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EVALUATION OF DIGITAL COMPETENCE BY INFORMATION TECHNOLOGY TEACHERS IN TURKEY IN THE CONTEXT OF 21ST CENTURY SKILLS AND THE QUALITY FRAMEWORK OF MINISTRY OF EDUCATION[i]

Yavuz Erişen[1ii],
Ercan Gürültü[1],
Cüneyt Bildik[2]
[1]Department of Curriculum and Instruction,
Faculty of Education,
Yildiz Technical University, Turkey
[2]Department of Foreign Languages,
Kirklareli University, Turkey

Abstract:
This research which examines information technology teachers' opinions on digital competence is a phenomenological qualitative research and was carried out with 10 information technology teachers in Turkey. The data were collected through semi-structured interview form developed by the researchers and analyzed by using content analysis method. The findings showed that information technology teachers explained digital competence with 193 utterances. These utterances were identified in 3 themes as "digital competence and its components", "importance and effects", "digital competence and education". These themes were separated into 9 categories as "meaning", "sub-dimensions", "supporting competences", "importance", "positive effects for future", "negative effects for future ",“ acquisition by formal education ",“ acquisition by informal education ",“ digital competence and educational problems". It was seen that information technology teachers expressed their opinions on digital competence with 61 codes from these categories. According to the results of the research, information technology teachers frequently produced "digital literacy", "knowledge and "communication", "foreign language knowledge", "necessity of the knowledge society", "necessity to be information literate", "fast communication", "technological antisocialism", "useless knowledge acquisition", "social regression", "school education", "early technology introduction" and "objective level mismatches" codes while expressing digital qualifications that individuals are expected to have.

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[ii] Correspondence: email erisenyavuz@gmail.com

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1. Introduction

The effective use of information and communication technologies has become an indispensable factor of the information age we are in, and acknowledged as a distinct feature of modern societies (Fraillon, Ainley, Schulz, Friedman & Gebhardt, 2014). Especially since the end of the 90's, there has been a remarkable growth in communication technologies. In 2016, the number of mobile phone subscribers worldwide was more than 7 billion, and the number of Internet users was 3.5 billion, of which 2.5 billion were people from developed countries (World Bank, 2018). It is possible to predict that this unprecedented boom in technology will last for the following years. By 2025, it is expected that all people around the globe will have internet access (Schmidt & Cohen, 2013, p.4). These rapid developments in information and communication technologies have brought about significant changes for situations where newly produced information is integrated, communicated, accessed and stored through systems (Dunn & Johnson-Brown, 2008). As this situation has become more evident in different areas of life such as social life, economics and politics, new possibilities to increase individual's life quality have emerged (Huyer & Sikoska, 2003). All these developments require people to have competences in information and communication technologies. For this reason, it is now a necessity for individuals to embrace digital innovations that will enable them to use and also produce information rather than merely consuming it (Akkoyunlu and Soylu, 2010).

This massive development of technology is also reflected in the concepts used to define people's qualifications in this field. In recent years, many terms have been used to define the competent use of digital technologies such as information and communication technology skills, technology skills, information technology skills, 21st century skills, information literacy, digital literacy and digital skills. One of these recent terms to define the competence in technology is digital competence (Ilomäki, Kantosalo & Lakkala, 2011, p.1).

According to Larraz and Esteve (2015, p. 99), one of the first definitions of digital competence was introduced by Paul Gilster in 1997. In this definition, digital competence is stated as "*the ability to understand and use information in numerous formats from a wide variety of sources when it is presented through computers*" (Larraz & Esteve, 2015 from Knobeland Lankshear, 2008). However, digital competence has turned into a fuzzy concept over time as many writers and institutions have come up with their own definitions, and these are later translated into other languages with differences in meaning (Larraz & Esteve, 2015, from Ferreiro, 2011).

The number of concepts used to express the competence in technology continues to increase, and as an emergent term, it is now even harder to pin down the meaning of digital competence. To this end, many researchers have attempted to reveal what

should be understood from the term. After examining 73 articles on digital competence and related terms between 1990 and 2014, Gallardo-Echenique, Oliveira, Marques Molias & Esteve-Mon (2015) have come to the conclusion that digital competence is a multidimensional concept derived from various fields (Gallardo-Echenique, de Oliveira, Marqués-Molias & Esteve-Mon, 2015, p.1). Ilomäki, Paavola, Kantosalo & Lakkala (2016) have carried out a similar research in the field of education, examined 76 educational research theories mentioning digital competence and stated that digital competence involves technical competence, the ability to use digital technologies for working, studying and daily life meaningfully, the ability to evaluate digital technologies, motivation to participate and commit in the digital culture. Similarly, Ferrari, Punie & Redecker (2012) explored how digital competence is defined in 15 frameworks and noted that the concept of digital competence is interpreted differently in political documents, academic writing, teaching and learning, and certification practices. Researchers have defined digital competence as:

> *"the set of knowledge, skills, attitudes, abilities, strategies and awareness that is required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; behave in an ethical and responsible way; collaborate; create and share content and knowledge for work, leisure, participation, learning, socializing, empowerment and consumerism"*(Ferrari, Punie & Redecker, 2012, p.84).

Although digital competence is dealt differently in various fields, eventually, it has become a necessity to find a common and working definition for all to express the digital competence of 21st century citizens explicitly. According to Ilomäki, Paavola, Kantosalo & Lakkala, (2016, p. 657), this is also the reason why digital competence has been increasingly used in European policy documents. Digital competence first appeared in the European Union documents within the context of Lifelong Learning in 2000s, (From, 2017, p.44 from Kack & Mannikkö Barbutiu, 2012, p. 16) and has been indicated as one of the eight key competences that citizens need to have to adapt to changing life conditions. According to the Council of the European Parliament:

> *"Digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet"* (European Council, 2006).

In this way, the Council of the European Parliament attempted to establish a common definition of digital competence and pointed to the broad scope of this competence. It is emphasized that *"digital competence requires a sound understanding and knowledge of the nature, role and opportunities of [Information Society Technology] IST in everyday contexts: in personal and social life as well as at work"* (European Council, 2006).

In the next period, the importance European Union attached to digital competence has continued. The fact that many citizens cannot benefit from digital technology in their daily lives, the lack of consensus on what technological skills are necessary and how they can be evaluated have laid the ground for establishing a common European digital competence framework which is called DigComp by the European Commission. By this way, what competence should be expected from today's citizens in terms of technology has been made clear. The framework was first published in 2013, updated in June 2016 with the name DigComp 2.0, and released as DigComp 2.1 in 2017 with a final update (European Commission, 2017). In the framework, five competences that constitute digital competence are expressed as "information and data literacy", "communication and collaboration", "digital content creation", "safety" and "problem solving". Requirements for each competence area are also stated for different proficiency levels which are named as foundation, intermediate, advanced and highly specialized (European Commission, 2017).

As in European Union documents, digital competence has started to appear more on the agenda of Turkey. Digital competence has found its place in the Turkish Qualifications Framework as one of the eight key competences of Lifelong Learning, which was designed in line with the European Qualifications Framework and put in use in 2017. Thereby, 21st century skills and competences that Turkish citizens need, have been integrated into school curriculum in accordance with the Turkish Qualifications Framework and Quality Framework of Ministry of Education and (TTKB, 2017).

Clearly, one of the biggest responsibilities for teaching of digital competence at schools effectively falls into the shoulders of information technology (IT) teachers (OECD, 2011a). In other words, raising digitally competent individuals is pretty much related to how this competence is perceived by teachers themselves and how it can be best taught to new generations in schools. In this respect, how digital competence, as a perplexing and novel term, is perceived by information technology teachers in Turkey is the focal point of this research. With this curiosity, the research attempts to present how digital competence is perceived by information technology (IT) teachers in Turkey; what it includes; its importance and positive-negative effects for future and how it can be acquired through education and training.

2. Method

This research which aims to investigate information technology teachers' opinions on digital competence, its importance, positive-negative effects for future and how it can be best acquired through education is a phenomenological qualitative research. Phenomenological research is usually defined as the research that highlights phenomena that we are aware of, but we do not have sufficient or detailed information about. It is a research on phenomena that we are not totally unfamiliar, yet we cannot precisely understand (Yıldırım and Şimşek, 2008).

2.1. Participants

In selection process of the participant teachers for the research, criterion sampling from purposive sampling methods was used. In a research, the sampling can be formed of people, events, objects or cases with distinct characteristics. In such cases people, events, objects or situations that meet the criterion are selected for sampling (Büyüköztürk et al., 2013). The participants selected for this research according to the criterion are 10 information technology teachers of Ministry of Education who are working in Istanbul province.

According to Karasar (2015, p.110), the research universe is the one that can be reached. For this reason, the participants are volunteer information technology teachers that can be reached who are working in various districts of Istanbul province. In this context, the research was carried out with the participation of 6 male, and 4 female teachers.

2.2. Data Collection and Instruments

Interview method was used to collect the data for the research. The interview method, which is frequently used in social sciences, is one of the most powerful methods in qualitative research for understanding others (Yıldırım and Şimşek, 2008). In this study, the data were collected from individual interviews that were done with participants through the semi-structured interview form. To decide on the interview questions to be directed to participants, first qualitative sub-problems of the research were analyzed, and then what kind of information might be needed for each problem was taken into consideration.

The open-ended questions in the semi-structured interview form were prepared by the researchers according to the digital qualifications individuals are expected to have and expert opinions were asked for content validity. Relevant literature was scanned and opinions of three lecturers from the fields of "Curriculum and Instruction" and "Computer and Instructional Technology Education" were obtained. A semi-structured interview form consisting of 7 questions was prepared on the data obtained. After the pilot study, interviews were carried out in the academic year of 2017-2018.

2.3. Data Analysis

The data were analyzed by using content analysis method. Data analysis is used to spot the existing expressions in the text and extract underlying relations (Merriam, 1998; Kızıltepe, 2015). The data obtained from the audio recordings of approximately 300 minutes were written down, the transcriptions were examined and appropriate codes were developed by analyzing participants' utterances. These codes were grouped under related headings and then mapped onto the themes. Codes and themes were presented together as tables and figures in the findings section. In addition, direct quotes from participants' utterances were also presented as to support the codes and themes that were developed by the researchers. While quoting, abbreviations were used to specify participants (e.g. T1 for Teacher 1).

2.4. Internal Validity of the Research

Researcher's role in a qualitative research is a threat to internal validity. For this reason, it is necessary for the researcher to be objective and carry out the research without prejudice (Freankel & Wallen, 2003). Measures such as detailed records of interviews, long-term interaction with participants, detailed data collection, participant diversity, expert opinions and participant confirmation enhance the internal validity of a qualitative research (Yıldırım and Şimşek, 2008). To increase the internal validity of this research, two different expert opinions from the Curriculum and Instruction department were asked to check whether the codes generated by the researchers represent the themes and categories properly. Matches that experts made were compared to those of the researchers, and the reliability of coding was calculated by using Miles & Huberman reliability formula (1994) [Reliability = consensus/ consensus + dissidence) x 100]. According to Miles & Huberman (1994), inter-coder reliability is expected be at least 80% (Miles & Huberman, 1994). In this research, reliability of coding was found .901 [55 / (55 + 6) x100 = 0.901].

3. Findings

In this section, information technology (IT) teachers' opinions on digital competence are presented.

According to the findings, information technology teachers produced 193 utterances about digital competence, consisting of 3 themes, 9 categories and 61 codes. These 3 themes are "digital competence and its components", "importance and effects", "digital competence and education". The model of themes is presented in Figure 1.

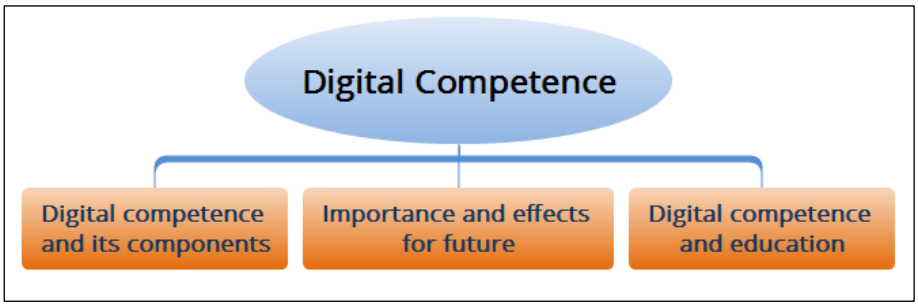

Figure 1: Digital competence: Themes

"Digital competence and its components" theme consists of "meaning", "sub-dimensions", "supporting competences"; "importance and effects" theme consists of "importance", "positive effects for future", "negative effects for future"; "digital competence and education" theme consists of "acquisition by formal education", "acquisition by informal education" and "digital competence and educational Problems" categories. The model for these categories is presented in Figure 2.

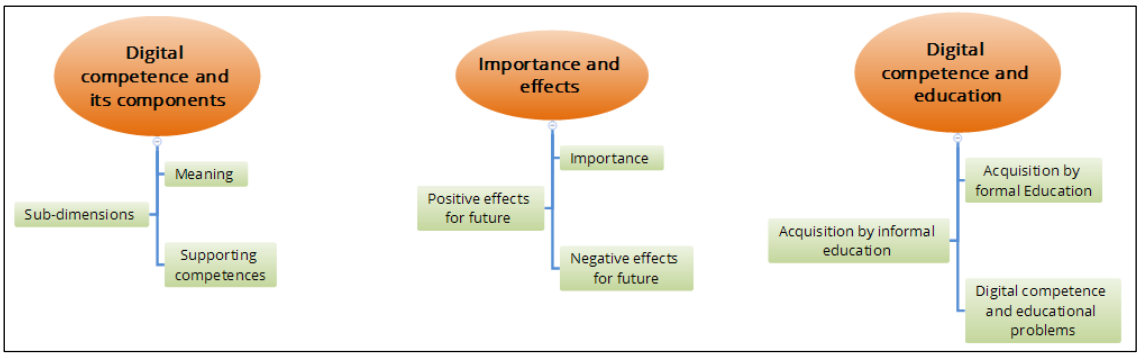

Figure 2: Digital competence: Categories

When IT teachers' opinions on digital competence were investigated, it was seen that they produced 193 utterances which involves 61 codes with respect to 9 categories.

The codes for "meaning", "sub-dimensions" and "supporting competences" categories are presented in Figure 3.

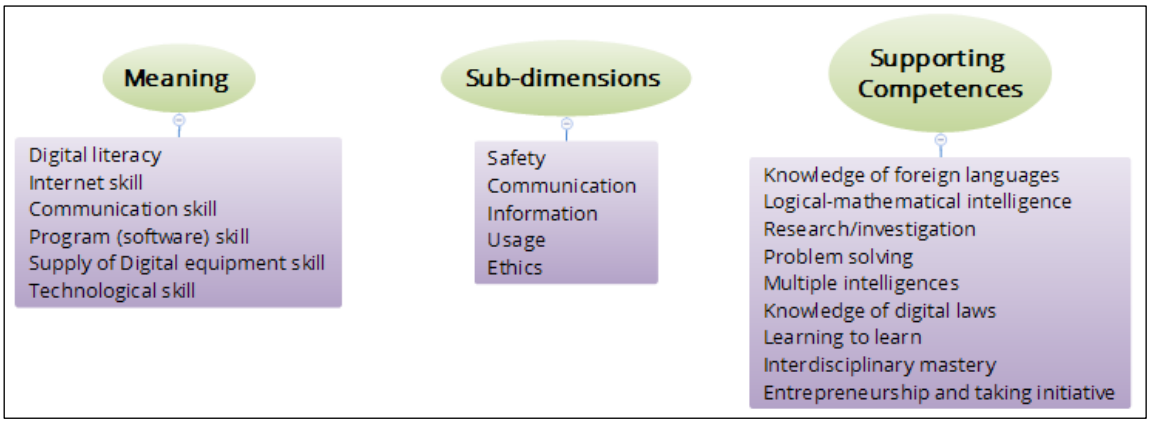

Figure 3: Codes for meaning, sub-dimensions and supporting competences categories

The codes for "importance", "positive effects for future", "negative effects for future" categories are presented in Figure 4.

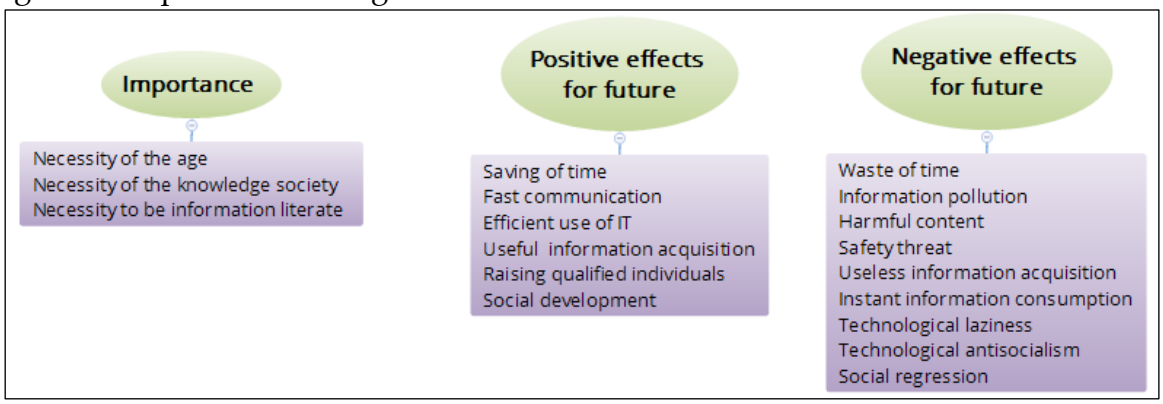

Figure 4: Codes for "importance", "positive effects for future", "negative effects for future" categories

The codes for "acquisition by formal education", "acquisition by informal education", "digital competence and educational problems" categories are presented in Figure 5.

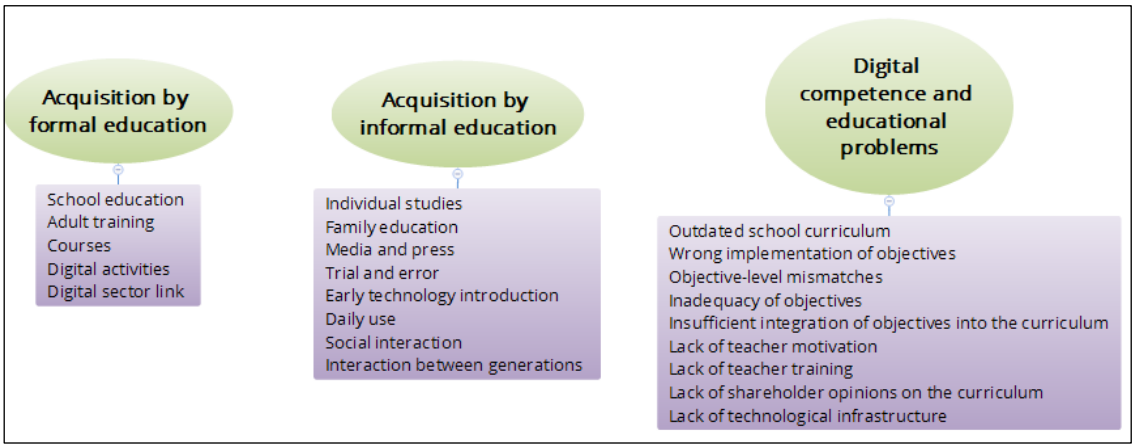

Figure 5: Codes for "acquisition by formal education", "acquisition by informal education", "digital competence and educational problems" categories

3.1. Meaning of Digital Competence and Its Components

Percentage frequency for the "meaning of digital competence" category is presented in Table 1.

Meaning of digital competence	*f*	%
Digital literacy	**8**	**36.36**
Internet skill	6	27.26
Communication skill	3	13.64
Program (software) knowledge	3	13.64
Supply of digital equipment skill	***1***	**4.55**
Technological skill	1	4.55
Total	**22**	**100**

Table 1: Percentage frequency for the meaning of digital competence

When Table 1 is investigated, it is seen that information technology (IT) teachers produced 22 utterances, of which %36.36 belongs to "digital literacy" code. The other codes are "internet skill", "communication skill", "program (software) skill", "supply of digital equipment skill" and "technological skill" respectively. Some of IT teachers' opinions on the meaning of digital competence are as follows:

T1: *"When we think that digital competence is for everyone, we can think of it as **internet skills**, **communication skills**. For example, for a housewife or anyone, the meeting point is **internet skills**, **internet use.**"*

T3: *"Digital competence is a term that I know as **digital literacy**. To me, it means **using information technologies effectively**. At the same time it requires **the use of internet technology and information literacy skills**."*

Percentage frequency for "sub-dimensions of digital competence" category is presented in Table 2.

Sub-dimensions of digital competence	*f*	%
Safety	6	23.08
Communication	**8**	**30.77**
Information	**8**	**30.77**
Usage	2	7.69
Ethics	2	7.69
Total	**26**	**100**

Table 2: Percentage frequency for sub-dimensions of digital competence

As seen in Table 2, IT teachers produced 26 utterances on the sub-dimensions of digital competence, and they mostly mentioned "information" and "communication" codes with the ratio of %30.77. The other codes are "safety, "usage" and "ethics" respectively. Examples from IT Teachers' opinions about the sub-dimensions of digital competence are presented below:

T4:"*Just as literacy involves reading-writing skills, digital competence can be expressed as* ***being able to construct knowledge, produce knowledge, get benefit from communication resources, and perform tasks and operations electronically****."*

T5: *"I can tell that it is a qualification that the ones who* ***have the necessary knowledge*** *to ensure the* ***safety of information*** *that forms the content or can solve safety problems according to people's needs and do this job as a profession must have."*

Percentage frequency for "supporting competences" category is presented in Table 3.

Supporting competences	*f*	%
Knowledge of foreign languages	**8**	**28.57**
Logical-mathematical intelligence	6	21.43
Research/investigation	4	14.29
Problem solving	3	10.72
Multiple intelligences	1	3.57
Knowledge of digital laws	2	7.14
Learning to learn	2	7.14
Interdisciplinary mastery	1	3.57
Entrepreneurship and taking initiative	1	3.57
Total	**28**	**100**

Table 3: Percentage frequency for competences supporting digital competence

When Table 3 is explored, it is seen that IT teachers produced 28 utterances while expressing competences supporting digital competence and produced "knowledge of foreign languages" code the most with the ratio of %28.57. This is followed by "logical-mathematical intelligence", "research/investigation", "problem solving", "multiple intelligences", "knowledge of digital laws", "learning to learn", "interdisciplinary

mastery" and entrepreneurship and "taking initiative" codes respectively. Some quotations from teachers' opinions for this category are given below:

T7: *"**Logical-mathematical intelligence** must be at the top. **Learning to learn** is very important. As much as the formal side of digital competence, a person will be much more successful when he can interpret, produce the information on his own. **Interdisciplinary practices** are really important for this. In this field which is called STEM, all practices are nested. As fields such are Physics, Chemistry, and Mathematics all converge in communications now, interdisciplinary mastery is important for being digitally competent. Of course, **knowledge of foreign languages is important too**. Because it is something universal and for it is not possible to find solutions in just one language".*

T6*:"Just as communities have, **digital environment has rules**. To know these rules, we need to have digital competence."*

3.2. Importance and Effects

Percentage frequency for "importance" of digital competence category is presented in Table 4.

Importance	*f*	**%**
Necessity of the age	6	23.08
Necessity of the knowledge society	**7**	**26.92**
Necessity to be information literate	**7**	**26.92**
Necessity of using technology	6	23.08
Total	**26**	**100**

Table 4: Percentage frequency for importance of digital competence

It is seen in Table 4 that IT teachers used 26 utterances while emphasizing the importance of digital competence and produced "necessity of the knowledge society" with "necessity to be information literate codes" the most. These are followed by "necessity of the age", "necessity of using technology" codes respectively. Some of teachers' opinions for this category are as follows:

T8*:"**Necessity of the age**. **Now, there is no area where social media or the Internet has not been used**. For example, you are going to order a meal, do shopping, you have forgotten something and you want it to come to you by itself or you are going to do some research for homework."*

T7*:"I think digital competence is necessary to raise individuals who are **technologically competent**."*

Percentage frequency for "positive effects" of digital competence for future category is presented in Table 5.

Positive effects for future	*f*	%
Saving of time	4	22.22
Fast communication	**5**	**27.78**
Efficient use of IT	1	5.56
Useful information acquisition	2	11.11
Raising qualified individuals	2	11.11
Social development	4	22.22
Total	**18**	**100**

Table 5: Percentage frequency for positive effects for future

As seen in the table, information technology (IT) teachers produced 18 utterances for positive effects of digital competence and they produced "fast communication" code the most with the ratio of %27.78. The other codes following this are "social development", "saving of time", "useful information acquisition", "raising qualified individuals" and "efficient use of IT". Some teachers' opinions about this category are given below:

T8*: "We can have **practical people**. By practical, I'm talking about individuals that **can produce faster solutions** for tasks and operations. For example, someone who can use the e-state application practically **won't waste time in waiting in the queue** at the governorate building."*

T10: "*Society will eventually transform from industrial society to **knowledge society."***

Percentage frequency for "negative effects" of digital competence for future category is presented in Table 6.

Negative effects for future	*f*	%
Waste of time	1	5.88
Information pollution	1	5.88
Harmful content	1	5.88
Safety threat	2	11.76
Useless information acquisition	**3**	**17.65**
Instant information consumption	2	11.76
Technological laziness	1	5.88
Technological antisocialism	**3**	**17.65**
Social regression	**3**	**17.65**
Total	**17**	**100**

Table 6: Percentage frequency for negative effects for future

As seen in Table 6, IT teachers used 17 utterances about negative effects of digital competence for future and among these, they produced "technological antisocialism", "social regression" and "useless information acquisition" codes the most with the ratio of %17.65. These are followed by "safety threat", "instant information consumption", "technological laziness", "waste of time", "information pollution", and "harmful content" codes. Some teachers' opinions on this category are as follows:

T2*:"We are in trouble if we do not lay the basis. Because people will* ***acquire useless, unnecessary information that won't develop us, move us forward****. We won't be anything and stay where we are with no progress. There will be* ***information pollution*** *and we will* ***consume the information****."*

T8*:"I think it will be beneficial if we can provide people with digital competences. But if we cannot or if we just be a generic user, it will do harm. We* ***will just have consumed the information****. For example, if we do not know anything about* ***the safety****, what will happen? We will hear lots of news on fraud. Or we cannot* ***protect our children from harmful content****. Individuals are already* ***antisocial*** *now. While doing research, they use whatever is on the Internet, without knowing if it is true, false or relevant. There is not much communication, they keep being antisocial."*

3.3. Digital Competence and Education Theme

Percentage frequency for acquisition of digital competence by formal education is presented in Table 7.

Acquisition by formal education	*f*	%
School education	**8**	**61.54**
Adult training	2	15.38
Courses	1	7.69
Digital activities	1	7.69
Digital sector link	1	7.69
Total	**13**	**100**

Table 7: Percentage frequency for acquisition of digital competence by formal education

As table indicates, information technology (IT) teachers used 13 utterances for acquisition of digital competence by formal education and "school education" is the most frequently used code with the ratio of %61.64. "Adult education", "courses", "digital activities", "digital sector link" follow respectively. Some quotes from teachers' utterances for this category are stated below:

T2*:"If we* ***start giving this education from primary school****, even if we do not directly start with digital competence, we can start with how an individual should behave, speak and later, we can teach how these should be in technological relations."*

T7*:"It can be through* ***public education courses*** *offered by the ministry and municipalities. To guide, there is* ***open high school training*** *out there. I mean, I think it can be provided by formal education in this way."*

Percentage frequency for acquisition of digital competence by informal education is presented in Table 8.

Acquisition by informal education	*f*	%
Individual studies	1	5.88
Family education	2	11.76
Media and press	2	11.76
Trial and error	1	5.88
Early technology interaction	4	23.53
Daily use	3	17.65
Social interaction	3	17.65
Interaction between generations	1	5.88
Total	17	100

Table 8: Percentage frequency for acquisition of digital competence by informal education

It is seen in Table 8 that IT teachers used 17 utterances concerning acquisition of digital competence by informal education and among these they mentioned "early technology introduction" the most with the ratio of %23.53. "Daily use", "social interaction", "family education", "media and press", "individual studies", "interaction between generations", "trial and error codes" follow respectively. Some quotations from teachers' opinions are given below:

K8*: "I think **this education has to be given in nursery school**. That is because children learn so well, and I believe, now a nursery school student can get access to digital world. He can access to what he wants in the digital world even if he does not know how to read or write."*

K3: "*I think **all children** should be able to use and **apply these in their homes**".*

Percentage frequency for "digital competence and educational problems" is presented in Table 9.

Digital competence and educational problems	*f*	%
Outdated school curriculum	3	11.54
Wrong implementation of objectives	2	7.69
Objective-level mismatches	**7**	**26.92**
Inadequacy of objectives	4	15.38
Insufficient integration of objectives into the curriculum	3	11.54
Lack of teacher motivation	1	3.86
Lack of teacher training	2	7.69
Lack of shareholder opinions on the curriculum	2	7.69
Lack of technological infrastructure	2	7.69
Total	**26**	**100**

Table 9: Percentage frequency for digital competence and educational problems

As seen in the table, IT teachers produced 26 utterances for "digital competence and educational problems" category and they produced "objective-level mismatches" code the most with the ratio of %26.92. This is followed by "inadequacy of objectives", "outdated school curriculum", "insufficient integration of objectives into the curriculum", "wrong implementation of objectives", "lack of teacher training", "lack of shareholder opinions on the curriculum", "lack of technological infrastructure", and

"lack of teacher motivation" codes respectively. Some of the teachers' opinions for this category are presented below:

K5: *"The ones who deal with digital competence professionally have already known about it. For example a computer operator would know these things. But the one who just uses this either knows nothing or believes in everything he sees. He can think everything as either true or false. For this reason, there must be competences for each. Some must have it at* ***the level that his profession requires*** *and some others* ***should be able to read this, for example the information, data****, should be information literate. Should be* ***at this level*** *I believe."*

K1: *"In our field, I mean in vocational schools, unfortunately we do not have many modules. I find it good though when we think of the time it was published. Of course, I speak of* ***digital competence at advanced*** *level for my students. Modules* ***need to be more up to date****. Need to be at advanced level. I think* ***the curriculum is a bit outdated*** *on this."*

4. Conclusion and Discussion

When the findings of the research were examined, it was seen that IT teachers used 22 utterances to express the "meaning of digital competence" and mostly produced the "digital literacy" code. This finding is in parallel with other conceptual researches on digital competence in the literature. Digital literacy is one of the most used terms to express digital skills, and regarded as the closest to digital competence in meaning (Ilomäki, Paavola, Kantosalo & Lakkala, 2016; Gallardo-Echenique, de Oliveira, Marqués-Molias & Esteve-Mon, 2015). However, two concepts should not be treated as synonyms. According to Cartelli (2012, p.54), what induced the passage from digital literacy to digital competence is the shift from a discipline centered paradigm to human centered paradigm. The focus of this new paradigm is the analysis of what people must know and be able to do with technologies rather than on how people use digital resources and processes since knowledge and skills are more important than the knowledge of instruments and processes for competence (Cartelli, 2012 from Le Boterf, 1990).

In this category, digital competence was defined by information technology (IT) teachers as having internet and communication skills to use technological tools and instruments and being able to use these at least at literate level in digital environments. Moreover, teachers emphasized that the scope of digital competence differs for daily technology users and professionals. For daily users it might be sufficient to be just digitally literate (to be able use e-state application or social platforms etc.), whereas for professionals a higher level of expertise is sought such as program [software] knowledge.

When "sub-dimensions of digital competence" category was explored, it was seen that teachers focused on "knowledge" and "communication" dimensions. These two dimensions are listed amongst the components of digital competence in European Commission's Digital Competence Framework DigComp 2.1. The other components in the Framework are "digital content creation", "safety" and "problem solving"

(European Commission, 2017). In this respect, safety is another dimension mentioned by IT teachers which is one of the main problems of technology use today. For example even if a person uses online shopping sites or social platforms he must have necessary digital competence in terms of safety. Other sub-dimensions in the EU Framework such as digital content creation or problem solving were not addressed by IT teachers. Having said this, it important that information technology (IT) teachers mentioned "ethics" and "usage" dimensions which indicates that they perceive competence not merely as knowledge but as a combination of knowledge, skills and attitudes (European Council, 2006).

IT teachers have expressed 28 utterances in the category of "competences supporting digital competence" and generally laid emphasis on "foreign language knowledge". Communication in foreign languages is denoted as one of the eight key competences by the European Commission (European Council, 2006). Without doubt, as a universal reality, foreign language knowledge is important for individuals to produce more professional solutions to digital problems, to research and investigate. And since digital innovations and English have both started to dominate the world scene from the second half of the 20th century onwards, these two competences are considered highly connected (Bucur & Popa, 2017). According to 2017 statistics, English is the most used language among the internet users in the world with the ratio of 25.3% (Internet World Stats, 2017). Teachers' opinion that foreign language knowledge is the most important competence to support digital competence can be considered as a result of this situation.

Apart from foreign language knowledge, learning to learn and mathematical competence are other supporting competences addressed by teachers. For algorithmic thinking it is necessary for individuals to have logical and mathematical intelligences at a sufficient level. Learning to learn is also important for individuals to develop their digital competence and get in touch with other disciplines digitally since individuals' spirit of entrepreneurship and taking initiative will be better developed this way. Nevertheless, teachers did not mention other key competences such as civic competence or cultural awareness and expression.

When the "importance of digital competence" category was explored, it was seen that teachers expressed 26 utterances and pointed to the importance of digital competence for today's society with "necessity of the knowledge society" and "necessity to be information literate" codes. Today, IT technologies are seen as the main factor for creating and sustaining knowledge societies (Değirmen, Vural and İbrahim, 2016). In today's society which is being shaped by technological transformations, almost everyone is expected to have basic digital skills for work, living, learning and collective participation (Parliament, 2017, p.3). In this respect, teachers are aware of the role that digital competence plays for individual and social development process. In our time, when almost everything is going digital, it is a reality that people must take advantage of this change and be digitally literate to ensure their safety, use technology effectively,

and also to protect themselves from possible risks. In this sense, digital competence is a must for societies in order not to lag behind the age and become a knowledge society.

Information technology (IT) teachers used 18 utterances for "positive effects for future" category and most frequently mentioned "fast communication" as an anticipated outcome of digital competence for future. Van Dijk (2010) lists ten major trends created by information communication technologies in contemporary societies as time, space, scale, social infrastructure, complexity, capitalism, class, politics, culture and daily life. It is obvious that due to information networks, limitations of time and space can be exceeded easily today. Information-exchange and communication happens in such a short time periods. Obviously, teachers drew attention to this rapid communication that occurs with the help of technology. However, the effects of IT technologies are not limited to this. In addition to significant economic benefits such as high productivity, low cost, new economic opportunities, business opportunities, innovation and increased trade, it is also possible to talk about some other advantages such as increasing quality of health and education services and social integration (World Bank, 2018). It can be said that in the future, digital competence will contribute to the development of more qualified, more practical people who will be able use information and communication technologies effectively. It can be expected that the social development will take place faster than ever thanks to these positive effects of digital competence.

When “negative effects for future” category was examined, it was seen that IT teachers produced 17 utterances and centered on “technological antisocialism”, “useless knowledge acquisition” and “social regression” codes. According to Beckers, van Gent, Iedema & de Haan (2005, p.393), when the research about the effects of digital competence on social cohesion is investigated, it is possible to come across different conclusions. In other words, the effect of technology on society is open to discussion. Some researches claim that technology leads individuals to isolation and destroys their social ties and wellbeing in society. On the contrary to this, some others claim that the Internet helps people maintain their social relations and brings people from different backgrounds together without any distinction by age, race, religion, gender or location (Beckers, van Gent, Iedema & de Haan, 2005 p.93). As a result, “useless knowledge acquisition” and “social regression” can be counted among negative effects of digital competence, albeit, from another perspective, it is also possible to defend that technology contributes to social cohesion and development in other ways.

It is a fact that the Internet is the ultimate source of information now as it is the most convenient and fastest for many when compared to others. However, as a result of uncontrolled use of the excessive digital content, besides accurate and reliable information, one can also come across false, unsafe or inappropriate information on the Internet due to information pollution or “infollution” (Cho & Lee, 2011). It can be considered that what teachers meant with worthless knowledge acquisition is related to this fact. To protect people from this pollution of the 21st century, it is necessary to inform users, especially children, raise people’s awareness and make relevant legal

regulations (Cho & Lee, 2011). In case of not providing individuals with necessary digital competence that is, when individuals are just generic users, there will be individuals who do not take any precautions in terms of safety to protect neither themselves nor their children from the harmful content, just consume information, do not question the reality or value of information and are antisocial in terms of technology.

For "acquisition of digital competence by formal education" category in which the relation between digital competence and education was investigated, teachers produced 13 utterances and stated that digital competence can be best taught through "school education". As the emerging technology-based knowledge society generated its own needs, the ability to learn, collaborate and solve problems in digital environments has now become the essentials skills (Griffin, Care & McGaw, 2012, p.3). The 21st century has been shaped in a way to respond to these changing needs of the society and one of the most important goals of education has been to improve students' digital competence accordingly (Scherer, Siddiq & Teo, 2015, p.202). With this awareness, many countries have adopted policies to integrate information technologies into their education systems effectively. While the Australian government identified ICT competence as one of the primary goals of education for the 21st century, the US government claimed to offer students the best experience available for learning of ICT (OECD, 2001, pp. 19-20). Similarly, the European Union showed its determination on the issue by claiming to make all students digitally literate when they finish their school education, and OECD countries started comprehensive initiatives to promote the use of ICT in schools (OECD, 2001, p. 21). In recent years, such policies for the effective teaching of ICT have been adopted in Turkey as well. The most striking example of this movement is Fatih Project, which is labeled as the world's most comprehensive educational reform on the use of ICT in schools so far (Fatih Project Web Site). It is evident from the findings of this research that this global ambition for teaching of digital competence at schools was also shared by information technology (IT) teachers. Teachers' opinion that digital competence can be best acquired in schools by formal education might be interpreted as a result of this. Teachers' suggest that it is very important for individuals to get this education during the early years of their school education. And for older generations, this competence can be acquired through adult teaching programs or with the help of training courses to be organized by the Ministry or Municipalities. Digital events or activities to be held in collaboration with the digital sector might also bring benefits for raising digitally competent individuals.

When "acquisition of digital competence by informal education" category was examined, it was seen that teachers mostly generated the code "early technology introduction". Informal education is usually defined as type of education that does not depend on a specific purpose and plan, but takes place spontaneously in the family, on the street or in the workplace (Oral & Taha, 2017, p. 7). Teachers' opinion that individuals must get introduced to technology at an early age draws the attention to the fact that how children start interacting with technology from the time they are born

thanks to their families, friends and media-communication tools today. This ubiquity of technology can be turned into an opportunity for the early acquisition of digital competence. In this process, adult guidance and intergenerational transmission from the family might be of help in the first place. In addition to adult guidance, children can have this competence by themselves informally through trial and error or personal engagement. To support this development, teaching of digital competence can be started from nursery school while children are gaining their self-confidence. In this way, digital competence can be gained at early ages at a desired level, of course on the condition that potential benefits of ICT and informal learning is exploited properly (European Commission, 2008, p.10).

In "digital competence and educational problems" category, it was seen that teachers concentrated on "objective-level mismatches" in the curriculum. Obviously, availability of IT tools in a school environment does not guarantee that these are being used effectively in education, teaching or assessment. It is noteworthy that many schools fall short of expectations for realizing the benefits of IT in education, despite the huge investments they made in these technologies (OECD, 2011b). Embedding IT technologies in the educational infrastructure successfully is a daunting task since teacher training, curriculum and materials, teaching practices, assessment, shortly almost every aspect of education, must be aligned for all levels thoroughly (Livingstone, 2011, p.10). Digital Competence Framework of European Commission is used as a reference tool to overcome this in several EU countries (Balula, 2016, p.281). In this framework, one can find competence indicators for different proficiency levels, all of which are written in terms of learning outcomes (European Commission, 2017). Therefore, as in the framework, in any curriculum, it is normal to expect that the required competence for different educational levels is stated clearly and learning outcomes are indicated accordingly. Teachers' confusion about the appropriate level of digital competence students are expected to have can be the result of the fact that these are not indicated concisely in their school curriculum. From teachers' opinions, it is understood that digital competence one is expected to have differs, and therefore the competence level should be made explicit for basic, average or advanced users. Teachers stated that this competence must be integrated appropriately in the school curriculum for different levels of users for example for daily users or for people who do this professionally. Moreover, teachers complained that the school curriculum is outdated, learning outcomes are either insufficient or are not put into practice properly and in some cases not integrated into the curriculum at all. To add, they claimed that shareholders' opinions on the curriculum are usually ignored; teachers are not well informed and motivated. Teachers also mentioned the lack of technological infrastructure as another hindrance to teaching of digital competence in schools.

5. Recommendations

This research attempts to reveal information technology (IT) teachers' opinions on digital competence, a key competence for Lifelong Learning and one of the latest concepts used to denote the technological qualification of individuals today. While touching upon the importance of this competence, it also underscores how crucial it is to provide individuals with this competence. Having said this, the research is limited to IT teachers' opinions who teach this competence in schools. Researchers might consult to other shareholders' opinions, especially to policy makers', to get a more complete and vivid picture of the matter. In this respect, other frameworks developed by the EU,- for teachers (DigCompEdu), for educational organizations (DigCompOrg) and for consumers (DigCompConsumers) can be examined thoroughly (European Commission, 2017, p.7). Such research is expected to offer many advantages to related parties. Policy makers can find local solutions for the successful integration of digital competence into the national curriculum by monitoring global trends. School managers can detect problems preventing the effective teaching of digital competence in their schools. Teachers can seek and follow the best teaching practices around for teaching of this competence in class as well as for developing their own digital competence in terms of their professional development.

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EUROPEAN JOURNAL EDUCATION STUDIE

Indexing and Abstracting

1. International Academic Databases and Academic Social Networks

Google Scholar is a freely accessible web search engine that indexes the full text or metadata of scholarly literature across an array of publishing formats and disciplines. Google Scholar index includes most peer-reviewed online journals of Europe and America's largest scholarly publishers, plus scholarly books and other non-peer reviewed journals. It contains roughly 160 million documents as of May 2014 and approximately 80-90% coverage of all articles published in English. Usually, a period of time, approximately 3-5 weeks, is required between the publication of the research and its indexation. Our indexed articles could be accessed **here**.

Academia.edu is a social networking website for academics. The platform can be used to share papers, monitor their impact, and follow the research in a particular field. It was launched in September 2008, with 31 million registered users as of January 2016 and over 8 million uploaded texts. Academia.edu allows following the evolution of a shared research, offering statistics about referring sources, views of the abstract and downloads of the indexed article. Our profile could be accessed **here**.

ERIC (Education Resource Information Center) is an online library of education research and information, sponsored by the Institute of Education Sciences (IES) of the U.S. Department of Education. The Education Resource Information Center (ERIC) provides access to educational literature and resources. This database provides access to information from journals included in the Current Index of Journals in Education and Resources in Education Index. The submission/accessing procedure are not conditioned by the existence of an account. THE INDEXING IT IS A COMPLEX PROCEDURE, THE ARTICLES ARE REVIWED BY ERIC, CLASSIFIED UNDER THEIR OWN KEYWORDS, ETC.., USUALLY THE INDEXING TAKES BETWEEN 4-6 WEEKS. ERIC INDEXED ARTICLES

ROAD is a Directory of Open Access scholarly Resources. ROAD has been developed with the support of the Communication and Information Sector of UNESCO, it provides a free access to a subset of the ISSN Register. This subset comprises bibliographic records which describe scholarly resources in Open Access identified by an ISSN: journals, monographic series, conference proceedings and academic repositories. ROAD records are enriched by metadata about the coverage of the resources by indexing and abstracting databases, registries and journals indicators. They are downloadable as a MARC XML dump and will be available as RDF triples in 2014.

ICDS = 2.5 (2016) / 2.8 (2017)

Updated annually, **MIAR** (a database of scientific resources developed by **Universitat of Barcelona, Spain, Generalitat di Catalunya and Agencia di Gestio, d'Ajuts Universitaris e di Recerca, Spain**) gathers key data for identification and analysis of journals. These are grouped into major scientific areas -subdivided turn in more specialist academic fields. The system creates a matrix of correspondence between journals, identified by ISSN, and databases, directories and library catalogs that indexed or included. In addition, the link to the websites of the publishers and makers of repertoires and sources indicated institutions is available whenever it. MIAR is a support tool for those who have to perform assessment work : now have data on the identity and dissemination of the journals in which the works are published under evaluation MIAR includes more than 28,000 publications , for each of which its presence and multidisciplinary repertoires BDD is analyzed and as a result their ICDS is obtained.

20 Publications 100 Readers

Mendeley is an academic platform aimed to allow sharing research papers, discovering research data and collaborating online. If offers the possibility of search by abstract, keyword and author, and allows to organize and share data in public and closed groups. Mendeley permits to follow the evolution in terms of the number of readers that accessed/saved the metadata of the shared research articles. Our profile could be accessed **here**.

Zotero is free and open-source reference management software to manage bibliographic data and related research materials. Notable features include web browser integration, online syncing, generation of in-text citations, footnotes, and bibliographies, as well as integration with the word processors Microsoft Word, LibreOffice, OpenOffice.org Writer and NeoOffice. It is produced by the Center for History and New Media of George Mason University, United States of America. Our profile could be accessed **here**.

Zenodo is an online digital repository where researchers can preserve and share their research outputs, including figures, datasets, images, and videos. It is free to upload content and free to access, in adherence to the principle of open data. It was created by OpenAIRE and CERN to provide a place for researchers to deposit datasets.

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Calaméo is a free document publishing platform that creates interactive web publications in real time. It allows following the evolution of the shared document by counting the readers. Our profile could be accessed **here**.

The goal of **Vixra** is to enable anyone to distribute their works of science and mathematics irrespective of their status or affiliations. Vixra is recording and time-stamping submissions and replacements so that the authors can use the information to establish the priority of their discoveries. The URL link to the abstract page can be used as a fixed reference and will remain open access to anyone with an internet connection. By providing this simple service viXra is supporting a growing community of scientists and mathematicians who are excluded from other repositories. Their output through viXra is about 4% of the quantity of submissions of arXiv (the biggest official academic repository.)

CiteUlike is a web service which allows users to save and share citations to academic papers. Based on the principle of social bookmarking, the site works to promote and to develop the sharing of scientific references amongst researchers. When browsing issues of research journals, small scripts stored in bookmarks (bookmarklets) allow one to import articles from repositories like PubMed, and CiteULike supports many more. Then the system attempts to determine the article metadata (title, authors, journal name, etc.) automatically. Users can organize their libraries with freely chosen tags and this produces a folksonomy of academic interests. Our profile could be accessed **here**.

ERIH (European Reference Index for the Humanities) is an index containing bibliographic information on academic journals in the humanities and social sciences. It has been called "**the most important and prestigious reference index in the European Union when it comes to international quality and impact accreditation for scientific journals in the areas of Humanities and Social Sciences**". The index includes all journals that meet the following requirements: "explicit procedures for external peer review; an academic editorial board, with members affiliated with universities or other independent research organizations; a valid ISSN code, confirmed by the international ISSN register; abstracts in English and/or another international language relevant for the field for all published articles; information on author affiliations and addresses; a maximum two thirds of the authors published in the journal from the same institution". ERIH was originally established by the European Science Foundation and was transferred to the Norwegian Social Science Data Services in 2014, mainly because it already operates the Norwegian Scientific Index. At the same time it was extended to also include social science disciplines and renamed ERIH PLUS. The list with the approved publications could be accesed **here**.

BibSonomy is a social bookmarking and publication-sharing system. It aims to integrate the features of bookmarking systems as well as team-oriented publication management. BibSonomy offers users the ability to store and organize their bookmarks and publication entries and supports the integration of different communities and people by offering a social platform for literature exchange. Both bookmarks and publication entries can be tagged to help structure and re-find information. As the descriptive terms can be freely chosen, the assignment of tags from different users creates a spontaneous, uncontrolled vocabulary: a folksonomy. It is developed and operated by the KDE group of the University of Kassel, the DMIR group of the University of Wurzburg, Germany. Some samples of our submitted research could be found here:**1**,**2**,**3**,**4**,**5**,**6**,**7**,**8**,**9**,**10**.

The **Open Archives Initiative** (OAI) develops and promotes interoperability standards that aim to facilitate the efficient dissemination of content. OAI has its roots in the open access and institutional repository movements. Continued support of this work remains a cornerstone of the Open Archives program. Over time, however, the work of OAI has expanded to promote broad access to digital resources for eScholarship, eLearning, and eScience. The Open Archive Initiative project is developed by Cornell University, USA. The profiles of our journals could be accessed here: **EJES**, **EJPESS**, **EJFLT, EJELT, EJSER, EJAE, EJOEES.**

Journal Index (ScopeMed JournalIndex.net) is a directory database service offered by ScopeMed that stores journals data and allows searching by various criteria: name, research area, country, language. It contains more than 9900 journals (March 31, 2016). The profiles of our journals could be accessed here: EJES, EJPESS, EJFLT, EJELT, EJSER, EJAE, EJOEES.

AcademicKeys is the premier source for academic employment. Our 18 discipline-focused sites offer comprehensive information about faculty, educational resources, research interests, and professional activities pertinent to institutions of higher education. More than 89% of the top 120 universities (as ranked by US News and World Report) are posting their available higher ed jobs with AcademicKeys.com. Our profiles could be accessed on the social sciences section (searching by publisher, ISSN or name of the journal) **here**.

The **Electronic Journals Library** (EZB) is a service to facilitate the use of scholarly journals on the internet. It offers a fast, structured and unified interface to access full-text articles online. It comprises 85027 titles from all areas of research, 16697 of which are available online only. In addition, 88009 journals, which are provided by aggregators, are listed. The EZB contains 52639 journals which are accessible free of charge to anyone. Furthermore, the participating libraries provide their users access to the journals they subscribe to. The journals are presented in lists sorted by research area. An updated list is generated by the database according to the member library's specifications each time it is accessed. The availability of full-text access is indicated by traffic-light symbols according to the license situation of each member library. The Electronic Journals Library project is developed by Regensburg University, Germany. The profiles of our journals could be accessed here: **EJES, EJPESS, EJFLT, EJELT, EJSER, EJAE, EJOEES**.

BASE (Bielefeld Academic Search Engine) is one of the world's most voluminous search engines, especially for academic open access web resources. BASE is operated by Bielefeld University Library, Germany. It facilitates effective and targeted searches and retrieves high quality, academically relevant results. The articles metadata is harvested

periodically, a period of around 2-4 weeks could occur between the publication and indexing. Samples of our submitted research could be find here: **1**,**2**,**3**,**4**,**5**,**6**,**7**,**8**,**9**,**10**. or with a **verbatim search**.

DataCite is an international not-for-profit organization which aims to improve data citation in order to establish easier access to research data on the Internet, increase acceptance of research data as legitimate, citable contributions to the scholarly record and support data archiving that will permit results to be verified and re-purposed for future study. DataCite was subsequently founded in London on 1 December 2009 by organisations from 6 countries: the British Library; the Technical Information Center of Denmark (DTIC); the TU Delft Library from the Netherlands; the National Research Council's Canada Institute for Scientific and Technical Information (NRC-CISTI); the California Digital Library (University of California Curation Center); Purdue University (USA) and the German National Library of Science and Technology (TIB). Samples of our submitted research could be found here: **1**,**2**,**3**,**4**,**5**,**6**,**7**,**8**,**9**,**10**.

Genamics JournalSeek is an online database covering academic journals. The JournalSeek database contains 104166 journals from 6434 different publishers (February 2016). The database includes journal descriptions and links to the journals' homepages. Journal information includes the description (aims and scope), journal abbreviation, journal homepage link, subject category, and ISSN. Searching this information allows the rapid identification of potential journals to publish your research in, as well as allow you to find new journals of interest to your field.Our profiles could be accessed here: **EJES**, **EJPE**, **EJSER**,

2. Impact Factor

CiteFactor is a service that provides access to quality controlled Open Access Journals. The Directory indexing of journal aims to be comprehensive and cover all open access scientific and scholarly journals that use an appropriate quality control system, and it will not be limited to particular languages or subject areas. The aim of the Directory is to increase the visibility and ease of use of open access scientific and scholarly journals thereby promoting their increased usage and impact. **(Impact Factor under evaluation)**

Impact factor = 3.719 (2016)

ResearchBib (Research Bible) is open access with high standard indexing database for researchers and publishers. The Journal Database contains 420,000+ journals from different publishers, which includes the title, abbreviation, journal host url, index, publisher, description (aims and scope), online issn and print ISSN etc.Research Bible may freely index journals, research papers, call for papers, research position. Journal Database try to cover all open access scientific and scholarly journals that use an appropriate quality control system, and it will not be limited to particular languages or subject areas. An Impact Factor based on citations, article reviews, accessings and number of published articles is calculated every year for every journal submitted. The profiles of our journals can be accessed here: **EJES** A ResearchBib free account is required in order to access the profiles.

Impact factor = 0.101 (2017)

OAJI (Open Academic Journals Index) is a full-text database of open-access scientific journals founded by International Network Center for Fundamental and Applied Research, Russian Federation. It s19tores more than 78.000 articles from 2100 journals from 90 countries. A Journal Impact Factor is calculated yearly based on previous activity: accessing, citation, indexing in databases, author provenience, website design, etc.. **(Impact Factor under evaluation)**

Section under Construction (pending subscriptions)

JournalTOCs is a Current Awareness Service (CAS) where you can discover the newest papers coming directly from the publishers as soon as they have been published online. It is one of the biggest searchable collections of scholarly journal Tables of Contents (TOCs). It contains articles' metadata of TOCs for over 27,299 journals directly collected from over 2824 publishers (February 2016). It is a project of School of Mathematical and Computer Sciences, Heriot-Watt University, Edinburgh, United Kingdom.

SHERPA/RoMEO is a database service run by SHERPA (Joint Information Systems Committee, United Kingdom, University of Nottingham, United Kingdom and University of Lund, Sweden) aimed to show the copyright and open access self-archiving policies of academic journals. The database uses a color-coding scheme to classify publishers according to their self-archiving policy. This shows authors whether the journal allows pre-print or post-print archiving in their copyright transfer agreements. It currently holds records for over 22,000 journals (February 2016).

Further Indexation and Abstracting are in process.
