# Investigation of the New Information Technologies and Software Course Curriculum in terms of the Elements of the Curriculum

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***Abstract***

*In the current study, it is aimed to investigate the new information technologies and software course curriculum. The data of the study were collected by using the document analysis method and the collected data were subjected to content analysis. The information technologies and software course curriculum aim to impart the 21st century learner skills to learners and presents objectives and goals in line with this target. In this sense, this curriculum can be said to be a curriculum based on universal competences. In addition, the most important point in this process is to take the opinions of stakeholders in each step, suitable conditions to achieve the objectives should be provided and the required steps should be taken to make the curriculum up to date considering technological developments.*

***Keywords:*** *Curriculum, education of computer science, information technologies, information technologies and software course curriculum, curriculum elements*

# Yeni Bilişim Teknolojileri ve Yazılım Dersi Öğretim Programının Program Ögeleri Açısından İncelenmesi

***Öz***

*Bu araştırmada yeni bilişim teknolojileri ve yazılım dersi öğretim programının incelenmesi amaçlanmıştır. Araştırmada veriler doküman incelemesi ile toplanmış olup elde edilen veriler içerik analizine tabi tutularak yorumlanmıştır. Yeni bilişim teknolojileri ve yazılım dersi öğretim programı, öğrenenlere 21. yy. öğrenen becerilerini kazandırmayı hedeflemekte, bu hedefler doğrultusunda amaç ve kazanımlar sunmaktadır. Bu anlamda yeni bilişim teknolojileri ve yazılım dersi öğretim programının evrensel yeterliklere dayalı bir öğretim programı olduğunu söylemek mümkündür. Bununla birlikte bu süreçte en önemli nokta ise her adımda paydaş görüşlerinin alınması olup hedeflere ulaşma yolunda uygun koşullar sağlanmalı ve teknolojik gelişmelerin ışığında öğretim programının güncelliğini sağlamaya yönelik gerekli adımlar atılmalıdır.*

***Anahtar Kelimeler:*** *Öğretim program, bilgisayar bilimi eğitimi, bilişim teknolojileri, bilişim teknolojileri ve yazılım dersi öğretim program, program ögeleri*

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## Introduction

Educational and instructional activities are planned, and scheduled activities based on countries' education policies and education systems. With the National Education Basic Law No. 1739, the goals and principles of Turkish national education were determined. One of the basic principles of Turkish national education is being scientific, and in this context, curriculums, course equipment and materials at each grade level have been continuously revised and up-dated according to scientific and technological principles and innovations, environmental and country needs (Ministry of Education [MEB], 1973). Educational and instructional programs need to be developed since many dynamics such as social and economic changes, political policies, scientific developments, individual and social demands, universal developments, and technological developments and legal regulations are in interaction with the education system.

Curriculum is defined by Demirel (2000) as a set of experiences covering all activities planned to be imparted to individuals outside or inside the school in relation to the teaching of a course. A curriculum; as a shown in figure 1, consists of 4 basic components and is the whole of the parts that make it up.

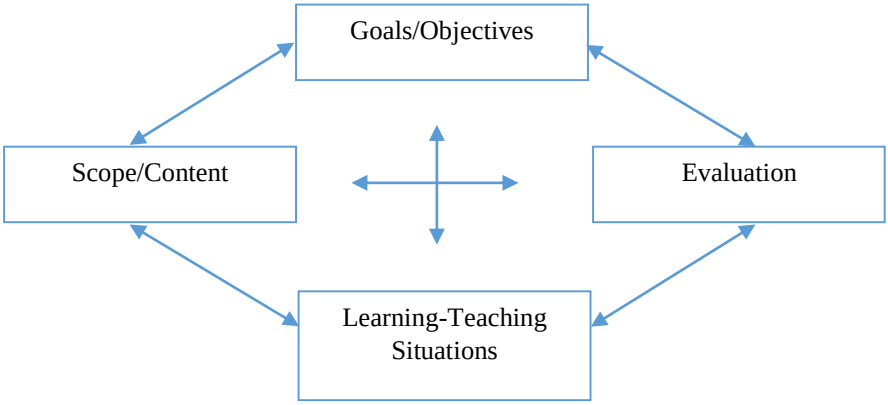


***Figure 1.*** Basic components of a curriculum

In the curriculum, the cognitive, affective, and kinaesthetic features that students are expected to have at the end of their educational activities are expressed as goals/objectives. The scope/content to be utilized in achieving the designated objectives is determined in the next step following the determination of the objectives. Content answers the question "What to learn". After determining what to learn, it is necessary to answer how to achieve the determined objectives by combining the content and resources. For this purpose, it is necessary to structure teaching methods and techniques, educational technologies, time, learning environments, and human resources to be used together in the process. Finally, in the evaluation stage, it is

necessary to determine the effectiveness of the teaching process, in other words, to what extent and how they have reached the competences determined in the objectives section of the curriculum and expected to be acquired by learners. Curriculum development process is a dynamic process, and after the curriculum has been implemented, the curriculum is reorganized and developed according to the feedbacks from various sources.

Given that the age we are in is the information age, it is inevitable that development plans and education policies and accordingly computer science education of countries are related to each other. With the necessity of Turkey's transformation into an information society, initiations have been taken for the integration of information technologies with education particularly within the context of the e-Transformation Turkey Project and in the 9th Development Plan, the goal of disseminating information and communication technologies was included (Karal et al., 2016). Rapid changes in web technologies require technology-based courses to be regularly revised and updated within the framework of these changes. The use of computers in the educational environments in Turkey, as in other European countries, started with the introduction of computers to public schools in the 1980s and laid the foundations of information technologies education (Akpınar & Altun, 2014). Subsequently, the Ministry of National Education has launched various projects for effective, efficient, and informed use of technological tools in schools and Basic Education Project Phase I, Basic Education Project Phase II aimed to integrate information Technologies into education through projects such as the National Education Development Project and the Movement of Increasing Opportunities & Improving Technology (MEB, 2007). The information technologies curriculum was first published as a computer teaching curriculum in 1998 and was revised in 2006. The general approach adopted towards the information technologies education in Turkey has been to continuously revise and update the information technologies curriculum considering the developments in the world. As a result, many changes and revisions have been made on the information technologies curriculum in the last 10 years. Finally, the information technologies and software course curriculum, which was updated in 2018, came into force (MEB, 2018).

When the related literature is reviewed, it is seen that there are studies on the information technologies curriculums. These studies focus on different subjects such as the evaluation of information technologies curriculum (Fidan, 2016; Karal et al., 2010), teachers' opinions about the information technologies curriculum (Çelebi-Uzgur & Aykaç, 2016; Fırat-Durdukoca & Arıbaş, 2011; Gülcü et al., 2013; Karakuş et al., 2015; Sarıkoz & Bangir-Alpan, 2019), the evaluation of the implementation levels of the information technologies curriculum (Dursun & Saracaloğlu, 2016; Erçetin & Durak, 2017; Yeşiltepe & Erdoğan, 2013), the evaluation of the information technologies curriculum on the basis of student opinions (Elçi & Sarı, 2016; İbili & Günbatar, 2020; Özgenel et al., 2018; Sarıkoz & Bangir-Alpan, 2019), the comparative evaluation of the information technologies curriculum (Işık, 2011;

Özdener, 2005). It is seen that the studies on curriculum evaluation aim to reveal the strengths and weaknesses of the curriculum and to examine the opinions of stakeholders such as teachers and administrators regarding the implementation of the curriculum in terms of different variables. In these studies, the following comes to the fore as difficulties experienced in the implementation of the curriculum; limited class hours allocated to the implementation of the curriculum (Domaç, 2016; Gülcü, Aydın, & Aydın, 2013; Şerefoğlu-Henkoğlu & Yıldırım, 2012; Şişman-Eren & Şahin-İzmirli, 2012; Yılmaz-Tanataş, 2010), elective courses in which students are not evaluated with grades (Aslan, 2014; Fırat-Durdukoca & Arıbaş, 2011; Şerefoğlu, Henkoğlu, & Yıldırım, 2012), technical inadequacies (Aslan, 2014; Fırat-Durdukoca & Arıbaş, 2011; Yılmaz-Tanataş, 2010), objectives neglecting the learner readiness, not sufficient for the development level of learners and not related to daily needs (Domaç, 2016; Karakuş, Çimen-Çoşğun, & Lal, 2015; Kaynarca, 2019), the need for alternative measurement tools (Sak, 2017), the need for innovation (Kaynarca, 2019) and lack of sources such as student course book, teacher's book and workbook (Aslan, 2014; Gülcü, Aydın, & Aydın, 2013; Karakuş, Çimen-Çoşğun, & Lal, 2015). When the literature on the examination and evaluation of the curriculum developed for the Information Technologies and Software course was examined, no research was found on the examination of the Information Technologies and Software course curriculum implemented in 2018. It is an effective and multi-dimensional process to prepare and implement the curriculum, to review it by considering the problems encountered in the process and to correct the problematic aspects. It is important to evaluate new curriculums developed during the curriculum development process, which is a dynamic process, from a holistic point of view. Investigation of the new information technologies and software course curriculum will contribute to the field in terms of seeing the innovations brought by the curriculum and the current situation in the information age we live in. Thus, in the current study, it was aimed to examine the new information technologies and software course curriculum in terms of the elements of the curriculum. To this end, answers to the following research questions were sought:

What are the features of the new information technologies and software course curriculum in terms of

1. objectives?
2. content?
3. learning-teaching process?
4. elements of evaluation?

## Method

### Research Design

The current study was conducted by using document analysis, which is a qualitative research model. Document analysis includes the analysis of written materials containing information about the case or cases that are aimed to be investigated (Yıldırım & Şimşek, 2013).

### Data Collection

The data of the study were collected by using the document analysis method. In cases where direct interview or observation is not possible in a qualitative research, document analysis can be used on its own without other data collection techniques (Yıldırım & Şimşek, 2013). In the current study, the new Information Technologies and Course Curriculum updated in 2018 was used as the document. In this context, in the first stage, the information technologies and software course curriculum was accessed on the official website of the Ministry of Education, and the research document was associated with the research questions.

### Data Analysis

The data collected in the current study were analysed through content analysis. The main goal in content analysis is to gather similar data around certain concepts and themes and to reach concepts and relationships that can explain the collected data. The data collected to this end are first conceptualized, then the emerging concepts are organized in a logical manner and thus the themes explaining the data are determined (Yıldırım & Şimşek, 2013).

## Findings

### The General Objectives of the Information Technologies and Software Course Curriculum

The curriculum has been prepared based on "General Objectives of Turkish National Education" and "Basic Principles of Turkish National Education" stated in the 2nd article of National Education Basic Law No. 1739. All the works carried out with the educational and instructional programs are aimed at achieving the objectives determined for pre-school, primary, and middle schools to be complementary to each other. The findings related to learner characteristics within the context of the general objectives of the information technologies and software course curriculum for primary level are presented in Table 1.

Table 1.
*General Objectives of the Information Technologies and Software Curriculum*

| | Objectives of the Information Technologies and Software Curriculum | | |
|---|---|---|---|
| **PRIMARY SCHOOL** | - Moral integrity<br>- Self-awareness<br>- Self-confidence<br>- Self-discipline<br>- Verbal, numerical, scientific reasoning<br>- Social skills<br>- Aesthetic sensitivity<br>- Orientation towards healthy life | **MIDDLE SCHOOL** | - Adopting national and spiritual values<br>- Skill<br>- Competent<br>- Using their rights<br>- Fulfilling their responsibilities |

The general objectives of the information technologies and software course curriculum can be explained as follows:

- Enabling students graduating from primary school to be individuals having self-confidence and self-discipline within the framework of moral integrity and awareness in accordance with their individuality and to be individuals who have gained the verbal, numerical and scientific reasoning at the basic level and social skills and aesthetic sensitivity required in daily life and are oriented to healthy life by using them effectively
- Enabling students graduating from secondary school to be individuals who have adopted national and spiritual values by developing the competences they have already gained in primary school, can use their rights, fulfil their responsibilities, and have acquired basic level skills and competences specific to different disciplines

**Special Objectives of the Information Technologies and Software Course Curriculum**

There are 8 special objectives in the information technologies and software curriculum for primary school. Findings related to the information technologies and software course curriculum for primary school ($1^{st}$-$4^{th}$ grades) are given in Table 2.

Table 2.
*Special Objectives of the Information Technologies and Software Curriculum (Primary School)*

| **Special Objectives of the Information Technologies and Software Curriculum (Primary School)** |
|---|
| - Gaining awareness of the correct and effective use of information technologies |
| - Using technology in an ethical and secure way |
| - Developing understanding about the use of technology for communication and research purposes |
| - Developing products by using information Technologies |
| - Gaining problem solving and computational thinking skills |
| - Developing understanding about algorithm design |
| - Using different structures of logic for solving problem |
| - Programming by designing their own games |

Through the information technologies and software course curriculum, it is aimed to impart skills to primary school students in compliance with the special objectives expressed in Table 2.

There are 15 special objectives in the information technologies and software course curriculum for middle school. Findings related to the special objectives of the information technologies and software course curriculum for middle school (5th – 6th grades) are presented in Table 3.

Table 3.
*Special Objectives of the Information Technologies and Software Curriculum (Middle School)*

| **Special Objectives of the Information Technologies and Software Curriculum (Middle School)** |
|---|
| - Being individuals who can understand technological concepts, systems, and operations as a digital citizen |
| - Using information technologies effectively in compliance with their purposes |
| - Accessing, researching, and using internet-based services |
| - Creating a general understanding and technical knowledge about computer science |
| - Acquiring problem solving and computational thinking skills and developing these skills |
| - Monitoring and evaluating the reasoning process |
| - Acquiring collaborative working skills as part of the learning process, benefiting from social environments, and sharing what they have learned |
| - Searching for learning opportunities on the internet |
| - Developing an understanding of an algorithm design and expressing it verbally and visually |
| - Selecting and applying the appropriate programming approach to solve the problem |
| - Developing technical knowledge on programming |
| - Being able to use at least one of the programming languages |
| - Conducting studies on product design and management |
| - Developing innovative and original projects for problems encountered in daily life |
| - Gaining awareness of the subject or lifelong learning |

Through the information technologies and software course curriculum, it is aimed to impart skills to middle school students in compliance with the special objectives expressed in Table 3.

### The Skills Which the Information Technologies and Software Course Curriculum Aims to Impart To Students

Findings related to the skills which the information technologies and software course curriculum aims to impart to students are presented in Table 4.

Table 4.
*Skills in the Information Technologies and Software Curriculum*

| | |
|---|---|
| **Skills Aimed to be Imparted** | - Computational Thinking<br>- Reasonable Questioning<br>- Problem Solving<br>- Algorithm Design |

As can be seen in Table 4, the information technologies and software course curriculum aim to impart higher order thinking skills to students such as computational thinking, reasonable thinking, problem solving and algorithm design, which are the requirements of the information age.

**Content of the Information Technologies and Software Course Curriculum**

The content of the information technologies and software course curriculum consists of 5 learning fields: "*information technologies*", "*ethics and security*", "*communication*", "*research and cooperation*", "*product generation*", and "*problem solving and programming*" presented in Table 5.

Table 5.
*Learning Fields in the Information Technologies and Software Curriculum*

- Information Technologies
- Ethics and Security
- Communication, Research, and Cooperation
- Product Generation
- Problem Solving and Programming

The issues addressed within the context of learning fields in the information technologies and software course curriculum presented in Table 5 are given below:

*Information Technologies*: In this area, subjects about up-to-date technologies and applications such as the change of information technologies from past to present, situations in which they can be beneficial or harmful in social, individual and social respects and working principles of the computer and other components are addressed.

*Ethics and Security*: In this learning field, subjects such confidentiality and security of information regarding the proper and responsible use of technology and ethical values are addressed.

*Communication, Research, and Cooperation*: In this learning field, subjects that can help students to gain skills required to have access to correct information and then to share it by fostering their research skills with the help of technological tools and to establish effective communication are addressed.

*Product Generation*: Within the context of this learning field, subjects allowing students to generate original products, to present their thoughts in different ways, to develop their skills of selecting and using appropriate tools in the process of constructing information are addressed.

*Problem Solving and Programming*: In this learning field, subjects that will help students acquire skills required to design algorithms so that they can develop different viewpoints of a problem, to use sequential logic, decision structure, loop structure, to select and apply the appropriate programming approach to solve the problems are addressed.

Information technologies and software course is based on the staged teaching approach in primary school level. In the context of the new curriculum, the staged teaching approach assumes that students' readiness, learning styles and computational thinking skills can be different. These stages involve a structure designed from simple to complex in relation to the effective use of information technologies and the use of problem-solving processes and statistical information (frequency) about the objectives in each grade level are presented in Table 6.

Table 6.
*Objectives in the Information Technologies and Software Course Curriculum*

| | ***Objectives*** | | | | | |
|---|---|---|---|---|---|---|
| **Learning Fields** | **1st Grade** | **2nd Grade** | **3rd Grade** | **4th Grade** | **5th Grade** | **6th Grade** |
| Information Technologies | 4 | 5 | 3 | 5 | 12 | 12 |
| Ethics and Security | 3 | 3 | 3 | 3 | 9 | 15 |
| Communication, Research and Cooperation | 2 | 3 | 3 | 4 | 12 | 13 |
| Product Generation | 1 | 1 | 1 | 1 | 15 | 12 |
| Problem Solving and Programming | 7 | 11 | 10 | 13 | 27 | 25 |

The findings presented in Table 6 in relation to the information technologies and software course curriculum can be explained as follows:

The objectives of the information technologies and software course curriculum are presented within the frameworks of the learning fields. In the curriculum, there are a total of 17 objectives in the learning fields in the first level: "information technologies" (*f*=4), "ethics and security" (*f*=3), "communication, research and cooperation" (*f*=2), "product generation" (*f*=1) and "problem solving and programming" (*f*=7). A sample objective for each learning field is given in Table 7.

Table 7.
*Sample Objectives for the Information Technologies and Software Course in the 1st grade*

| Learning Fields | Sample Objectives | *f* |
|---|---|---|
| Information Technologies | - Recognizes the uses of the computer for different purposes.<br>- Uses multi-media resources for learning purposes. | 4 |
| Ethics and Security | - Realizes the necessity of respecting others' rights in technology use.<br>- Understands that he/she must take responsibility while using technology. | 3 |
| Communication, Research, and Cooperation | - Recognizes the changes in communication technologies from past to present.<br>- Recognizes that he/she can communicate through technology. | 2 |
| Product Generation | - Designs a toy by using electronic wastes. | 1 |
| Problem Solving and Programming | - Designs simple operational flows for the situations related to daily life.<br>- Predicts the results of a given operational flow. | 7 |

In the curriculum, there are a total of 23 objectives in the learning fields in the second-grade level: "information technologies" (*f*=5), "ethics and security" (*f*=3), "communication, research and cooperation" (*f*=3), "product generation" (*f*=1), and "problem solving and programming" (*f*=11). A sample objective for each learning field is given in Table 8.

Table 8.
*Sample Objectives for the Information Technologies and Software Course in the 2nd grade*

| Learning Fields | Sample Objectives | *f* |
|---|---|---|
| Information Technologies | - Explains the relationship between hardware and software.<br>- Produces solutions to simple hardware and software problems. | 5 |
| Ethics and Security | - Understands what should be done for the protection of the confidentiality and safety of personal information.<br>- Expresses which information should be kept confidential while using the internet. | 3 |
| Communication, Research, and Cooperation | - Recognizes that there are very different multi-media contents on the internet.<br>- Uses the tools of information technologies to conduct research. | 3 |
| Product Generation | - Designs a model for the real life by using electronic wastes. | 1 |
| Problem Solving and Programming | - Shows a problem by dividing it into its sub-problems.<br>- Discovers that a problem can be solved in different ways. | 11 |

In the curriculum, there are a total of 20 objectives in the learning fields in the third grade: "information technologies" (*f*=3), "ethics and security" (*f*=3),

"communication, research and cooperation" (*f*=3), "product generation" (*f*=1) and "problem solving and programming" (*f*=10). A sample objective for each learning field is given in Table 9.

Table 9.
*Sample Objectives for the Information Technologies and Software Course in the 3rd grade*

| Learning Fields | Sample Objectives | *f* |
|---|---|---|
| Information Technologies | - Discusses the contribution of information technologies to daily life.<br>- Understands how computers perform operations. | 3 |
| Ethics and Security | - Discusses the negative situations that can emerge when he/she shares his/her own or others' personal information.<br>- Creates a secure password. | 3 |
| Communication, Research, and Cooperation | - Conducts simple research on the internet.<br>- Realizes that he/she should search information from secure sources. | 3 |
| Product Generation | - Creates stories by using digital contents. | 1 |
| Problem Solving and Programming | - Creates an algorithm for the solution of a problem.<br>- Discovers the interface of the block-based programming device. | 10 |

In the curriculum, there are a total of 26 objectives in the learning fields in the fourth grade: "information technologies" (*f*=5), "ethics and security" (*f*=3), "communication, research and cooperation" (*f*=4), "product generation" (*f*=1) and "problem solving and programming" (*f*=13). A sample objective for each learning field is given in Table 10.

Table 10.
*Sample Objectives for the Information Technologies and Software Course in the 4th grade*

| Learning Fields | Sample Objectives | *f* |
|---|---|---|
| Information Technologies | - Prepares a poster on the proper and secure use of technology. | 5 |
| | - Develops suggestions for the beneficial use of technology. | |
| Ethics and Security | - Recognizes that operations performed in the internet and user information are recorded. | 3 |
| Communication, Research, and Cooperation | - Conducts simple research on the internet. | 4 |
| | - Recognizes that information should be searched in reliable sources. | |
| Product Generation | - Creates stories by using digital contents. | 1 |
| Problem Solving and Programming | - Creates an algorithm for the solution of a problem. | 13 |
| | - Discovers the interface of the block-based programming device. | |

In the curriculum, there are a total of 75 objectives in the learning fields in the fifth grade: "information technologies" (*f*=12), "ethics and security" (*f*=9), "communication, research and cooperation" (*f*=12), "product generation" (*f*=15) and "problem solving and programming" (*f*=27). A sample objective for each learning field is given in Table 11.

Table 11.
*Sample Objectives for the Information Technologies and Software Course in the 5th grade*

| Learning Fields | Sample Objectives | *f* |
|---|---|---|
| Information Technologies | - Comparatively presents the components of different trademarks, models, and technologies of the same kind.<br>- Conducts basic file and folder management operations. | 12 |
| Ethics and Security | - Recognizes that digital sharing is permanent and leaves traces behind.<br>- Realizes the problems to be encountered in case of the violation of ethical principles. | 9 |
| Communication, Research, and Cooperation | - Discovers the journey of information through the networks.<br>- Organizes the information he/she has obtained through correct referencing. | 12 |
| Product Generation | - Conducts operations for the organization of visuals.<br>- Explores different programs to make presentations. | 15 |
| Problem Solving and Programming | - Find solution suggestions for the problems he/she encounters in daily life.<br>- Explains the basic concepts related to programming. | 27 |

In the curriculum, there are a total of 77 objectives in the learning fields in the sixth grade: "information technologies" (*f*=12), "ethics and security" (*f*=15), "communication, research and cooperation" (*f*=13), "product generation" (*f*=12) and

"problem solving and programming" (*f*=25). A sample objective for each learning field is given in Table 12.

Table 12.
*Sample Objectives for the Information Technologies and Software Course in the 6th grade*

| Learning Fields | Sample Objectives | *f* |
|---|---|---|
| Information Technologies | - Discusses the contributions of information technologies to social and cultural life and their risks over examples.<br>- Compares different operating systems. | 12 |
| Ethics and Security | - Recognizes the importance of the internet ethics.<br>- Explains the concept of cyber bullying and discusses the precautions to be taken to prevent it. | 15 |
| Communication, Research, and Cooperation | - Explains the required components to set up a network and the characteristics of these components.<br>- Does advanced search by using search engines. | 13 |
| Product Generation | - Creates a table suitable for the purpose by learning about the interface of the spread sheet.<br>- Shares the video file cooperatively created online. | 12 |
| Problem Solving and Programming | - Selects the fastest and correct solution by analysing different algorithms.<br>- Constructs programs including the decision structure. | 25 |

**Learning-Teaching Process in the Information Technologies and Software Course Curriculum**

The issues to be considered in the implementation of the new information technologies and software course curriculum are generally expressed as follows:

- In the field of information technologies, every student should be provided with the opportunity to benefit from technology and gain the computational thinking skill.
- Rich learning environments should be created for learners.
- The learning process should be enriched with practical opportunities as well as theoretical knowledge.
- Opportunities should be provided for learners to develop their own products and projects.
- Meaning making and organization strategies should be used for learners to integrate what they have just learned with their prior knowledge so that they can construct the knowledge.
- Learners should be enabled to be actively involved in the learning process, and both individual and group work should be encouraged.
- Opportunities should be offered to learners to share the products and projects they have developed with their peers. It is extremely important to directly associate the problems and solution proposals addressed in this process with real life and to produce a solution to a real problem and in this connection, the learning process should be associated with other school subjects.

The new information technologies and software course curriculum is designed as a flexible framework curriculum that should be structured by the teacher according to the interests and developmental characteristics of the students, rather than as a standard curriculum. The themes in the curriculum, which is based on the thematic approach, cover different topics. These themes represent the learning fields of the curriculum. In the curriculum, a great importance is attached to developing activities consistent with the purpose of the curriculum. The importance of including various learning activities and practices based on active learning is also emphasized in the curriculum.

**Evaluation Process in the Information Technologies and Software Course Curriculum**

In the evaluation process in curricula, it is necessary to act with the understanding of maximum diversity and flexibility due to changing learner characteristics and individual differences. Since diversity in education is seriously affected by internal

and external dynamics such as the individual, education level, course content, social environment and school opportunities, main responsibility should be taken by teachers, not by the curriculum, in ensuring the effectiveness of evaluation practices. At this point, originality and creativity are the main expectations from teachers. Multi-focused measurement and evaluation is the basis of the new information technologies and software course curriculum, and measurement and evaluation practices should be carried out with the active participation of teachers and learners. In the curriculum, not only the learning product but also the learning process is evaluated. For this reason, process-oriented measurement and evaluation are adopted in the new information technologies and software course curriculum. In the evaluation process, it is recommended to use alternative measurement and evaluation approaches in addition to evaluation with traditional methods.

## Results and Discussion

With the developments in web technologies, access to technology has become easier and technology has become a tool that everyone needs and uses in daily life and business life. Although the importance of information technologies, which are predicted to shape the future, is great in the field of education, when the curricula are examined, it is seen that they are mostly related to the technologies and software of the past. Therefore, rapid changes and transformations in technology necessitate some arrangements in any information technologies curriculum. It is seen that the studies on curriculum evaluation aim to reveal the strengths and weaknesses of the curriculum and to examine the opinions of stakeholders such as teachers and administrators regarding the implementation in terms of different variables (Aslan, 2014; Domaç, 2016; Fırat-Durdukoca & Arıbaş, 2011; Gülcü, Aydın, & Aydın, 2013; Karakuş, Çoşğun-Çimen, & Lal, 2015; Karal, Reisoğlu, & Günaydın, 2010; Kaynarca, 2019; Sak, 2017; Şerefoğlu-Henkoğlu & Yıldırım, 2012; Şişman-Eren & Şahin-İzmirli, 2012; Yılmaz-Tanataş, 2010). Curriculum review and evaluation studies are not carried out only at the end of the curriculum period. Any curriculum should be evaluated on an ongoing basis in terms of its effectiveness before, during and after its implementation. Thus, it will be possible to determine the effectiveness of the curriculum and the extent to which it serves its purpose. With curriculum evaluation, the strengths, and weaknesses of the curriculum and whether the desired behaviours have been gained or not can be checked and the deficiencies in the curriculum can be determined and necessary adjustments can be made accordingly (Yüksel & Sağlam, 2012). In the current study, the new information technologies, and software course curriculum, which was put into practice in 2018, was examined in terms of program elements (objectives / gains, content / scope, learning-teaching process, evaluation).

The new information technologies and software course curriculum is based on the main principle of training individuals who can produce information with the objectives it presents, can use this information functionally in their life, can solve problems, think critically, are entrepreneurial, determined, have communication

skills, have empathy, and contribute to society and culture. It is designed as a flexible framework curriculum rather than as a standard curriculum. The thematic approach is taken as the basis in the curriculum and since the themes do not have a hierarchical order, it is left to the teacher's discretion to decide which theme would be used at which grade level. It is aimed to equip students with knowledge, skills, values, and attitudes through objectives. The learning-teaching process of the curriculum is designed as a process in which active learning-based teaching methods and techniques are used and student-centred learning is implemented with various activities. It is possible to say that the new information technologies and software course curriculum contributes to the field by fostering learning by doing and project-based activities. In the implementation of the curriculum, teachers are expected to determine the level of learners for different competences and to aim to improve student levels to be better than their current level. In this process, there is no specific level and set of subjects that needs to be taught for a particular grade level and the choices of levels and subjects are left to teachers' discretion. It is expected that the renewed program will be carried out in accordance with the constructivist, learner-centred approach, and alternative assessment and evaluation approaches come to the fore in the process-oriented evaluation process.

The process of change, which also affects education on a global scale, defines students as individuals who produce knowledge, can transfer the acquired knowledge to daily life and use it functionally, can solve problems, think critically, are entrepreneurial, determined, have communication skills, empathize, and contribute to the society and culture they live in. Curriculums to be employed to achieve this goal, on the other hand, should have a simple and understandable structure that considers individual learner needs and aims to impart values and skills to students, rather than a structure that merely conveys information. Considering the findings of the current study evaluating the new information technologies and software course curriculum, it can be argued that the skills aimed to be imparted to students by this curriculum such as computational thinking, logical questioning, problem solving, and algorithm design seem to serve the purpose of training individuals having the qualifications required by the age of information. There are some points to be considered for the information technologies and software course curriculum to serve its objectives. In this framework, in the field of information technologies every student should be given the opportunity to benefit from technology and gain computational thinking skill. In this context, with the new curriculum, it is aimed to introduce students to different hardware and software options, and it is suggested to create rich learning environments for students (MEB, 2018). In the process of learning with the information technologies and software course curriculum, it becomes important to find ways of applying the acquired theoretical knowledge into practice. In this context, students should be provided with opportunities to develop their own products and projects. When the information technologies and software curriculum was evaluated in terms of its learning fields, a total of six learning fields were found: "information technologies", "ethics and security", "communication, research, and cooperation",

"product generation" and "problem solving and programming". When we examined the number of objectives within each learning field, the problem solving and programming area come to the fore at every grade level, and the importance given to problem solving and project-based teaching approaches with the new information technologies and software curriculum was found to be remarkable. In the process of achieving these objectives as targeted, active participation of students in the learning process should be ensured through both individual and group work, and students should be able to share their developed products and projects with their peers.

To summarize, the new information technologies and software course curriculum contributes greatly to the field and the 21st century learners with the skills it aims to impart, particularly the computational learning skill which is a great necessity of the era, and with the inquiry and project-based activities. In this sense, it is possible to say that it is a curriculum based on universal competences. On the other hand, it may be a more appropriate method to handle the objectives with an interdisciplinary approach for interdisciplinary connections to be applicable. By reducing the objective statements in the curriculum, the application dimension can be concentrated on. To eliminate the problem of lack of sources, which is often expressed as an important limitation in the literature (Aslan, 2014; Gülcü, Aydın, & Aydın, 2013; Karakuş, Çimen-Çoşğun, & Lal, 2015), functional sources such as student textbooks, teachers' books and workbooks can be made available for every student. Studies based on stakeholder views on the determination of positive and negative situations regarding the implementation of the curriculum will make significant contributions to the literature. In this context, one of the most important stakeholders in the success of the curriculum is teachers. In the literature, there are studies that emphasize the difficulties faced by information technology teachers in the implementation of the curriculum currently in force (Çelebi-Uzgur & Aykaç, 2016; Erçetin & Durak, 2017; Yeşiltepe & Erdoğan, 2013). Another important point in this process is to provide suitable conditions necessary for the accomplishment of the goals. Therefore, the opinions of stakeholders such as teachers, students, parents, and school administrators should be taken into consideration to reveal the expressed potential of the new information technologies and software course curriculum and to accomplish its objectives. Finally, taking the dizzying speed of technological developments into consideration, the necessary steps should be taken to keep the curriculum up to date.

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The author complied with ethical rules in all processes of the research.

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## Genişletilmiş Özet

Eğitimle ilgili yasal düzenlemelerin yanı sıra sosyal ve ekonomik değişmeler, siyasi politikalar, bilimsel gelişmeler, bireysel ve toplumsal talepler, evrensel ve teknolojik gelişmeler gibi birçok dinamik eğitim sistemiyle ilişkili olup eğitim ve öğretim programlarının geliştirilmesini gerektirmektedir. Dinamik bir süreç olan program geliştirme sürecinde öğretim programının uygulanmasından sonra çeşitli kaynaklardan gelen geribildirimlere göre öğretim programı yeniden düzenlenmekte ve geliştirilmektedir. Bu bağlamda bu araştırmada yeni bilişim teknolojileri ve yazılım dersi öğretim programının incelenmesi amaçlanmıştır. Doküman incelemesi ile toplanan araştırma verileri içerik analizi ile çözümlenmiştir.

Bilgi ve iletişim teknolojilerinde meydana gelen gelişmeler, yaşamı büyük ölçüde kolaylaştırırken; teknolojinin eğitim başta olmak üzere birçok alanda kullanımını da

desteklemektedir. Etkin teknoloji entegrasyonu süreci, eğitim sisteminin tüm paydaşlarının belirli yeterliklere sahip olmasını gerekli kılmaktadır. Bu bağlamda Uluslararası Eğitim Teknolojileri Topluluğu (ISTE) tarafından Ulusal Eğitim Teknolojisi Standartları (NETS) ortaya konmuş ve birçok ülke tarafından kabul görmüştür (ISTE, 2016). Eğitimde teknoloji entegrasyonu sürecinde öğrenen özellikleri önem taşımakta olup bu çerçevede bilgi toplumunun temel unsurlarından biri olan 21. yy. öğrenenlerinin hangi becerilere sahip olması gerektiği konusu öne çıkmaktadır. İçinde bulunduğumuz çağda bireylerin ve toplumların var olabilmeleri, değişen teknolojilere uyum sağlamayı ve hatta bu teknolojileri üretebilmeyi gerektirmektedir (OECD, 2005). Öğrenciler için ulusal eğitim teknolojisi standartları (NETS-S), küreselleşen dünyada çağın öğrenenlerinin yaşamın her alanında başarılı olabilmeleri için sahip olmaları gereken yeterlikleri içermektedir. Bu yeterlikler öğrenciler için uygulamaları derinleştirmekte, akran iş birliğini desteklemekte ve öz düzenleme becerilerini destekleyerek öğrencilerin kendi öğrenme sorumluluklarını alma sürecine katkı sağlamaktadır. NETS-S, 21. yy. öğrenenleri için yetkin öğrenen, dijital vatandaş, bilgiyi oluşturan, yenilikçi tasarımcı, bilgi işlemsel düşünür, yaratıcı iletişimci ve küresel ortak kavramlarına vurgu yapmaktadır (ISTE, 2016). Phoenix Araştırma Enstitüsü 'nün (2011) 2020 yılı için belirlediği dijital çağ ile iş hayatında öne çıkabilecek beceriler arasında kültürlerarası yenilik, bilgi işlemsel düşünme, yeni medya okuryazarlığı, sezgisel yetenek, yenilikçi ve uyarlanabilir düşünme ve bilişsel yük yönetimi yer almaktadır. Söz konusu beceriler arasında öne çıkan problem çözme ve bilgi işlemsel düşünme becerisinin gerek öğrenenlere gerek eğitimcilere yardımcı olabileceği düşünülmektedir. Günümüzde bilgi işlemsel düşünme becerisi, başta eleştirel düşünme ve problem çözme gibi 21. yy. becerilerini destekleyen, fen bilimlerinden sanata hayatın her alanında yer alan ve sadece bilgisayar bilimcileri için değil herkes için okuma-yazma ve aritmetik becerilerin yanı sıra temel bir beceri olarak nitelendirilmektedir (Astrachan, Hambrusch, Peckham ve Settle, 2009). Bilgi işlemsel düşünme becerisi, gelişen teknoloji ile daha da önem kazanır hale gelmiş ve başta programlama olmak üzere tasarım tabanlı öğrenme aktiviteleri bilgi işlemsel düşünme becerisinin gelişimini desteklemektedir. Danimarka, Finlandiya, Portekiz ve İsviçre gibi birçok ülkenin öğretim programlarında mantıksal düşünme ve problem çözme becerilerini desteklemeye, kodlama ve programlama becerisi kazandırmaya ve öğrenenleri bilgisayar bilimine yönlendirmeye yönelik olarak bilgi işlemsel düşünme becerisinin yer aldığı görülmektedir (Bocconi vd., 2016). Dolayısıyla salt bilgiyi aktaran yapıdaki bir öğretim programından ziyade bireysel öğrenen gereksinimlerini dikkate alan, 21. yy. becerileri temelli, nitelikli öğretim programları önem kazanmaktadır. Söz konusu önem durumu dikkate alınarak yeni bilişim teknolojileri ve yazılım dersi öğretim programının değerlendirildiği bu araştırma kapsamında elde edilen bulgulara göre yeni öğretim programı öğrencilere kazandırmayı hedeflediği bilgi işlemsel düşünme, mantıksal sorgulama, problem çözme ve algoritma tasarımı gibi beceriler, programın genel yapısı ve temel aldığı kazanımlar bağlamında çağın gereksinimlerine uygun bireylerin yetiştirilmesine hizmet eder niteliktedir. Bilgi teknolojileri alanında her öğrenciye teknolojiden yararlanma ve bilgi işlemsel

düşünme becerisi kazanabilme noktasında yeni öğretim programı ile öğrencilerin farklı donanım ve yazılım seçenekleri ile tanıştırılması hedeflenmiş olup öğrenciler için zengin öğrenme ortamlarının oluşturulması önerilmektedir (MEB, 2018). Bilişim teknolojileri ve yazılım dersi öğretim programı öğrenme alanları açısından değerlendirildiğinde "bilişim teknolojileri", "etik ve güvenlik", "iletişim, araştırma ve iş birliği", "ürün oluşturma" ve "problem çözme ve programlama" başlıkları karşımıza çıkmaktadır. Bu konu alanları kapsamındaki kazanım sayıları incelendiğinde ise her sınıf düzeyinde problem çözme ve programlama alanı öne çıkmakta ve yeni bilişim teknolojileri ve yazılım dersi öğretim programı ile problem çözme ve proje tabanlı öğretim yaklaşımlarına verilen önem göze çarpmaktadır. Söz konusu kazanımlar doğrultusunda hem bireysel hem grup çalışmaları ile öğrenen katılımı desteklenmeli, geliştirilen ürün ve projelerin akranları ile paylaşabilmeleri sağlanmalıdır.

Özetlemek gerekirse yeni bilişim teknolojileri ve yazılım dersi öğretim programı, herkes için temel bir beceri olarak ifade edilen çağın gerekliliği bilgi işlemsel düşünme becerisi olmak üzere kazandırmayı hedeflediği beceriler, temel aldığı araştırma ve proje tabanlı etkinliklerle gerek alana gerekse öğrenenlere büyük katkı sağlamaktadır. Dolayısıyla bu bağlamda yeni bilişim teknolojileri ve yazılım dersi öğretim programının evrensel yeterliklere dayalı bir niteliğe sahip olduğunu söylemek mümkündür. Öte yandan disiplinler arası bağlantıların uygulanabilir olması için kazanımların disiplinler arası yaklaşımla ele alınması daha uygun bir yöntem olabilir. Programdaki kazanım ifadeleri azaltılarak uygulama boyutuna odaklanılabilir. Alanyazında sıklıkla önemli bir sınırlılık olarak ifade edilen kaynak eksikliği (Aslan, 2014; Gülcü, Aydın, & Aydın, 2013; Karakuş, Çimen-Çoşğun, & Lal, 2015) sorununu ortadan kaldırmaya yönelik olarak öğrenci ders kitabı, kılavuz kitap, çalışma kitabı gibi işlevsel kaynaklar kullanıma sunulabilir. Programın uygulanmasına ilişkin olumlu ve olumsuz durumların belirlenmesine yönelik paydaş görüşlerini temel alan çalışmalar alanyazına önemli katkılar sağlayacaktır. Bu bağlamda öğretim programlarının başarıya ulaşabilmesi noktasında en önemli paydaşlardan birisi ise öğretmenlerdir. Alanyazında bilişim teknolojileri öğretmenlerinin içinde bulundukları dönemde aktif yürürlükte olan öğretim programlarına ilişkin uygulamada karşılaştıkları zorluklara vurgu yapan çalışmalar mevcuttur (Çelebi-Uzgur ve Aykaç, 2016; Erçetin ve Durak, 2017; Yeşiltepe ve Erdoğan, 2013). Bu süreçte diğer bir önemli nokta da hedeflere ulaşma yolunda uygun koşulların sağlanması olup; bu bağlamda yeni bilişim teknolojileri ve yazılım dersi öğretim programının ifade edilen gücünü ortaya koyabilmesi noktasında gerek öğretmen, öğrenci, veli, okul yönetici gibi paydaşların görüşleri dikkate alınarak söz konusu öğretim programının kazandırmayı hedeflediği becerilerin öneminin kavranmasına katkı sağlanmalı gerekse eğitim kurumlarının alt yapı sorunlarına kalıcı ve etkili çözümler sunulmalıdır. Son olarak teknolojinin hızlı değişim gücü göz önünde bulundurularak bilişim teknolojileri ve yazılım dersi öğretim programının güncelliğini sağlamaya yönelik gerekli adımlar atılmalıdır.