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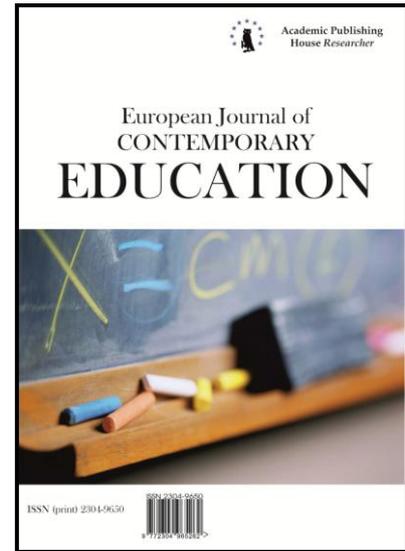
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## Computer Assisted Educational Material Preparation for Fourth Grade Primary School Students' English Language Class in Teaching Numbers

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### Abstract

In this study, using ADDIE instructional design model, it is aimed to prepare English language educational material for 4<sup>th</sup> grade primary students to teach them numbers. At the same time, ARCS model of motivation's attention, relevance and satisfaction phases are also taken into consideration. This study also comprises of Design Based Research which includes design, theory and application processes. The first phase of the ADDIE method is the analysis where there is a discussion with primary school English language teachers so as to determine the topic, the content and the target groups. During the design phase; objectives, strategies, activities, assessments, and methods of learning are determined to organize and present the content on the basis of learning objectives. In the development phase; images, animations and user interface are created in accordance with students' ages. Additionally, sounds including the pronunciation of digits and numbers are created and the codes of the visual scenarios that are designed are written in ActionScript 2.0 in Adobe Flash CS3 Professional. At the implementation phase, some of the target group students are tested with prototype material that has been implemented. In the classroom, students learn both the pronunciation and the spelling of the numbers. After checking their spelling and typing errors of numbers with quizzes, the students repeat what they have learned and then they take the spelling quizzes. The program checks the misspelled words. Students who correctly complete the quizzes are entitled to have one flag. And when they have all the flags (4 flag), they receive a certificate of achievement. With this rewarding technique, it is intended to raise the motivation of the students. Finally, at the evaluation step, the observed problems in the materials are revised. At every stage of the process, expert evaluations are consulted. With this study that is based on ADDIE instructional designed model and ARCS motivational model, it is

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expected that students enjoy learning pronunciation and the spelling of the numbers in a semi-game environment.

**Keywords:** Instructional Design, ADDIE Instructional Design Model, ARCS Motivational Model, English Pronunciation of Numbers, Computer Assisted English Education.

### **Introduction**

According to Chastain (1976); individuals who speak foreign languages have a better understanding of the world, easily overcome the cultural and linguistic hindrances and acquire new learning skills that enable them to have a profession. Although everyone agrees on the importance of foreign language, it is clear that the level of foreign language education is not sufficient in Turkey (Aydın, 2014). It is widely believed among the educators that the foreign language education in Turkey is one of the biggest problems of national education systems.

According to Karal & Berigel (2006), the problems encountered in teaching foreign languages is that English teachers are not be able to find “suitable” materials in order to use in classes. The main reason why some materials cannot be used efficiently in classes is that the materials are not designed in a way suitable for target group and purposes of the class. This is another problem faced in teaching foreign languages (Karal & Berigel, 2006). Işık (2008) states that traditional methods used in foreign language teaching, in other words perceiving foreign language teaching as learning grammatical rules, is one of the biggest problems in foreign language teaching. Crowded classes, poor physical conditions, troubles to train qualified teachers, language policies and mistakes in applying modern language education is amongst the most important problems in English language teaching in Turkey (Erkan, 2012). According to Saricoban (2012), some other factors also affect the success of foreign language teaching in Turkey such as curriculums, text books and teaching methods.

According to Yaşar (1990); although there are several reasons not to achieve the expected success in the foreign language education, at a level of program development, not adopting the concept of modern program development in education and not giving place to program development studies in a sufficient level are amongst the reasons that affect the foreign language education adversely.

Büyükaslan (2007) claims that the root of the problem is about how to, what to and whom to teach. The question or the problems that are among the main principles of linguistics are the most important aspects that need to be taken into consideration either in Turkish or in other foreign languages. The success of foreign language education for a target group in line with planned objectives is possible through the correct and proper use of methods to apply and materials to choose (Büyükaslan, 2007).

Gündüz (2005) emphasizes that the role of computers “to provide service for users” along with the “assistance” role in education should be considered. At this point, the methods and materials to be used within the framework of modern program development should be integrated into language education. At the same time, aside from traditional methods, providing alternative learning environments or opportunities for foreign language learners is critical.

According to She, Wu, Wang and Chen (2009), technology offers web-based alternatives comparing to traditional methods. Thanks to these alternatives, the concepts hard to learn becomes much easier to understand; thus learning process becomes more permanent. Besides, learning becomes more understandable with the help of various materials. Additionally, students’ motivation can be kept at the highest level. At the same time, the elements such as illustrations, pictures, videos and animations in these materials that students can easily use make the learning process more enjoyable (She, Wu, Wang and Chen, 2009).

Games that enable learners to actively participate and have a learning oriented process play an active role in this phase. The students feel more relaxed and comfortable in this kind of an enjoyable learning environment (Uzun, 2009). Moreover, an effective language education is related to what extent attention, wishes and expectation of the learner is taken into consideration. Thus, the long and boring language learning process can be turned into a more enjoyable and active learning environment via the games created with purpose of education (Aydın, 2014).

Büyükaslan (2007) states that these learning environments that make a learner to have an active role rather than a passive one and that appealing to more than just one sense have a significant place in terms of the permanence of learning.

According to Baturay, Yıldırım and Daloğlu (2009), making the learning and teaching process more effective can be possible through the better evaluation of computer and its opportunities of multimedia. These environments and materials used are the support of language learning interaction (Baturay, Yıldırım and Daloğlu, 2009). Computers are crucial in language learning since they provide more repetition and practice opportunities in individualized learning environments and their impact is long-lasting in foreign language learning (Baturay, Yıldırım and Daloğlu, 2009).

According to Karal & Berigel (2006), the aspect that will boost the success of learning English, is to benefit from the multimedia such as sound, picture, video and animation in the class as much as possible as English teachers also agreed. At this point, the lack of technical infrastructure is the most important problem (Karal & Berigel, 2006). Forming the learning environments in a way promoting active participation of the learner should be considered in language education as well as all other domains. Materials that can motive students and keep them interested are a need in the classes (Karal & Berigel, 2006). The main purpose of this material is to meet this necessity. Therefore, the opportunities of the information and communication technologies should be benefited to the fullest by taking technical infrastructure opportunities into account so as to achieve success.

Another important step is the selection and design of the materials that will enrich the learning environments. The materials that are selected and designed in order to make the teaching-learning process more organized and favorable require to be functional as well as to have a solid theoretical framework. Teaching theories have an important role in the design, formation and output of teaching materials (Reigeluth, 2013). At this point, one or some of the instructional design models in addition to materials that need to be used and methods to be applied, if included, will bring more positive results.

According to Wang and Hannafin (2005); designed-based research is a research that researchers and participants cooperatively take place in the analysis, design, development and application processes and that conducted in a real environment of application. In this material dealing with 'English digits and numbers', ADDIE design model, one of the instructional design models, and ARCS motivational models are utilized. This study of a planned 14 week period will be explained step by step in accordance with the basic design model ADDIE and analyzed in detail in the method section.

## **Method**

This study based on ADDIE design model, one of the basic instructional design models, is a product of a planned 14 week period.

This theoretical framework -ADDIE Instructional Design Model- that instruction designers and education developers use as a guideline comprises of five phases: Analysis, Design, Development, Implementation and Evaluation (Piskurich, 2015). This model whose name composes of the capital letters of each phase in English is the basis of many studies in the literature.

ARCS motivation model that is selected as a support to our basic model, emerged as a synthesis of Keller's researches about motivation model in 1987 (Keller, 1987). This model acquired its name from the capital letters of Attention, Relevance, Confidence and Satisfaction phases in English. The practices and activities in this study are designed by taking the attention, relevance and satisfaction steps of ARCS motivational models into consideration into consideration. The explanation of the practice and activities in the each phase of ARCS motivational is going to be placed in the design and development phase of the study.

It is found that students are confused about the English equivalent of numbers in the range 13-19 (one by one) and 30-90 (by ten). Based on the idea of eradicating the confusion, the preparation of a material that would allow a computer-assisted English education started. After analyzing the curriculum, the scope of the material are broadened, which will allow both the pronunciation and the spelling of the numbers in the range 0-100. Some videos and instructional

techniques such as ‘Mind Palace’\* that are developed special to the material by the researcher are utilized with the aim of the permanence of subjects.

In a design-based research, the first version of the design is developed and put into practice. In the application, the state of designed is observed. According to the experiences from application, arrangements are made by revising regularly. Finally the design becomes solid, correct and efficient (Kuzu, Çankaya & Mısırlı, 2011).

In this section, each step of the preparation process will be explained according to ADDIE instructional design model.

### Analysis

The idea of this project emerged from the problems students faced in mock exams on a subject within the scope of the project when the researchers work as an English teacher in private institution. As a result of the research, the outline of the project is prepared on the basis of videos shared online. Project developer handled this project within the scope of the class, ‘Software Design for Computer Assisted Instruction’, during his master’s degree at Balıkesir University, Institute of Science, in the department of Computer and Instructional Technology. A series of activities have been designed in order to make students learn the related subject more permanently, enjoyably and interactively in an easy way.

In this process, three separate domain experts, i.e. English teachers are consulted in person or through phone calls and texting. The feedbacks of the teachers demonstrate that learning and teaching of the subject especially of some numbers in certain ranges are hard or/and confusing. Additionally, when inquired about the teaching strategies of experts themselves, the answers showed that the subject was taught by memorizing or singing. This situation, also realized by the researcher is the origin of the problem in the project developing phase. Taking all these aspects into consideration, a computer-assisted instructional material that will draw students’ attention and make the process entertaining.

To sum up, in the analysis step which is the first phase of ADDIE design model; at the meetings with the English teachers the title and the scope of the subject and the target group are determined. Afterwards, English education program of the primary school 4<sup>th</sup> grade is also examined. It is found that in the education program, the relevant gain of the subject is “Students will be able to recognize numbers twenty through one hundred” (M.E.B., 2013). The scope of the material is broadened by including the digits and numbers zero through twenty in order to help the target group to learn English pronunciation and spelling of the numbers in range of 0-100.

### Design and Development

In these phases, the design of the material and the developing process as a result of feedbacks will be explained.

The design and development process is planned weekly and it is demonstrated in [Table 1](#).

**Table 1.** Activity Calendar

Phases	Activities	Duration
Analysis	<ul style="list-style-type: none"> <li>• Process to determine a subject</li> <li>• Meetings with domain experts</li> <li>• Analyzing curriculum</li> <li>• Title and content of the subject and determining target group</li> </ul>	2 weeks
Design	<ul style="list-style-type: none"> <li>• Determining the learning objectives</li> <li>• Designing the learning strategies</li> <li>• Designing the learning activities</li> <li>• Designing the learning assessments</li> </ul>	3 weeks

\* “Mind Palace” section belonging totally to the developer, is designed especially for the instruction of the subject.

Development	<ul style="list-style-type: none"> <li>• Designing the outline of the material</li> <li>• Designing the scene and buttons</li> <li>• Drawing several items and images (building, roads, vehicle etc.)</li> <li>• Designing menu and instructions</li> <li>• Designing the logo, main page and information pages</li> <li>• Designing the content of classes</li> <li>• Designing certificate and print out screen</li> <li>• Setting the confidentiality of collecting flags and the button to have certificate and designing quiz application</li> <li>• Designing the section of Mind Palace</li> <li>• Editing the material for the last time</li> <li>• Programming the material with programming language, ActionScript 2.0, in the Adobe Flash Program</li> </ul>	7 weeks
Application and Evaluation	<ul style="list-style-type: none"> <li>• Using, testing, editing the material and making some improvements</li> </ul>	2 weeks

It is decided that the material to be designed should teach the numbers in the range 0-10, 11-20 and 21-30 by counting by ten and the numbers ten through one hundred counting by one. To this end, “garbage truck” and “taxi” activities have been designed. Students can prefer to learn either with a garbage truck or a taxi. They can also switch the vehicles when bored thanks to the menu options and continue to learn.

There is a quiz session after each class. In these quizzes, it is aimed to test whether a student learn the subject by producing numbers randomly (in the relevant range). A student who answer “ten” questions correctly will have a right to end the quiz and have a “flag” that shows he completed the quiz. In the upper right corner of the screen, the number of acquired flags\* is shown. A student who acquires 4 flags in total will qualify for a “Success Certificate” in his name. This information is offered to the student with the help of related instructions as long as they complete quizzes. This stage of this practice was designed by taking the stage of “attention” in ARCS Motivation Model into consideration in order to draw students’ attention and maintain it throughout the instruction (Keller, 1987). When a student wants to log out before completing the quiz -if the other vehicle belonging this level did not get a flag- should get a notification indicating he/she will not obtain a flag that would help to receive a certificate and thus the student will be informed about the new target.

At the end of the classes and quizzes including the instruction of the numbers in the range 11-20 mind palace section is added. Also after instruction of the numbers in the range 10-100 (by ten), necessary explanation about the rest of the numbers (in the range 31-99) should be made, a video about the subject –that the numbers are taught by singing- is added. Additionally, an exclusive quiz practice is included to the material. In this practice, students are expected to write the total of randomly produced numbers according to their different levels “beginner, intermediate and advanced”. All the practices and instructions that respond to the question of “what is the benefit of this program for me?” can be evaluated within the scope of the “Relevance” stage of ARCS Motivational Model (Keller, 1987).

A menu is added to each scene so as to provide the ease of use. Therefore, the user can easily switch locations as he/she wants. In the class screen buttons that enable to move from one number to another as well as the play/pause buttons that helps to stop and resume the animations are included.

When the answers are true, false or blank, students will get an audiovisual feedback.

\* The number of flags to collect is determined to be “4” in total, acquiring one flag after each.

Students who qualify to have 4 flags and the certificate in their names will have an opportunity to save their certificates in “pdf” format and print them out. The stage that aims to award students is designed by taking the “satisfaction” phase of ARCS Motivational Model into consideration (Keller, 1987). This certificate aims to make students feel valuable and sufficient in this subject. It is thought, therefore, that the motivation can be kept at a high level in this process.

General scene designs and menus of the prepared material is as follows:

In the main page, there are a designed logo and the title of the subject and the buttons that enables access to other sections of the material (Fig. 1). In the Numbers Track screen, there is a map drawn in the form of cutout dashes from the start button to the finish button (Fig. 2).



Fig. 1: Main Screen



Fig. 2: Track Screen

There is certain explanatory information -instructions- in each button (start, help and finish) of the map in the Fig. 2 about the use of the material. The sample screenshots of the explanations are demonstrated in Fig. 3 and Fig. 4.

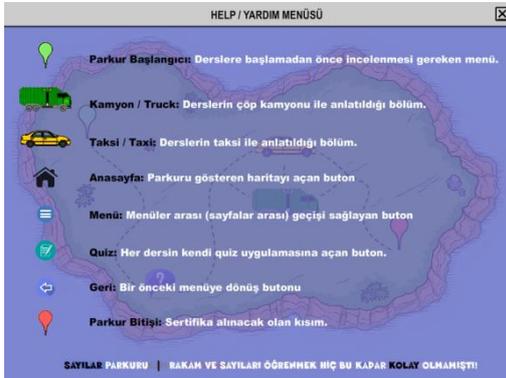


Fig. 3: Help Screen



Fig. 4: Finish Screen

In the Fig. 3, there is information indicating the function of each button. In the Fig. 4, there is a screenshot of the information showing this must be the last menu to be visited as well as of the “certificate button”.

When clicked on the buttons of garbage truck and taxi on the track screen, there are entry buttons and explanation of classes divided into certain number ranges so as to teach (Fig. 5 and Fig. 6).

\* The button in Fig. 4, is confidential at first. It appears when a student having 4 flags open this menu -finish menu- in order to obtain the certificate.

[ Taksi Garajı ]			
	Model	Görev Yeri / Durak	
1	Devrim	1961	[ 0 - 10 ]
2	Zafer	1968	[ 11 - 20 ]
3	Anadol	1966	[ 21 - 30 ]
4	Çağdaş	1980	[ 10'un Katları ]

**Fig. 5:** The Garage of Taxi

[ Kamyon Garajı ]			
	Adı	Model	Kayıtlı Konteynırlar
1	Anka	2009	[ 0 - 10 ]
2	Anka	2010	[ 11 - 20 ]
3	Akıncı	2011	[ 21 - 30 ]
4	Altay	2012	[ 10'un Katları ]

**Fig. 6:** The Garage of Garbage Truck

As seen in both figures above, the numbers are analyzed for four different ranges of numbers. Additionally, items in screen are designed to keep students interested. Instead of complex and distracting items, a plain design is preferred.

The designs of the scenes in which lessons are given (the ones taught via taxi and garbage truck separately) can be seen in Fig. 7 and Fig. 8.



**Fig. 7:** Sample Lesson Screen With Garbage Truck



**Fig. 8:** Sample Lesson Screen With Taxi

As seen in both figures, there are buttons at the top-center of the screen to access the previous and the next page and play/pause buttons. In the upper right corner of the screen, there are the total number of the flags he obtained and the menu button that enables to switch the menus. It is shown how to write in figures and to spell in English of the digits and numbers demonstrated to teach by the vehicles in both classes. Besides, the English pronunciation of these numbers and digits are given in the background. During classes it requires having equipment such as headphones or speakers, in order to listen the pronunciation of digits and numbers.

The screenshots of the quizzes that come up at the end of each class and the menu showing up when a student wants to log out before completing the quiz -if he/she did not get a flag with a taxi or a garbage truck from the same level- can be seen below (Fig. 9 and Fig. 10).



Fig. 9: Sample Quiz Screen



Fig. 10: Quiz Caution Screen

In Fig. 9, aside from some explanations, there are the information of the total number of the questions that were asked to students and answered by them, of answers submitted and confirmation of these questions, as well as a button to jump to another number, to finish the quiz and to check the answer. In Fig. 10, students is being constantly made aware of the target by warning them they may miss one of the flags that would help them to get the certificate.

The section of “Mind Palace” and the screenshots of the particular range of numbers that are not taught can be seen in Fig. 11 and Fig. 12.



Fig. 11: Mind Palace Screen

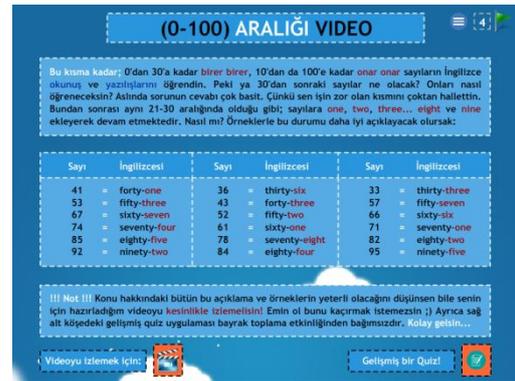


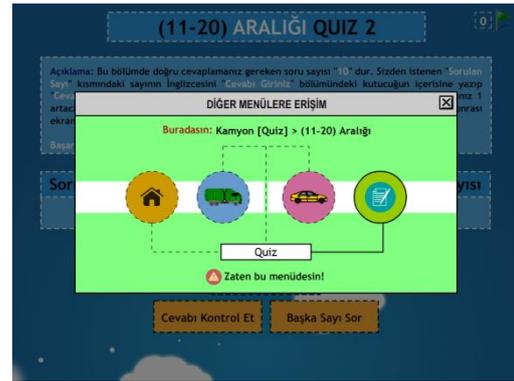
Fig. 12: The Numbers to the Other Range

After making short explanations on the screen of Mind Palace, the English spelling of the numbers in the range 13-19 are given. Since the numbers in this range are compared to numbers, multiple of 10 in the range 10-100, the number 16 is chosen as an example. The spelling of the number 16 as “sixteen” in English is separated as “six” and “teen”. It is tried to emphasize that the spelling of 16 includes both 6 “six” and 10 “ten”. The spelling of the rest of numbers in the range 13-19 is painted in writing by using different colors for the first part of the numbers and the “teen part” and it is tried to be shown that this is the same for the numbers in this range. It is emphasized that the number 60 which is usually confused with 16 and whose equivalent is “sixty” does not even have a “ten” in it and this method facilitates the differentiation between 16 and 60.

In Fig. 12 there are explanations regarding the instruction of other numbers -after 30- which are the multiples of ten, “one, two, three, ... , eight and nine” should be added and maintain this way up to 100 (for example: thirty-one, forty-six, fifty-five... etc.). To support this instruction, a video that teaches all the numbers in the range 0-100 was added to this material (Fig. 13). The button to access this video was shown at the bottom-left corner in the previous figure -Fig. 12- while at the right bottom corner there is a quiz practice button. The screenshot of the menu button that facilitates jumping to other menus especially to the main page is as follows (Fig. 14).



**Fig. 13:**All Numbers in the 0-100 Range (Video)



**Fig. 14:** Menu Buttons

As seen in the Fig. 14, with the expression “you’re here”, the user is informed about which menu he/she sees. There is a warning as “you’re already here” that shows up whenever the user clicks the quiz button when he/she is already in this section. In this menu, it can easily be switched to the sections about the instruction where the garbage truck or taxi are used to teach, and especially to the main page. Besides, students can reach the quiz related to the subject whenever he wishes.

The illustration of the certificate given to the students who successfully completed the instruction process is demonstrated in Fig. 15.



**Fig. 15:** Certificate Screen

In the certificate demonstrated in Fig. 15, there are students’ names, date of the certificate and print button that allows them to print it out.

As seen in many illustrations, it is aimed to use English equivalents of the words that used in menus and buttons. The purpose is to make students familiar with the words used on a daily basis and learn their meanings.

In the design of the material, it is generally avoided to include distracting items, shapes and colors.

### Application and Evaluation

At this stage, some primary school students (3 children) along with some undergraduate students were asked to use the material.

In the classroom, students learn both the pronunciation and the spelling of the numbers. After checking their spelling and typing errors of numbers with quizzes, the students repeat what they have learned. Then they take the spelling quizzes and the program checks the misspelled words automatically. Students who correctly complete the quizzes are entitled to have one flag. And when they have all the flags (4 flag), they receive a certificate of achievement. With this rewarding technique, it is intended to raise the motivation of the students.

Necessary adjustments were made in the light of the feedbacks coming from the students For instance, play and pause buttons that are placed in the instruction screen are the results of the said

feedbacks The design of the track page is revised in order to make the material more understandable. What this new design intends is to prevent the misunderstanding that a certain part of the class is taught by one vehicle complements the other parts that are taught by the other.

There is also another problem it is observed that students are confused about the English spelling of the number 40. When researched, there is a difference between British and American English of the spelling of 40 as “fourty” and “forty” and it prompted necessary updates.

Throughout the process and after the updates, expert opinions are consulted.

### **Findings**

During the development of the material, in order to evaluate the compatibility of the material with the target group and the program, the feedbacks from the primary and secondary school students who used the material were collected and they were positive. The reactions of the students who used the material are as follows:

-“Now, I want to try the taxi”.

-“Well, I already know this, I will directly skip to the questions”.

-“Now, there is only one flag leeeeft”.

-“What should I write for my name? Will it be on the certificate?”

There are not a lot of findings since only a small group is used as a pilot study. It is planned to use the material with the experimental and control groups in a real classroom. The effect of the learning material is investigated.

### **Conclusion and suggestions**

A computer-assisted material related to instruction of digits and numbers in English in the range 0-100 for the 4<sup>th</sup> grades was designed. In the development process of the material, necessary adjustments were made in accordance with the views of both experts in this domain or the instructional design experts.

According to Akçay, Aydoğdu, Yıldırım & Şensoy (2005), Computer Assisted Instruction (CAI) whose main difference from the traditional methods is interaction, is used in order to individualize the education. Because CAI is a designing and building process of the mechanism that helps students to organize, complement, integrate and codify the information in their minds. Besides, CAI is an effective method using audiovisual elements comparing to other materials and methods. The opportunities that CAI offers should be benefited at a maximum level in order to increase the success of a student. When the elements such as time and performance are considered, CAI is more preferable than other methods.

CAI materials and its opportunities should be taken into consideration more in terms of the instruction process and the success of the student and these materials need to be integrated more into the process.

This material that is designed to be suitable for personal use, it should be used in personal computers or computer laboratories in schools. During classes it requires having equipment such as headphones or speakers, in order to listen the pronunciation of digits and numbers. To use it in computer laboratories, it is more appropriate to use headphones not to get distracted by other students.

The purposes and the consequences of this study can be listed as follows. It is expected that the so-called material development process in this study help researchers that study design and development processes. It is planned to use the material with the experimental and control groups in a real classroom. The effect of the learning material is investigated. It is thought that with this designed instructional material, subjects can be learned and taught more permanently and more lively.

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