items

Types	1.Q	2.Q	3.Q	4.Q	5.Q	6.Q	7.Q	8.Q	9.Q
Pre-Multiple Choice	865	742	869	812	854	807	725	864	858
Post-Multiple Choice	889	765	887	825	836	819	789	857	894

The same comprehension questions were used after, to determine whether the acquisition of the same words differed across AR and classical method teaching practice. If the experimental group, who learned vocabulary with AR application, significantly differed from the control group, the use of AR technology in professional English terminology education would be more effective than the classical method.

**3.5. Observation and Semi-Structured Interview Forms:** During the AR technology application process, the comments, reactions and students' views were observed and recorded by the researchers. Afterwards, the correlation between the observed behaviors and students' responses to the interview questions were examined. In other words, the similarity between the findings of the observations and interviews indicated that the students completed the application by focusing on the subject, not just for entertainment purposes. In this regard, the interviews were examined under four headings compiled from previous studies by taking into account the conceptual framework of the research.

Qualitative data collection methods enjoy several limitations such as shifting away from objectivity and not generalizing the data, and therefore it is painful to ensure validity and reliability. Validity studies

differ across qualitative and quantitative research in terms of presenting the researched subject as it is and as far from subjectivity as possible (Yıldırım & Şimşek, 2008). In this context, the relevant literature was analyzed in the preparation of the interview questions considering the conceptual framework of such a new generation technology application (Çakır, et al., 2015; Ibanez et al., 2014; Ibrahim et al., 2018; Küçük et al., 2014; Ogata et al., 2011; Solak & Cakir, 2015; Takkaç Tulgar, 2019; Tyson, 2021; Zhao, Li, Wang, & Shi, 2020). Various interview questions were prepared by the researchers through brainstorming in line with the relevant literature and presented to the field experts such as the academicians in maritime, computer technologies and English language teaching departments. Necessary corrections were made in consideration of the experts' feedback and 2 general questions were included in the form. Taking the necessity of interview questions into account, it is substantial to quote the observation results of the participants during the application and their views after the application in order to support the quantitative results and increase the validity of the research. The views of the researchers were not quoted during the observation, yet only the statements of the participants regarding the AR application and material were included in the present study.

University students voluntarily participated in the interviews after the application without any force. The interviews were held in the researchers' offices, which are quiet and undisturbed, and the essential precautions were taken into account in order not to have anyone else in the office or not to hear what was being said outside the office. Each interview lasted approximately 20 minutes and was recorded via a voice recording smartphone. The researcher posed open-ended questions to the students and allowed them to express their views without any restrictions (eg, time). The validity and reliability of the study were ensured with the aforementioned techniques.

#### **4. Data Analysis**

In order to determine which tests would be used in the analyses, it was investigated whether the data exhibited a normal distribution and whether the distribution was homogeneous. To achieve this, the Kolmogorov-Smirnov and Levene tests were applied, and it was determined at a 5% significance level that the variables did not conform to a normal distribution. Consequently, the non-parametric Mann-Whitney U test was employed in the study. Non-parametric analysis tests were used since the data did not demonstrate normal distribution. Mann-Whitney U test was performed to reveal whether the pretest and posttest scores significantly varied across the experimental and control groups. The degree of significance was taken as  $p < 0.05$ .

Qualitative data were analyzed by descriptive statistical analysis method to determine the experimental group's views on AR application. The observation notes and the responses to the interview questions were documented with excerpting the students' statements. Constant Comparison Method (CCM) analysis was done in this sense. This technique enabled data-driven analysis that put developing patterns and themes ahead of preconceived notions (Boeije, 2002). As a result, the collected data were divided into codes. The smallest unit of data—a word or a phrase—that expresses an opinion, a thinking, or a feeling about the integration of technology in professional English class for Maritime is referred to as a code in this context. The detected codes were identified and compared to one another repeatedly until groups of comparable codes were created to create categories with related themes. To strengthen the validity of qualitative analysis, this procedure of coding, categorizing, defining themes, and connecting them was carried out by two different raters.

#### **5. Validity and Reliability**

With the permission of the participants, the semi-structured interviews were recorded with a voice recorder smart phone and then they were converted into written text (transcribed).

Creswell (2013) mentioned eight validity strategies to prove the limits of validity and "correctness" of studies in qualitative research and recommended that at least two of them should be present in qualitative research. For this purpose, in the research process, the stages such as; developing the questions and process steps, collecting data, performing inductive data analysis for general themes from specific cases, and interpreting the data by the researchers were applied.

The compatibility and consistency between the codings were investigated. For this, the formula of Miles and Huberman (1994) [Agreement / Consensus + Disagreement] x 100] was used. In this context,

the consensus correlation coefficient between the expert and the researcher was found to be .81. The values of 70% and above obtained from this formula are sufficient for reliability. Therefore, it can be said that the encodings are reliable.

The information on the validity and reliability studies of the measurement tool for the quantitative dimension of the research is as follows. [Fraenkel and Wallen \(2006\)](#) examined validity in quantitative studies under three headings: content, criterion and construct validity. Accordingly, the form developed for the achievement test was prepared as a result of the opinions of a total of 9 faculty members working in the English Language Teaching department and the Ship Management department, and the reliability and validity of the data collection tool was ensured.

Finally, internal consistency analyzes were made for the reliability of the test. The Cronbach's alpha coefficient of consistency of the scale was found to be .76. Considering this value, it can be said that the scores obtained by the students from the test are quite reliable.

## FINDINGS

Quantitative and qualitative findings are presented in this section of the study.

### 1. Quantitative Findings

The normality test, Kolmogorov-Smirnov and Shapiro-Wilk test results revealed that the data did not demonstrate normal distribution ( $p=.00 < .05$ ). Therefore, Mann Whitney-U, one of the non-parametric analysis tests, was used during data analysis. The results of the pre-test can be seen in Table 4.

**Table 4.** *The Result of Pre-test*

Group	N	Average rank	Total rank	U	p
Experimental	50	50,15	2507,50	1232,50	,884
Control	50	50,85	2542,50		

Table 4 displays that the pre-test results did not differ across the experimental and control groups ( $U=1232.50, p<.05$ ). Thus, the results most likely show the effectiveness of the AR material application for the participants.

The normality test of the post-test did not show normal distribution, just as in the pretest data ( $p=.00 < .05$ ). Therefore, Mann Whitney-U, one of the non-parametric analysis tests, was used for data analysis. The results of the post-test can be seen in Table 5.

**Table 5.** *The Result of Post-test*

Group	N	Average rank	Total rank	U	p
Experimental	50	71,64	3582,00	193,00	,000
Control	50	29,36	3582,00		

As seen in Table 5, a statistically significant difference was noted across the experimental and control groups in terms of the posttest scores ( $U=193, p<.05$ ). In this context, the students in the experimental group significantly outpaced those in the control group. Considering the rank mean of the posttest results after the AR application, the difference was determined to be in favor of the experimental group.

**Table 6.** *Wilcoxon signed ranks test results of pre- and post-test data of the control group*

Post-test/Pre-test	N	Average rank	Total rank	z	p
Negative order	0	,00	,00	-6,217	,00
Positive order	50	25,50	1275,00		
Equal	0				

\*Based on negative order.

Table 6 suggests Wilcoxon Signed Ranks test results on determining whether a statistically significant difference was found between the pretest and posttest results of the students in terms of achievement in relation to vocabulary acquisition through traditional teaching methods. ( $z=-6.217, p<.05$ ).

The pretest and posttest data of the experimental group were analyzed through the Wilcoxon Signed Ranks test (Table 7).

**Table 7.** Wilcoxon signed ranks test results of pre- and post-test data of the experimental group

Post-test/Pre-test	N	Average rank	Total rank	z	p
Negative order	0	,00	,00	-6,121	,00
Positive order	49	25,00	1225,00		
Equal	1				

\*Based on negative order.

A statistically significant difference was noted across the tests in the experimental group ( $z = -6.121, p < .5$ ).

## 2. Qualitative Findings

The observations and recordings of the experimental group during the implementation and the reactions given during the implementation as well as the responses to the open-ended semi-structured interview questions after the implementation were classified and presented in Table 8.

**Interview question 1.** How do you evaluate the application of AR in PEM terminology acquisition?

**Table 8.** Student views on the application of ar in pem terminology vocabulary acquisition

Technological Views	Positive Attitude
Easy Access	Attractive
3D Authentic material	Interesting
New generation technology	Demanding
Multiple learning environment	Amusing
The feeling of virtuality	Readiness for PEM (for training)

The students' views were grouped under two main headings as "technological views" and "attitude views" on practice. The students having a technological point of view emphasized that "The new generation AR technology will contribute positively to the terminology, which takes a long time, especially in the PEM, access to technology is easy thanks to smart phones, the lesson is easier to understand through 3d authentic materials, they feel privileged with the new generation technology, they have a multi-learning environment and AR material presents them a sense of reality".

*"It provided access to information faster and whenever I wanted. It is advantageous for us to see an object in 3D and learn its content. It is possible to see and learn things through augmented reality that we cannot see in reality. (Student 1-Male)"*

*"It created the effect of a real ship visit. It is better to see it visually rather than a rote system and learn with a feeling as if we were in a live presentation. (Student 3-Female)"*

Upon analyzing the interview question 1, the participants' views on the application, namely their attitudes towards the application were as following: "it is an interesting way of teaching, the application arouses curiosity, it is motivating for the lesson and increases their desire, they learn in a much more fun environment and they have positive views towards this technology in terms of the readiness level for the profession that requires professional English knowledge such as internship".

*"As I saw the image in 3D, it immediately attracted my attention. Frankly, it aroused my curiosity and it was an interesting material. I wish this application was used in our other lessons. (Student 3-Female)"*

*"I can't think of a more enjoyable and entertaining learning environment or classroom. The ship was like on the table in front of me. If this practice continues, I will not miss any lesson. (Student 4-Male)"*

*"My desire to listen to the lesson increased. I think that if this application is developed, it will be much easier to memorize English words. (Student 5-Male)"*

*"As soon as I opened it on the phone and saw the ship on the table, I started to have a lot of fun. We have many technological gadgets in our pockets and homes, but I have never encountered such a reality.., (Student 6-Female)".*

**Interview question 2.** How do you evaluate the AR application in general learning?**Table 9.** Student views on ar material in general learning

Learning
Easy Learning
Individual Learning
Learning Anytime & Anywhere

The students' responses to the second question were listed as "facilitating learning, contributing to individual learning and learning anywhere-anytime" (Table 9).

*"AR app provides to learn something automatically with visual memory without any need for memorization. You can hear and see as if it were real, and benefit from technology. A great way to teach. (Student 2-Male)"*

*"Regardless of time and place, it provides access to information and that image with great ease. I think it will be advantageous in professions like maritime where vocabulary is significant. Moreover, it seems possible to access a lot of information before starting the profession thanks to this technology. Since we are students, we cannot board the ship or enter the port whenever we want. I think we can have all kinds of opportunities thanks to AR app. (Student 1-Male)"*

All the findings indicated that AR application, a new generation technology that is different from the classical methods and that the students have not experienced before, will greatly contribute to their learning since they are accustomed to techniques such as reflecting documents on the projection screen in the traditional classroom, on the blackboard or the computer. At the same time, students were given the opportunity to manage their own learning stages, to revise as much as they wish, to learn with fun, to have opportunities that they could not actually reach in Turkey, and thus to have a good command of PEM terminology.

## DISCUSSION, CONCLUSION AND SUGGESTIONS

This study reports on analyzing the impact of using AR learning material on achievement in professional English teaching and the views of the undergraduate Maritime Faculty students. A learning material supported with AR technology, described as innovative technology by the researchers, was first designed and a semi-experimental study was carried out to investigate the effect of this learning material. The experimental group was taught by using AR learning material, while the control group with traditional methods (i.e. worksheets). The impact of AR learning material on student achievement was examined and consolidated with the students' interviews. The results was presented in consideration of the relevant literature.

The pretest scale was administered to the experimental and control groups before the AR material was used, and no significant difference was identified across the pretest data ( $U=1232.50$ ,  $p<.05$ ), referring that both groups demonstrated a homogeneous distribution, namely, they were at the same level at the very beginning of the study. This also illustrates that the post-test results were more significant and showed the effectiveness of the AR material application for the participants. As in parallel with the study of [Karaman, conducted in 2023](#), a digital instructional design was created using augmented reality technology for the teaching of German as a second foreign language at the middle school level. The effectiveness of this design was evaluated through pre-tests, post-tests, and student feedback. The findings revealed a significant difference between pre-test and post-test scores, indicating that instruction with augmented reality improved students' academic performance. Similarly, [Solidjonov \(2023\)](#) investigated the use of augmented reality technology in English language learning and concluded that AR technology can be utilized to teach various aspects of English, including vocabulary, pronunciation, grammar, reading, and writing skills. The results are contrary to some of the previous studies as opposed to expectations, it was observed that learning outcomes were more favorable in groups that experienced either greater physical or increased mental interaction, even in the absence of AR technology (Krüger & Bodemer, 2020). However, following a carefully planned learning exercise, the outcomes indicated that the participants actively participated in the learning scenario, developed both linguistic and content-related knowledge, and generated coherent essays (Liu & Tsai, 2013).

The study also attempts to determine whether post-test data significantly differed across the experimental and control groups. In this context, a statistically significant difference was found between the experimental and control groups in terms of the post-test findings ( $U=193$ ,  $p<.05$ ). The students in the experimental group outpaced those in the control group. The rank mean of the posttest results after the AR application suggested that the difference was in favour of the experimental group. The results of this study are congruent with those in the related literature. [Barreira et al., \(2012\)](#) designed an educational AR game titled MOW (Matching Objects and Words) in collaboration with primary school teachers so that children could learn a variety of words in both Portuguese and English languages. The results indicated that children who used the Augmented Reality games had a superior learning progress than those who used only traditional methods. In another study, [Wu \(2021\)](#) conducted a study examining the relationship between English language learning through the Pokemon Go! Game and AR technology. The study concluded that AR technology-supported applications have the potential to enhance students' English language skills, vocabulary acquisition, and learning motivation. The objective of the study titled as "Examining the effect of materials designed with augmented reality on language learners' vocabulary learning" and carried out by [Solak & Cakir \(2015\)](#) was to determine the motivation levels of students in a language class towards course materials designed with AR technology, and to examine the relationship between academic achievement and motivation level. The results of this study, which was conducted with 130 undergraduate students from a state university in Turkey and which deployed Instructional Materials Motivation Questionnaire, revealed that AR technology materials had a positive effect on increasing the undergraduate students' motivation towards learning vocabulary in language classes. Besides, a positive and significant relationship was noted between academic achievement and motivation in using AR technology in language classes. [Çakır et al., \(2015\)](#) conducted a semi-experimental study with 60 university students to investigate the application of AR technology in the classroom environment and its effect on students' academic achievement and motivation. English vocabulary teaching supported with AR was carried out in the experimental group, while traditional methods were used in the control group. Thus, students' achievement in the experimental group was found to be significantly higher than those in the control group. In their study titled "The Effect of Augmented Reality Applications in Foreign Language Teaching on Vocabulary Learning and Retention", [Akçayır & Akçayır \(2016\)](#) used pre-test post-test semi experimental method to determine the effect of AR application developed for foreign language I course on university students' vocabulary learning and retention. The data analysis results implicated that AR technology had positive effects on foreign language vocabulary learning. [Tyson \(2021\)](#) conducted a study with 29 high school students and investigated the impact teaching academic vocabulary through AR technology had on acquisition and retention compared to using a traditional flash card-based approach. A pre-test and post-test word evaluation was made at the beginning and end of each related word unit and they were included in four separate word units of 10 words each. These words were taught through AR and flash card-based approach and post-tested one week from the date of teaching. The results revealed a significant difference between the two vocabulary teaching methods, in other words, AR technology is beneficial in terms of teaching vocabulary and retention. Similar results emerged in another study about the effect of AR technology on achievement in foreign language teaching/learning: [Liu \(2009\)](#) designed an AR-supported English learning environment called HELLO which is geared towards enhancing listening and speaking skills in English as a foreign language. He conducted a case study with the participation of three high school teachers and 64 high school students. Analysis showed that the academic achievement of the experimental group students was significantly more satisfactory than the control group. In addition, another study ([Özdemir et al., 2018](#)), which was consistent with the result of the study but did not completely overlap in content, was conducted to examine the effect of AR technology on academic achievement. 16 studies published in the Social Sciences Citation Index (SSCI) between 2007 and 2017 were examined to investigate the effect of AR applications on the learning process (primary education, high school, undergraduate), and AR applications were determined to increase the students' academic achievement in the learning process compared to traditional methods. Unlike the results of these studies, [Garzón & Acevedo \(2019\)](#) conducted a meta-analysis of 64 studies in their study titled "Meta-analysis of the impact of Augmented Reality on students' learning gains" and found that AR had a medium effect on students' learning gains, meaning that AR has a positive impact on education.

A significant difference was identified across the pretest and posttest results of the students in the experimental group before and after the application of the AR material designed by the researchers ( $z=-6, p<.5$ ). It is most likely to mention that AR material is effective in students' professional English vocabulary learning, namely, their academic achievement. There may be many reasons for the increase in the students' academic achievement in learning environments supported with AR technology. [Chiang, Yang, & Hwang, \(2014\)](#) stated that AR provides a fun learning environment for students. Likewise, [Hsiao et al., \(2016\)](#) concluded that AR technology creates better understanding, recall, concentration, interaction and more attractive learning environments compared to traditional learning environments. Besides, [Ibanez et al., \(2014\)](#) reported that AR technology increases concentration and facilitates a better understanding of the subject. [Dukalskaya and Tabueva \(2022\)](#) explained that augmented reality technology and QR codes have been found to enhance motivation, interest, and professional foreign language proficiency in students.

Considering the pretest and posttest results of the students in both the experimental and control groups as well as the posttest result of the experimental group, there seems to be a statistically significant difference. There may be various reasons related to the increase in the academic achievement of the experimental group students, which can be explained in view of the qualitative findings. Within the context of a mixed-methods research design, quantitative data were examined alongside qualitative data obtained from a semi-structured interview form. The analysis of qualitative findings suggests that there may be various reasons that can explain the increase in academic achievement among students in the experimental group. Thus, experimental group students' views on "Augmented reality application in Professional English course Maritime terminology vocabulary acquisition" were categorized as technology and positive attitude. The students having a technological point of view emphasized that "The new generation AR technology contributes positively to the terminology, access to technology is easy thanks to smart phones, the lesson is easier to understand through 3D authentic materials, they feel privileged with the new generation technology and AR material presents them a sense of reality" ([Küçük et al., 2014](#); [Zhao, et al., 2020](#)). The participants' views on the application and their attitudes towards the application were listed as following: "it is an interesting way of teaching, the application arouses curiosity, it is motivating for the lesson and increases their desire, they learn in a much more fun environment and they have positive views towards this technology in terms of the readiness level for the profession that requires professional English knowledge such as internship" ([Ibrahim et al., 2018](#); [Solak & Cakir , 2015](#); [Tyson, 2021](#)). Students' views on augmented reality material in professional English vocabulary acquisition were listed as "facilitating learning, contributing to individual learning and learning anywhere-anytime" ([Karadayı-Taskiran, et al., 2015](#)). [Yılmaz & Batdi \(2016\)](#) concluded that AR applications had a positive impact on education. [Takkaç Tulgar et al, \(2022\)](#) examined research trends related to the use of augmented reality (AR) technology in teaching English as a foreign language. The results indicate that the primary focus of these studies is on the effectiveness of mobile and ubiquitous learning. Hence, it can be inferred that AR technology may facilitate learning anywhere and anytime.

In a nutshell, the reasons for the increase in the experimental group students' academic achievement may be; Professional English course supported with AR material is delightful, it arouses curiosity, an environment that motivates learning is created, the course is easier to understand through 3D authentic material, students experience different and multiple learning environments, AR material creates a sense of reality, and it presents both fun and individual learning environment, etc.

**Suggestions:** Further studies may be conducted on developing an AR material on different themes in professional English teaching and examining its impact on students' academic achievement. Detailed studies may be carried out to analyze the impact of AR material in Professional English teaching on students' attention, motivation and the readiness levels for the profession that requires professional English knowledge such as both individual learning and situational learning as well as internship.

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## Profesyonel İngilizce öğretiminde Artırılmış Gerçeklik (AR) Temelli Öğrenme Materyali Geliştirme ve Akademik Başarıya Etkisinin İncelenmesi

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### Özet

Artırılmış gerçeklik (AG) gibi yeni nesil teknolojilerin öğrenme materyallerinin, hayatın her alanında bu tür gelişmelerle yetişen bireyler için yeterli girdi sunması beklenmektedir. Bu nedenle, bu çalışmanın önemi yeni bir öğrenme materyali geliştirmek değildir, ancak yeni bir konu olarak mesleki (iş İngilizcesi olarak kabul edilebilir) İngilizce dersleri için bireysel öğrenme seviyesine göre kontrol edilebilen ve uygulanabilen bir AG oluşturmak günümüzde büyük önem taşımaktadır. Bu doğrultuda, bu çalışmanın amacı, mesleki İngilizce terminolojisini öğrenmenin veya iletişim kurmanın profesyonel yaşam için en zor engellerden biri olduğu Denizcilik veya Liman İşletmeciliği eğitimi alan üniversite öğrencileri için AG'ye dayalı özerk bir dil öğrenme materyali geliştirmektir. Bu çalışmada, Denizcilik Fakültesi öğrencileri için (50 deney + 50 kontrol) müfredata göre geliştirilen mesleki İngilizceye yönelik 4 haftalık AG destekli uygulama yapılmıştır. Karma yöntem araştırma deseni olarak nitel (gözlem ve yarı yapılandırılmış görüşme formları) ve nicel (ön ve son test) araştırma yöntemleri kullanılmıştır. Bulgulara göre, akademik başarı doğrultusunda gruplar arasında anlamlı bir fark vardır ve deney grubunda bazı önemli tepkiler gözlemlenmiştir: AG teknolojisi ile dil öğrenimi büyüleyici ve yenilikçi bir deneyimdir. AG, geleneksel dil derslerini, öğrencilerin sanal unsurlarla etkileşime girebileceği, dinamik ve ilgi çekici bir öğrenme dünyasını keşfederken öğrencilerin dil becerilerini geliştiren, eğitimi daha heyecanlı ve etkili hale getiren sürükleyici, etkileşimli ortamlara dönüştürmektedir.

**Keywords:** İngilizce eğitimi, Denizcilik eğitimi, Artırılmış Gerçeklik, Öğrenme Materyali



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## Genişletilmiş Özet

**Problem:** İnsanlar ana dillerini ailelerinden öğrenirken yabancı bir dili ise çoğunlukla eğitsel bir ortamda öğrenmektedirler. Söz konusu öğrenme ortamının nitelikli olması bilimsel bir zemine oturması ile mümkün olabilmektedir. Bu itibarla yabancı dil eğitimi, dilbilim ve eğitimbilim kapsamında değerlendirilen bir bilim alanıdır (Toprakçı, 2016). Bu dillerden biri de dünyada en çok kullanılan bir dil olarak İngilizcedir. İngilizce küreselleşen dünyada ekonomi, bilim, teknoloji, tıp, askeriye, mühendislik, turizm ve denizcilik gibi alanlarda uluslararası bağlamda kullanılan bir dildir. Bu alanlardaki İngilizce öğretimi, her bir disiplinin kendi özel terimlerine sahip olması nedeniyle Profesyonel İngilizce olarak ifade edilir ve ilgili meslekte çalışmak için bu terminolojiyi kazanmak bireyler için büyük öneme sahiptir. Bu meslek alanlarından biri de denizciliktir. Uluslararası Denizcilik Örgütü'nün çalışmalarıyla da desteklenmek suretiyle "denizcilik İngilizcesi" kavramı denizlerde kullanılmak üzere geliştirilmiştir (Saray, 2020). Dirgeyasa (2018) denizcilik İngilizcesini şu şekilde tanımlar: "1) Tüm denizcilikle ilgili durumlarda, gemide, gemiye gemiye ve gemiden karaya iletişimde kullanılan dil, 2) denizcilikle ilgili özel terimleri içerir - navigasyon, gemideki işlemler, roller ve sorumluluklar, sağlık ve güvenlik, acil durumlar, 3) ulusaliteleri fark etmeksizin denizciler tarafından kullanılmak üzere basitleştirilmiş İngilizce" (s. 42). Denizcilik fakültelerinde veya denizcilik ve liman yönetimi, yönetim ve acentelik gibi bölümlerde lisans ve önlisans düzeyinde öğrenim gören öğrencilerin kariyerlerine başlamadan önce bu denizcilik İngilizcesini öğrenmeleri esastır.

Denizci adaylarının, sınıf ortamında eğitim aldıklarında Denizcilik İngilizcesi kavramlarını istenilen düzeyde edinmemeleri muhtemeldir. Çünkü eğitimbilimsel anlamda her öğretim veya öğrenim faaliyetinin ortak ve farklı yöntem, teknik araç ve gereçleri vardır (Toprakçı, 2017). Örneğin, Dirgeyasa (2018) Endonezyalı denizciler için Denizcilik İngilizcesinin hâlâ düşük seviyede olduğunu ortaya koymuştur. Bu nedenle, mesleki İngilizce öğrenme ortamının çeşitliliği ve zenginliği kayda değerdir. Mesleki İngilizce dersi öğretmenlerinin, sınıf ortamında denizcilik öğrencilerinin dikkatini çekebilmeleri ve derse yönelik motivasyonlarını artırabilmeleri için yeni yöntem ve teknikler uygulamaları gerekmektedir. Mesleki İngilizce öğrenimi/öğretimi, İngilizcenin konuşulduğu yerel kültür bağlamında olmadığı için, denizcilerin Mesleki İngilizce öğrenmede sorunlar yaşaması muhtemeldir (Rivera, Villarreal, Miranda & Mayorga, 2019, s. 526). Bu nedenle, eğitimcilerin bu zorlukları hafifletmek, mesleki İngilizce eğitimine yönelik olumlu bir tutum geliştirmek ve genel öğrenme ortamını iyileştirmek için teknolojiyi uyarlamaları çok önemlidir.

Değişen ve gelişen zaman, ortam, teknoloji, mesleki İngilizce öğretmenleri ve öğrenenlere yeni öğretim/öğrenme yöntem ve teknik olanakları sunmaktadır. "Artırılmış Gerçeklik" (AR) bu yeni teknolojilerden biridir. AR mesleki İngilizce öğretim/öğrenme sürecinde kullanılan bir teknolojidir. AR'nin, öğretim/öğrenme ortamında kullanımı incelenmiş ve öğrenme sürecini olumlu yönde etkilediği ve öğrencilerin öğrenme motivasyonunu artırdığı (Bacca et al., 2014; Huang, Chen, & Chou, 2016) tespitleri yapılmıştır. Denizcilik endüstrisi için AR uygulamaları üzerine birçok çalışma olmasına rağmen, denizcilerin mesleki İngilizce dersi sınıf ortamında kullanabileceği AR öğrenme materyalleri hakkında çok az çalışma bulunmaktadır. Bu nedenle, bu çalışmanın amacı, mesleki İngilizce eğitiminde kullanılan AR materyalinin denizcilik bölümü adaylarının akademik performansı ve tutumları üzerinde nasıl bir etkisi olduğunu belirlemektir. Böylelikle, ilgili konudaki boşluğun kapatılmasına katkı sağlanmış olunacaktır. Bu çalışmanın, denizcilik sektörüne girmeden önce denizci adaylarının mesleki İngilizce öğrenmeleri için etkileşimli bir öğrenme ortamı sağlanması konusunda gelecekteki araştırmalara ışık tutması beklenmektedir. Bu çalışmada, Denizcilik fakültesi öğrencileri için geliştirilen ve müfredatın bir parçası olarak mesleki İngilizce dersi kapsamında yabancı dil kelime dağarcığı kazanımını desteklemek amacıyla 4 haftalık AR destekli bir uygulama kullanılmıştır. Nitel ve nicel araştırma yöntemlerinin aynı anda kullanımını sağlayan karma bir yöntem araştırma tasarımı, AR destekli uygulamaya katılan ve katılmayan öğrencilerin akademik başarıları arasındaki farkı belirlemek için kullanılmıştır (Creswell, 2007). Araştırmacılar tarafından geliştirilen kullanıcı dostu AR teknolojisi, denizci adaylarının yabancı dil kelime dağarcığı kazanımı için deney grubunda kullanıldı. Kontrol grubunda ise aynı ders içeriği geleneksel yöntem kullanılarak öğretildi. Deney ve kontrol grupları arasında puanların farklılaşıp farklılaşmadığını değerlendirmek için ön test ve son test uygulandı. Her iki grupta da aynı ön test ve son test kullanıldı. Nitel veriler, uygulama döneminde yapılan gözlemler ve katılımcıların görüşlerini daha detaylı bir şekilde açıklamak için açık uçlu sorular içeren yarı yapılandırılmış bir mülakat formu aracılığıyla toplandı. Böylece,

AR uygulamasının mesleki İngilizce dersi kelime dağarcığının kazanımı üzerindeki etkisi, nitel verilerle detaylı bir şekilde açıklandı.

**Yöntem:** Deneysel grupta yer alan kadın öğrenci sayısı 12 iken, erkek öğrenci sayısı 38'dir. Deneysel gruptaki katılımcıların 44'ü 18-25 yaş aralığında olduğu görülmektedir. Kontrol grubunda ise kadın öğrenci sayısı 7, erkek öğrenci sayısı 43'tür. Kontrol grubundaki öğrencilerin çoğunluğu, deneysel gruptaki gibi 18-25 yaş kategorisindedir. Çalışmada, İngilizce yeterlilik testi, kişisel bilgi formu, AR uygulaması, başarı testleri (ön test ve son test) ve uygulama sürecinde yapılan gözlem ve mülakat formları gibi çeşitli veri toplama araçları kullanılmıştır. Katılımcıların izniyle, yarı yapılandırılmış mülakatlar ses kaydedici bir akıllı telefonla kaydedildi ve daha sonra yazılı metne dönüştürüldü (transkript haline getirildi). Çalışmanın geçerlik ve güvenilirliği nitel veri analizlerine göre kodlama yapılarak sağlandı. AR materyalinin kullanılmadan önce ön test skalası deney ve kontrol gruplarına uygulandı ve ön test verileri arasında anlamlı bir fark bulunmadı ( $U=1232.50$ ,  $p<.05$ ), bu da her iki grubun da homojen bir dağılım sergilediğini, yani çalışmanın başlangıcında aynı seviyede olduklarını göstermektedir. Bu aynı zamanda, son test sonuçlarının daha anlamlı olduğunu ve AR materyal uygulamasının katılımcılar için etkili olduğunu göstermektedir. Çalışma ayrıca, son test verilerinin deneysel ve kontrol grupları arasında anlamlı bir fark gösterip göstermediğini belirlemeye çalışmaktadır. Bu bağlamda, son test bulguları açısından deneysel ve kontrol grupları arasında istatistiksel olarak anlamlı bir fark bulundu ( $U=193$ ,  $p<.05$ ). Deney grubundaki öğrenciler, kontrol grubundakilerden daha başarılıydı. AR uygulaması sonrası yapılan son test sonuçlarının sıralama ortalaması, farkın deneysel grup lehine olduğunu göstermektedir.

1. Mülakat Sorusu olan "AR'nin PEM terminolojisi kazanımı üzerindeki uygulamasını nasıl değerlendiriyorsunuz?" sorusuna Öğrencilerin cevapları şu şekildedir:

"Yeni nesil AR teknolojisi, özellikle PEM'de uzun zaman alan terminolojiye olumlu katkı sağlayacak. Akıllı telefonlar sayesinde teknolojiye erişim kolaydır, 3D gerçekçi materyaller aracılığıyla ders anlaşılır hale gelir, yeni nesil teknoloji ile ayrıcalıklı hissederiz, çoklu öğrenme ortamı sunar ve AR materyal bize gerçeklik hissi verir."

"Bize istediğimiz zaman daha hızlı bilgiye erişim sağladı. Bir nesneyi 3D olarak görmek ve içeriğini öğrenmek bizim için avantajlı. Gerçeklikte göremediğimiz şeyleri artırılmış gerçeklik aracılığıyla görmek ve öğrenmek mümkün."

"Gerçek bir gemi ziyareti etkisi yarattı. Sadece ezber sistemine dayalı bir şekilde değil, canlı bir sunumdaymışız gibi hissederek görsel olarak görmek daha iyidir."

1. mülakat sorusuna verilen cevaplar incelendiğinde, öğrencilerin uygulamaya yönelik tutumları açısından şu sonuca varılabilir: Bu öğretim yöntemi ilginç bir şekilde dikkat çekicidir, uygulama merak uyandırır, ders için motivasyon sağlar ve isteği artırır, çok daha eğlenceli bir ortamda öğrenirler ve staj gibi mesleki İngilizce bilgisi gerektiren mesleki yeterlilik için hazırlık seviyesi açısından bu teknolojiye olumlu bakarlar.

2. Mülakat Sorusu olan "Genel olarak öğrenme sürecinde AR uygulamasını nasıl değerlendiriyorsunuz?" sorusuna ise öğrencilerin cevapları şu şekildedir (Nitel cevaplardan en net cevapları olanlar çalışmaya dahil edilmiştir):

"AR uygulaması, herhangi bir ezberleme gereksinimi olmaksızın görsel hafıza ile otomatik olarak bir şeyleri öğrenmeyi sağlar. Gerçekmiş gibi duyabilir ve görebilirsiniz, teknolojiden faydalanabilirsiniz. Öğretmenlik için harika bir yöntem."

"Zaman ve mekan gözetmeksizin bilgiye ve o görüntüye kolaylıkla erişim sağlar. Sözcük dağarcığının önemli olduğu denizcilik gibi mesleklerde avantajlı olacağını düşünüyorum. Dahası, bu teknoloji sayesinde mesleğe başlamadan önce çok çeşitli bilgilere erişmek mümkün görünüyor. Öğrenci olduğumuz için istediğimiz zaman gemiye binemiyor veya limana giremiyoruz. AR uygulaması sayesinde her türlü fırsata sahip olabileceğimizi düşünüyorum."

Nitel veri analizinden anlaşıldığı üzere, öğrencilerin verdiği cevaplar doğrultusunda, AR teknolojisinin mesleki İngilizce dersinde kullanımını yüksek derecede iyi karşıladıkları, akademik başarılarını iyi yönde geliştireceklerini, bu sayede motivasyonlarının arttığı ve aynı zamanda kelime edinimine karşı olan negatif ön yargılarının azaldığı anlaşılmıştır. Bu çalışmanın hem nitel hem nicel sonuçları göz önüne alındığında, ilgili literatürdeki birtakım çalışmalarla uyumlu olduğu (örn., Barreira et

al., 2012; Solak & Cakir (2015; Çakır et al., (2015; Akçayır & Akçayır (2016). Ayrıca "yeni nesil AR teknolojisi, terminolojiye olumlu katkı sağlar; akıllı telefonlar sayesinde teknolojiye erişim kolaydır, 3D gerçekçi materyaller aracılığıyla ders daha kolay anlaşılır hale gelir, yeni nesil teknoloji ile ayrıcalıklı hissederiz ve AR materyal bize gerçeklik hissi sunar" (Küçük et al., 2014; Zhao et al., 2020).

**Bulgular ve Sonuç:** Tüm bulgular, klasik yöntemlerden farklı olan ve öğrencilerin daha önce deneyimlemediği yeni nesil bir teknoloji olan AR uygulamasının, öğrencilerin öğrenmelerine büyük katkı sağlayacağını göstermektedir. Geleneksel sınıfta belgelerin yansıtıldığı projeksiyon ekranına, tahtaya veya bilgisayara alışkın oldukları tekniklerden farklı olarak, AR uygulaması öğrencilere kendi öğrenme süreçlerini yönetme fırsatı vermiş, istedikleri kadar tekrar yapma imkanı sunmuş, eğlenceli bir şekilde öğrenmelerini sağlamış, Türkiye'de gerçekten ulaşamadıkları fırsatlara sahip olmalarını sağlamış ve böylece PEM terminolojisini iyi bir şekilde öğrenmelerini sağlamıştır.

Özetle, deneysel gruptaki öğrencilerin akademik başarısının artmasının nedenleri şunlar olabilir: AR materyali ile desteklenen mesleki İngilizce dersi keyifli bir hale gelir, merak uyandırır, öğrenmeyi motive eden bir ortam yaratılır, 3D gerçekçi materyaller aracılığıyla ders daha kolay anlaşılır hale gelir, öğrenciler farklı ve çoklu öğrenme ortamları deneyimler, AR materyali gerçeklik hissi yaratır ve hem eğlence hem de bireysel öğrenme ortamı sunar.

**Öneriler:** Daha sonraki yapılacak çalışmalar için öneriler aşağıdaki gibidir:

- Mesleki İngilizce öğretiminde farklı temalarda AR materyali geliştirme ve bu materyalin öğrencilerin akademik başarıları üzerindeki etkisini inceleyen ileri çalışmalar yapılabilir.
- Mesleki İngilizce öğretiminde AR materyalinin öğrencilerin dikkat, motivasyon ve profesyonel İngilizce bilgisi gerektiren meslek için hazırlık düzeyleri üzerindeki etkisini analiz etmek için detaylı çalışmalar yürütülebilir. Bu çalışmalar, bireysel öğrenme ve durumsal öğrenme yanı sıra staj gibi unsurları da içermelidir.

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