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Professions and competencies of computer education and instructional technologies department's graduates in non-teaching fields

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Even though the main purpose of Computer Education and Instructional Technology (CEIT) department is to educate and train computer teachers for K12 level schools in Turkey, the graduates from the department have diverse competencies in different fields like instructional designer, content creator, software developer, etc. However, neither the graduates nor the companies in educational technology or other fields have fully awareness of that competencies essential mostly in non-teaching fields. A small number of studies have worked with CEIT graduates, but more studies are needed to explore those competencies and current job requirements in the companies. In this way the graduates would create better career plans and the companies would hire correct employee. Moreover, the CEIT curriculum would be reconsidered with respect to the experiences or expectations of the graduates or the companies. This study was conducted to investigate the opportunities of CEIT graduates in non-teacher positions in any business sector in Turkey. For this purpose, four research questions were asked: 1) What are the job opportunities of CEIT graduates in non-teaching fields? 2) What are the competencies of CEIT graduates that enable them to work in non-teaching areas? 3) What competencies do CEIT graduates need to have more in order to work in non-teaching areas? 4) What are the changes that CEIT graduates in non-teaching fields suggest in the undergraduate program? To answer the questions a survey research design was used, and data were collected from 41 CEIT graduates who were working in non-teaching jobs, by means of a questionnaire. The questions were analyzed with descriptive statistics and content analysis. The results show that CEIT graduates do and can have professions in many different fields, both due to the courses in their own degree programs and the competencies that can be acquired after graduation. In addition, improvements in CEIT undergraduate curriculum have been discussed and suggested to support certain specializations in different fields.

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Introduction

Utilization of information and communication technologies (ICT) is essential for quality in education (Amutha, 2020). Teaching digital literacy in K12 and integrating ICT into educational environments requires computer teachers and special competencies. For this purpose, Computer Education and Instructional Technology (CEIT) department was founded in 1998 at many universities in Turkey (Torun, et al. 2021). The main purpose of the department was to graduate a computer teacher for K12 schools (YÖK, 2023a). CEIT undergraduate program has many ICT related field courses like programming, web application development, open and distance education, mobile programming, technology planning, project development and management, computer networks, instructional design, graphics and animation in education, database management etc. (YÖK, 2023b) In addition to these compulsory courses, many elective courses may also provide more ICT related courses having various objectives depending on the university. With other core pedagogical courses, the graduates are aimed to gain necessary knowledge and competence to become a computer teacher.

On the other hand, the knowledge and competencies gained in the CEIT undergraduate program are also valuable in non-teaching professions, that will be used as a general term in this study meaning for "not begin a computer teacher in K12 or at higher education". The "instructional technologist" (INST), existing in the department's name, emphasizes the competencies of the graduates in doing either their teaching profession or in other jobs where ICT integration and instructional design is needed in a coherent way. Like "instructional technology", INST has evolving definitions depending on the emerging digital technologies utilized in educational environments. İzmirli and Kurt elaborated many definitions of INST and concluded with the recent one as "technology experts who are competent in human relationships, develop the school family relationships, know basic teaching-learning theories well, and who know how to integrate technology into the learning environment." (İzmirli & Kurt, 2022, p23).

Considering the curriculum and some research findings, it can be asserted that the CEIT graduates have many interdisciplinary competencies. For example, İzmirli and Kurt (2021) analyzed the department graduates and grouped the competencies into three as social, educational and technological (İzmirli & Kurt, 2022). Arslangiray (2019) also showed that the CEIT graduates have "21st century skills" (Arslangiray, 2019, p332) not only in ICT and pedagogy, but also critical thinking, problem solving, entrepreneurship, innovation, social responsibility, leadership and career realization. Durmaz (2012) researched the competencies of CEIT graduated by the perspective of employers working in private sector and found that the graduates had moderate proficiency in pedagogy, ICT knowledge and communication. Among these, while ICT knowledge was the lowest, communication and teamwork skills were higher.

In recent years, a smaller number of CEIT graduates plan to become a computer teacher in K12 public or private schools (Torun, et al. 2021) for various reasons (Cirak & Islim, 2018). Among these, one reasons for shifting career plan is insufficient computer teacher positions being hired in public schools in Turkey (Karal & Timuçin, 2010). Depending on the reduction the number of ICT courses in K12 curriculum, less computer teachers have been hired in public schools Henkoğlu & Yildirim, 2012). Another reason is the unsatisfaction of graduates working in computer teacher positions. Torun et al. (2021) and Keser and Çetinkaya (2013) found that a significant number of graduates working as a computer teacher were also not satisfied in their

positions since they thought their profession is not appreciated or their job definition was not clear.

According to a study examining CEIT graduates' careers status (Torun, Güler & Şanal, 2021), a large number of graduates in the study worked numerous jobs while continuing their education, but a significant number were still unemployed. Only a small percentage of employed graduates were hired as teachers, and even fewer were employed in the public schools. Others took on permanent roles or worked as professors or academics, while others worked as adjunct lecturers. Among the recruited graduates, few worked in the IT sector, while others served as "police" or "military officers" or "government officials" in various public organizations or industries (Torun, Güler & Şanal, 2021. The study also showed that the satisfaction levels of ICT teachers have deteriorated as a result of negative external opinions about their work, such as being seen as "useless" or "just a hobby". The main problems that the graduates had to deal with were the lack of computer teachers positions and unemployment. Planning and decision-making about the future of the CEIT department for both current students and graduates depends largely on the information provided by graduates about their current employment conditions and the views of the department (Torun, Güler & Şanal 2021).

While Akgün et al. (2020) argued that the CEIT students have lack of knowledge or vision in career opportunities in other fields than computer teachers, Torun et al. (2021) stated that the graduates who worked during their undergraduate years tend to work in non-teaching fields. With ICT or instructional technologist competencies, the graduates have job opportunities in various positions: developing and managing computer or web-supported educational environments, designing and managing learning management systems, creating and managing digital content, designing and developing courseware and applications, and the comprehensive application of appropriate pedagogical approaches in all these processes (Gedik, 2017). Nonetheless, there is no internships in the undergraduate curriculum (YÖK, 2023b) to practice in corporate organizations which could provide graduates with more recognition and improved employment opportunities in sectors other than education (Arıcı, 2007).

To expose the advantageous aspects of the CEIT undergraduate programs and to map the expectations of non-teaching sectors with CEIT programs is an important research topic. Kurtoğlu Erden and Seferoğlu (2020) executed a qualitative research study with 22 CEIT graduates working in non-teaching jobs to investigate the how the competencies gained from undergraduate program contributed to the experiences in the job environments. They concluded that the graduate thought their education was sufficient in terms of digital and/or educational content development. The participants in the study thought that they need to improve their ICT related skills like programming and software development.

Improvement suggestions can be made to CEIT undergraduate programs or individual course with the suggestions of graduates working in sectors that need experts in the field of educational technologies and to reveal the existing advantages of the CIET programs. Akgün et al (2020) proposed qualitative studies investigating the graduates' experiences about effects of courses in CEIT department on potential vocations. In this way, two constructive outputs can be obtained: The first is to make the CEIT departments, which have fallen to the back row in university preferences due to the risk of "not being hired as a teacher" in recent years, more attractive, and the second is to raise awareness in different sectors that the graduates of the CEIT can be the right experts in many fields other than teaching with the knowledge and skills they have.

At this point, this study aims to investigate the job opportunities of CEIT graduates in Turkey in non-teaching fields, to what extent the education in the undergraduate program supports these opportunities and to reveal suggestions for possible changes to support them more. Four research questions were asked for the purpose:

1. What are the job opportunities of CEIT graduates in non-teaching fields?
2. What competencies do the CEIT graduates already have to work in non-teaching fields?
3. What are the extra competencies that CEIT Graduates should gain in order to work in non-teaching fields?
4. What are the changes that CEIT graduates working in non-teaching fields want to be made in their undergraduate programs?

In the first research question, it is aimed to reveal the current situation. The CEIT graduates are asked to understand in which professions or sectors they are, or any graduate may, working in non-teaching fields.

In the second research question, it is aimed to reveal which knowledge and skills gained by CEIT graduates in their undergraduate program are important or necessary in non-teaching professional areas. In this way, it will be tried to ensure that the sectors that need experts in educational technologies or similar fields are aware of these knowledge and skills of the graduates of the CIET.

In the third question, the new or extra competencies and characteristics that CEIT graduates should have gain in order to work in non-teaching fields are asked. In this way, it is thought that CEIT graduates will be able to orient themselves for professional development and also these competencies can be taken into consideration in curriculum improvement studies.

In the fourth question, it is aimed to determine what the proposed changes are to be made in undergraduate programs in CEIT programs so that graduates will be more effective in non-teaching fields.

Method

Research Method

A survey research design was used in this study. Survey studies aims to expose the participants' experience, knowledge, perception, attitudes or reactions in certain situations (Krathwohl, 1993) without trying to change or manipulating any aspect (Karasar, 2007). Depending on the data collection tools analysis, they can provide descriptions and trends that can serve either for qualitative or quantitative perspective. (Krathwohl, 1993). Considering the employment opportunities, undergraduate program and job opportunities in non-teaching fields of the CEIT graduates in Turkey, it is aimed to examine the situation with the survey research pattern.

Participants

The participants were 41 CEIT graduates working in non-teaching fields. More than that number of graduates were invited to the study by convenience sampling technique. This

technique allows researchers to collect data from accessible participant practically and quickly (Yıldırım & Şimşek, 2011). Personal relationships, social media and Linkedln™ (professional resume sharing platform) search options were utilized to invite CEIT graduates. The demographic data of the participants is given in Table 1 below.

Table 1. Participants Demographics

Gender	**Freq.**	**Percentage (%)**
Female	26	63. 0
Male	15	37.0
Graduation Year		
2000 - 2010	3	7.3
2011 - 2015	6	14.6
2016 - 2020	25	61.0
2021 - 2022	7	17.1
Education Degree		
Undergraduate	30	73.1
Graduate	11	26.9
Working Period in Non-teaching Field (Years)		
1-5	27	65.9
6-10	10	24.4
11-15	3	7.3
16-20	1	2.4
City Where They Work		
İstanbul	28	68.3
Ankara	9	22.0
İzmir	1	2.4
Sakarya	1	2.4
Tekirdağ	1	2.4
Sejong (Güney Kore)	1	2.4
Sector in which they work		
Education	17	41.5
Other	4	9.8
Defense & Military	3	7.3
Software	3	7.3
Finance	3	7.3
Telecommunication	2	4.9
Textile	2	4.9
E-Commerce	1	2.4
Medicine	1	2.4
Retail	1	2.4
Cyber Security	1	2.4
Manufacturing Industry	1	2.4
Energy	1	2.4
Automotive	1	2.4

Data Collection Tool and Process

A survey was administered to the participants to answer the research questions. There are 2 parts in the survey, created by researchers. In the first part, there were 8 demographic questions in order to get to know the profile of the participants; while in the second part, 14 questions were asked about the knowledge and skills of CEIT graduates, job opportunities and sectors where the CEIT graduates might be employed and recommendations for curricular changes in CEIT programs. The whole survey is given in Appendix 2.

The survey was presented to the participants via a Google Form. Before the survey questions were finalized, revision was made by conducting a pilot study with a PhD. faculty member in the field of CEIT and two people working in the sector. During the survey preparation phrase in order to construct options for the competency questions, 11 job advertisements of companies looking for CEIT graduates were analyzed from leading job search websites in March and April 2023. The knowledge and competencies frequently mentioned in these advertisements were added to the questions as options. The features and qualifications sought in advertisements are given in Appendix 1. In Table 2 below, the sectors of the companies giving these advertisements are listed.

Table 2. Sectors of the companies included in the job advertisements seeking CEIT Graduates

Company No	Sector of the Company
1	Energy
2	Automotive
3	Education
4	Education
5	Automotive
6	Education
7	Information Technology
8	Retail
9	Security
10	Textile
11	Technology

Data Analysis

The data obtained from the survey were presented with the descriptive statistics such as frequency values and percentage values. The responses to the open-ended questions were analyzed and collected into themes using the content analysis technique and the frequencies of these themes were given in tables.

Ethical Issues

After the survey was prepared, an ethical committee approval application was made to Başkent University Institute of Educational Sciences on May 12, 2023. Participation in the study was on a voluntary basis. It was informed to the participants at the beginning of the survey that the data to be collected within the scope of the study would be analyzed in a way that would

not reveal the personal information of the participants and that this information would only be used by anonymizing in academic publications. Their consent was obtained at the beginning of the survey form.

Findings

This part of the study includes the findings made through descriptive and thematic analysis. The findings are given in the order of the following survey questions.

Table 3. The most preferred jobs or sectors by CEIT Graduates

Job / Sector	Freq
Teacher	26
Software development / Programming	25
Educational Technologist	16
Content Development	7
IT Consultant	5
Finance	5
Retails	2
Syber Security	2
Distance Education	2
Different jobs in Public Institutions	1
Robotic	1
Digital Game Development	1
Food	1
Textile	1

As seen in Table 3, teaching (26), software development (25) and educational technologist (16) are the most preferred jobs or sectors by CEIT graduates. It is seen that the preferences spread in 14 different jobs or sectors as in the table.

Table 4. Jobs for CEIT graduates in non-teaching and non-academic fields (Open-ended question)

Job / Sector	Freq.
Educational Technologist	22
Software development / Programming	19
Content Development	8
IT Consultant / Specialist	4
Distance Education	4
Human Resources	3
Social Media Specialist	2
Network Specialist	2
Retail	2
Syber Security	2
Game design and development	2
Graphical Design	2
Web Design	1
Finance	1
Robotic Coding	1

In Table 4, the job fields in which CEIT graduates can work are listed. Accordingly, the most frequently expressed jobs were "educational technologist" (22), "software development" (19), and "content developer" (8). A total of 15 different job fields were expressed in the table. In addition, 3 participants in this question, without stating any job or sector, said that the graduates can have jobs in all areas where digital technologies are involved.

Table 5. According to job advertisements, the participants opinions about the professions in which CEIT Graduates can work.

Jobs that graduate of the CEIT department can work	**Freq.**
Educational Technologist	41
Software developer	40
Education Specialist	38
Web designer	36
Graphic Designer	33
Project Development Specialist	30

In Table 5, the participants were again asked which professions CEIT graduates can work, but in this question, they were asked to mark the options obtained from the job advertisements. Accordingly, all occupations stated in the advertisements were marked by almost all of the participants. Participants were able to tick more than one option for this question.

Table 6. The training and certification processes recommended for graduates to advance in educational technologies.

Training/Certificate Subject	**Freq.**
Learning Special Software*	14
Educational Content Development	13
Instructional Design	13
Master's or PhD in CEIT	4
Learning Management Systems	3
Software Development	2
Web Design	2
Company internship during undergraduate education	2
Foreign language	1
Social media management	1
Communication	1
Andragogy	1

**As special software, image, video and audio editing software of certain companies and different presentation software are expressed.*

Table 6 lists the answers to the question asking which training or certificates graduates should receive in order to work in the field of educational technologies. According to Table 6, it is stated that training or certificates of special software used for image, video and/or audio editing and authoring tools to create educational content are the mostly (14) required. Next, it was stated that training or certificates are required in the subjects of educational content production

(13) and instructional design (13).

Two of the participants stated that CEIT departments are sufficient, but graduates need to constantly improve themselves:

> *"The CEIT department provides the necessary training, apart from that, a certificate qualification is not sought in the sector. It is necessary to know the main software used in the educational creation process. The person can improve himself about the software from any channels or from Youtube channels. I did not learn any of the software I used in the companies that I worked for at school, but we [as students] learned to use computer software in basic principle, so I had no problems. Volunteer internships are a good step to learn both the industry and the software. The important thing is to be knowledgeable about andragogy, especially in private companies (Participant #5)*

On the other hand, another participant who expressed the lack of CEIT curriculum at the following statement:

> *"The difference between the equivalent of education technologies in the CEIT department and the equivalent in the sector is huge. The tools and technologies used, the activities carried out with the technical team and especially the technologies used on the customer experience side are not covered in the department education. These create an insufficiency and I think it is a necessity to carry out a training and certification process to overcome this insufficiency (Participant #26)"*

The data of the study reveal that different participants learn different skills while their education in the department. These skills or software are given in Figure 1 below.

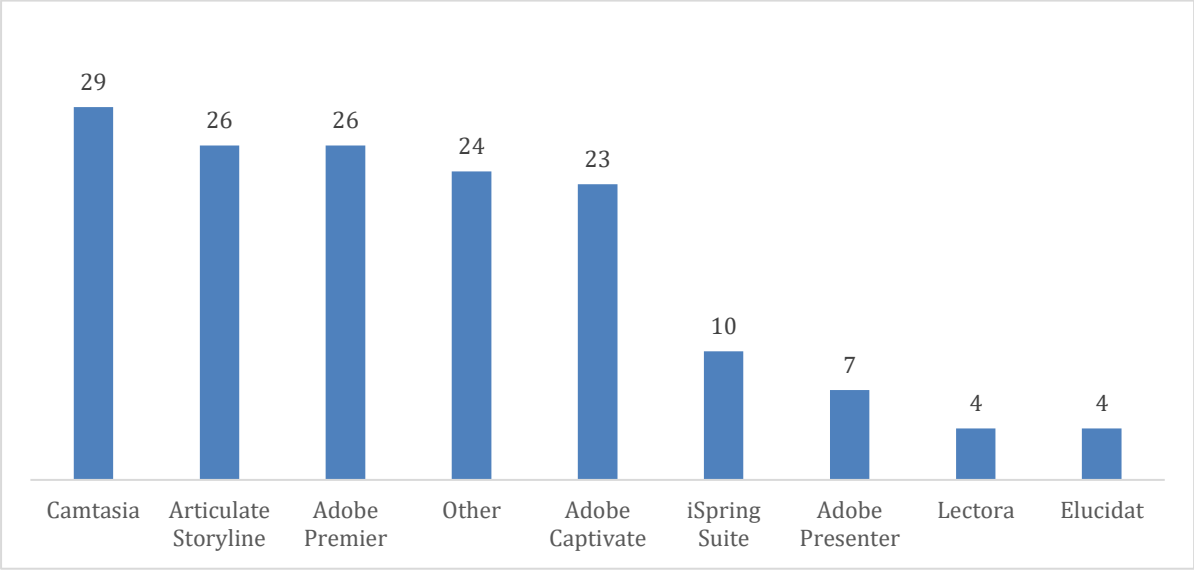

Figure 1. Software learned by CEIT graduates during their department education.

When the participants were asked which software they learned in their department education (options to be marked were from job advertisements), the names and their distribution in the Figure 1 was obtained. Considering the distribution, it is seen that that software can be categorized either as video/audio editing and creation (Camtasia, Adobe Premiere) or interactive content presentation preparation (Articulate, Adobe Captivate, İspring Suite, Lectora, Elucidat, Adobe Presenter) software.

An open-ended question was asked about what competencies CEIT graduates should have in order to work in non-teaching fields. The purpose of this question is to get answers based on to their own experiences and thoughts without directing the participants. Table 7 below shows the responses and their frequencies. Among the 25 different competencies expressed, the top three are "able to use special software" (15) (authoring tools used to develop digital content), "software development or programming" (10) and "educational or instructional design" (8).

Table 7. Competencies that CEIT graduates should have in order to work in non-teaching areas.

Competency / Knowledge	**Freq.**
Able to use special software*	15
Software development / programming	10
Educational / Instructional Design	8
Visual Design	7
Communication Skills	6
Open to development	6
Foreign Language (English)	6
Analytic Thinking	5
Project Management	5
Willingness to learn	4
Problem Solving	4
Computer Network Knowledge	3
Critical Thinking	2
Creativity	2
Entrepreneurship	2
Need Analysis	2
Team Working	2
Time Management	1
Presentation Skills	1
Stress Management	1
Database Knowledge	1
Pedagogic development knowledge	1
Syber Security	1
Digital Marketing	1
Basic Hardware Knowledge	1

** It means digital content development software and/or authoring tools*

The same question was asked again in the next question where the competencies in job advertisements were offered as options. Figure 2 below shows the answers that the participants could answer by choosing more than one option.

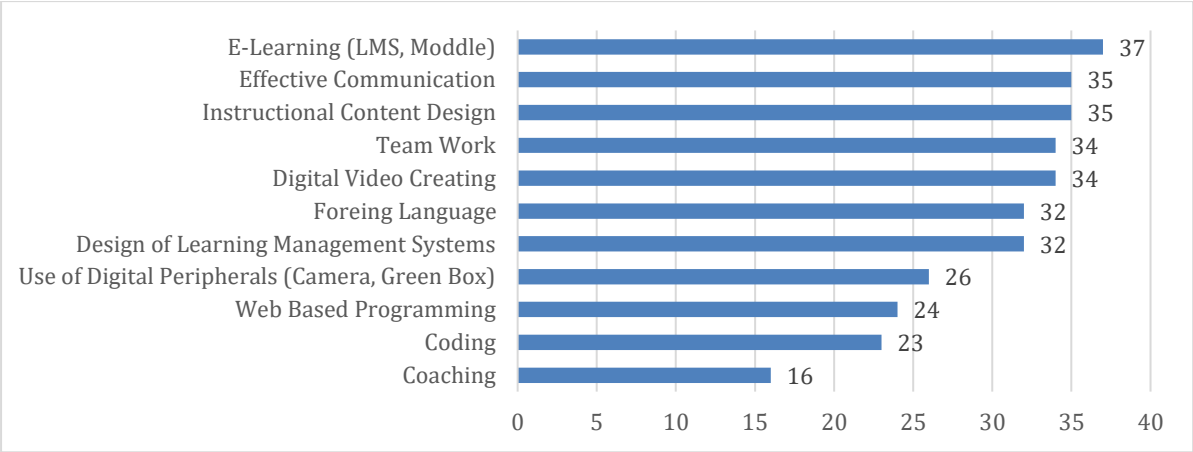

Figure 2. Competencies that CEIT graduates should have (N=41, Marking-options question)

The data about the competencies that graduates should acquire after graduation while working in a non-teaching field are presented in Table 8. In this question, 16 different competencies within 3 themes were obtained, "specializing in one area" (8) was the most frequently stated response around which competencies should be formed respectively.

Table 8. Competencies that CEIT Graduates should acquire after graduation.

Competency to be gained		**Freq.**
INST Com.	Specializing in a Field	8
	Knowing Special Software*	3
	Instructional Technologies	3
	Distance Education	2
	Digital Content Development	1
	Visual Design	1
ICT Related Com	Software Development / Programming	4
	Computer Networks	1
	Database	1
General Com.	Teamwork	4
	Communication	4
	Foreign Language	4
	Learning to Learn	3
	Project management	2
	Curiosity	1
	Analytical Thinking	1

** It means digital content development software and/or authoring tools*

In the next Likert type question, post-graduation competencies were given and expected to be marked how important for graduates (Not Important – 1, Partly Important – 2, Very important – 3). Figure 3 shows these competencies, the distribution and average of responses to each.

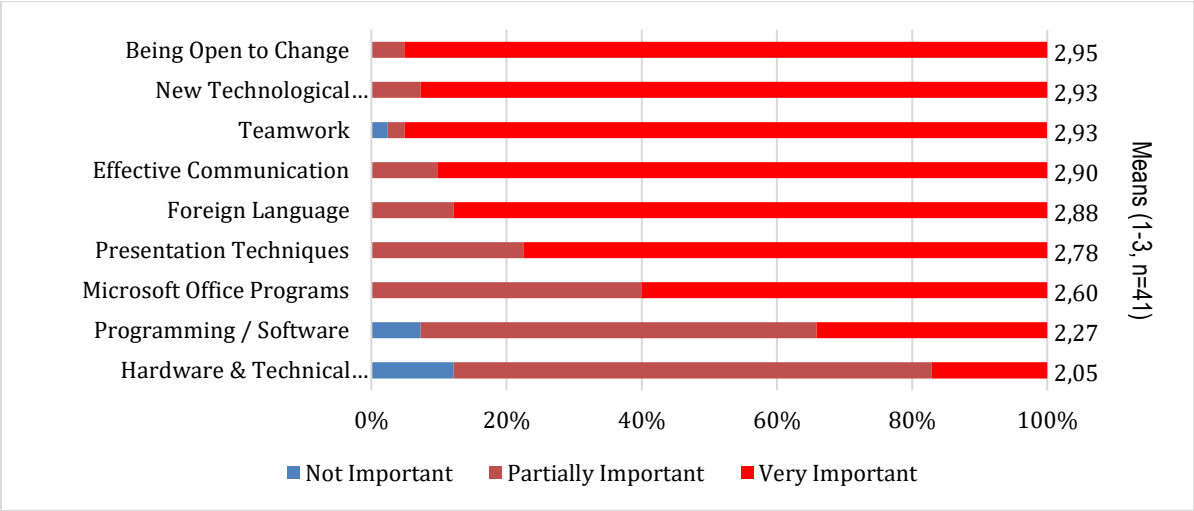

Figure 3. The degree of importance of the competencies that graduates should have after graduation.

While grading the importance of the competencies to be possessed after graduation, it has been seen that the 3 competencies with the highest importance are "openness to change", "new technological developments" and "teamwork" (Figure 3).

Table 9. Differences/Similarities in the World and Turkey in terms of Job Opportunities in Educational Technologies

Differences/Similarities	**Freq.**
There is more demand abroad	12
Job descriptions abroad are better	7
Job description in Turkey is limited/like a technical employee	3
Pandemic raises awareness in Turkey	2
Educational technologies are better in Turkey	2
This field is new in Turkey, but it is developing	2
Abroad and Turkey are similar	1
There are more opportunities to work from home (freelance) abroad	1
There are job opportunities only in certain cities in Turkey	1
Not valued in Turkey	1
Those who do not have a CEIT degree in Turkey should not work in the field	1
Not knowing a foreign language in Turkey is a disadvantage	1

Table 9 above shows the answers to possible differences or similarities in the field of educational technologies in Turkey and abroad. It has been stated that there are more job opportunities abroad in the field of educational technologies (12), the job descriptions in these jobs abroad are better (7), and the similarly, job descriptions are limited or inaccurate in Turkey (3).

Table 10. The role of CEIT graduates in the digital transformation process in education.

Opinions about Roles	Freq.
Very important	27
CEIT graduates do best in educational/Instructional technologies	10
Policies are wrong, they should be changed	4
It should be the CEIT Graduates who increase Computer Literacy	2
The graduates must be a goal/vision builder	2
The graduates must be a project manager	1
The departments objectives must change	1
Computer courses in K12 should be compulsory	1

Table 10 shows the answers given to the question asked about the role of CEIT graduates in the digital transformation process in education. Most of the participants (27) stated that CEIT graduates have a very important place in this process. In addition, they stated that the jobs in educational or instructional technology can be accomplished best by CEIT graduates (10), but the importance it deserves is not given to CEIT graduates in employment and decision-making policies (4). After these opinions, the participants were asked to suggest changes in the education given in the undergraduate programs of CEIT departments. These recommendations can be seen in Table 11 below.

Table 11. Change suggestions of graduates about CEIT undergraduate curriculum.

Suggestions	Freq.
Projects should be made with up-to-date content development software	5
Non-teaching internships should be added	5
Courses on Instructional Design should be increased	4
More Foreign Language (English) Lessons should be increased	4
Selectable sub-domains should be available	4
Lessons should be taught project-based	3
Cooperation with the sector should be increased	3
Artificial Intelligence lessons should be added	2
The current curriculum is sufficient, but the quality of teachers should be increased	2
Software Development (Programming) and Robotics should be increased	1
Andragogy should be increased	1
Existing course contents should be updated	1

The participants suggested projects including up-to-date content development software (5) and internship (5) in non-teaching sectors. Other recommendations are given in Table 11.

Table 12. Opinions about the teaching internship in CEIT undergraduate programs

Opinions	Freq.
There should be internships in non-teaching companies/sectors	25
Sufficient for teaching	10
The preference should be allowed between teaching and non-teaching internship	3
Teaching internship should be improved	2

The opinions about the existing teaching internship in CEIT undergraduate curriculum were

asked, and the responses with frequencies were presented in Table 12 above. The majority of the participants (25) stated that it would be beneficial to do additional internships in companies or sectors in non-teaching fields. While the opinion that the current internship is sufficient for those who aim for the teaching profession is in the second place (10), the opinion that the internship place and/or sector should be chosen by the student was also expressed (3). Increasing the quality of the current internship was also expressed as an opinion (2).

Discussion and Conclusions

In this section, it has been tried to answer the research questions and discuss them within the framework of the obtained findings.

Research Question 1: What are the job opportunities of CEIT graduates in non-teaching fields?

Although the main purpose of CEIT departments is to train "computer teachers" (YÖK, 2023a); they graduate with the knowledge and skills that can be involved in all processes where learning needs to be supported by technology. From this point of view, graduates have job opportunities in the following sectors other than teaching (Table 3, Table 4 and Table 5):

- Software Development
- Educational Content Development
- Finance
- Digital Security
- Retail
- Food
- Textile
- Digital Game Development
- Distance Education
- IT Consultancy

These findings are similar with the study where Surry (1996) listed the roles of an instructional technologist in higher education as consultant, computer-aided instructional developer, trainer, laboratory manager, distance learning specialist, and technician. While some of these sectors seem to be more related with ICT, others like food, textile and finance and retail sector focusing on different areas would hire INTS in order to design, execute and evaluate in service trainings or continuous personal development programs.

In terms of tasks/professions in these sectors, CIT graduates may perform following (Tables 4 and 5) vocations:

- Education / Instructional Technologist
- Software Developer / Computer Programmer
- Digital content designer and developer
- Visual Designer and Content Developer
- Project Executer and Manager
- Web Designer and Developer
- Social Media Specialist

- Computer Networks Specialist
- Learning Management System Manager

Most of these task/professions are in parallel with the vocations that Kurtoğlu Erden and Seferoğlu (2020) and Gedik (2017) stated in their studies. Considering these findings, it can be said that CEIT graduates have job opportunities in many different sectors and fields related directly with ICT and/or integration of ICT in instructional activities or products. Today, due to the rapid developments in technology, it is inevitable to perform in service training or personal development programs. Many different companies from diverse sectors that want to carry out these trainings with ICT need CEIT graduates as educational / instructional technologist.

Research Question #2: What competencies do the CEIT graduates already have to work in non-teaching fields?

In order to rationalize that CEIT graduates have job opportunities in many fields in non-teaching fields, it is questioned what competencies have gained from undergraduate programs. Especially, the knowledge and skills of using special software for content/material creation (Figure 1) and the training and certification suggestions during or after graduation (Table 6) overlaps following three mostly stated competencies have been emerged:

- Developing educational software or digital materials,
- Designing and managing teaching/training processes,
- Software development and web design.

The top three responses in Table 6 focus on "development of digital educational material or software". The applications and tools that give rise to this competence are the software presented in Figure 1 and taught in the CEIT programs (YÖK, 2023b). From this point of view, it can be said that the first competence is "educational software or digital material production".

Next, there is the "design for teaching/learning processes" by using previous software or in any training process. Knowing the possibilities and limitations of technology, creating content based on pedagogical knowledge, designing interactions, performing need analysis and process/product evaluation are the sub-knowledge skills that make up this competence. Those competencies are similar with the findings of Kurtoğlu Erden and Seferoğlu (2020).

"Software development and web design" are the skills that CEIT graduates learn at a basic level, whether the context or aim is for educational purposes or not. The "programming knowledge" and skills necessary to be a computer teacher enable graduates who are interested in this field to have jobs in related sectors if they improve themselves. Sumuer et al (2006) have also examined competencies of an instructional technologist and found four group of competencies: professional foundations, educational foundations, technical foundations, and instructional technology foundations. In the technical foundations, they pointed the same programming skills gained from courses in the curriculum.

Notice that these competencies include both theoretical knowledge and practical skills to design, develop and produce a learning environment or material. Likewise, Moallem (1995) emphasized that qualifications of an instructional technologist differ from those of Master of Science or Ph.D. graduates and require more practical ICT (software and hardware).

Research Question 3: What are the extra competencies that CEIT Graduates should gain in order to work in non-teaching fields?

In addition to the existing knowledge and skills of the CEIT graduates, the competencies and characteristics that might be gained after graduation were asked to the participants. This request was asked to the participants with 4 different survey questions and the answers are presented in Table 7, Table 8, Figure 2 and Figure 3. Multiple survey questions in different types (open-ended, multiple option, and Likert type) were asked to make the responses more secure. Looking at Table 7, the first place is the knowledge of the up-to-date versions of leading software in the field of digital content development or educational software development. Although that software is included in the CEIT curricula, it is necessary to know the up-to-date versions because of continuous renewal and updated features in ICT. Similarly, it is recommended to know the current programing languages, tools and editors in the fields of software and programming.

Furthermore, when Table 7 is examined, it was seen that many general competencies not specific to CEIT graduates are also expressed such as foreign language, communication, problem solving, teamwork, creativity, critical thinking, willingness to learn and openness to development. These traits that are sought after in almost all employees in order to be included in complex job descriptions such as product and process development.

Requirements in current job advertisements looking for CEIT graduates were then asked to participants to be marked if a graduate should have. Most of the participants marked the competencies presented in Figure 2 that CEIT graduates should have. These are Communication, teamwork and foreign language are highly marked general competencies. Looking at Table 7 and Figure 2, it is seen that there are similar competencies.

Some of the participants (8) stated that CEIT graduates should “specialize in sub-field” after graduation. If the other competencies in Table 8 are considered as a field of expertise (software development, content development software, distance education, computer networks, database), these can be suggested sub-fields to be "specialized ". This explains why some, but not all, of the competencies in Table 8 are expected to be found in all graduates, probably seen as an alternative to each other.

In Figure 3, the degree of importance of the competencies obtained in the advertisements was asked again, and it was seen that similar competencies and features in Tables 7 and 8 were seemed important by more than the average number of participants.

All data from four questions' responses show that graduates should have three groups of competencies: ICT related competencies, INST competencies and general competencies. A similar categorization was also established by İzmirli and Kurt (2009) who grouped the competencies as social, educational and technological. Kurtoğlu Erden and Seferoğlu (2020) have also found similar competencies. ICT related competencies, like programming, web-based application development, database and computer networks already exist in CEIT curriculum (YÖK, 2023b). However not only the content but also the instructional strategies by which a course is given important. In general competencies, teamwork and project management are two competencies that can be gained through project-based or group learning strategies. Tezera (2019) emphasized that, teamworking and coordination are important skill in instructional technology. INST competencies, similarly, exist in the curriculum, however the speed of

innovation in digital technologies challenges for the graduates who are expected to improve their own skills and knowledge on educational software or content development tools.

Research Question 4: What are the changes that CEIT graduates working in non-teaching fields want to be made in their undergraduate programs?

The findings about the participants suggestions about changes in CEIT curriculum at undergraduate level were presented in Tables 9, 10, 11 and 12. In order to make sense of the possible requested suggestion in the curriculum, firstly, the participants' opinions about the differences, if any, of the existing CEIT graduates in the field of educational technologies in Turkey and abroad, and the role of CEIT graduates in the digital transformation process in education were asked.

It was observed that the participants thought that the situation in Turkey and abroad is different in terms of job opportunities in non-teaching positions for CEIT graduates (Table 9). They stated that the "educational/instructional technologist" profession abroad is more defined and existed before Turkey. However, they think that this situation has also being developed in Turkey, and that the compulsory distance education process in the Covid19 pandemic has created an awareness on this issue.

Participants, saying that current graduates were hired in jobs incompatible to their competencies and/or were undervalued, stated that their job opportunities were geographically limited in certain provinces and that there were fewer "freelance" opportunities. On the other hand, the majority of the participants stated that CEIT graduates are the most important actors in the digital transformation processes in education, that others should not be involved in this field, and that they hope that these people will be in the role of setting goals and visions (Table 10).

As a result of these two questions, it is possible to conclude that the participants think that CEIT departments and graduates have an important place in Turkey and abroad and that their place should not be occupied with employee from other fields. It is thought that the profession of "educational / instructional technologist", having higher awareness abroad, can be fulfilled by the graduates of CEIT departments successfully in Turkey.

Suggested changes in the current CEIT undergraduate curricula are given in Table 11. Some of these include adding the following courses or skills to the existing curriculum:

- Non-teaching internships should be added,
- Artificial intelligence lessons should be added,
- Lessons for adult education (andragogy) should be added.

Moreover, the *scope* of some of the following courses or subjects in the current curriculum

should be *increased*:

- Instructional Design,
- Foreign Language (English),
- Cooperation with the private sector,
- Software development and Robotic programming.

In addition, in order to *increase the quality of existing* CEIT curriculum,

- Content development software should be taught with up-to-date versions,
- Specialization in sub-fields of CEIT should be allowed,
- Courses should be carried out project-based,
- The quality of teaching staff should be increased,
- Course contents should be updated.

One important aspect in these suggestions is internships in educational technologies or different ICT related companies in addition to the already existing teaching internships. While the participants who made this suggestion accepted that teaching internship is necessary for the teaching profession, they offered internships, may be optional, in different companies for students planning a non-teaching career (Table 12).

Another notable suggestion is to identify sub-fields to be specialized and to allow selecting courses based on sub-field preference. For professions such as educational technologist, software developer, web designer, it is suggested that the curriculum should support sub-field specializations.

The third noteworthy suggestion is that the existing courses should be project and product development oriented in order to comply with the project-based study pattern in the sector. At the same time, it is recommended that these project courses be taught through up-to-date and industry-preferred software.

In the last question of the survey, opinions about the existing teaching internship policy were asked, and the majority of the participants offered internships in non-teaching fields or companies (Table 12). The current internship was seemed inevitable for teaching profession, but its quality was expected to be improved. In addition, it was stated that internship opportunities in non-teaching field were necessary for employment in those sectors. Even though there exist some courses executed by project-based strategies, either their quantity or quality were insufficient so that graduates could merely gain such experience only after starting their working life in non-teaching jobs. In addition, it can be concluded that some courses which could not executed practically for different reasons may reduce the chance of success in jobs other than teaching.

Recommendations

CEIT departments have unique roles to graduate compute teachers and INST. The students or candidates should be aware of the job opportunities so that they can lead to a specific courses or activities improving apprenticeship in certain competencies.

The courses in the curriculum should be up to date in terms of software and other equipment in learning environment. Additionally, the instructional strategies the courses project based and collaboration oriented.

In addition to the teaching internship, an INTS internship may be added for students as an elective course. Another alternative could be a close collaboration with private sector firms in project-based courses.

A consultancy about selection proper elective courses or extracurricular activities could help

students to improve their own general competencies like foreign language or effective communication.

Limitations

There are some limitations in this study. First one is that the findings are limited with the participants in the study. Even though the convenient sampling made the data collection easy and practical, it reduces the generalizability of the findings for all graduates working in non-teaching vocations.

The similar limitation also exists in requirements obtained from the job advertisements. Larger number of advertisements within longer period of time could be analyzed to fully understand the job-specific requirements.

Another limitation comes from profile of the participants. Employees working in similar positions but not graduated from CEIT departments could be included in the study to compare with the CEIT graduates.

The findings are also limited with the survey questions and options. In order to minimize this limitation, open ended questions were asked before the multiple option or Likert type questions.

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APPENDIX 1: REQUREMENTS EXPRESSED IN JOB ADVERTISEMENTS BY COMPANIES LOOKING FOR CEIT GRADUATES

The following advertisements were obtained in different professional advertisements over the Internet in March and April 2023.

Company No*	**Company Sector**	**Required Technical Qualifications 1**	**Required Technical Qualifications 2**	**Required Technical Qualifications 3**	**Competencies Sought**
1	Energy	Adobe Programs	Basic HTLM Knowledge	Articulate Storyline, Adobe Captivate	Teamwork
2	Automotive	LMS (Learning Management System)	Design of promotional, video and visual projects	Good command of English	Strong Communication
3	Education	LMS, SCORM and AICC Knowledge	Articulate, Camtasia Use	Adobe Programs	Analytical Thinking
4	Training	Adobe Programs	LMS (Learning Management System)	Design of promotional, video and visual projects	Human Relations
5	Automotive	Good Level of English	LMS (Learning Management System)	Articulate, Camtasia Use	Strong Communication
6	Education	Adobe Programs	Articulate Storyline and Rise	MS Office Program Usage	Open to change and innovation
7	IT	Good Level of English	LMS, SCORM and AICC Knowledge	Coding Experience	Instructor
8	Retail	Good command of English	LMS, SCORM and AICC Knowledge	Learning Design	Communication
9	Security	Educational Design	Training Planning & Reporting	MS Office Program Usage	Instructor
10	Textile	LMS Platform Usage	Good command of English	MS Office Program Usage	Innovative Thinking
11	Technology	Training Planning & Reporting	Coaching	Educational Design	Presentation Skills

APPENDIX 2: SURVEY QUESTIONS

1. Indicate your participation in the survey: I do / I don't
2. Email address:
3. Gender: Male/Female
4. Your graduation year:
5. Education Degree: Undergraduate / Graduate / PhD.
6. Your current firm/company, sector and duty:
7. How long have you been working in non-teaching field:
8. City of your work:
9. Which sectors or vocations do the CEIT graduates prefer mostly?
10. Which sector are you working in except teaching? Education / Energy / Finance / Food / Civil / Chemistry / Mechanic / Mine / Automotive / Agriculture / Textile / Tourism / Transportation and Logistics / Other:
11. Which non-teaching fields or vocations do you think the CEIT graduates have an opportunity to work?
12. Which one/ones of the following vocations do CEOT graduates can work? Web design / Graphical design / Software / Educational technologist /Educational specialist / Project development specialist / Other:
13. What kind of training and certification process do people who want to specialize in educational technologies go through?
14. Which one/ones of the following programs have you had the opportunity to learn during your undergraduate? Adobe Captivate / Articulate Storyline / Adobe Premier / Camtasia / Lectora / iSpring Suite / Adobe Presenter / Elucidat / Other:
15. What competencies do the CEIT graduates need to have in order to work in non-teaching areas?
16. Which one/ones of the following competencies are needed for CEIT graduates to work in non-teaching areas? Desing of learning management systems / Creating digital video / Web based programming / E-learning Systems (LMS) Management / Design or educational content / Using digital tools and peripherals (Camera, Green box etc.) / Coding / Effective communication / Teamwork / Coaching / Foreign Language
17. What skills and qualifications do the CEIT graduates need to have in order to advance in their careers after graduation?
18. Choose how important are the following areas in which BÖTE graduates want to improve themselves after graduation: Hardware and Technical Knowledge / New Technological Developments / Programming & Software / Foreign Language / Presentation skills / Microsoft

Office Applications / Teamwork / Being open to change (1- Now important, 2-Partilally Important, 3-Veri Important)

19. What are the differences between the world and Turkey in terms of job opportunities in educational technologies?
20. What is the role of the CEIT graduates in the digital transformation process in education?
21. What concrete changes would you like to see made in the curriculum of existing CEIT programs? Current program catalog can be found here: https://www.yok.gov.tr/Documents/Kurumsal/egitim_ogretim_dairesi/Yeni-Ogretmen-Yetistirme-Lisans-Programlari/Bilgisayar_ve_Ogretim_Teknolojileri_Ogretmenligi_Lisans_Programi.pdf
22. What are your opinions about the internship practices of CEIT students do before graduation?