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Instructional Design of a Computer Literacy Course via Distance Education

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Abstract

In the implementation of the Computer Literacy (CL) course with face-to-face education, there were many problems encountered such as huge number of students who could not reach the education, and the inability to use the physical facilities of the university and the workforce effectively. For the solution of these problems, there was a need for a distance learning environment that is independent of time and space, equipped with rich learning experiences and using new technologies. In this study, a course design was prepared to be taught by distance education by following a systematic process according to the analysis, design, development, application, and evaluation stages of ADDIE model. ADDIE teaching design model was utilized in the study design development, which was carried out using the design-based research method. First, a problem analysis was conducted in order to determine the current situation, the expected situation, and the learner characteristics. During the design process, subject titles were created by considering the basic module of International Computer Driving License (ICDL), purpose analysis was done according to Bloom's taxonomy, and assessment tools were developed by taking into account the time allocated to the subject with the purpose analysis. In the development process, the teaching material, that is, the digital course content, was prepared in accordance with the goals of the course. The design was evaluated in every process from problem analysis to assessment, especially in the final stage, process and product evaluation were made more comprehensively. Semi-structured interview form and students' academic achievements were used to gather data from the students and instructors. According to the analysis of the data on which pilot and product evaluations are made, the improvement of the instructional design of the course supports the required learning environment. The study is believed to contribute to instructional designers, trainers and experts who want to conduct the course with distance education.

Keywords: Distance education, instructional design, instructional design for distance education, computer literacy

Uzaktan Eğitim ile Bilgisayar Okuryazarlığı Dersinin Öğretim Tasarımı

Öz

Bilgisayar Okuryazarlığı (BO) dersinin yüz yüze eğitim ile yürütülmesinde öğretimin ulaşamadığı öğrenci sayısının fazla olması, üniversitenin fiziki imkânlarının ve öğretim elemanlarının iş gücünün etkili kullanılamaması problemleri yaşanmıştır. Problemlerin çözümü için, zaman ve mekândan bağımsız, zengin öğrenme yaşantılarıyla donatılmış ve yeni teknolojilerin kullanıldığı uzaktan öğrenme ortamına ihtiyaç duyulmuştur. Bu çalışmada, analiz, tasarım, geliştirme, uygulama ve değerlendirme aşamaları ile ADDIE modeline göre sistematik bir süreç izlenerek uzaktan öğretim ile verilecek bir ders tasarımı hazırlanmıştır. Tasarım tabanlı araştırma metodu kullanılarak yapılan çalışmanın tasarım geliştirilmesinde ADDIE öğretim tasarım modelinden yararlanılmıştır. İlk olarak mevcut durum, olması gereken durum ve öğrenen özelliklerinin belirlenmesi için problem analizi yapılmıştır. Tasarım sürecinde, Uluslararası Bilgisayar Yetkinlik Belgesi'nin temel modülü dikkate alınarak konu başlıkları oluşturulmuş, Bloom'un taksonomisine göre amaç analizi hazırlanmış ve amaç analizi ile konu anlatımına ayrılan süre dikkate alınarak ölçme araçları geliştirilmiştir. Geliştirme sürecinde, dersin hedeflerine ve uzaktan öğretim ortamına uygun öğretim materyali yani ders içeriği hazırlanmıştır. Problem analizinden değerlendirme aşamasına kadar her süreçte tasarım değerlendirilmiş, özellikle son aşama olan değerlendirme aşamasında süreç ve ürün değerlendirme daha geniş kapsamlı yapılmıştır. Öğrenci ve eğitmelerden yarı yapılandırılmış görüşme formu, öğrencilerin akademik başarıları ile veriler elde edilmiştir. Pilot ve ürün değerlendirmelerin yapıldığı verilerin analizine göre dersin öğretim sistemleri geliştirilmesi gereksinim duyulan öğrenme ortamını desteklemektedir. Çalışma uzaktan eğitim ile dersi yürütmek isteyen öğretim tasarımcılarına, eğitmenlere ve uzmanlara katkı sağlayacağı düşünülmektedir.

Anahtar kelimeler: Uzaktan eğitim, öğretim tasarımı, uzaktan eğitimde öğretim tasarımı, bilgisayar okuryazarlığı

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1 | INTRODUCTION

Technological developments in the world and has changed the structure of the education-training process as well. As a support or complement to formal education, distance learning environments where technology's superior aspects are integrated with educational environments have started to take place in educational institutions. Arranging the necessary structures and organizations in distance education is one of the most important factors (Anderson & Elloumi, 2004). It can be clearly observed that this approach has the potential to develop our lives in ways we could not anticipate. For example, while technological classroom practices were recently limited to devices such as movies, television, slideshows, radio, today's students can use simulations of environment and events in normal classrooms, receive education from far-distance institutions, communicate with them, and interact with broad-based information systems (Schunk, 2009).

An instructional design model guides people on how to learn and how the instructional designer organizes instruction. Models help us to visualize a system or process visually (Gustafson and Branch, 2002). Instructional design is the systematic process followed to reach the solution of an instructional problem. According to the core design of the instructional design, the detailed procedures in all models are expressed in five basic stages. These stages are analysis, design, development, implementation and evaluation and are expressed as ADDIE (Analyze, Design, Develop, Implement, Assess, Evaluate). The ADDIE model provides guidance to teaching that focuses on learning outcomes, meets students' needs, and facilitates active learning (Reinbold, 2013). The ADDIE process is used to introduce an approach to instruction design that has a proven record of success (Branch, 2009).

Instructional design is a system approach to develop educational programs consistently and reliably (Gustafson & Branch, 2002). It is about helping people learn better. Seels and Glasgow (1997) address the instructional design model in five stages. At each stage, the designer is looking for answers to the following questions;

- Analysis: What is the problem? How do we solve the problem? What are topics, tasks and assignments? What should we teach?
- Design: What are the instructional strategies to achieve the goals? Which methods make learning effective? How should the qualification of the material be determined?
- Development: What effect does the materials have on the user? What can students learn from the materials?
- Implementation: Are the students ready to take this lesson?
- Evaluation: Did the design contribute to the solution of the problem? Can it be used in the future? Are changes and revisions necessary? If necessary, which stages should be revised?

The stages of ADDIE aim at the definition of educational needs, learning tasks, performance criteria and the best delivery method (Reinbold, 2013). The needs of the students are determined during the analysis phase. At this stage, the educational goals are established and what should be taught to reach the educational goals is revealed. During the design phase, a broad overview or plan is prepared explaining how to give instructions to achieve the goals set during the analysis phase. During the development phase, each training component reveals practical details as much as possible to meet the plan created during the design phase. During the implementation phase, educators perform the task first with a smaller beta or pilot study. Finally, during the evaluation phase, educators receive feedback about the program. They make the changes and arrangements suitable for the curriculum according to these feedback (Cheung, 2016).

During the COVID-19 pandemic, it has changed the traditional education system to the educational technologies model, where teaching and assessments are conducted online (Joshi, Vinay and Bhaskar,

2020). Teachers who try to do whatever it takes to educate their students in this process emphasize that they need instructional design in distance education for their long-term professional development (Marek, Chew & Wu, 2021). Since we are not free to move and experience during the epidemic, our senses are limited to a few environments. The task of the educators is to provide instructional design for students to gain creative thinking, reasoning, and self-regulation skills. On the other hand, attention should be paid to ensuring digital equality in students' access to learning environment. The followings are the instructional design recommendations of Aquilar (2020) to eliminate the digital inequality experienced during the COVID-19 process: Assign students "big picture" projects that draw on a variety of disciplines, rather than trying to recreate a school-like structure that is difficult to achieve at the best of times; Embrace asynchronous activities, as the ubiquity and availability of live lesson technologies can place a huge burden on students and families; Find ways to connect with students outside of concurrent activities (such as cell phones and emails);

The study is also functional by addressing the distance education teaching design that teachers need during the COVID-19 pandemic conditions and presenting the steps for solving the current instructional problem in a systematic process.

The Purpose of the Study

The purpose of this study is to reveal how to use the instructional design model known as ADDIE for a course to be carried out by distance education. It was aimed to prepare an instructional design that will meet the educational needs by determining the needs within the scope of this course and to evaluate the instructional design. Conducting the course with distance education will have many benefits for both the institution and the students.

For the university, the benefits are the followings:

- With the use of rapidly developing technology in education and training, distance education, which facilitates mass education, can be offered to more students with a rich educational environment with less cost.
- The distance learning environment will provide a new and different research environment for both researchers and academic staff working within the university.

For students, the benefits are as follows:

- The proposed distance education model will provide students with a unique education opportunity independent of time and place and will increase the knowledge and skills of every student who is motivated to learn.

Having a unique education experience at the undergraduate level will make important contributions to learners as part of lifelong education and provide them with privileges.

2 | Method

Design based research method was preferred within the scope of the study. Design-based research has a very important potential, especially in the design and research of e-learning environments. There is a design process in these environments, and existing research methods are mostly not interested in the design process (Kuzu, Çankaya & Mısırlı, 2011). Although design-based research is powerful, it has several limitations. First of all, design-based research is a compact research that needs to be done longitudinally. In design-based research, a large amount of data is gathered and analysed. The data collected are mostly qualitative data, and revealing the data obtained during the design process can bring a great workload to researchers.

In design-based research that aims to transform from theory to learning environments that encourage practice, new and complex methodologies are needed to capture the systematic nature of learning,

teaching, and assessment. The outputs of previous studies are very important in reorganizing school and work environments (Brown,1992). Design-based research embodies theories about teaching-learning and helps to understand the relationship between theory, design, and practice.

ADDIE instructional design model was used while developing the instructional design in this study. Among the instructional design models, it has been observed that the most studies are related to ADDIE Model (Özerbaş & Kaya, 2017). Although the stages of the ADDIE model may seem like a linear sequence, it consists of an interactive and circular process in itself. All stages intersect, affect each other, and work simultaneously (Reinbold, 2013). For example, a change in the analysis phase can affect the evaluation phase, and a change in the development phase can have an impact on the design phase. Additionally, the aims of the stages in ADDIE model is to guide a designer to the roadmap to achieve the best possible educational solution. The following explanations of the ADDIE model are written in linear order. However, as stated in the study, most of the stages were studied simultaneously.

Problem Analysis

It is the first stage of instructional design. Problem analysis helps us find important needs and their degrees of importance. It reveals the elements between the current situation and the target situation (Mattson, 1995; Cheung, 2016). During the analysis phase, educators identify the knowledge, skills or attitudes that learners should attain and collect more information about what should be taught. It is important to eliminate unnecessary information carefully to reach the educational goal and to focus time and resources better on the necessary learning needs (Cheung, 2016).

In the problem analysis of this study, the problems experienced in CL course conducted with face to face education were examined. CL course is a compulsory course for students to graduate from undergraduate and associate degree programs except for some departments (engineering) at the university where the study is conducted. As a result of interviews with course instructors, coordinator and examination of the course archive records, the following problems were identified:

- Of the nearly 1000 students enrolled in the course in the 2015-2016 academic year, 26% of the students (N=262) failed due to absenteeism. According to these data, education could not be provided to about a quarter of the students.
- The course is carried out in computer labs where there are approximately 25 computers that each student can use. Since the number of students who do not attend the classes is high, the workforce of the university's physical facilities and faculty cannot be employed effectively.
- Since CL course is a common course taken by students in different departments / programs, there are problems in using computer labs during lesson hours suitable for both students and faculty.

In order to solve the current problems, CL course is planned to be given by distance education using new technologies equipped with rich learning environments, independent of time and space. As a result of the needs analysis, it was determined that huge number of students that the education could not be provided, and the physical facilities of the university and the workforce of the teaching staff were not utilized effectively in conducting CL course face to face. There is a need for a distance learning environment using new technologies equipped with rich learning environments independent of time and space.

Learner analysis

Since CL course is a compulsory course for undergraduate students, the target audience for whom the course was designed was the students studying at the undergraduate level. The vast majority of students were born between 1990 and 2000. Today's youth, born in the 1990s, are the most familiar generation with technology among the generations ever existed (Cabı, 2016). In today's conditions where digital

technologies have become an indispensable part of life in every field, we see it in the generation that uses these technologies actively and in a mixed manner and is called the "Generation Z" or "Generation Z" (Taş & Demirdöğmez, 2017). In Prensky's (2001) published article, he referred to this generation as digital natives. Students in this age group are native speakers of the Internet, video games, computer, and digital languages. On the other hand, Brown and Czerniewicz (2010) state that they found the concept of digital natives incorrect by taking a further step. According to them, those with such features are an effective digital elite. Instead of the old analog generation, an Internet generation using new live information and communication technologies effectively has been growing. Therefore, it can be said that students who use information and communication technologies effectively have the ability to take courses with distance education.

Design

The design phase includes choosing the teaching method (s), setting learning objectives, assessment and evaluation activities. Opinions and suggestions of 6 instructors who are experts in the field of educational technologies and who take part in the conduct of the course for at least 5 years were taken for the design of the course planned for 14 weeks. In the course syllabus, the topics have been determined by taking into consideration the ICDL (International Computer Driving Licence) basic module and standard module renewed with the changes of society and technology after 2013. In addition to the basic and standard modules of ICDL, special topics for the use of digital resources of the university are included in the scope of the course.

Goal Analysis and Development of Assessment Tools

The aim of the course (general purpose) and the objectives (sub-goals) of the course should be determined before the development of assessment tools. In this regard, by analyzing Bloom's (1979) learning taxonomy, goal analysis was conducted. The goals determined according to the cognitive classification steps are given in Figure 1.

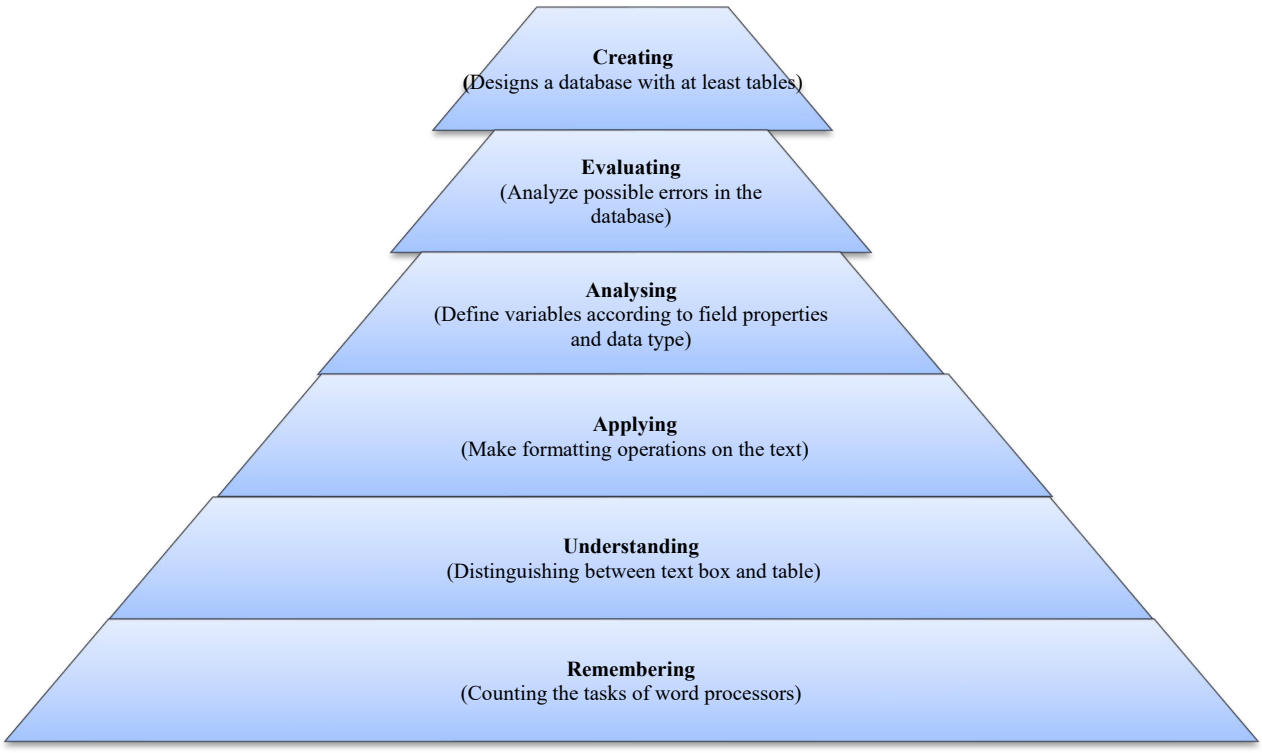

Figure 1. Determining the goals according to Bloom's taxonomy

At the end of the Goal Analysis, assessment tools were developed for these purposes. Multiple choice tests were preferred in the final and exemption exams. Multiple choice tests are preferred in cases where the number of people to whom the exam is applied, and the reliability and validity of the test should be high (Güler, 2017). In Figure 2, examples of multiple-choice tests developed according to goal analysis are given.

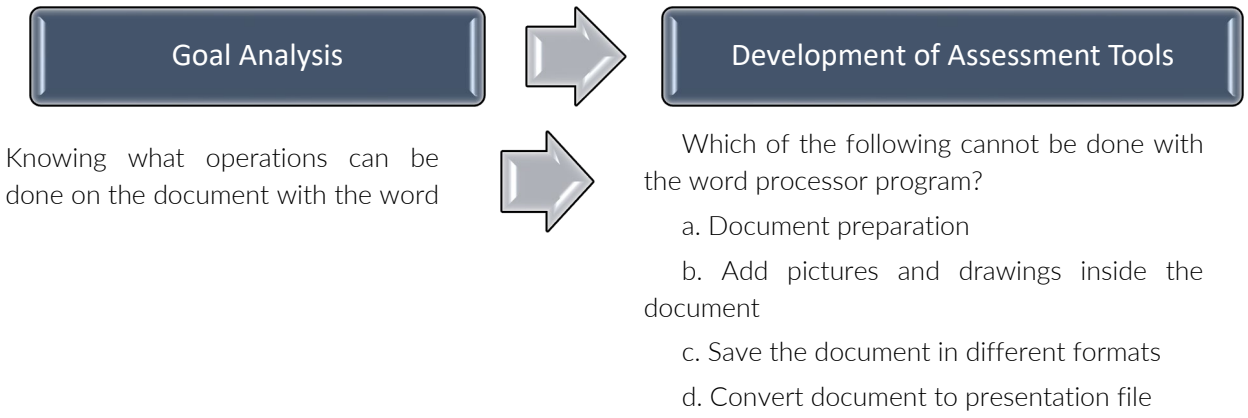

Figure 2. *Development of Assessment Tools According to Goal Analysis*

In Turkey, according to the Principles and Procedures Regarding Distance Education in Higher Education Institutions published by Higher Education, "The effect of the unattended assessment and evaluation activities of the courses given by distance education on general success cannot be more than 20% in distance education" (CoHE, articles 12-3). Taking this situation into consideration, a study was conducted on the distribution of evaluation points; 20% of the assignments given during the semester and 80% of the final exam is planned to affect overall success. Homework is planned unattended while final exam is supervised. In order to comply with the scope validity of the number of questions to be prepared for the final exam, the time allocated to the topics and the objectives of the course were taken into consideration.

Planned Assessment Tools

Self-evaluation: It was prepared for the purpose of self-assessment of the student within the scope of the subject. According to the subject of the week, any question type such as question-answer, multiple choice, true / false can be used. Two different types of assessment are used; multiple choice test questions which were prepared with teaching and content management system- Moodle's homework activity module. The computer-based exam is activated by the course instructor by regulating the access periods for the exam. The student is expected to answer the questions within a certain period of time, and when all questions are answered, they are transmitted to the system. The student can see the correct and incorrect answers in detail from the results page.

Interactive application (drag-and-drop): The interface with questions prepared with Captivate software is shared with the student via Moodle. There are activities such as drag and drop and matching in each page. If the student answers the question correctly, they can move to the next page.

Homework: The question, which includes an application similar to or equivalent to application question solutions in Word, Excel, PowerPoint and Access, is given to the student as an assignment in this section. The effect of each assignment on the grade is 5 points, and the homework must be announced to the student by SMS or via a Moodle. Each assignment is expected to be uploaded to the relevant week by the student within the time determined by the instructor. Teachers can submit feedback comments and upload

files such as marked student submissions, documents with comments, or spoken feedback when reviewing assignments thanks to teaching and content management system used. Assignments can be graded on a numerical or custom scale, or by advanced grading, such as letters. In Figure 4, the view of this process on Moodle is given.

Midterm: An applied exam including the topics covered until the midterm exam week in the academic calendar will be held. In the midterm exam, students are expected to answer the practice questions in the previously announced computer labs. It is aimed to maintain the student's interest in the course.

Final: Final exams will be announced on the academic calendar and will be held on the printed paper, on the same day and at the same time with all sections. Multiple choice question type will be used. It is compulsory for the student to take the exam at the place and time previously announced.

Development

The development phase consists of creating and editing learning material to be used during teaching. Educators take the draft or overview created during the design phase and think step by step how to present each feature of this process in practice (Cheung, 2016). The development process is the step where the features considered are applied.

Teaching and content management system - Moodle has been found suitable for giving the course with distance education. This system is a comprehensive website where the course contents (readings, discussion lists, short films, presentation files, etc.) are presented to the students who attend the courses by connecting to the Internet from their homes or workplaces. Teaching and content management system is a system used in distance and mixed education in many universities where it can increase students' perception, support learning communities, and increase student participation and success (Macfadyen & Dawson, 2012). In this study, students can enter Moodle with their user name and password. The open source Moodle system has been organized by the university by customizing its interface and activities. This system meets all needs in content sharing in the field of distance education, and it can provide service to thousands of users (including students and faculty members) 24/7.

Content Development

In this process, selection and development of teaching materials suitable for the objectives, content and distance education environment of the course were made. There are learning objectives on the course page with the topics every week. Students can see what knowledge and skills they will acquire after the topic of the week is completed. Figure 3 gives an example of the weekly course content on Moodle.

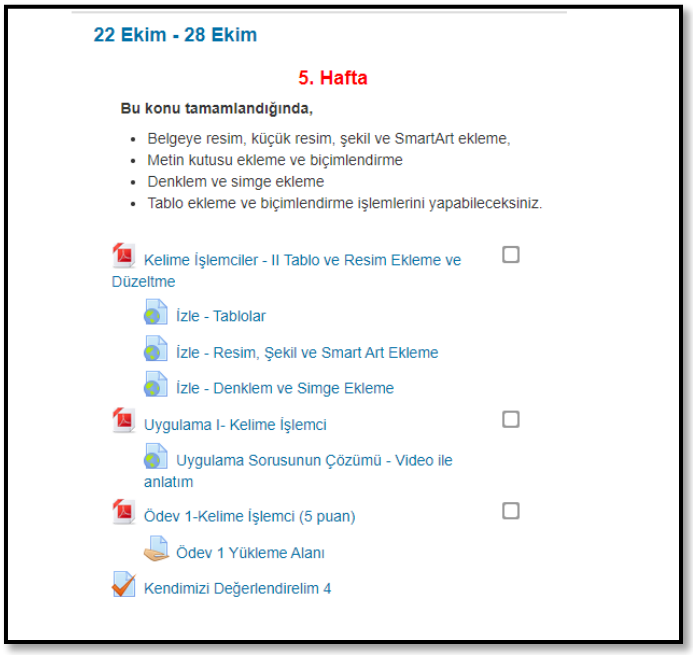

Figure 3. *Weekly Course Content on Moodle*

There exist descriptive text-based course contents under the title of ***Read (text).*** Video and presentation evaluation activities were prepared in line with the course contents. In text-based teaching, content analysis is ordered according to specific characteristics by performing task analysis in accordance with the objectives of teaching; cover page, goals, contents, lecture, summary, let's think - discuss, multiple choice questions and resources. The ordering and formal design of the content were designed based on the uniform connectedness principle.

Watch (video): The topic of the week is explained and recorded by the instructor. Video recording was done with Camtasia Recorder, and Camtasia Studio software was used for video montage and publishing. In order to ensure integrity in all videos, a video interface template was prepared by the instructor designer and all videos were prepared by the instructors according to this template. The following specific features were taken into account when recording and montaging videos:

- Home page (music) → Objectives → content presentation → summary → What did we learn? → Exit page (music)
- The whole video should not exceed 15 minutes, if it will take longer, it should be recorded separately,
- Recording should be done with full screen of 1280x720 and publishing should be in .mp4 format.

Application and Solution: CL course is a course that requires practice. In face-to-face education, it was tried to be integrated into the distance learning environment where the teacher gives applications to the students in the classroom and explains how this application is done step by step with the help of projection. In the application link, descriptive question text and instructions of the activity are included. In link of the solution of the application question, the solution of the problem is explained in detail by the instructor via the video. The question solution is recorded on video and presented to students offline on Moodle. There are four sample question solution records: Word, Excel, PowerPoint and Access.

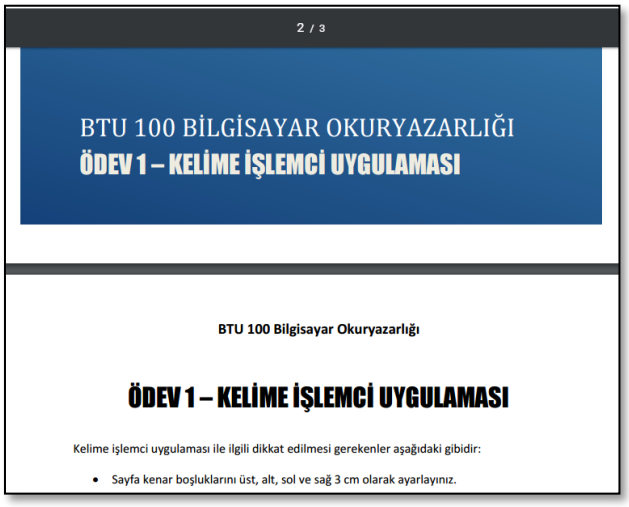

Figure 4. *The View of Instruction for Homework*

Live Course Connection and Recording: The lecturer will share the meeting invitation of the live course with the students via Moodle and SMS every week using the video conference system. The live lesson will last about one course hour when the students are eligible (on weekdays, evenings or weekends), and will be recorded by the lecturer to present these records to the students. Every week, during the "live lesson" hours of the lesson, students will be able to attend to virtual classes to take courses based on teacher and student interaction. During live lesson hours, a summary of the topic of the week, question-answer, let's evaluate ourselves and homework activities can be included.

Application and Evaluation

Assessment tools have been used to determine whether the program has achieved its learning outcomes from the problem analysis to the assessment phase and what is required to develop the program, if any. In the evaluation phase of the instructional design, it is done more comprehensively. Two evaluation types are taken into consideration as evaluation of the process and product (Smith & Ragan, 2005).

Process Evaluation

Expert Evaluation: Before using teaching materials, expert evaluation is applied. Information about the product being developed is collected from content experts, instructional designers, subject area experts or teachers (Smith & Ragan, 2005). In the instructional design made in this direction, the experts' opinions were obtained by providing that the evaluation of the materials prepared by the 6 experts in the process was done by other experts. The text contents were examined by the field expert in terms of grammar and spelling. In addition, each stage of the instructional design was shared with the participation of the expert group in the instructional design and with the participation of the course coordinator, who conducted the course face to face, and the opinions and suggestions of the stakeholders were received.

Pilot evaluation: Educators who want to practice in a long and complex process using a large group of instructors and students can make a pilot assessment that covers a real-time and smaller group before the application. Here, several participants, students and instructors follow the course before implementation, provide feedback after each step in the process, and reveal unforeseen difficulties in practice. Thus, problems in practice, especially time constraints, can be discovered and corrected (Cheung, 2016). In the pilot evaluation conducted for the target group, data on the effectiveness of teaching, the detection of learning problems, whether or not the learning objectives have been achieved, student satisfaction, and how the teaching will be realized without the intervention of the designer are collected (Yalın, 2012).

In this study, a pilot application was carried out for the distance education of Computer Literacy course in the spring semester of 2015-2016.

Study Group

A pilot study was carried out with a total of 200 students in 2 sections each consisting of 100 students. In the 14-week course, the study was conducted with 25 students in the first section and 24 students in the second section attending the exams and all activities. The pilot study of the designed course was done by 2 instructors. At the end of the study, quantitative and qualitative data were obtained from the students who joined the group. In the collection of quantitative data, answers to the following questions or uncertainties were sought.

Product Evaluation

It is carried out to determine the effectiveness of a curriculum after implementation (Yalın, 2012). In the evaluation of product in the context of instructional design, the purpose of product evaluation is to collect and analyze data to determine whether the instructional design is effective and then evaluate the results.

Gathering Data

A semi-structured interview form was used for obtaining the data based on the nature of the problem. The interview form approach includes the sequence of questions or topics to be examined during the interview (Patton, 1987). The titles or contents to be handled were determined in advance, and a template was prepared. This template increases the scope of the data and becomes systematic for each participant (Büyüköztürk et al., 2011). The questions in the semi-structured interview form are given below:

- What are the opinions and suggestions of the students and instructors regarding the course conducted with distance education?

Study Group

In 2016-2017 Spring Semester, the course was implemented with 1666 students - 30 branches (50 students per branch) - 17 Instructors. Regarding the course, the opinions and suggestions of 85 students and 12 instructors, 8 of whom were female while 4 of whom were male, were taken. A semi-structured interview form was used for collecting the data.

Data Analysis

Data were analyzed by using content analysis approach. Content analysis is used to describe the data systematically (Schreier, 2012). This approach is proposed for interviews and analysis of data from open-ended questions. Predefined steps are used in content analysis. These steps include identifying the research problem, sampling the data, coding, and interpreting and presenting the results.

Limitations

Design-based study is a compact research that needs to be done longitudinally. Lots of data need to be collected and analysed. On the other hand, there are many subsystems which affect each other in the ADDIE model. For this reason, elements such as presenting all the data obtained, determining the goals, methods, and techniques of each week of the course, reflecting the message design principles used in creating digital content were excluded from the scope of the study. The phases of the ADDIE model were sometimes concurrent, sometimes multiple, as the evaluation is done at each phase. However, the stages and operations are presented in a linear order. A team consisting of an instructional designer, subject area specialist, teacher, and assessment and evaluation specialist should be involved in the development of teaching systems (Morrison, Ross, & Kemp, 2001). The instructional designer of this study also works as a subject area expert.

3 | FINDINGS

What is the Effect of Different Evaluation Method on Student Success?

The effects of different evaluation methods on academic achievement were evaluated. The number of students and evaluation methods are given in Table 1.

Table 1. Number of Students and Evaluation Methods

	Number of Students	Evaluation Method
Group 1	25	Homework (20 points) (unattended) + Midterm (10 points) +Final exam (70 points) (supervised)
Group 2	24	Homework (20 points) (unattended) +Final exam (80 points) (supervised)

According to the table, different evaluation methods were used in two different sections. The t-test result of the students' academic scores obtained at the end of the semester according to different evaluation methods is given in Table 2.

Table 2. Effect of Different Evaluation Methods on Student Success

Factor	Sections	N		ss	df	t	Sig.
Success	1. Group	25	67.06	6.197	47	.396	.694
	2. Group	24	65.78	14.887			

According to Table 2, students' achievements did not show a significant difference according to different process evaluation groups (t (47) =.396, p>0.05). According to this finding, both evaluation methods can be used. However, it was stated that it would not be useful to have a midterm exam as it was expected that there would be a large number of students to take the exam within the scope of CL course. Therefore, the evaluation method for 2nd group students is recommended by the experts involved in instructional design.

Is there a relationship between the navigations on teaching and content management system and academic success?

Navigation data of students on teaching and content management system can be accessed through reports / log on the interface of the system. The relationship between the number of navigations on the system and their academic achievements at the end of the semester was examined (Table 3).

Table 3. Correlation Values Between Success and Navigations

	Success
Navigation	.727**
**<.05	N =25

According to Table 3, it was seen that there was a positive and meaningful relationship between students' navigation on teaching and content management system and their achievements.

Which time do you prefer most for live course hours?

Students only take the designed course from afar and have other courses in face to face format. Apart from face-to-face lessons, three choices of live lessons were presented, and students' opinions were taken (Table 4).

Table 4. Students' Live Course Hours Preference

Weekday evening		Weekend evening		Weekend daytime		Total	
f	%	f	%	f	%	f	%
27	57.4	17	36	3	6.4	47	100

According to Table 4, 27 of 47 students (57%) wanted live course time in the evening during weekdays. According to this finding, the majority of students preferred live lessons in the evening on weekdays.

Opinions and Suggestions for the Usefulness of Instructional Design

In pilot evaluation, it was aimed to obtain detailed information about the evaluation of the process by gathering quantitative data as well as qualitative data. Opinions and suggestions were received from the students regarding the usefulness of the learning environment, course instructors, structure of the design, motivation and learner experiences. At the end of the education, the views of 21 students regarding the usefulness of the instructional design are presented in Table 5.

Table 5. Students' Opinions and Suggestions for the Usefulness of Instructional Design

Usability of Learning Environment			
	Positive (f)	Negative (f)	Sample for positive or negative views
Teaching and content management system interface (Moodle)	10	2	*"I easily adapted to the Moodle environment"* *"A very useful interface"*
Live lecture environment	8	3	*"Live lesson was fun"* *"I liked that there were practice activities in live lesson"* *"It is inefficient to attend the classes live outside of school"*
Video content	8	2	*"I was able to do revision with video recordings.*
Pdf, Resource Files	9	2	*"Pdf and resource files were effective in understanding the subject"* *"Materials in Moodle were useful when studying for the exam"*
Assignment	7	2	*"I benefitted a lot from homework and documents"* *"I had a hard time completing the homework assignments"*
Let's evaluate ourselves	8	1	*"I revised the subject with the exercises""* *"Exercises and explanations should be added for the final exam"* *"At the end of each topic, there should be tests about that topic"*
Course Instructor			
Giving Feedback	10	2	*"I received timely / quick feedback"* *"I could not get an explanatory feedback"*
Communicating	10	2	*"I was able to communicate with the teacher of the course"* *"I prefer communicating with the teacher in the classroom environment"* *"I would expect my teacher to be in contact so I can follow the lesson"*
Seeking help	7		*"I was able to communicate whenever I wanted"*
Facilitating learning	8	1	*"Sample question solutions, PDF, homework instructions made it easier for me to do tasks"*
Guiding	11	1	*"The course contents helped me understand the subject"*
Structuring the Course Instructional Design			
Achieving the Objectives	6	0	*"To me, the objectives of the course have been achieved"*
Materials	7	1	*"A rich content presentation was made"*
Visuals	6	1	*"More interesting materials should be included"*
Testing and evaluation	4	3	*"That final exams constitute 80% of total grade was hard for us"* *"I prefer all exams to be practice based"*
Motivation and Learner Experiences			
Satisfaction	10	1	"I was satisfied with the lesson" *"I would like to attend the live lesson by phone"*
Skill / contribution	8	2	*"I improved my skills / computer skills"* *"I don't believe that online lessons improve my digital skills"*
Request to take lessons with distance education	4	4	*"I recommend taking lessons with distance education"* *"I prefer the face-to-face environment"*
Technical Specifications			
Help	5	-	
Guideline	7	-	
Computer & the internet	4	2	*"There are difficulties in accessing OYİS at certain times."* *"There are problems with video and audio in live lessons"*

As seen in Table 5, it was observed that the opinions of the students about the usefulness of the learning environment, the course instructor, the structure of the course teaching design, the experiences about the lesson and the technical features are generally positive. Solution suggestions for negative opinions are given below.

- As stated by students, "There are problems with video and audio in live lessons" was also reported by the instructors.
- It is thought that this problem will be solved with an up-to-date, effective and high-capacity video conference software. It was forwarded to the authorized units to overcome this problem that could be solved by management. In addition, the new video conferencing system should support the students' demand which is to "attend the live lesson by phone".
- In order to solve the negative opinion of "I had difficulties in completing the homework", it was decided to extend the homework submission deadlines from 1 week to 2 weeks.
- The view that "it is compulsory to attend live lesson" is not in line with the design of distance education environment.
- Taking into account the view that "adding exercises and explanations for the final", video and practice activities were included.
- There is currently no solution to the view that "exams should be practice based." While the number of students taking the course is expected to be around 2000, it is not appropriate to apply an application-oriented exam to each student on the computer. This view can be taken into consideration in the future.
- Considering the opinion that "there should tests related to the topic at the end of each topic", it was deemed appropriate to add an activity to evaluate ourselves in each week of the course.
- As a solution for the view that "I would expect my teacher to be in contact so I can follow the lesson", it was suggested that before the live lessons, to inform the place and time of the final exam, to share the homework and to send warning messages via SMS close to the end of the homework deadline.

Product Evaluation

All the compulsory CL courses throughout the university were conducted remotely in the fall semester of 2016-2017. For 1160 students registered, 14 Instructors taught at 25 branches, each of which has 50 students. In product evaluation, the effect of distance and face-to-face learning environment on students' academic success was examined. The academic success of students who took the course conducted in the face-to-face learning environment in the previous term and the course conducted in the distance learning environment were compared (Table 6).

Table 6. Academic Success of Students Taking Courses in Distance and Face to Face Learning Environment (Last Two Semesters)

	Distance Education 2016-2017 Fall (Final)	Face-to-Face 2015-2016 Spring (Final)
Number of Students Enrolled	1153	892
The number students in Final exam	825	561
Participation Rate for Final Exam (%)	71.55	62.892
Average of Success (%)	65.9	62.893

As seen in Table 6, students who took courses with distance education were higher than the students taking face-to-face courses (71.55%), and their average of success (65.69%) was also higher than the ones in face-to-face course. It was an important finding that the average of success of students in distance education is higher. This finding gave us a sign that instructional design has an impact on success. In the product evaluation, an in-depth analysis was made for the answers of the questions given below.

In this study, the data obtained from the predefined semi-structured questions were coded and presented with frequencies in tables. It was also reflected by quoting individuals' opinions. The students were asked semi-structured questions for product evaluation regarding taking course via distance education, content of the lesson, and achieving learning objectives (Table 7).

Table 7. Students' Opinions

	Yes		No		Partially		Total
	f	%	f	%	f	%	
Are you satisfied that you took this course with distance education?	61	72.62	23	27.38	0	0	84
Are the examples compatible with the applications, "let's evaluate ourselves", and the content of the course?	70	92.11	2	2.63	4	5.26	76
Are teaching materials effective in attaining learning objectives?	60	89.55	4	5.97	3	4.48	67

The vast majority of students reported that they were satisfied that they took the CL course with distance education (Table 7). Additionally, although the students had the following positive views "It was new experience for me", "It is a very nice method that gives students a sense of comfort, it makes more sense to teach with different methods instead of constantly teaching at school" and "We have the opportunity to listen again to the parts which we could not understand with the help of distance education more efficiently", they also stated their negative thoughts like the following "It could have been more efficient with face to face education." In addition, they indicated that the sample, application and self-evaluation activities given in the course content were compatible with the course content and that the teaching materials were effective in attaining the learning objectives. Moreover, students expressed their opinions like the followings: "There is content in every respect, which positively affects our success." "The fact that various data such as video, text and application speeded up the learning process."; "I find it very successful, I can easily work on issues I missed whenever I want"

The responses given to the question of "What are the positive and negative aspects of the course taking course with distance education?" were examined. The common themes and the frequency distribution of the themes are given in Table 8.

Table 8. The Positive and Negative Aspects of Taking Lessons with Distance Education

Positive Aspects	f	Negative Aspects	f
Easy access to the material	8	Difficulty in entering the system / internet	8
Easily asking questions to the teacher in the live lesson	5	High number of homework assignments	6
To receive education independent of the location	5	Lecture being at late hours	5
Taking courses via the internet	4	Not being able to attend to live class	3
To be able to communicate effectively with the teacher	4	Live broadcast freezing	2
Saving time	3	Not being able to do the applications face to face in the laboratory	2
No obligation to attend	2	No reminders for live lessons and assignments	3
Diversity of the learning environment	2	Not being able to ask questions in the live lesson	1
Learning in a systematic structure	2	I didn't like it. There is none.	34
To follow the lesson by phone	1		
No views	6		

The main positive aspects of distance education, according to student views, were easy access to the material, and it was easy to ask questions to the teacher (Table 8). Again, the negative aspects were having difficulty logging in to system / internet, the high number of homework, and the lesson starting at late hours.

Instructors were also asked semi-structured questions regarding content and accomplishment of learning objectives for product evaluation (Table 9).

Table 9. Instructor Feedback

	Yes (f)	Partially (f)
Moodle (logging in the system, access to course materials, assignment submission,…) is a suitable management system for the course.	9	3
Virtual classroom management software, where live lessons are held, meets the need.	12	0
Teaching materials (pdf files, videos, assignments, applications…) are sufficient.	9	2
Assignments, practices and self-evaluation are compatible with the course content.	11	1

According to instructor responses (Table 9), the instructional management system and virtual classroom management software used were suitable for the course and met the need. The majority of the views on teaching material and activities indicated that they are also sufficient.

The positive views of the instructors were as follows: "It is providing students with the opportunity to watch and read again and again at their own pace at any time, as well as learning independent of time and place."; "Including correctly prepared and planned activities simultaneously in a systematic framework with the contents of the previously prepared lessons."; "The fact that all materials have been added (pdf

documents, video narratives, tests and applications prepared for students' self-assessment, etc.) facilitates this process quite easily", "Teaching lessons with a different experience for students", "The process is very well structured, the activities and course contents are planned correctly"; "Students can advance at their own pace."

One of the instructors who gave "partially" as a response to the course content "I think teaching the topic "Excel" is insufficient. It can be planned to give Excel as a one-semester long course, not within the CL course. The same is true for Access. However, compared to Access, teaching Excel to the student is more important for the student's future professional life." On the other hand, the other instructor expressed his opinion by stating that "The videos were adequate, but can videos go above the baseline?" In addition, one of the instructors said, "It would be good to review some of the pdf files (spelling) and the answers of the tests in 'let's evaluate ourselves' part." "Decrease in the number of students participating in live connection at the beginning of the semester towards the end of the semester" is among the negative aspects related to the course.

4 |Discussion and Conclusion

This section of the study covers research results and suggestions offered accordingly.

Conclusion

In order to carry out the CL course which aims to provide basic knowledge and communication skills throughout the university by using distance education technologies, an instructional design was prepared with the ADDIE model that is appropriate for educational goals and objectives and will meet the educational needs by identifying the needs within the scope of the course. Firstly, problem analysis was performed to determine the current situation and the situation that should be present, and learner characteristics. In conducting the course in face-to-face format, it was determined that the number of students who could not reach the education was quite high, that the physical facilities of the university and the workforce of the academic staff could not be used effectively, and a distance learning environment using new technologies equipped with rich learning environments was required. The design process was initiated by considering the basic module and standard module of the European Computer Competence Certificate. According to Bloom's taxonomy, goal analysis was prepared, and assessment tools were developed. Homework assignments were planned unattended while final exam is supervised. In order to comply with the scope validity of the number of questions to be prepared for the final exam, the time allocated to the topics and the objectives of the course were taken into consideration. The selection and design of teaching materials suitable for the objectives, content and distance education environment of the course were made in the development process. Teaching and content management system - Moodle were found suitable for giving the course with distance education. The content of 14-week course including text-based explanatory information, presentation, video, solution of application question, let's evaluate ourselves, homework and simultaneous activities was developed.

Assessment tools were utilized to determine whether the program has achieved its learning outcomes from the problem analysis to the assessment phase and what is required to develop the program, if any. During the process evaluation phase, the expert opinion was obtained by providing that six experts who prepared the materials evaluated each other's materials. The text contents were examined by the field expert in terms of grammar and spelling.

In pilot evaluation, the effect of different evaluation methods on academic success was examined, no significant difference was detected. In addition, the relationship between students' browsing Moodle and their academic achievement was examined, and it was found out that there was a positive and meaningful connection. In a similar study Song, Rice, and Oh (2019) who examined the participation of the student on teaching and content management system, he analyzed the frequency and duration of access to the course, discussion board and chat correspondence and final grades. It showed that the frequency and

duration of access to the lesson, the amount and quality of discussion and chat recordings were significantly related to the student's success. In pilot evaluation, it was aimed to obtain detailed information about the evaluation of the process by collecting quantitative data as well as qualitative data. It was observed that the opinions of the students about the usability of the learning environment, the course instructor, the structure of the course teaching design, the experiences about the lesson, and the technical features were generally positive. The negative opinions of the students were that the video conference system is not efficient, the assignment submission periods are short, the exercises, practices and explanations regarding the final exam and given assignments are insufficient and not reported to the students.

In product evaluation, the effect of distance and face-to-face learning environment on students' academic success was examined. The academic success of the students who took the course in the face-to-face learning environment and the course given in the distance learning environment was compared. Compared to students taking face-to-face courses, students who take courses with distance education had a higher rate of participation and higher average of success in the final exam. It is an important finding that the average success of students in distance education is higher. This is because students who do not attend classes can take the final exam. Additionally, an in-depth analysis was made with qualitative data in product evaluation. The students stated that they were satisfied with the distance education, the examples given in the course content, the application and the self-evaluation activities were compatible with the course content and that the teaching materials were effective in attaining the learning objectives. Again, according to the students who gave their opinions, the main positive aspects of distance education were the convenient access to the material, asking questions easily to the teacher in the live lessons, the negative aspects were having difficulty in logging in to the system / internet, the high number of homework, and the lesson starting at late hours.

During the product evaluation phase, all the course instructors had positive thoughts about the course given by distance education method. The teaching management system and virtual classroom management software used were suitable for the course and met the need. On the other hand, the instructors raised the problems of enriching the topics of the spreadsheet and database program and the gradually decreasing number of students attending the live lesson towards the end of the semester.

The fact that the CL course was given by distance education has contributed to the effective use of both the teaching staff and the related employees' workforce, and the physical facilities of the university. The content of the course was presented to a great number of students with a rich educational environment. It has been observed that distance education design made with ADDIE model increased the knowledge and skills of every student who is motivated to learn by providing a unique education opportunity independent of time and place. Successful results were obtained in the studies conducted using the ADDIE model. Wang, and Hsu, 2008, who designed the Second Life activities according to the ADDIE model, stated that this model constituted a systematic method that would enable the instructor to function as a teaching and learning tool that helps them design their learning tasks. In addition, ADDIE model was used in library teaching design. It has been found that the model can lead to a teaching that focuses on student learning outcomes, meets the needs of students and facilitates active learning (Reinbold, 2013).

According to the analysis of the data obtained from students and instructors on the design of the course with distance education, management or design-oriented solution suggestions are given below;

- The impact of homework (unattended) and final exam (supervised) on overall success in the final evaluation is 20 points and 80 points respectively,
- Due to the high number of students, the final exam is done with multiple choice test,

- The students' browsing through Moodle is taken into consideration in student assessment,
- Live courses should be conducted in the evening on weekdays,
- Provision of up-to-date, effective and high-capacity video conferencing software makes live lessons more efficient,
- Extending the assignment deadlines and giving explanatory feedback,
- Adding more exercises, practices and explanations for the exam and homework on the Moodle page of the course,
- Instructor should send alert messages to students before live lessons, exams and sharing assignment,
- Students who want to practice should be advised to use the computer laboratories to be allocated,
- Increasing the storage areas reserved for assignments with visual and audio files on Moodle,
- Allotting sufficient time to Excel or reviewing the content,
- Reviewing the compatibility of the text file content and application in Access,
- The lecturer has authority and responsibilities in the situations specified in the management of the course (content of the last week, classroom performance grade, having make-up sessions, etc.),
- According to the literature review, the opinions, and suggestions given above, a "Course and Instructor Evaluation Form" is created and student opinions are received at the end of each semester,
- Planning the live lesson hours given through the internet should not be too late in the evening on weekdays,
- In order to prevent the decrease in the number of students participating in the live sessions from the beginning of the semester towards the end of the semester and to ensure the active participation of the student, different methods and techniques are included. For example, instead of the one-to-one explanation of the pdf document, the subject is summarized, then the application is done about the subject, the interactive learning environment with the subject is provided to the students by preparing a questionnaire about the subject on video conferencing system, sharing the homework sent to the system on the screen, giving feedback on the homework by sharing the homework sent to the system on the screen, and including the question-answer technique.
- The trainer who will take part in distance education should review the course material before the live lesson, be willing to teach lessons, be knowledgeable and experienced in the field and information technologies, if necessary, they should be informed about this process before starting the distance learning process, giving necessary explanatory feedback to the assignments, to provide guidance for the student who will request an interview by determining office hours,
- The content of the course should be constantly renewed and improved in parallel with the developing technology. Therefore, in addition to preparing instructional designs, it is recommended that the assistance and support of the teaching staff of the Department of CEIT continue in the updating of the content.

SUGGESTIONS

The data obtained from the evaluation studies as a result of the instructional design developed will be used for the renewal and improvement of the next lesson. Indeed, teaching design should be evaluated in a constantly revised cycle. The study of undergraduate course instruction design to be given by distance

education is expected to set an example for the different courses planned to be taught via distance education.

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