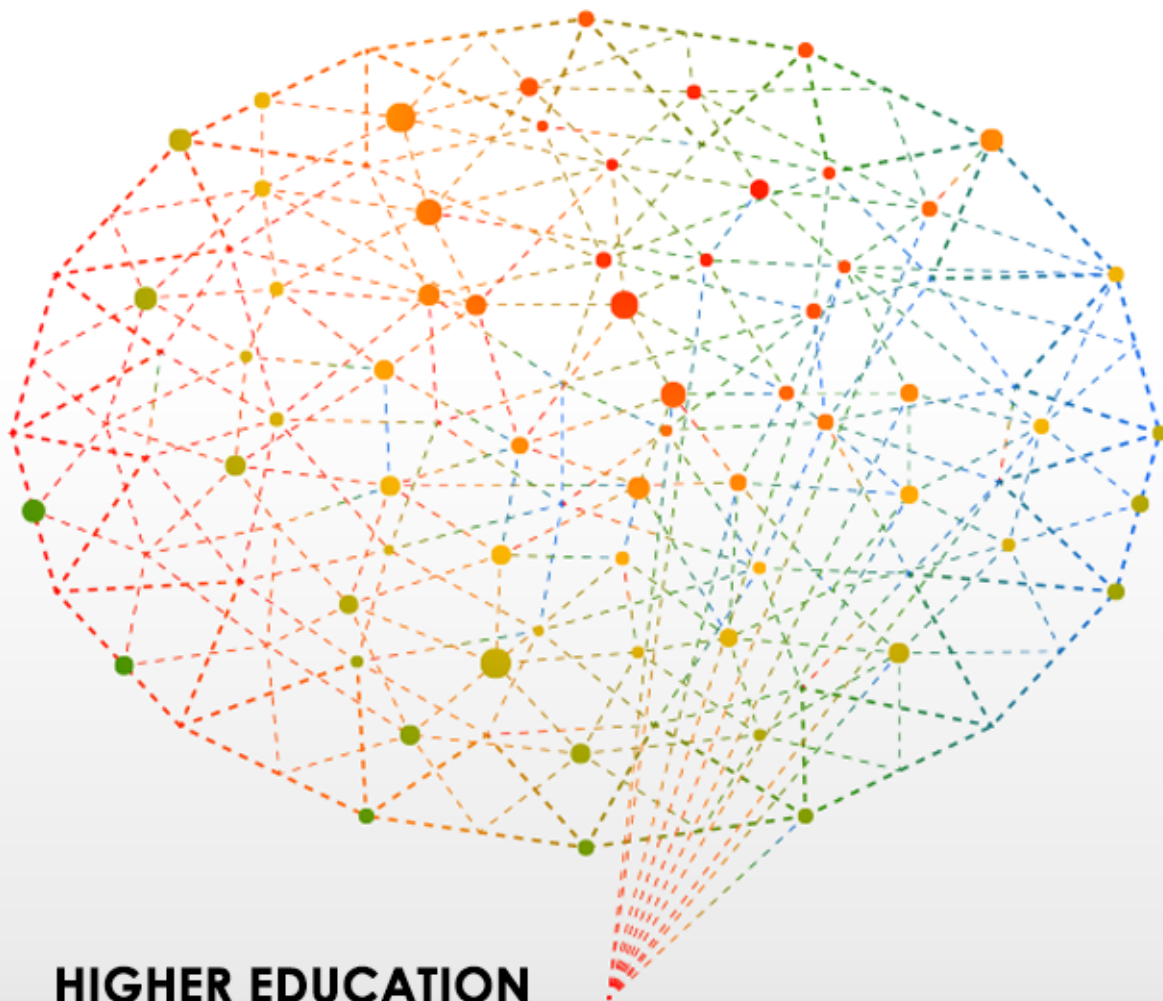




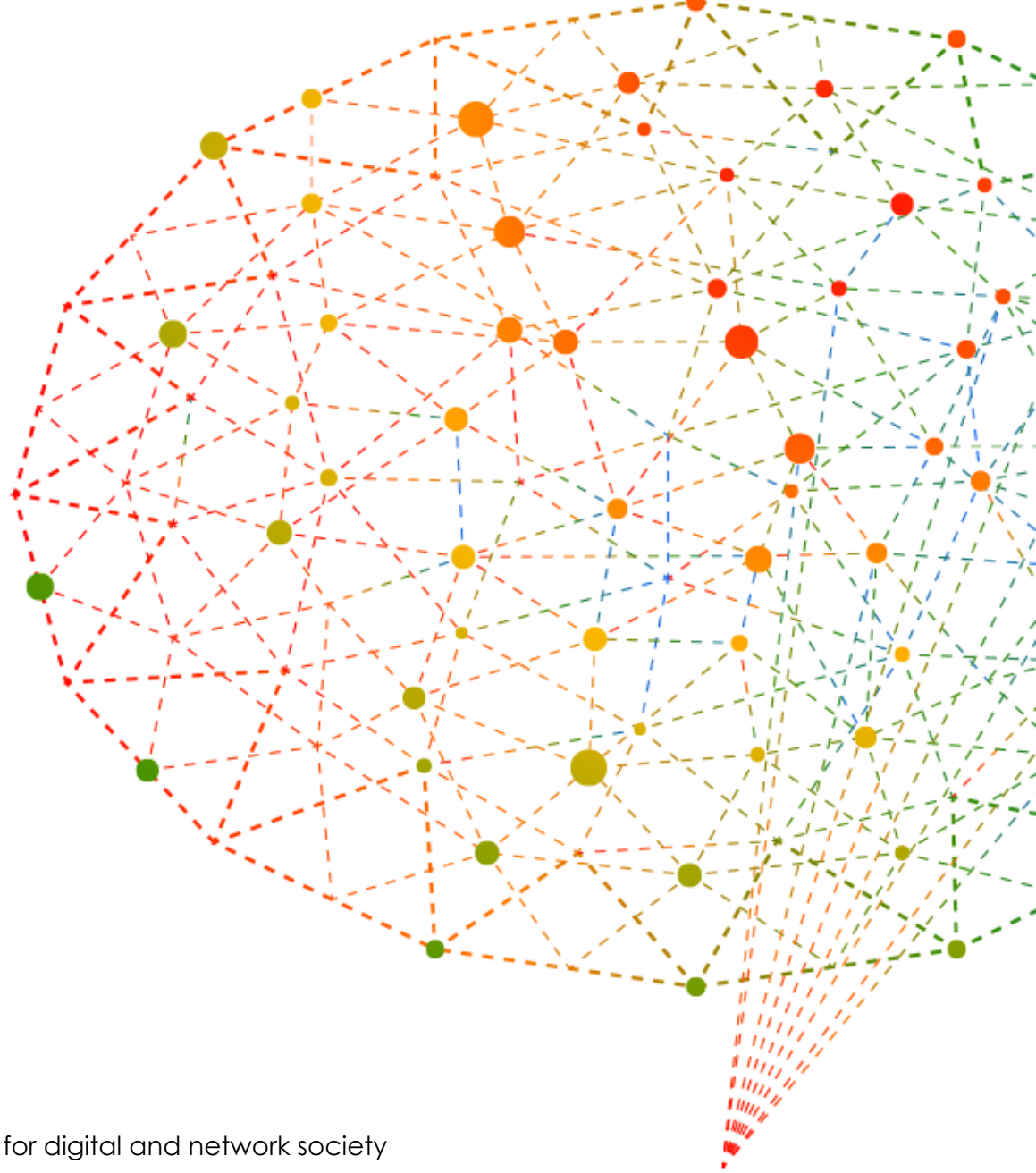
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**HIGHER EDUCATION  
FOR DIGITAL  
AND NETWORK SOCIETY**



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## Introduction

Technology is leading to tremendous changes in social political, cultural, and economic life. Castells (2004) argues that the key factor distinguishing contemporary society is the fact that the use of technologies helps to create and sustain far-flung networks in which new kinds of social relationships and communication are created (p. 3). The new phenomenon of Digital and Network Society (DNS) has emerged which creates a new culture and requests new learning modes. European Digital Economy and Society Index (DESI, 2018) data show that in 2017, 79% of Europeans went online regularly (at least once a week). 70% of Europeans read news online and 65% use social networks. The largest increase relates to the use of the Internet for voice and video calls, where the share of the Internet users went from 39% in 2016 to 46% in 2017. Digital technologies and networks are leading to changes in the way we learn and relate to each other and, most importantly, it encourages openness to learning by using a variety of tools, resources and environments. The necessity of openness in learning is widely discussed among scholars (Judith & Bull, 2016; Santos-Hermosa, Ferran-Ferrer, & Abadal, 2017). The research results (Rolfe, 2017) are used to help create meaningful messages for communication on openness in and for learning. The role of personal practice, learner benefits, content, institution, value and culture need to be stressed. DNS members learn in new, timeless and borderless, spaces. Such society members are always connected and online, sharing and co-creating knowledge, and their learning needs serve as the greatest driving forces for higher education (HE) curriculum change. Research results show that there are various factors affecting the need for HE curriculum change, including the fourth industrial revolution (Schmidt, 2017), emerging technologies, open educational resources (McGreal, 2017; Redecker, 2017), globalization, education for all and lifelong learning (Berry, 2018) and many others. Besides pedagogical and economic motives, there is a growing need for flexibility of time and place, and better use of resources (Kyburienė & Juodeika, 2015), benefiting both residential students and a wider range of professional and other lifelong learners.

Researchers argue that universities reshape education on the web (Lewin, 2012) and address the necessity of providing relevant and innovative study programmes, discuss how to reinforce the teaching mission of universities by maintaining curricular reform and renewal, introducing new approaches to teaching, offering flexible learning paths adapted to the needs of different learners (Smidt & Sursock, 2011; Teichler, 2015). Gaebel, Kupriyanova, Morais, and Colucci (2014) studies reveal that almost all HE institutions are involved in some forms of online learning. It seems that there has been no sudden and disruptive change, but rather a gradual adaptation has taken place, which continues at different paces and scales across Europe.

However, the gap between emerging ways of learning among DNS members and HE curriculum increases, because the latter does not change properly to meet the new learning needs in terms of openness and flexibility in and for learning. Students leave HE and join diverse society groups and become lifelong learners selecting open and online learning (OOL) possibilities, searching for more flexible learning, for digital and accessible curricula, as well as for flexible forms of recognition of learning achievements (Guardia, Maina, & Sangra, 2013; Orsini-Jones, 2015). Often one of such possibilities is massive open online learning courses (MOOCs). A UNESCO and Commonwealth of Learning study (Patru & Balaji, 2016) reveals the potential of MOOCs to reach sustainable development goals, but Butcher and Rose-Adams (2015) argue that they are too narrow to meet learners' needs. The research on OOL is often related with MOOCs, studying this recent trend in education due to its impact on the innovative pedagogy (Marc & Barbera, 2013; George, Forsey, & Riley, 2013), searching for quality (Stracke, 2017; Margaryan, Bianco, & Littlejohn, 2013), different aspects of students behaviour (Onah, Sinclair, & Boyatt, 2014; McAndrew & Scanlon, 2013). Some researchers (Witthaus et al., 2016) while analyzing assessment and recognition practices in Europe and, particularly, MOOC-based learning, pointed out the need for further research on practices which would enable the setting up of specific strategies for advancing the recognition of open education in Europe. While research on Open Online Learning reveals different aspects and roles of HE, it becomes clear that the student lifelong learning model should not be restricted to traditional students; non-traditional groups should benefit as much from the open online learning.

Thus, regardless of the fact that there are examples of successful opening up of HE, universities still face challenges related to the transformation of their curricula to OOL. Mainly, there is too little research to identify the new characteristics of the transformed OOL curriculum. Classical parameters of HE curriculum, such as content, pedagogy, collaboration, assessment and recognition, as well as its flexibility and accessibility have to be adapted to the new features and characteristics that would meet the needs of DNS and other stakeholders. They need to be researched, identified and classified.

Furthermore, while researching OOL curriculum, open educational resources (OER) are important learning materials with the potential to facilitate the expansion of learning worldwide. The openly licensed content is an important precondition for supporting the educational use of content in almost all educational settings (McGreal, Kinuthia, & Marshall, 2013). It is important to establish OER development and sharing practices, as well as to investigate teacher and learner attitudes towards OER and how they improve and transform HE curriculum into OOL. A field of particular significance is the field of OOL, and it may be the most relevant solution for HE in transformation of curricula to meet the needs of DNS. However, OOL is still in early

adoption by HE. Research in OOL reveals that new innovative curriculum design, flexibility in time and space, and open teaching and learning models enable various society groups, of different age and with diverse possibilities, to access formal HE. However, OOL does not yet become a considerable part of HE available for DNS members and their emerging learning needs.

We define OOL as a set of specific characteristics that are typical of open distance learning (Tait, 2000; Thorpe, 2002; Cole, Shelley, & Swartz, 2014): open and flexible learning online; ensuring accessibility to open / distance learning courses; collaboration carried out by learners in online learning activities as integral for both, learner support and course content; developing new open knowledge and open learning practices as a result; exploiting and exploring learning groups themselves as resources for study and personal development, as well as sharing learning outcomes among learners, with the teachers and with the society at large.

If we reconsider the conceptual framework of DNS in terms of how it affects technology enhanced or enabled learning in "timeless time" and "space of flows" in "virtual reality" described by Castells (2000 b; 2014)) and Van Dijk (2012), the investigation of the spaces and places of learning by DNS becomes urgently important for HE so that environments that meet the emerging ways of learning could be prepared, as well as the characteristics of the transformed OOL curriculum could be established. HE institutions need a model of OOL environment suitable for educating DNS members, which is not developed yet at all.

The complexity of this research is consistently linking the following elements: the description of the DNS, its needs for OOL, new emerging ways of learning and how they are compatible with the methodology of OOL, characteristics of the new and transformed OOL curriculum, as well as modeling of the main characteristics of OOL environment suitable for educating DNS members, and creating possibilities for designing OOL curriculum for HE and, following the needs of DNS members, providing open and flexible online learning possibilities. All these elements are mandatory dimensions of transformation of OOL curriculum in HE meeting the needs of DNS.

**The problem addressed by the research** is the increasing gap between DNS and traditional HE curriculum. Although a lot of steps have already been taken in order to further align teaching and learning practices in institutions of HE, to better qualify teachers to be able to use technologies for teaching, and to improve institutions' infrastructures to meet the needs of a 21<sup>st</sup> century university, one particular issue still remains critical: the development of curricula which are designed to foster the development of future skills (OECD 2018) for students, and to meet the needs of digital and network society.

A particular field of early adaptation is the field of OOL. Due to its capability of adaptation of using technology for delivery over distance and time it has both potential and need to advance to the forefront of the educational sector when it comes to curriculum development. However, the questions what OOL methodology best suits the needs of DNS and HE curriculum transformation have not been answered yet. The parameters of the new HE OOL curriculum have not been described, nor the model of OOL environment has been developed.

**Abbreviations used in this study**

DNS – digital and network society

OER – open educational resources

OOL – open online learning

MOOC – massive online open course

VLE – virtual learning environment

LO – learning outcomes

## Research methodology

**The aim of the research is to *identify characteristics of transformed open and online learning curriculum and to establish a model of open and online learning environment which meets the emerging learning needs of digital and network society.***

In order to achieve this aim, first, the needs of DNS members will be identified, and the new emerging learning ways will be described in the first chapter of this study.

Second, in Chapter Two of this study, transformation processes of HE curriculum will be described and the characteristics of OOL curriculum will be defined, with the special focus on the importance of OER and their impact on the transformation of HE curriculum.

Finally, a model of OOL environment will be developed, based on the DNS needs for OOL, and OOL curriculum parameters identified. The third chapter of this study will be dedicated to the modeling of the OOL environment, while the new knowledge of overall research will be presented in the final chapters of the book.

The object of the research is open and online learning for digital and network society.

The research problem, object and purpose concentrate on specific research questions, which the research study aims at clarifying based on the results of the empirical qualitative and quantitative study, identifying the needs of DNS society for OOL, as well as reflecting on OOL curriculum parameters, impact and importance of OOL transformation in HE, as well as OOL environment modeling in HE. Thus, the research questions are as follows:

- What are emerging learning needs of digital and network society?
- How open and online learning curriculum in higher education should be transformed to meet the emerging learning needs of digital and network society?
- What kind of open and online learning environment would best suit the needs of digital and network society and would help universities to transform HE curriculum to OOL?

In order to find answers to the above research questions, qualitative and quantitative research methodology as a mixed method of empirical research was chosen. An overview of the overall research process applied by the research team is given in Figure 1 Overall research process, including the first step of the study undertaken by the research team through which the key concepts used in the study were identified and defined, namely, the description of DNS and characteristics of OOL and curriculum.

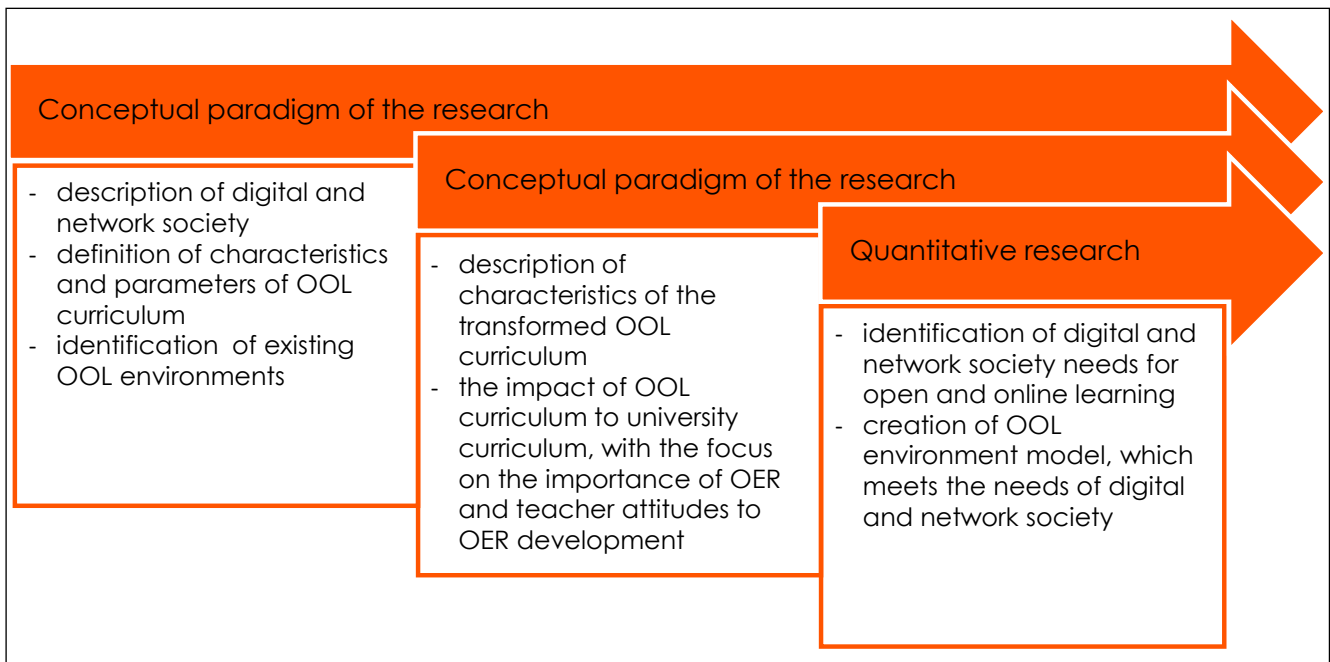


Figure 1. Overall research process

As a second step, a qualitative research has been performed in order to describe the characteristics of the transformed OOL curriculum and the ability of the university teachers to develop the OOL curriculum, with the focus on the importance of OER.

During the third step, a quantitative research has been performed with the aim of identifying DNS needs for OOL and environment. All the research steps were taken in parallel, and OOL environment model was developed as a result of the study.

In this study, we will present the research in connection with theoretical discoveries, supplementing them with qualitative or quantitative findings.

### **Qualitative research**

As defined by numerous researchers (Merriam, 2002; Creswell, 2007, 2009; Flick, 2009), qualitative research is based on induction and description of results, and its purpose is to study and understand complex phenomena with their own characteristics, and to present various meanings and attitudes about the investigated phenomena from the perspective of participants.

The lack of research on the identification of the factors influencing the needs for the change of open online learning in high education, taking into account emerging digital and network society learning needs, has led to the selection of a qualitative research paradigm that helps to understand human experience and to reveal the subjective meaning and interpretation of instances of individual experiences without isolating them from the context.

### **Data collection tool**

In the qualitative study semi-structured interviews and field observation were used for data collection. At the initial stage of the research, the tool for data collection was constructed on the basis of theoretical findings and orientated towards the key research question. Seven open-ended questions about the characteristics of DNS; the emerging ways of learning; the changing role of universities for meeting the needs of DNS; on the description of a transformation of OOL curriculum; the impact of OER towards OOL in HE, as well as the main parameters of the OOL environment were defined.

The participants of the interview gave permission to record the conversations with a voice recorder. Essential aspects of the interview or questions were noted in the researcher's diary.

### **Interviewees**

In this study, a targeted selection of interviewees has been used to select those who are most familiar with the research problem and can provide detailed information on the needs for the change of OOL in HE, taking into account emerging learning needs of DNS.

The following criteria were applied for the selection of research participants:

1. Experts involved in the activities of one of the biggest European or global professional associations in the area of OOL;
2. Experience of at least 10 years of working in the field of OOL, either implementing OOL in HE or working with OOL solutions for HE;
3. Experts representing different countries worldwide and working with DNS members (either creating OOL solutions or being involved in innovating non-formal and formal HE).

All experts were either creating OOL solutions for HE institutions or were involved in one or another way in non-formal and formal HE innovations that help to meet the learning needs of DNS (Table 1). The experts were invited for the interview during the international events and volunteered for the interviews. The size of the whole sample of experts meeting the selection criteria is not known, but during the international conferences and seminars the selection criteria were announced to session participants and the ones who volunteered were invited for the interview.

Potential participants have been contacted by emails the contents of which presented the topic of the research, the aims of the study and a request to participate in the interview. Having received the consent, the researchers visited the interviewees and interviewed them face to face, except for one case when the expert was interviewed at a Skype session. The duration of one interview lasted up to 1 hour.

Table 1. Characteristics of research participants

Participant code	Gender	Experience of working in OOL (years)	Work position	Type of institution	Country
I1	F	11	Researcher	University	Lithuania
I2	M		Researcher	University	Italy
I3	F	15	Policy maker, administrative staff	University	Croatia
I4	F	10	Practitioner, administrative staff	University	Croatia
I5	M	12	Researcher, practitioner, administrative staff	University	Hungary
I6	F	10	Researcher	International foundation	Spain
I7	M	11	Researcher, practitioner, administrative staff	University	Germany
I8	M	18	Researcher, practitioner, administrative staff	University	Spain
I9	M	12	Policy maker, researcher	Company	Malta
I10	F	10	Practitioner, teacher, administrative staff	University	Lithuania
I11	F	10	Researcher, teacher, administrative staff	University	Lithuania
I12	F	11	Practitioner	Company	Hungary
I13	M	10	Researcher, company owner	Private company	USA

The researchers interviewed 13 international experts from eight countries (Table 1), based on the fact that such an interview would help to obtain enough meaningful information for the research, which would help ensure data saturation. The study involved 7 women and 6 men aged 35-60, with the experience in the open online learning from 10 to 18 years and currently working on the policy level in higher education, with ample experience in practical application.

### Data analysis

Qualitative data were analysed through thematic analysis based on the steps documented by Clarke and Braun (2013) and presented as a linear, six-phase method (Nowell et al., 2017). The

process of the thematic analysis is described in Table 2.

Table 2. The process of the thematic analysis (based on Clarke, & Braun, 2013; Nowell et al., 2017)

Phases of thematic analyses	Description of the process
Familiarizing with data	Data transcription, active reading and secondary reading, searching for meaning, primary coding, writing researcher's notes
Generating Initial Codes	Selection of interesting semantic and latent data ideas, systematization into meaning groups, comparison of data with code matching, preliminary data record analysis in the researcher's notes.
Searching for Themes	Grouping codes into broader groups, assigning data to each potential theme, searching for links between themes and code topics
Reviewing Themes	Checking whether the data reflects the codes and the topics; assessing internal and external homogeneity of themes, designing the thematic map. Themes and subthemes are vetted by the researchers' team.
Defining and Naming Themes	Rethinking and establishing titles of the themes, linking them to the contents of the data, analyzing the consistency of the themes.
Producing the Report	Drafting the report. Selection of the most prominent and interesting data examples, description of the data, interpretation, argumentation, linking it with the research question and scientific literature.

Certain preliminary broad theme nodes were provided to describe the phenomenon of research, however, the data were essentially processed on the basis of the inductive research logic, since the underlying themes and subthemes were formed directly from the results of the empirical data.

The choice of the inductive research data processing logic, the coding is characterized by a "recognition of moments" before the process of interpretation: the theme must at least minimize the organization, characterize information and maximize the interpretation of the aspects of a phenomenon.

Using the thematic analysis method, the results of the research are illustrated by a thematic map with a detailed description and the interpretative analysis (Attride-Stirling, 2001; Clarke & Braun, 2013).

**Ethics.** The study was initially guided by the principle of volunteering (Flick, 2009; Smith., Flowers, & Larkin, 2012), an oral consent was received from the participants to participate

in the interview. The investigation was confidential (no one except the researcher can use information provided) and anonymous, without disclosing the identity of the participants in the investigation. The analysis of the data has also been guided by the principle of impartiality in order to see the data as they are, in an effort to disclose, without preconditions, a transformation of OOL curriculum in HE taking into account emerging learning needs of DNS.

**Limitations.** There are some limitations that should be considered regarding this research. Firstly, the qualitative research strategy reflects subjective experiences of research participants thus the research results cannot be generalized. Moreover, interviewees who were chosen based on purposive sampling, may not have revealed all the potential approaches towards the research question. Therefore, a thematic map may represent only a part of themes and sub-themes that are important for the research question. Finally, the fact that most of interviewees and researchers themselves are non-native English speakers is also seen as an important limitation of the study.

#### **Quantitative research. The case of Lithuania**

The questionnaire was developed, approved and used by the research team for a statistically representative survey of adult population between 18 and 74 in Lithuania in 2018. Survey method: mixed, online survey and face-to-face survey. Quantitative research was performed in two ways:

1. The electronic version of questionnaire was put into the Internet website of Open Studies portal, Vytautas Magnus University, [https://docs.google.com/forms/d/e/1FAIpQLSe2u1kXj7M4V6zedx5owEg9Of4fqgY21zklrWqJmFAPZ\\_e7Q/viewform](https://docs.google.com/forms/d/e/1FAIpQLSe2u1kXj7M4V6zedx5owEg9Of4fqgY21zklrWqJmFAPZ_e7Q/viewform). The number of responses received was 235.
2. A direct interview at the respondent's place by using multivariate probabilistic stratified sampling. The quantitative research was performed with the help of Market and Opinion Research Centre "Vilmorus Ltd." The research was carried out in 26 cities and 34 villages (Vilnius, Kaunas, Klaipėda, Šiauliai, Panevėžys, Alytus, Šakiai, Tauragė, Rokiškis, Utena, Švenčionys, Telšiai, Mažeikiai, Raseiniai, Ukmergė, Kupiškis, Molėtai, Akmenė, Kretinga, Prienai, Varėna, Klaipėda, Šiauliai districts and Kalvarija, Birštonas, Pagėgiai and Elektrėnai municipalities). Also, at airports, to get a spectrum of opinions on distance learning from Lithuanians living abroad. 3648 visits and interviews were made, and 1241 completed questionnaires were selected for analysis.

Online survey and face-to-face survey data were merged for statistical analysis using MS Excel and the 23<sup>rd</sup> version of SPSS (Statistical Package for Social Sciences). For the data analysis descriptive statistics, factorial analysis, non-parametric criteria were used.

## **Data collection tool**

A survey questionnaire was prepared based on the theoretical conceptual analysis of three main thematic areas: 1) the digital and network society and its characteristics; 2) the OOL and curriculum; 3) an analysis of the existing variety of OOL environment. The questionnaire consists of Intro and Demographic questions (research participants' gender, place of residence, marital status, education and employment) and four survey parts. All in all, there are 26 questions that are all designed for typical Likert scale responses:

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The first part deals with questions about learning online. Only those who use the Internet are supposed to participate in the research. So those whose response to the main question "Do you use Internet?" was negative did not continue to participate in the survey. The section includes questions concerning the meaning of learning, time spent online, learning online, motivation to learn and most acceptable forms of learning online.

The second part includes questions on experience with social networks: participation, indications where to follow information, devices used most often when connecting to the social network or getting online, purposes for which social networks are mostly used.

The third part on open learning deals with the importance of choosing suitable time to learn at a suitable pace, to combine work and family, get information in different forms (video, audio, in writing, etc.), to get a badge for automatic synchronization with social networks.

The fourth part is related to services provided specifically in higher education, disclosing, for instance, whether Lithuanian higher education institutions (universities and colleges) respond to the respondent's learning needs, or highlighting features that are important for a virtual learning environment and attractiveness of studies or professional development at the HEI.

When processing the responses for presenting the survey data graphically in other sections of this book, we have combined the statements used in the Likert scale, for example, merging agree and strongly agree into one answer.

## **Research participants' characteristics**

The population of the study is Lithuanians aged 18-74 in Lithuania and abroad who use the Internet. The total number of respondents is 1241, 45% men and 55% women respectively.

For the 1000 respondents surveyed, the maximum statistical error is +3.1%, at 95% reliability.

Such accuracy is recommended in an empirical sociological research in social sciences. When the the number of the respondents is 1241, statistical error for different results satisfies the reliability indicators (at 95% reliability level).

Distribution according to the place of residence is as follows: 68% of the respondents are from cities (with more than 10,000 residents), the rest 16.5% living abroad, 22.7% in small villages or farmsteads and 9.3% are from towns (with less than 10,000 residents). Thus the majority of respondents are from cities with more than 10,000 inhabitants.

By the age, the research participants distributed fairly evenly, all the groups starting with age 18-24 coming close to 20% of the age group (see Figure 2), only the age group 65+ was as small as 8%.

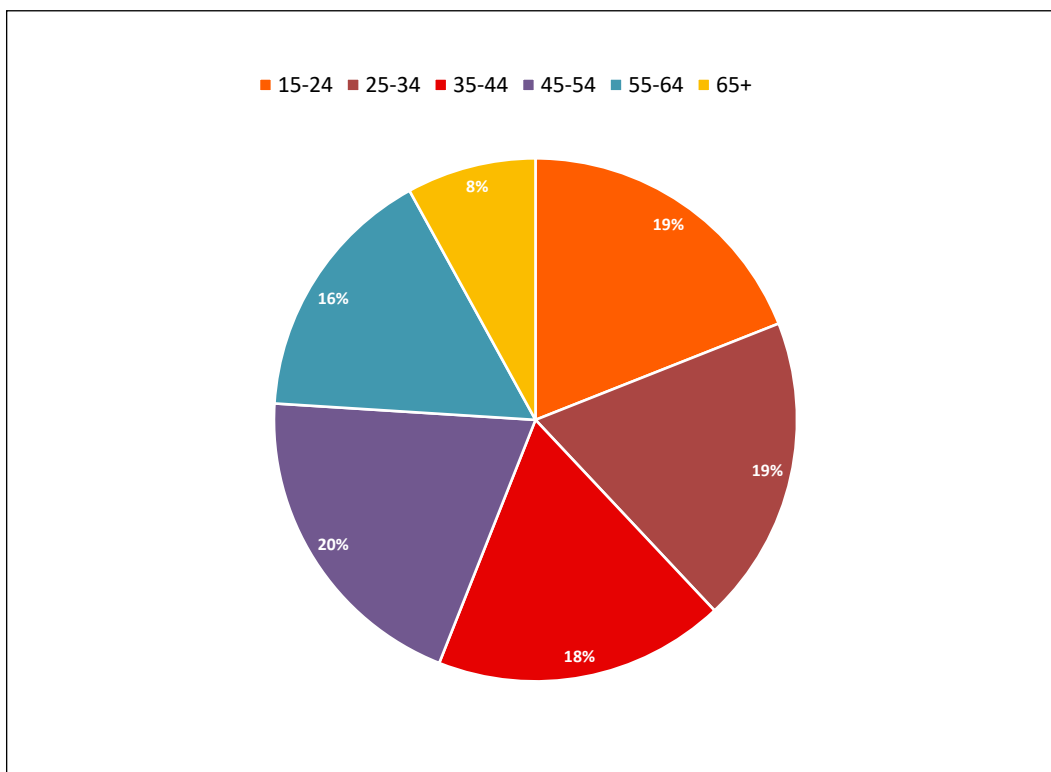


Figure 2. Respondents according to the age (Authentic project researchers' findings)

Therefore, in this research we chose to group the respondents into four groups: up to 27 years; 28-38 years; 39-52 years and senior than 53 years. This was done for a more even distribution of the respondents in each group.

The research participants were mostly full-time employees, 57%; also students, 14%; people in retirement, 9%; part-time employees, 7%; unemployed, 5%; entrepreneurs, 4%; parents raising small children, 2% (Figure 3).

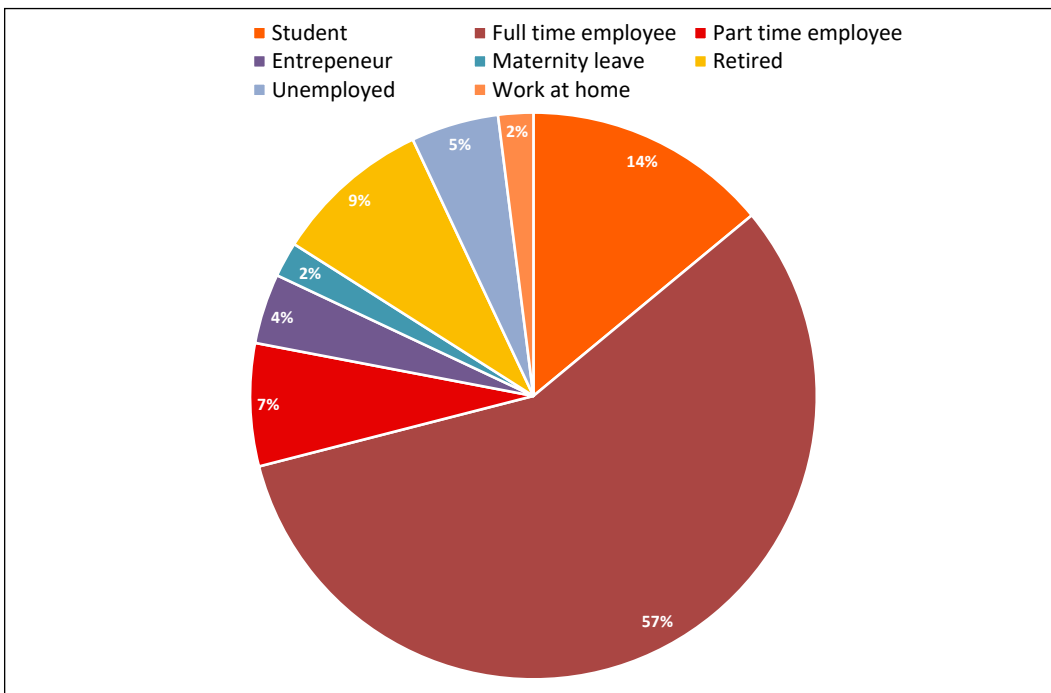


Figure 3. Research participants according to their employment status (Authentic project researchers' findings)

Respondents according to the type of education fall into the following groups: the majority of respondents hold a degree in tertiary education (59%); 14.6% participants have a vocational education degree; 16.4% have secondary education; 8% have upper secondary (gymnasium) education, and the minority, 2% only, have primary education.

The occupational area covers a wide range of professions, starting with social care, police, agriculture, education, administration, building and development, industry, management, services. The biggest number of research participants indicated being in a sales manager's position, 14.5%, and every other choice was less than 10%.

Figure 4 indicates the amount of money research participants could allocate per month for learning, which varies from 100 EUR (8%) to less than 25 EUR (21%); 19% of the participants could allocate 26 to 50 EUR/month, and 14% could allocate 51 to 100 EUR. However, 10% did not want to specify the amount and 28% did not know it. This means that for undecided persons online educational services, their quality and their personal motivation would be very important.

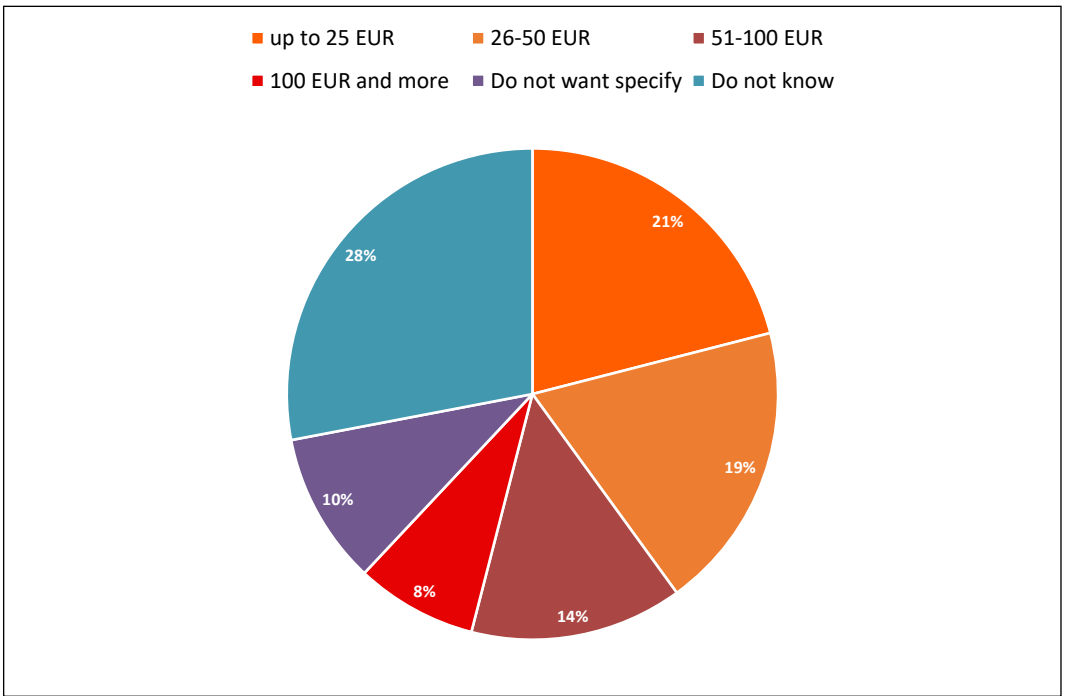


Figure 4. The amount of money research participants could allocate per month for learning (Authentic project researchers' findings)

**Limitations.** Direct surveying at the respondents' home failed due to the main reasons: only those who use Internet were included in the research; face-to-face interviews failed because respondents were not found at home after the second visit or refused to participate. In general, there were 3648 visits, of which only 1006 have been successful. The questionnaires that have been filled in remotely could hardly be controlled and the researchers faced difficulties when processing data without distorting information. Only correct and complete questionnaires were included into the research.

## 1. The emerging learning needs of digital and network society

In the following section, we present a brief literature overview on the state of the art of research in the field of DNS, its challenges and the emerging places and spaces of learning, and present the results of the interview study indicating connectedness as a key characteristic of DNS members. Moreover, we describe the emerging learning needs of DNS based on quantitative analysis focusing on motivation, acceptable forms of learning, most often used devices and social networks.

### 1.1. Digital and network society. A conceptual theoretical paradigm of the research

The European Commission (2015) compares the impact of the development of high-speed Internet for the society today with the development of electricity and transportation networks a century ago. Achieving the digital agenda targets justifies the way to innovative services such as e-health, e-government, smart cities and data-driven manufacturing.

New technological devices such as mobile phones, tablet computers, and social networks make impact on communication patterns and contribute to the merging of people's online and offline lives. They know and find everything they are looking for: they have social networks to establish relationships, online search harvesting tools to find information, online news and networking solutions such as tweets to track news from your networks, professional online networks for career development and consultancy, and research online platforms for networking and sharing research activities and results. Technological uptake and development show "no sign of slowing down. Technology is leading to massive changes in the economy, in the way we communicate and relate to each other, and increasingly in the way we learn" (Bates, 2015, 21). Many jobs will be disappearing, and new ones will be created because of digital changes, and there is already a need of knowledge workers that can adapt quickly to these changes, and learning is the key for this capacity (EAEA, 2015).

Theoretical foundations for DNS were grounded by the Spanish sociologist Castells (2000a; 2000b) who developed the theory of the network society, emphasizing the impact of digitalisation on human beings and society. The concept of the network society is closely associated with social consequences of globalization and the role of e-communications technologies. The definition of a network society is that it is "a society whose social structure is made up of networks powered by micro-electronics-based information and communications technologies." (Castells, 2004, p. 3).

There are no universal definitions of the terms "digital", "digitalization", or "network". Digitalisation can be seen as the use of human-computer interaction in order to achieve desired or explained as the process of integrating technologies into people's lives through digital resources

(Niedzwiecka & Pan, 2017). Digitalisation can also be understood as the way how our social life is reorganised around digital communication and media infrastructure (Wildemeersch, & Jütte, 2017) and how it affects our daily life in its routine manifestation, such as shopping, banking transactions, leisure time, the way we communicate, listen to music, watch TV and play games.

The digital society requires a digital citizen, the one who has digital skills and is able to adapt to changes taking place in the society. In reality many citizens of the digital age demonstrate aspirations in making contributions to the society. The phenomenon of digitalization as a paradigm of thought does not reduce the society functions to an instrumental use of technologies; on the contrary, it enables people to act as new actors, recognizing a wide spectrum of new activities. Many observers properly note that there are impressive signs of participation in political life (Lee, 2016; Weller et al., 2014), civic engagement (Bennett, 2008) in online social networking and entertainment communities, in dissemination of information, in organization mobilization, fundraising or coordinate collective movements (Celikates, 2015). The digital society is also characterized by a specific social structure – the network which functions on the basis of a network logic, the traditional form of social organization.

Today, however, empowered by the new media, new communities are created specifically on or by the Internet (Hoff & Hansen, 2010). The structure and organisation of the network society are characterized by fluidity (Levinsen, 2011) and the essential requirements for citizens in this fast-changing environment is the ability to cope with change. Our current network society is a product of the digital revolution, and major sociocultural changes in the society are the consequence of digitalization and networking. Throughout the network society, Van Dijk (2012) refers to several examples of new media, including social media, computer-mediated communication, e-books, knowledge sharing platforms, and e-voting systems. The social networks of organizations, individuals, and groups that are represented on the Internet and mobile phone networks constitute the development of new media. The network components are as important as are its connections, and while new media affects its users, these users also shape the nature of new media. The network recognizes each member of the community using information technology, but it is also an integral part of this society as it connects its users within their work and private life. A network has become a natural form of being, and its function is understood as so particularly favourable, that it is often used as a neutral condition through which citizens' action is interpreted (Shah, 2013).

Castells (2000a; 2000b) emphasized the impact of digitalisation on people, time and space, as well as culture, politics and economics at large. Castells (2011) argues that it is not simply

the progress of technology that characterizes contemporary societies, but also a combination of new cultural, economic and political aspects that create the network society. He argues that "While organizations are located in places, . . . the *organizational logic is placeless*, being fundamentally dependent on the space of flows that characterizes information networks" (Castells in Nyíri, 2004, p. 23). His examination of space is central to his theory. One of his key spacial characterizations of the information age is the "space of flows". Communication technologies allow the destruction of space, instant and asynchronous communication and, as a result, change the relationship with time. Following his definition, DNS is in "virtual reality", in "timeless time", which is affected by the "space of flows" taking society further and deeper into experience and knowledge sharing thanks to new media formats.

The concept of the network society is closely associated with social consequences of the evolving role of e-communication technologies and globalization. Castells (2004) defines the network society as "a society whose social structure is made up of networks powered by micro-electronics-based information and communications technologies". Castells' theory serves as a framework for understanding societies and globalisation: "he made network a basic unit of analysis, which integrated social structures, social action, social organization, space of flows, and new technologies" (Anttiroiko, 2015).

Society is constructed around personal and organizational networks powered by digital networks with communication through the Internet. In most cases networks are global or have no boundaries, therefore the network society is a global network society. Sites of social network are constructed by users themselves, based on specific criteria. Networks are tailored by people with different levels of profiling and privacy. The key to success is self-presence of a real person connecting to real people (Castells, 2014); it is a self-constructed society with connection of different networks.

Network and technology have become central structural characteristics of our society and play an important role in society thus comprising the capacity of the society to transform itself. Castells (2014) emphasizes that digital innovations are a fundamental factor for social changes, changes of organizational structures and policies being the most important issues. Digitalization opens up possibilities that can be realized in different ways. He observes political, economic or other social actors in the way they adapt to the innovations; he suggests a new interpretation of the relationship between the society and the Internet: the Internet is not just a technology, it is the backbone of the new economy and the network society (Castells, 2011). Anttiroiko (2015) summarizes the power of the network society through four different forms, as based on Castells' theory (Castells, 2011, 773):

- “Networking Power: the power of actors and organizations included in the networks that constitute the core of the global network society over human collectives and individuals who are not included in these global networks.
- Network Power: the power resulting from the standards required to coordinate social interaction in the networks. In this case, power is exercised not by exclusion from the networks but by the imposition of the rules of inclusion.
- Networked Power: the power of social actors over other social actors in the network. The forms and processes of networked power are specific to each network.
- Network-making Power: the power to program specific networks according to the interests and values of the programmers, and the power to switch different networks following the strategic alliances between the dominant actors of various networks” (p.773).

In general Castells' theoretical framework of DNS can be summarized by testifying the reorganization of human activities in relation to the new dimension of time and space, shaped by the real-time communication introduced by digital technologies over great distances. More than that, the framework serves as a background for analysing the impacts of spatial transformation in the network society (Rytkönen, 2015), designing spaces for the networked learning (Jones, 2015; Nordquist & Laing, 2015), and relationships between professional work and Information Communication Technology in the Network Society (Baker, Warburton, Hodgkin & Pascal, 2014; Juchnevič, 2016).

In contemporary digital society young adults grow up with digital technologies integrated as an integral part of their life. Compared with more mature generation, young people use technologies differently. They can simultaneously execute more than one programme or task. If digital technology is not that familiar, the learning environment must be adapted to their needs. Andone, Dron, Pemberton, & Boyne (2007) suggest that the learning environment should contain “a blend of Internet and mobile technologies which enhance student-tutor and student-student communication through multiple media channels, providing responsiveness, customizability and flexibility to adapt and be adapted to the students' needs” (p. 41).

All in all, Castells' (2014) framework has been taken up by different scientists: it serves as a background for the analysis of impacts of spatial transformation in the network society (Rytkönen, 2015), designing spaces for the networked learning (Jones, 2015; Nordquist & Laing, 2015), and relationships between professional work and information communication technology in the DNS (Baker et al., 2014; Juchnevič, 2016).

## 1.2. Challenges of digital and network society

From this point of view, researchers explore the differences of society groups in terms of demographic characteristics, Internet usage, accessibility, social status, the role of geographic location, as well as communication, digital skills and competences.

Most researchers associate digital inequalities with economic and social inequalities, which are based on income inequality. Fundamental income inequalities and the causes of social and digital inequality and exclusion can only be removed by government policy, which can, to the contrary, also deepen the general social exclusion. The link between digital inequality and civic passivity, social exclusion and deepening social inequalities has been identified by a number of researchers (Hargittai, 2003; van Dijk, 2008; Warschauer, 2002, 2004, 2007).

Researches confirm the impact of digital skills, and competences, on inclusion and increasing access to better living conditions for all members of the society. Vice versa, a prevalent problem is digital divide – the gap between different social groups in access to ICTs and in their different usages (Mok & Leung, 2012). Lack of digital competences could lead to digital exclusion which can have different levels. Hargittai (2003) indicates two levels of exclusion, that of physical access and that of usage of skills, Van Dijk (2008) points out four levels: motivation, physical access, skills and benefits.

Digitalization is of the greatest benefit to those with a higher social status, not because of their frequent use of this technology, but because of the benefits they receive in various important spheres of life (Van Deursen & Helsper, 2015). Yet, the socio-economic situation, the social status is more related to benefits of the internet than to access to it (Wei & Blanks Hindman, 2011). The findings of a revision of digital exclusion in Canada demonstrate that access to the Internet reflects existing inequalities in society with income, education, rural/urban, immigration status, and age (Haight, Quan-Haase, & Corbett, 2014). Furthermore, those findings demonstrate that the digital divide not only exists, but it is expanding and includes inequality in the level of online activity, including social networking. For instance, there is considerable concern in China that digitalization leads to certain negative social impacts.

In many countries, the issue of roughly equal access to digital technology has been resolved and recent studies on the use of digital technology show that digital inequalities have shifted from the access to appropriate technologies to the use and benefit from them. Yet, due to the use of digital technology or its intensity the digital inequalities have not been diminished, as those are the motives and goals of its use that make it possible to maximize its benefits (Buchi, Just, & Latzer, 2015). In a representative survey of the Dutch population (van Deursen, & van Dijk, 2013) it was found that people with low levels of education and disabled people were

using the Internet for more hours a day in their spare time than higher educated and employed populations, however the online activities of those groups were totally different. Low levels of education and disabled people compared with higher educated spent more time playing games or used the Internet for entertainment purposes.

However, the findings imply (Lee, Park, & Hwang, 2015) that “access and skill gaps could be higher barriers to the active engagement in diverse online activities and consequently create an overlapping effect on the established divide” (p. 45).

Researches in generation issues disclose how members of different groups use digital technologies and how they perceive their benefits. It has been found that the use of digital media is influenced and affected by the use of computers in the younger age, education, the nature of previous work, and income. The use of digital technologies, in turn, helps to maintain social and family relationships, improves overall well-being and mood, allows for more active engagement in society and fostering diverse interests. Young users of digital technologies are more often engaged in political, civic, social, or cultural action and advocacy online to create social change. The authors (Stornaiuolo & Thomas, 2017) argue that youth’s digital activism serves as a central mechanism for disrupting inequality. There is also a trend in recent years, together with the appearance of smartphones, different devices, news sources and, especially, with the different situational contexts (Lee, 2016, Picone, 2016) for increasingly extended and fragmented younger generation news consumption.

Research in youth and children groups reveals the distribution of access to digital technologies and the ability to use them according to the same structural groups, but also shows the influence of such institutions as schools and the library, with a comprehensive reduction of this gap (Larghi et al., 2015). On the other hand, it has been established that access to computers at home correlates with poor literacy and math tests (Vigdor, Ladd, & Martinez, 2014, 1103). This indicates that access to technology does not in itself solve inequalities in the use of technology. Studies of migrants and refugees in various countries have revealed that access to information and information technologies (youth cases in mobile technologies) helps to prevent marginalization of migrants, to participate in the life of local communities, to create positive social identities and to gain interesting cultural experiences, to learn the language and codes of the host culture, to maintain family ties over long distances and the accumulation of social capital on the spot, to enter social cultural networks of the host culture (Lloyd, Kennan, Thompson, & Qayyum, 2013; Lloyd, Pilerot, & Hultgren, 2017; Wilding, 2012). Social inequalities between immigrants and refugees arising from structural differences between individuals have been identified in the United Kingdom (Ono & Zavodny, 2008), Norway (Hatlevik, Björk

Guðmundsdóttir, & Loi, 2015) or Australia (Alam & Imran, 2015). In the study of immigrants in New Zealand, it has been observed that even people who get some digital training use information technologies in a very limited way and do not understand all the possibilities offered by them (Kabbar & Crump, 2006).

Reduction of structural digital inequalities caused by the normal operation of dominant social institutions, yet dividing the population into certain categories (Royce, 2009), is possible. In this case, it is important to use appropriate tools, among other things, for digitization, by developing the capacity for using digital technologies, seeking ways to promote the need, motivation, interest and habits of using digital technologies to solve everyday life problems.

The inequalities and the digital divide are primarily a geographic indication, which shows that people living in cities are getting higher incomes and are more sensitive to technological innovations. The paradox is that rural communities (Riddlesden & Singleton, 2014; Saleminck, Strijker, & Bosworth, 2017) are most in need of improved digital connectivity and infrastructure to compensate for their remoteness, but they are least connected and included.

In Lithuania, in terms of the digital inequality, differences between people living in cities and villages are also recorded. In total, in 2017, access to the Internet was in 75% households. 83.7% households of the major cities of the country (Vilnius, Kaunas, Klaipėda, Šiauliai, Panevėžys) had access to the Internet. In other cities of the country, access to the Internet was 73.2%. of the population, while in rural areas only 65.7%. households enjoyed the Internet (Lithuanian Department of Statistics, 2017). Also, digital inequality is often captured according to age, education and employment characteristics. In 2017, of the total population of the country aged 16-74, 77.6 percent of population used the Internet. However, an analysis of online use of age groups reveals a clear example of digital exclusion. The majority of youth in Lithuania use the Internet: 16-24 years old make 98%; 25-34 years old - 96.9%; 35-44 years - 91.7% However, in the senior groups, there are declining levels of Internet usage: 45-54 years old make 77.6%; 55-64 years old - 62.6%; 65-74 - 34 percent (*Lithuanian Department of Statistics, 2017*).

Employed people of the country's population regularly use 88% of the Internet, while the rest (e.g. old age pensioners, countryside farmers, job seekers), only 60% use the Internet.

In summary, tendencies of digital inequalities in Lithuania exist between the urban and rural population, as well as between the different age groups (especially elderly people, who prove digital exclusion) and contrasts between different occupational populations (for example, employed and unemployed).

Today, with regard to the digital inequality, it is emphasized that physical access to the Internet and most recent information technologies is not enough; the practical aspect of the effective

use of these tools (that is, practical skills and ability to use the digital technology) becomes most important. An individual's digital skills facilitate the use of e-learning (Mohammadyari & Singh, 2015), and should be considered when examining the impact of the latter on the individual's performance. EAEA (2015) stresses the need for all to master digital skills and make sure that every citizen is comfortable in using computers, tablets or smartphones and all other related tools. Thus for developing digital skills, ideas of transition from traditional 'school' forms of instruction to educational processes that are fully mediated by digital technologies are very much supported (Vlieghe, 2016).

Digital skills are among the eight key competences as defined by the European Framework for Key Competences for lifelong learning. Stakeholders consider online learning (De Paepe, Zhu & Depryck, 2017) as a valuable way to enhance digital skills, as demanded by the professional environment.

As mentioned above, digital skills ensure digital inclusion and participation. Many governmental services and tools for civic participation are now available online but due to the lack of digital skills and abilities are not sufficiently used. The participation of Lithuanian population in the processes of electronic democracy confirms it. In 2017, online searches for decisions taken or planned by public sector institutions were sought by 21% of the country's population. 4% of the respondents expressed their opinion on the decisions made or planned by the public sector institutions in making decisions, while proposals for improvement of the decisions of public sector institutions were submitted by 3% (Information Society Development Committee, 2017). The reasons why Lithuanian residents do not visit public institution websites relates to the lack of appropriate skills and abilities. 49 percent of residents of the country indicated that the public institution websites did not provide the necessary information, and 21% pointed out that it was too complicated to use electronic services (Information Society Development Committee, 2017).

The data confirms the existence of the digital inequality and the problems of efficient use of information technologies. As has already been mentioned, today the digital inequity has shifted from access to technologies to the right skills for effective technology exploitation and benefits.

### **1.3. Connectedness as a key characteristic**

The characteristics of DNS, the new culture and new dimensions of time and space shape new characteristics of learning processes, learning forms and methods, places and spaces, as well as new features of ever-changing virtual learning environments. OOL potential offers tremendous possibilities for HE institutions to improve and transform curricula to open learning

spaces to new cultures of learning and the new “spaces of flows”. First, we need to discuss how far research in OOL allows to define new emerging ways of learning that best suite DNS members.

Qualitative research findings through the process of thematic analysis of interviews of international experts allowed us to distinguish the key elements that were prominent in the data. Based on this, the theme “*Constantly connected and learning online*” was defined as seen to be essential and summarizing the research participants' approaches.

The DNS refers to persons who are able to use technologies in their daily life and who are constantly connected online through technological means: smartphones, tablets or computers. These are the people who browse the Internet every day, read and/or comment the news by using their phones or other digital devices. To belong to the DNS one needs to communicate or at least relate oneself to a certain digital community by being a member of social network, by subscribing or reading and participating in online discussions at certain news pages or blogs, or by joining closed online group discussions, or at least following them (see Figure 5).

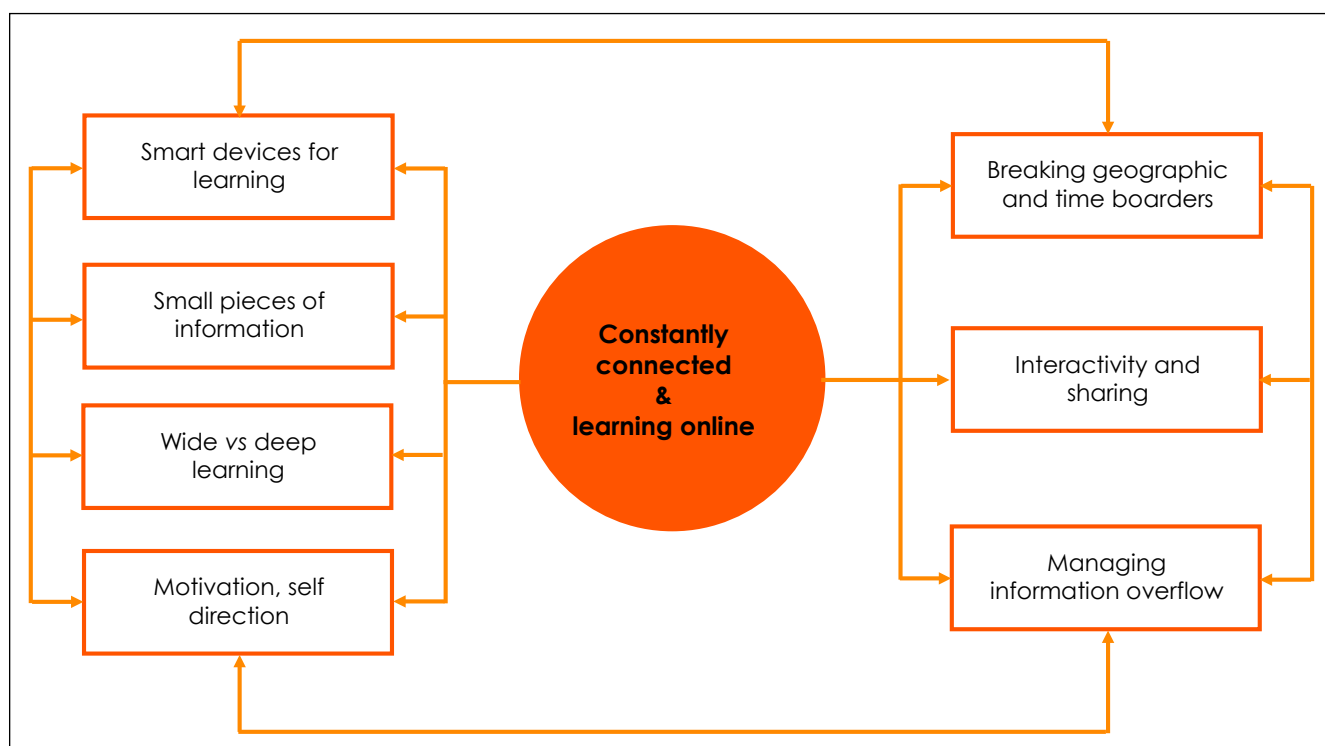


Figure 5. Constantly connected and learning online

DNS members use digital tools and new media in their life, from waking up in the morning till the end of the day. Mobiles wake them up, digital messages remind them what to do, digital calendars help and remind people when to learn or go to work. Digital tools help them organize the whole day: to watch films, to review records, and even to connect to their family businesses. Thus, the DNS can even be characterised by family members communicating via

smartphones, by SMS messages, in virtual places. The use of digital technologies, in its turn, helps to maintain social and family relationships, improves overall mood and well-being, as well as allows more active engagement in society and fostering diverse interests as pointed out by international expert:

*"<...>it is smarter, it is more about network connected"(I13)*

The DNS is something that is quite a new phenomenon which is developed through the enhancement of our reality by ICT tools. We establish and develop networks, and these networks "have their own lives" and their own impact upon the society.

### **Managing information overflow**

Our concern today is to find proper and good quality information. DNS members may and should be able to decide on the sources and the channels where information and the news come from, and they usually decide what version of the news or information they prefer:

*"<...> for the first time in history, any human being on the planet has access to more or less the entire stored knowledge of humanity, which is incredible when you stop a minute to think about it." (I9)*

*"<...> because we have too much information, and we have to be able to choose from this information." (I12)*

### **Extending geographic and time borders**

The speedy dissemination of knowledge and information is one of the characteristics of the DNS. There are no national or regional borders in the network society, people connect to each other globally. Global network members can get access to the same knowledge immediately. Time differences are no longer important as well. Information flow and DNS channels allow us to reflect on issues we would not have thought of before:

*"This is the importance of digital point of view and this is strictly related with network society because you can have no borders at all what concerns geographic and timing issues because you can answer synchronously an email or in a forum, or by tweeting and so on. So, time is not a matter anymore" (I2).*

*"<...>it's about interconnection of people, the exchange of knowledge, it's not limited anymore to physical locations like an institution, it's open, because of that you don't have any boundaries anymore, so digital and network society has no boundaries anymore, that's a major element of it" (I7).*

### **Interactivity and sharing**

DNS means no or less physical interaction, with virtual interaction dominant. Lots of connections, lots of interactivity, lots of innovative ways of sharing knowledge and skills in a group.

*"I think it's all about sharing ideas, the really fundamental need of humans to interact and to share what they have achieved and to implement something new from others" (I4).*

### **Merging educational boundaries**

As pointed out earlier, knowledge and information are now widely accessible on the Internet, thus creating opportunities for learning. New technological devices such as mobile phones, tablet computers, and social networks are becoming central for learning. Boundaries between formal, non-formal and informal education and learning are gradually weakening, everyone can choose and use a learning way that suits them. Moreover, learning happens everywhere in the open online environment.

*“Every time we connect to the online community, we learn, we sometimes don’t feel that we learn, but every new experience, every piece of knowledge that gives us input for new ideas and reflections and changing any behaviour or thinking is a way of learning; and nowadays it is very easy to learn by participating in an online community, as people tend to share interesting, valuable pieces of information that influence our thinking and knowledge.” (I10)*

Though we are constant online learners, there is the distinction, however, between online digital living which could be related with gaming, chatting, or entertainment and online learning. Whenever a disagreement during a conversation occurs, despite our physical whereabouts, it is very common for us to pick up a mobile device and to check information immediately. At the time we share, search for, or validate information, we naturally include our experience and communication into our learning.

### **Small pieces of information**

There are new emerging ways of learning that can be easily observed in the DNS. Searching and sharing knowledge and information in smaller portions, making decisions and solutions much quicker, spending less time for analysis of what is written or spoken become emerging ways of knowledge acquisition today. We live in a *faster society*, in a *faster world*, and we, as individuals, have to minimize the acquisition of information, which in its turn is fragmented. That is to say, in order to absorb all the new things or new elements we need to take smaller portions of everything.

*“We have to be clear as experts, that learning in small time slots is completely different from learning in one-hour face-to-face lessons. That’s what happened that you have to change, for example, the assessment. It’s completely different to assess 10 minutes of learning instead of one of learning, and also our children are not learning anymore as before, because maybe they could skip the content they don’t need, and they have to filter much more than what they are reading on the Internet because there are so many sources”. (I2)*

*“I see shorter and shorter modules and lessons in this digital world, which was not the case 10 years ago, the trainer society was quite reluctant to minimize the knowledge, so that is a kind of transformation, easy access, quick access for small chunks, small bits of learning”. (I5)*

### **Wide versus deep learning**

Digital forms of information, new media formats have raised challenges for information scalability and presentation online. Online learning reflects the challenges of information and knowledge sharing, and presentation, thus sometimes it is “accused” of wide vs deep learning through reading, listening or watching (Houghton, 2004). However, this topic needs much further analysis and is interrelated with cognitive characteristics of human beings, as well as with shifting and new pedagogy of online learning. We should not be corrupt with the new media forms by transferring their principles into curriculum design but should better search for didactical solutions maintaining the principles of a pedagogical scenario and learning objectives, not mixing with the characteristics of the new media and information publishing formats.

*“I don't believe this is a problem. This is only a different way of approaching knowledge. We are living in a society that allows you to go deep in one dimension or to stay on the top and have a wide perspective of all the feelings of the subjects and so on. I strongly believe that at the moment the knowledge by the learner stays maybe too much on the wide perspective and not into the deep perspective”. (I2)*

There is a tendency among DNS members to focus on limited topics and brief news rather than go more thoroughly into specific deep reading. However, this may show characteristics of a more complex phenomenon: DNS members may prefer scrolling through wide horizontal levels of information, instead of going into narrow, but deep, vertical levels, but then they can demonstrate the ability to see multidisciplinary connections that others have never seen before.

*“Today even myself, I'm not going so deep, I have lots of information and it's important that I understand this information and then just collect the pieces and build my knowledge upon them. So, I don't go very deep into each subject, but I'm just building based on more information than before. So, I think today the youngsters are also doing it this way” (I3).*

### **Motivation, self-direction**

Online learners are diverse in their nature, needs, and preferences. There is a tendency to characterise them as self-directed learners, as they manage to diagnose their own learning needs, to identify appropriate resources for learning, and to choose appropriate learning strategies. However, others need some structured help to become more self-directed. Self-directed learners are highly motivated, and they themselves usually select and validate all the information available. This fact has direct and huge impact towards the entire education system, and it will change the level of knowledge exchange dramatically, because:

*“<...> now young people, living in the village, not having access and the possibility to go to*

*a university, now will have the chance to gain knowledge and to build on knowledge and be successful in life, so that's a very important element" (17).*

The trends and characteristics of open and online learning include self-directed and personally motivated learners, responsible for their learning. This proves that education providers should revise their approach to curriculum development and delivery, as future curriculum will all be online and open. It is the technology that motivates us to think more carefully about how we organize teaching and learning online through open and online curriculum.

#### **1.4. Places and spaces of learning**

A dozen years ago, learning spaces were mainly concentrated in traditional educational institutions such as schools, universities, adult learning and other education institutions. Today, the digitalization opens entirely new spaces of education and learning, new technological devices such as mobile phones, tablet computers, social networks become central for informal learning, while classical boundaries between formal, non-formal and informal education and learning are gradually weakening. Knowledge and information are now widely accessible through the Internet, thus creating opportunities for learning.

Online learning platforms are aimed at creating digital communities, augmented and virtual reality is gaining pace, virtual museum tours and exhibitions are becoming mainstream practices (Walsh, 2014), members of online communities can network on the features of the website (forums, blogs) throughout all Europe and globally.

The rise of the number of MOOC platforms shows clearly a great potential in terms of individual and societal benefits, such as providing university level education which is free of some of the traditional barriers, e.g. participation in elite education void of cost and academic background (Katy, 2014). The number of learners continues to increase as indicated by Chuang & Ho (2016) summarizing HarvardX and MITx four Years (2012-2016) open online courses delivery: "290 courses, 245 thousand certificates, 4.5 million participants, 28 million participant-hours, and 2.3 billion events logged online" (p. 2). The development of MOOC offers does not limit other attractive forms of open learning. The immense popularity of the online conferences on video channels demonstrate the power of digital provision that opens new opportunities for learning. At the same time learners can participate in learning networks and develop their personal knowledge through selective connections with other persons. Networked learning defined as 'learning in which information and communications technology is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources' (Jones, 2015a, 5) occupies an expanding space in DNS. OOL is considered to have the added value of promoting lifelong learning for different society

groups (De Paepe, Zhu & Depryck, 2017), including adults with low education, migrants. This fits well within the Europe 2020 strategy: Europe encourages lifelong learning to its inhabitants, as part of its efforts is to develop a knowledge society. The EU2020 strategy requires that by 2020, 15% of the population aged between 25 and 65 must participate in some form of training or course.

### **1.5. Digital and network society needs for open and online learning**

Educational reformers suggest that the appearance of digital technologies will radically transform what people learn, how they learn, and where they learn (McLoughlin & Lee, 2010; Redecker et al., 2011; Warshauer, 2007), yet there exists some disagreement on the speed and scope of change.

According to personal needs, OOL can be used in almost every level of formal education and for non-formal or informal learning. Digital competence is fundamental for participation in education, social, cultural and political life (Mavrou et al., 2017), that is why learning in the network society and the digitized school (Krumsvik, 2009) plays a vital role for social integration, educational success, employment opportunities, and overall quality of life. It is a way for learners to explore knowledge more than what they can get from a traditional classroom.

In general, non-formal learners are very positive about their experiences of using online learning, personal learning networks (Farrow, de los Arcos, Pitt & Weller, 2015), with a huge majority stating that they are more likely to use OOL in the future. Employees are highly interested in receiving continuous training in online format (Quesada-Pineda, Conn & Sanchez, 2011). Even older adults tend to satisfy a wide range of learning needs (e.g., health and wellness, leisure, personal and professional interests) using informal and self-directed open online learning experiences (Conole, 2017; Morrison, 2015). The idea of generations could be misleading when talking about digital technologies and online learning. Greater emphasis should be placed on understanding sub-groups who may have different skills and knowledge than their own generation because of their past experiences and attitudes towards technologies (Bencivenga, 2017).

Various studies investigated membership, participation, knowledge building (Chunngam, Chanchalor, & Murphy, 2014), experiences of online learners (Stone et al., 2016) perceptions of online adult learners' interaction with the instructor, contents, and other learners (Kuo, Belland, 2016), as well as support of adult learners (Leping & Wenzhen, 2012). This finding suggests that open online learning which takes place outside educational institutions is important for informal learning and makes it easier for individuals to build and share knowledge because it cancels physical distance and makes it easier to share interests. Open online learning can promote learner agency and autonomy (Suzuki, 2013), gives them the opportunity to balance different

responsibilities (Zhang & Cheng, 2012), can 'facilitate the exchange of ideas and practices among people of different cultural backgrounds' (Koutsoupidou, 2014). The findings highlight blended learning approach, online learner-learner interaction (Cocquyt, 2017).

Adult learners are diverse in their nature, needs, and preferences. Some adult learners are clearly attributed to self-directed learners, as they manage to diagnose their own learning needs, to identify appropriate resources for learning, and choose appropriate learning strategies. However, for others some type of structure is needed to help them become more self-directed. Therefore, a combination of the advantages of both face-to-face and online methods is often advocated for adult learners (Cornelius & Gordon, 2009). DNS with diverse learning needs benefit from different possibilities, instructional approaches, goals and use of andragogical principles (Rotar, 2017). It is suggested that a facilitator must encourage learners to become as self-directed as possible through the use of creative assignments and projects, encouraging their input and suggestions, while being available to provide guidance when needed (Simmons, 2015). Andragogical principles were introduced by Malcolm S. Knowles who believed that the effective adult learning experience should be based on work and real-life experiences. Scholars Herbold (2011), Knowles, Holton, & Swanson (2005) highlighted the key ones:

- "Adults are motivated to learn as they experience needs and interests that learning will satisfy.
- Adults' orientation to learning is life-centered; therefore, the appropriate units for organizing adult learning are life situations, not subjects.
- Experience is the richest resource for adult learning; therefore, the core methodology of adult education is the analysis of experience.
- Adults have a deep need to be self-directing; therefore, the role of the teacher is to engage in a process of mutual inquiry with them rather than to transmit his or her knowledge to them and then evaluate their conformity to it.
- Individual differences among people increase with age; therefore, adult education must make optimal provision for differences in style, time, place and pace of learning". (Knowles, Holton, & Swanson, 2005, pp. 39-40).

The discussions how OOL should be organized depending on the types and preferences of adult learners still continues, however OOL is oriented towards those principles and attempts to meet them.

An application of adult learning principles can strengthen personal and professional development when a person is involved in online learning. Learning experience in open online

learning in general was confirmed by researchers to be positive in most cases (Byington & Tannock, 2011; Reynolds, 2016), with clear efforts to create visual, multimedia, and social learning environments, provide slower paced learning experiences that involve time for reflection (Walter, 2013).

However not all participants are equally positive about online learning process, some lack feedback from their peers and teachers (Rienties et al., 2013), some indicate poor online collaborative processes (Romeu, Guitert & Sangrà, 2016), while finding adequate ways to assess the effectiveness of non-formal learning (Giannakos, 2014) remains a challenge.

Further, striving to discover the main research question – what digital and network society needs are for open and online learning – we studied Lithuanian population and how much time adults spend online and for online learning, what the meaning of learning is to adults, what motivation is to learn online, how many of them do not need to learn, what most acceptable learning forms are when learning online, learning and participation in social networks.

### 1.5.1. Time spent online vs time spent for online learning

Our data have demonstrated that the respondents' answers fall into five categories in terms of time spent daily online (Figure 6). The majority of the respondents, as many as 42%, spend up to 2 hours online. 22% of the respondents indicate that they spend 2 to 3 hours a day, 19% - 3 to 4 hours a day, and 17% - over 4 hours online.

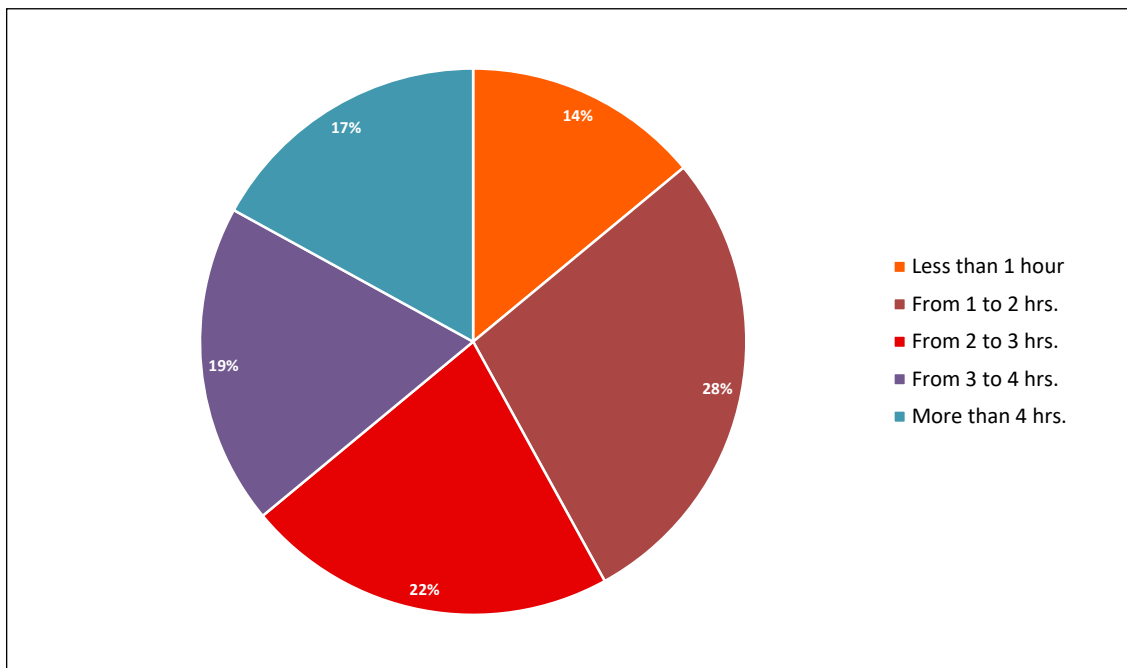


Figure 6. The average time spent daily online

The data of the research shows that the link between the gender and the time spent on the Internet ( $p \geq 0.05$ ,  $\chi^2 = .469$ ,  $df = 4$ ) is different: women spend more time on the Internet

than men. Kruskal-Wallis criteria were used to answer the question if there is a difference of the time period spent on the Internet according to the living location. Analysis showed that comparing the respondents who live in the city, village or in the countryside there is a statistically significant difference in the time they spend on the Internet ( $p=.000$ ,  $\chi^2=19.686$ ,  $df=2$ ). The data also show that the mean rank is smaller (539.19) among respondents living in the countryside, the next group is respondents living in villages (638.20) and the highest mean rank between respondents living in the city (645.16). This indicates that life in more populated locations leads us to more hours spent on the Internet. We used Mann-Whitney criteria to find exactly which groups are statistically significantly different. The results show that there is no statistical difference between respondents living in a city or a town ( $p>0.017$ ,  $U=47900$ ,  $z=-0.232$ ), but there is a statistically significant difference between the respondent from the city and the countryside ( $p=.000$ ,  $U=98400$ ,  $z=-4.380$ ); in the city respondents spend more time on the Internet. Also, there is a statistically significant difference between respondents from towns and villages ( $p=0.008$ ,  $U=13492$ ,  $z=-2.645$ ), respondents living in towns spend more time on the Internet than respondents from villages.

However, the situation is different when we analyze how much time respondents spend daily on the Internet for learning purposes. The results show that the majority of respondents do not agree that joining the Internet means learning (see Figure 7): 66% of the respondents indicate that they engage in learning less than an hour a day. Only 1% of the respondents indicate that they spend more than 4 hours daily for learning purposes. Figure 7 demonstrates that 36% of participants spend more than 3 hours on the Internet, but only 4% engage in learning during these hours. Such a discrepancy raises several questions: could it be, that there is no need to learn online? Are there no possibilities to learn? Or do people not identify that they are learning?

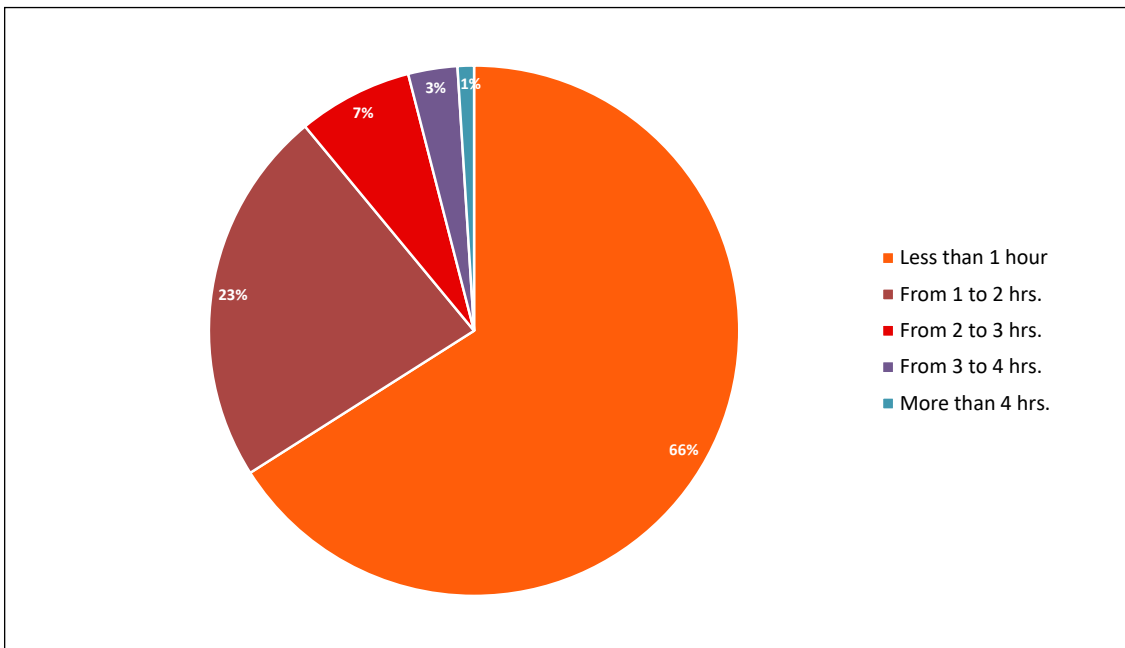


Figure 7. Average daily time spent on the Internet for the purpose of learning

Young adults and seniors spend respective time learning online, but obviously young adults spend more time for learning than mature adults. Kruskal-Wallis criteria show that there is a statistically significant difference between the age groups ( $p=.000$ ,  $\chi^2=124,559$ ,  $df=3$ ). The mean ranks show that the younger the respondents are, the more time they spend learning something on the Internet (up to 27 years 756.98; 28-38 years 652.72; 39-52 years 555.08; over 53 years 512.03). Mann-Whitney criteria were used to find exactly which groups were statistically significantly different. The results demonstrated that there were statistically significant differences between groups in all age groups (in all cases  $p=.000$ ), except the age group from 39 to 52 years and over 53 years, this indicating that these two groups do not differ according to the time spent on the Internet for learning purposes. In all other groups younger participants tend to spend more time on the Internet while engaging in learning.

In the age group over 53 years, the majority of respondents spent time for learning online less than 1 hour per day. The younger generation spent longer time online for learning (see Figure 8). The general trends can be expressed graphically as follows:

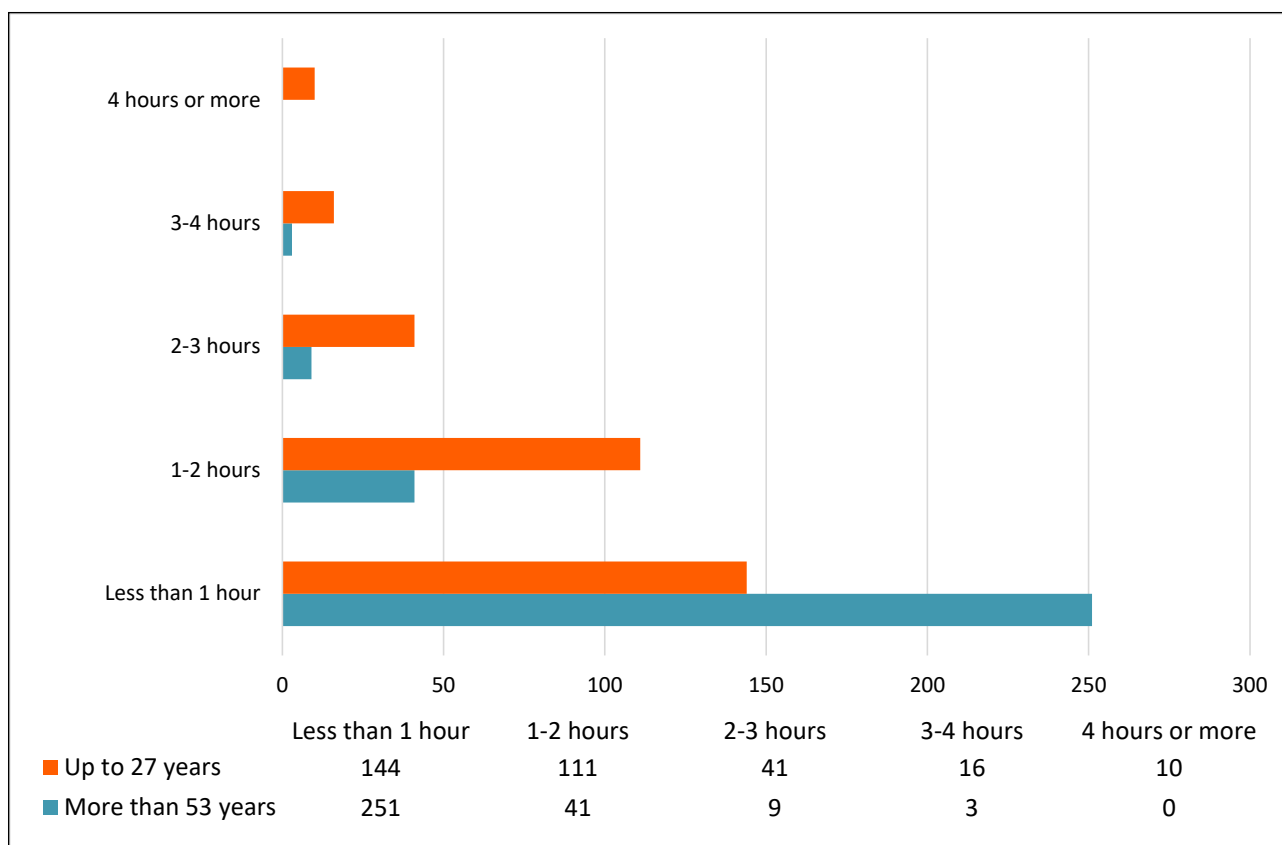


Figure 8. Time spent online for learning per day according to age groups (a comparison of up to 27 years and over 53 years of age)

Lithuanian data confirm the tendency of decline of the time spent online depending on age. For instance, in 2017, the total amount of goods or services purchased online in Lithuania was 38.1 percent for all the population under observation (age group 16-74 years). Analysis by the age group reveals the existing distinction of the awareness of the Internet and information technology among people of different ages. Younger people bought goods or services online most actively: age group of 16 to 24 years old made 57.6 percent of the total; age group 25 to 34 year-olds made 66%; age group 35 to 44 bought 51.8 percent of goods and services online. (The higher activity of the 25-34 age group compared to the 16-24 age group can be explained by the increasing financial opportunities of that age, as young people after graduation start working and have more money for purchases). In senior age groups, there is a clear decline in the Internet usage for purchasing goods or services: 45–54 make 30.1%; 55-64 make 17%; 65-74 - 4.4% (Statistics Lithuania, 2017).

A great variety of factors, such as individual differences among people increasing with age, digital competence of different age groups, employment situation, education, geographical presence, even monthly earnings determine the way and frequency of participation in learning. In addition, we have questioned whether there is any interdependence according to monthly

earnings per family members and time spent on the Internet for learning purposes. Kruskal-Wallis criteria show that there is a statistically significant difference between the age groups ( $p=.000$ ,  $\chi^2=38,288$ ,  $df=7$ ). The analysis of the mean ranks suggests that the more respondents earn monthly, the more they tend to spend time to learn something online (Figure 9).

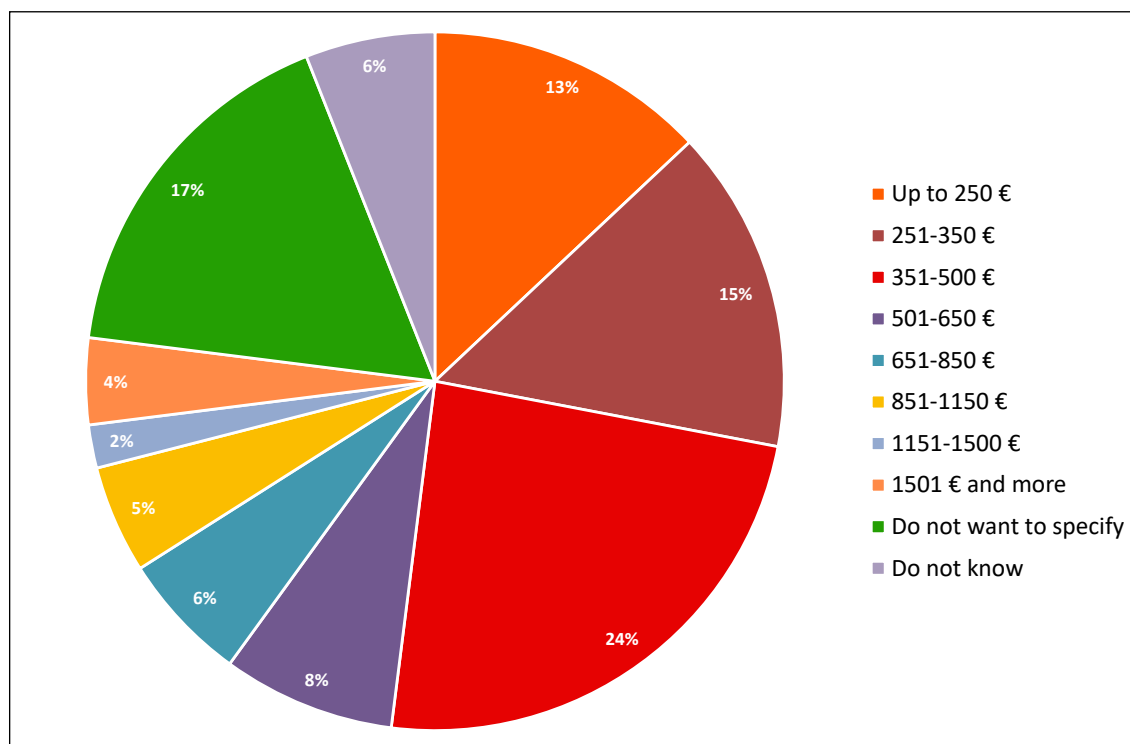


Figure 9. Monthly earnings per family members and time spent on the Internet for learning purposes

This confirms the earlier mentioned research findings (Haight, Quan-Haase, & Corbett, 2014; Van Deursen, & Helsper, 2015; Wei & Blanks Hindman, 2011) that income, socio-economic situation, and social status are related to the benefits of the Internet.

### 1.5.2. Motivation to learn online

Learning online could have different meaning for adults as there are a lot of possibilities and ways to learn. As indicated earlier learning happens everywhere in the open online environment, and boundaries between three forms of education: formal, non-formal and informal are gradually weakening. Everyone can choose a learning that is the most appropriate for him or her. The variety of the existing choices in the sense what one wishes to do and how one chooses to spend time online suggests learning ways, influences motivation and creates another meaning of learning.

What does learning online mean to adults, when they are connected? The majority, i.e. 72%, pointed out watching lecture recordings; educational films (71%); also reading articles (69%); being connected to the virtual learning environment (68%); learning in MOOCs (63%) (Figure

10). Less than half of participants indicated that watching YouTube videos (47%) or following information in discussion forums (47%) or participation in discussion forums (42%) is also a form of learning.

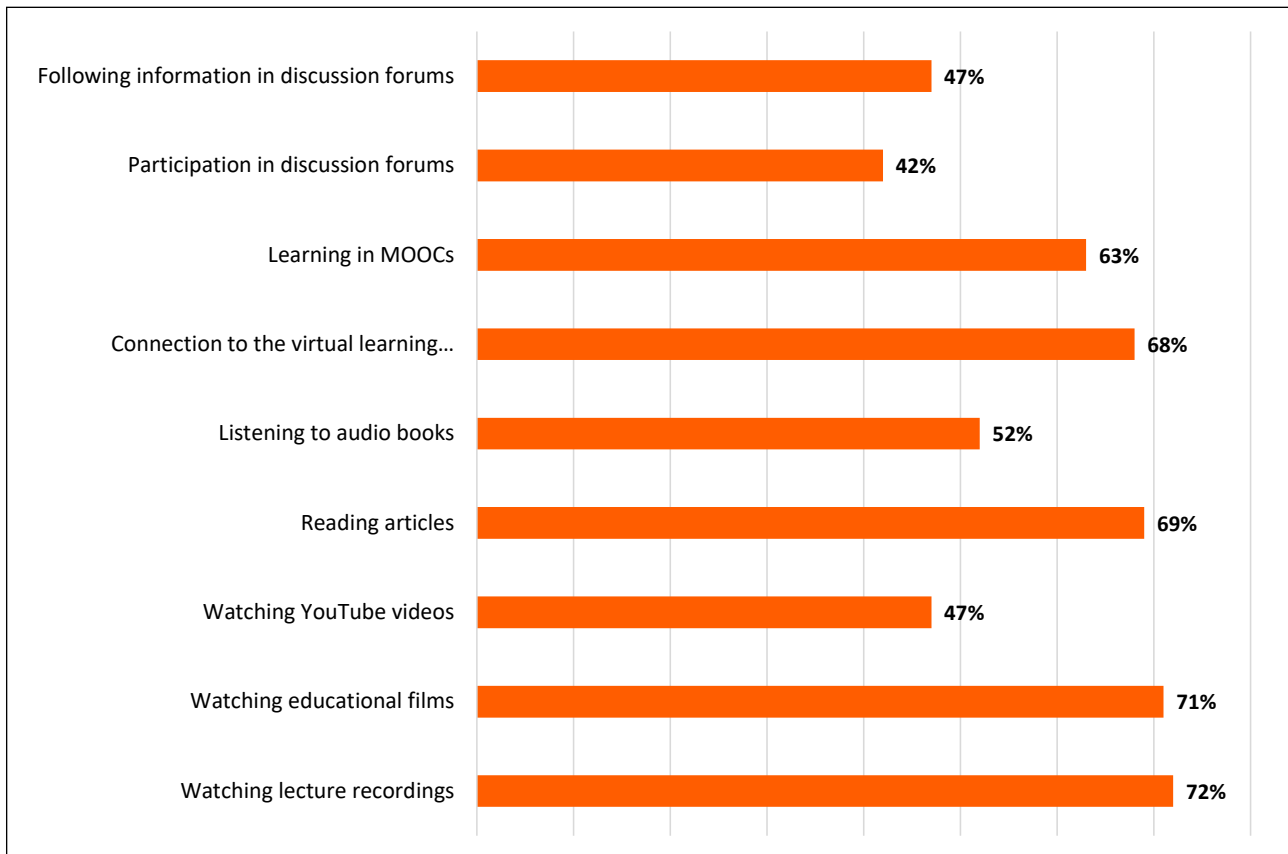


Figure 10. Meaning of learning

It is worth remembering that a lot of people spend their time online with very little or no intention to learn (Figure 11), in particular the age group of 53 plus. Analysing the responses how many of them do not think they need to learn, the trend through different age groups indicates that in general only a small part of people consider they do not need any learning. Only 11.2% of age group 53 plus indicate no need for learning. Kruskal-Wallis criteria show that there is a statistically significant difference between the age groups ( $p=.004$ ,  $\chi^2=13.594$ ,  $df=3$ ). The mean ranks show that the younger the respondents are, the more likely they are to think that learning is important (the mean figures for age group under 27 are 586.80; age group 28-38 are 582.84; age group 39-52 are 652.20; and over 53 year are 660.39). This corresponds to the general trend of the progression of age: people are less interested in learning, no matter whether it is traditional or OOL.

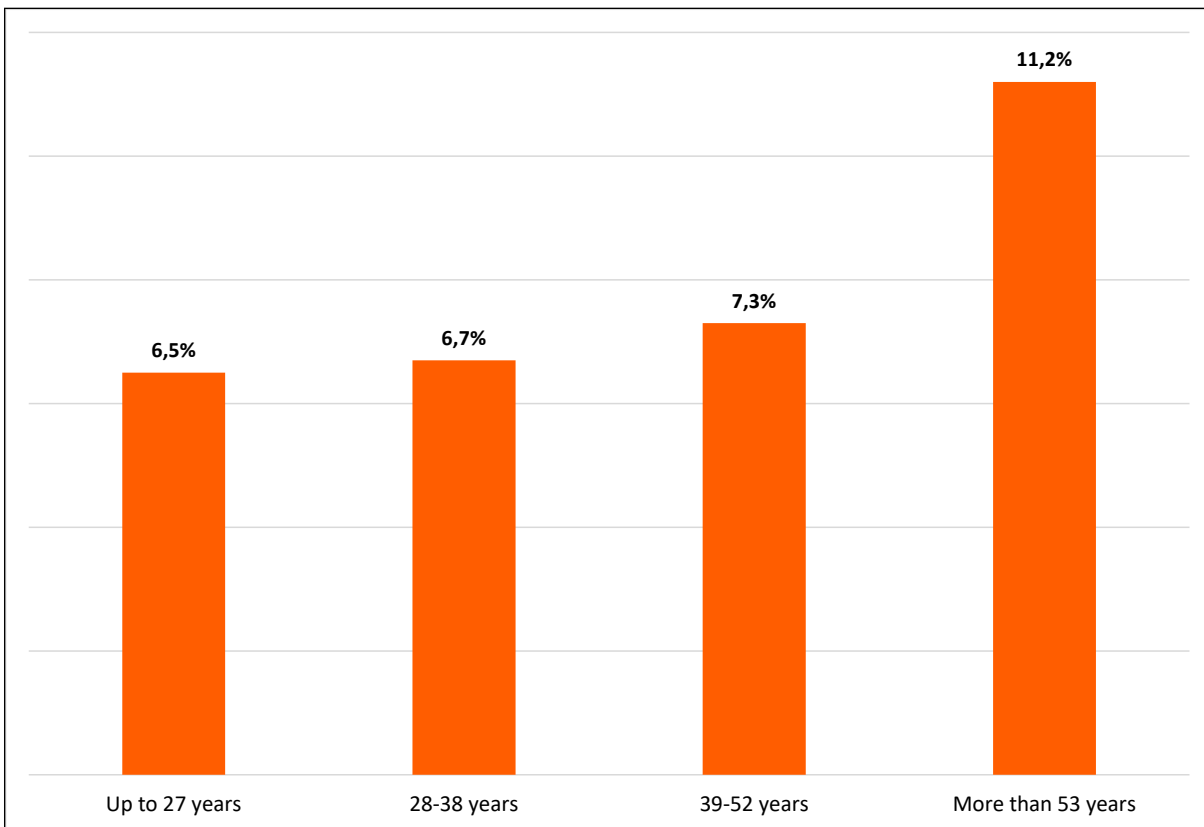


Figure 11. No need to learn, according to age groups

The reasons that motivate adults to learn are very different (Figure 12). A major part of them, 66%, wish to learn for personal reasons, 53% learn due to professional reasons, for 51% learning is a pleasure. The majority, i.e. 67% of adults, choose learning because it gives a possibility to communicate and collaborate with others. In adulthood family support still remains important, and 35% participants have stressed it. Half of the participants, 50%, have indicated that they like a certain form of learning which they find to be a strong motivation factor for learning in general.

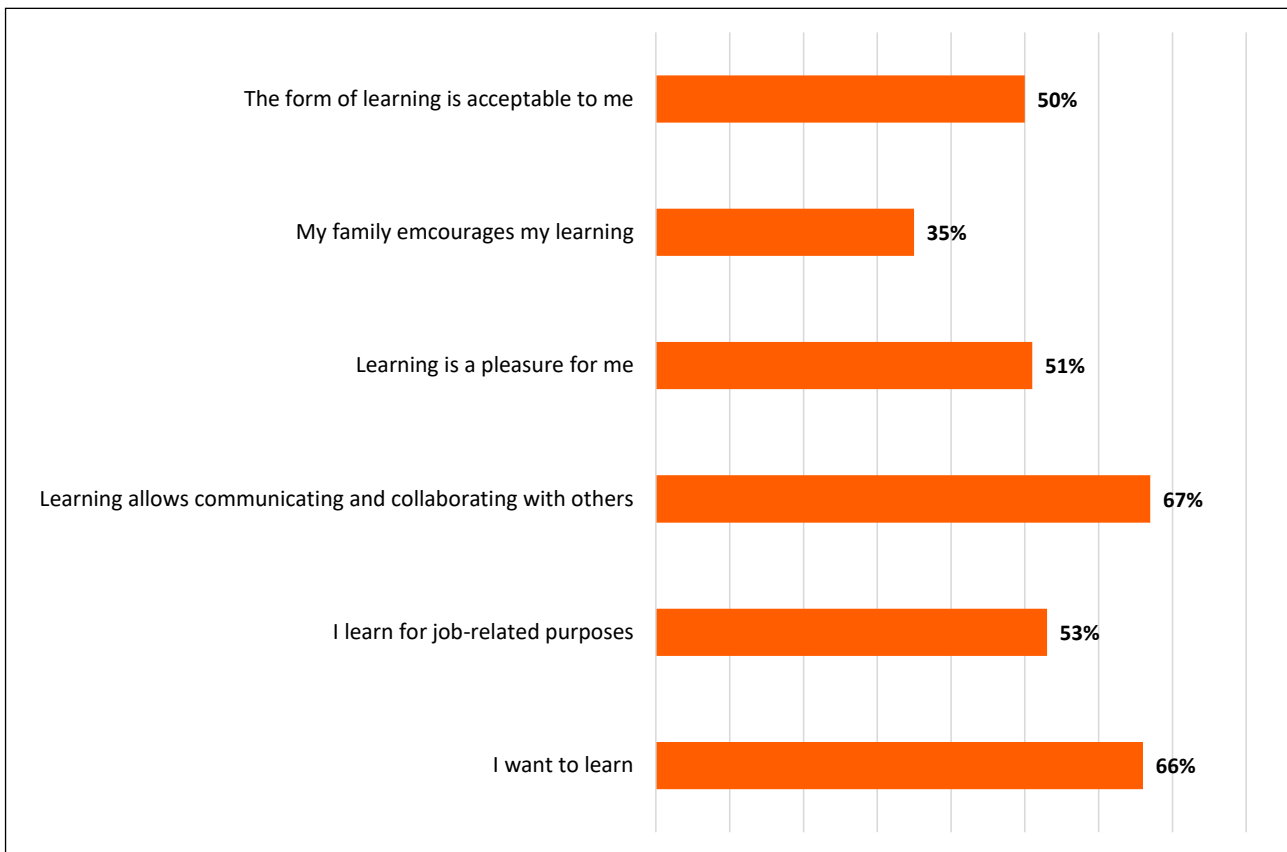


Figure 12. Motivation to learn

The motivation reasons suggest that not only personal, professional but also social factors remain important: the communication and collaboration aspects during the learning process are seen as most important.

### 1.5.3. Most acceptable online learning forms

When responding to the enquiry what forms of learning would be most acceptable, the participants have given priority to short tutorial videos (76%), short lectures with interactive tests and assessment (74%); distance learning course with a teacher, consultations and lectures (74%) (see Figure 13). More than half of the participants, 64%, agree that a blended learning course when students learn online and face to face is also an acceptable form of learning. A distance learning course without a teacher as an independent learning case satisfies 58% of participants. They also are happy to do reading in the mobile device (61%) and use voice books (60%). The data show that for online learning adults short pieces for learning are most acceptable, but they do not mind to participate in courses guided by the teacher or independently. The highest scores have been awarded to a distance learning course with a teacher, consultations and lectures (84%), short lectures with interactive tests and assessment (83%) and short tutorial videos (78%).

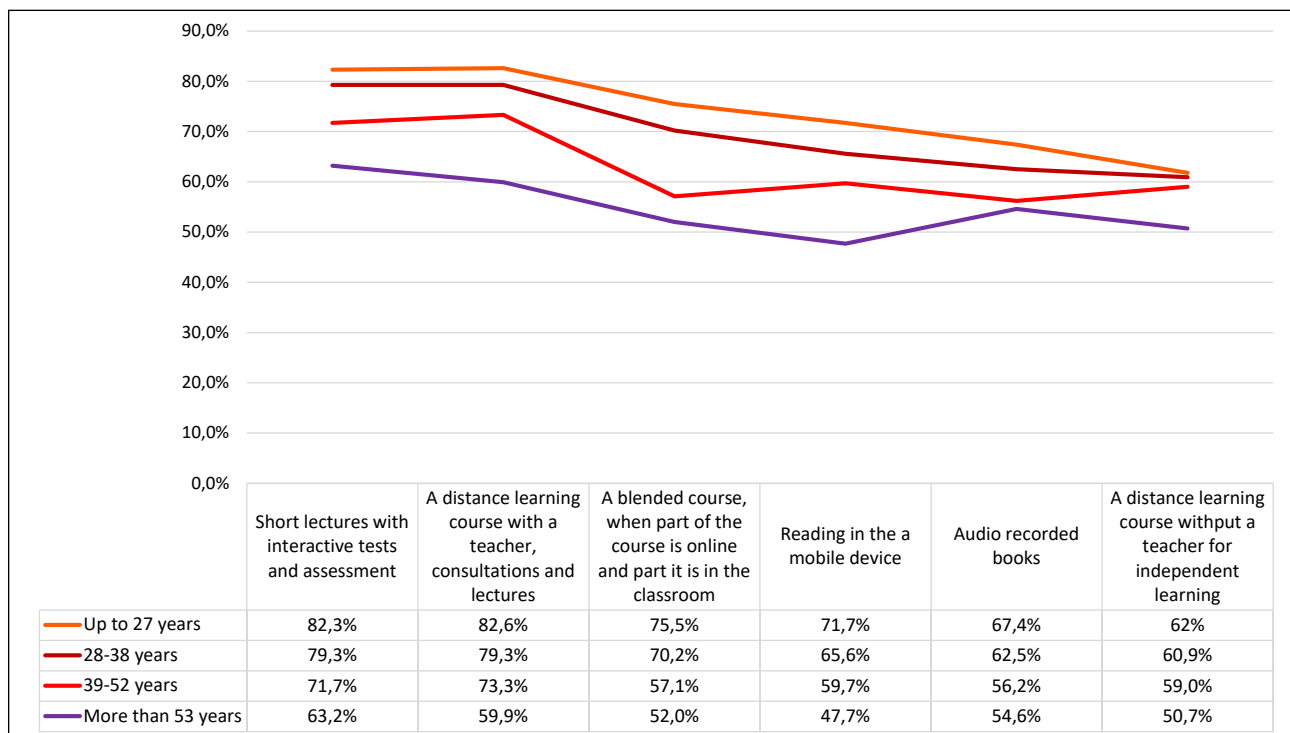


Figure 13. Most acceptable learning forms when learning online (n=1241)

When the up-to-27-years age group is compared with the rest of the learning population, it can be seen that for young adults the learning forms indicated above are even more important. This difference is statistically significant in all learning forms (in all cases  $p < 0.05$ ). More prominently than the seniors, the young respondents think it would be better to learn when the learning material is supplied with short tutorial videos ( $p = .003$ ,  $\chi^2 = 15.840$ ,  $df = 4$ ,  $\phi = 0.113$ ), when learning consists of short lectures with interactive tests and assessments ( $p = .000$ ,  $\chi^2 = 27.360$ ,  $df = 4$ ,  $\phi = 0.149$ ), they are more likely to engage in a distance learning course with a teacher, consultations and lectures ( $p = .000$ ,  $\chi^2 = 21.486$ ,  $df = 4$ ,  $\phi = 0.132$ ), or a blended course, when part of the course is online and part of it is face to face ( $p = .000$ ,  $\chi^2 = 29.495$ ,  $df = 4$ ,  $\phi = 0.154$ ), they prefer reading to be done in the mobile devices ( $p = .000$ ,  $\chi^2 = 34.941$ ,  $df = 4$ ,  $\phi = 0.168$ ), and the learning material to be supplied with voice books ( $p = .001$ ,  $\chi^2 = 17.715$ ,  $df = 4$ ,  $\phi = 0.120$ ), and are more likely to engage in a distance learning course without a teacher for independent learning ( $p = .008$ ,  $\chi^2 = 13.767$ ,  $df = 4$ ,  $\phi = 0.105$ ) than elder respondents.

#### 1.5.4. Learning and participation in social networks

82.6% of research participants have an account in a social network and only 17.4% (n= 216) do not. The main reasons why they do not have an account are that respondents think they do not want to join a social network (38.4%); they had been connected, but did not like it (18.5%); one of the biggest reasons was marked that there is no privacy (30.1%). Between those who have an account and participate in social networks, the majority (69.1%) gives

priority to Facebook, 47.5% use YouTube and 22.5% - Instagram. There is a part of respondents that uses several networks, though priorities are the same.

When distributing the answers of those who have an account of a social network, the purposes where and how participants use the social networks, the research data show that the majority (82.62%) of respondents use social networks to connect with family, friends and other people (Figure 14). People use social networking for a lot of reasons, such as searching for information, conferences, seminars, events, friends, professional contacts, jobs. They also share experiences, photos, videos, create their own professional image and branding. Least of all social networks are used for learning purposes, only 24% of participants use them as a place for learning.

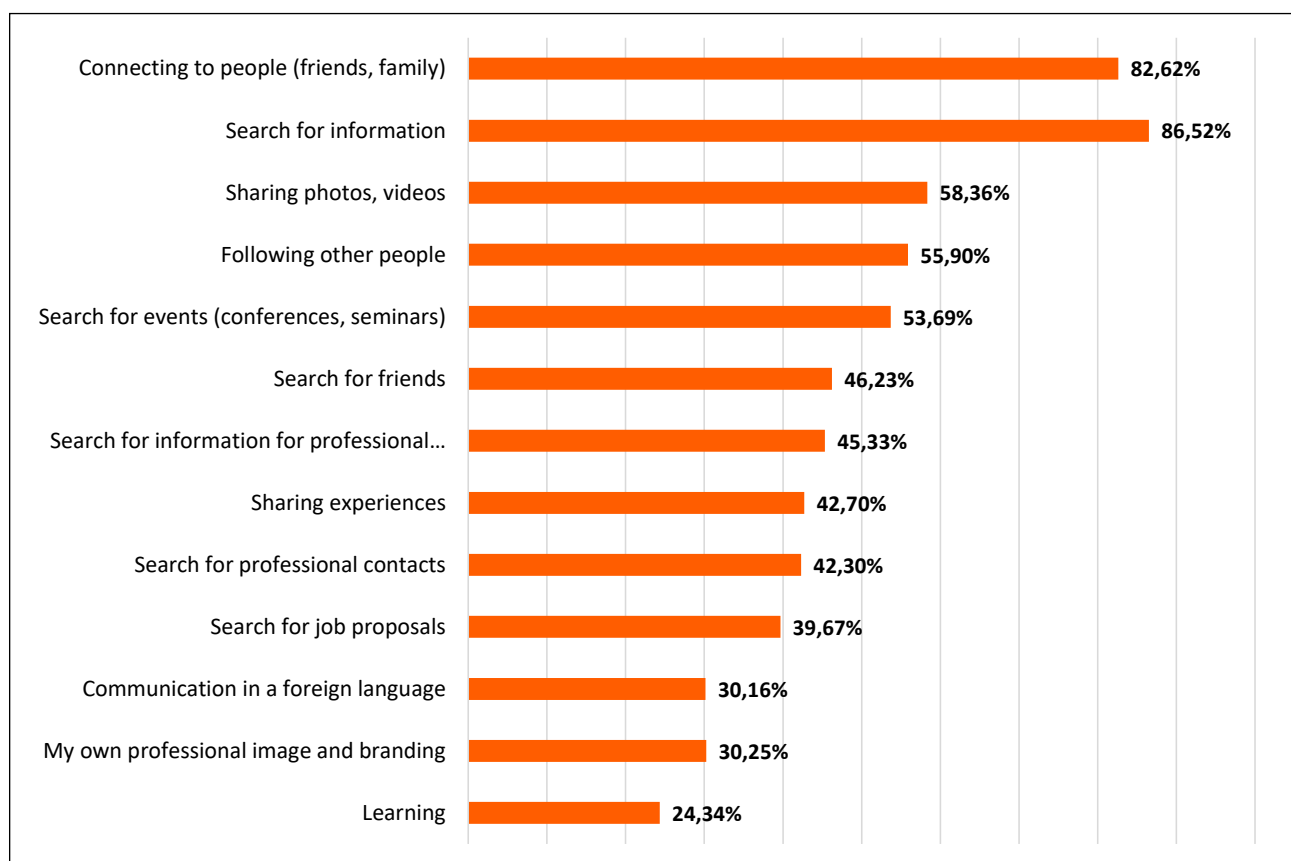


Figure 14. Purposes of using social networks

Considering the purposes of the usage of social networks, data analysis showed that there were statistically significant differences between men and women. Mann-Whitney criteria indicated that women, more than men, used social networks for connection with others (family, friends) ( $p=0.019$ ), for following other people ( $p=0.025$ ), for searching for events (conferences, seminars) ( $p=0.00$ ) and searching for development possibilities ( $p=0.002$ ). Also, Mann-Whitney criteria showed that there were statistically significant differences between younger and older respondents (in all cases  $p=0.000$ ). Younger respondents tended to engage more in social

networks in all cases.

More than that, the data show that a significant proportion of social networking is used for professional development possibilities (45.33%), for making professional contacts (42.30%) and search for information (68.52%); all these responses are closely connected to learning processes and indicate that learning via social networking has a substantial impact towards adult learning.

Kruskal-Wallis test shows that there is a statistically significant difference in the age groups and the use of social networks ( $p=0.000$ ,  $\chi^2=515.791$ ,  $df=3$ ). The analysis of mean ranks shows that older respondents are less engaged in social networks. Also, Kruskal-Wallis test that there is a statistically significant difference between age groups according to all purposes of the use of social networks ( $p=0.000$ ).

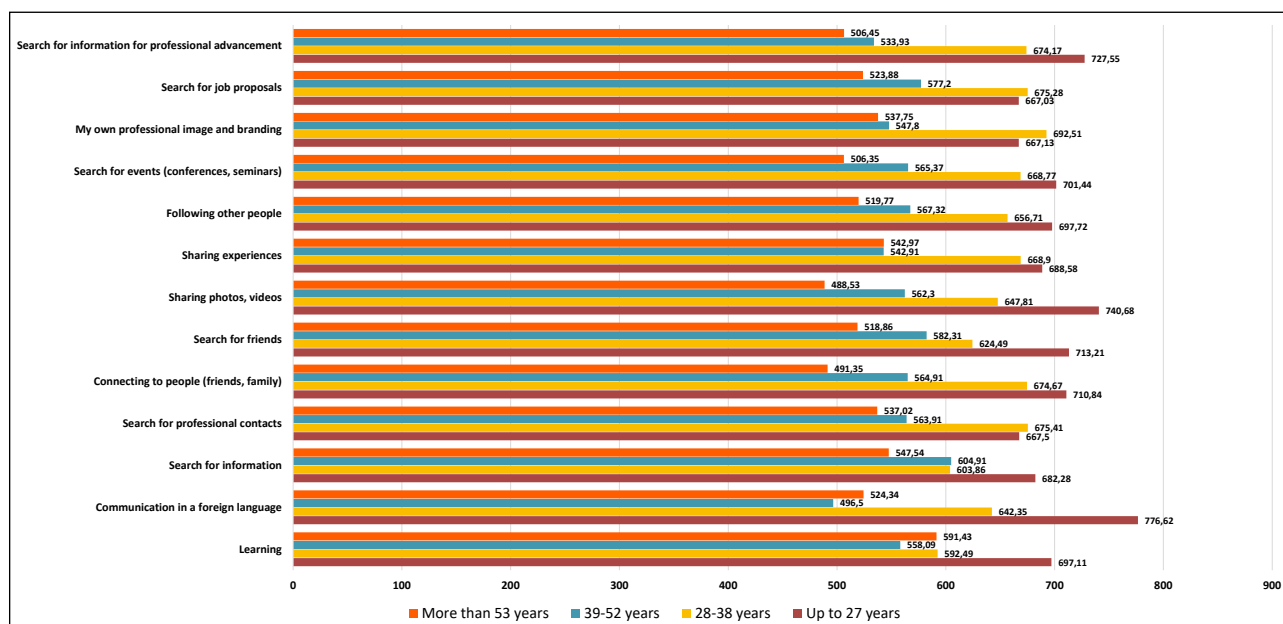


Figure 15. Mean rank of the use of social networks for learning in different age groups

This means that the great potential of social networks which is already used will be even more important when learning offers increase in scope and format. Future lifelong learners will be eager to spend more time connecting to social networks in order to gain knowledge and develop themselves. The explicit use of social networks by the younger generation indicates that education services must take social networks more into account and respond to this need (see Figure 15).

### 1.5.5. Benefits of open online learning

The research participants mention important issues when they learn online, namely, that they would like to learn at a suitable pace and time, be able to access learning material any

time, to get information in different forms (video, audio, written, etc.), to plan their time in the learning environment, have clear instructions and a possibility to use social networks when learning. Those needs are important for all age groups. Less expressed needs, or secondary to the primary ones seem to be combining work and family, being synchronized in social networks and study materials and getting a badge for automatic synchronization with social networks. In Figure 16. the data compare the group of young adults (up to 27 years) to the one of more-than-53-year olds. Both groups are eager to get clear instructions when learning; however, the greatest discrepancy occurs concerning the item "To get a badge automatically synchronized with social networks": it is important for 86% of young adults and only 37% of senior participants (n=1241). There is a statistically significant difference between the younger and older respondents (p=0.000, U=124880.5, z=-4.335), This shows that young people are more aware of digital badges and their privileges for online learning.

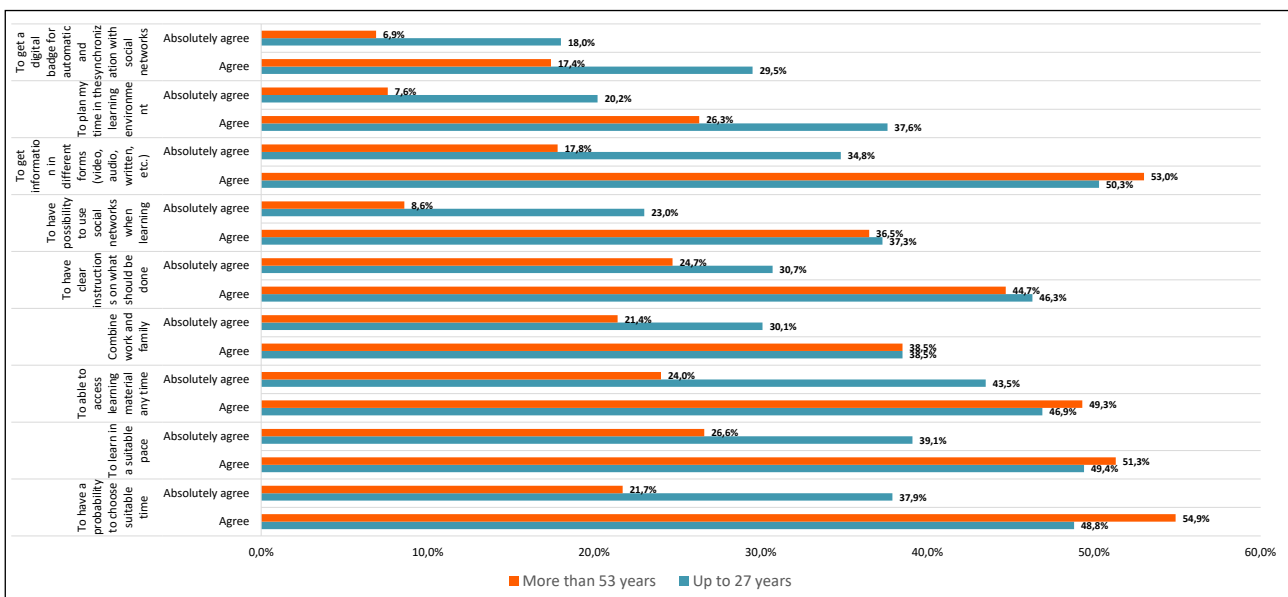


Figure 16. Important issues when learning online

When asked what exactly adults would like to learn, most adults (40%) did not know (Figure 17) what to wish. This may be due to inadequate or unclear learning offers or due to the fact that there is not yet a common practice in Lithuania to look for online learning opportunities. 27% of adults would like to study foreign languages: this might be due to the tendencies of globalization, participation in a variety of professional networks and the fact that the participants can learn foreign languages using various existing programmes and online courses, which is an established practice.

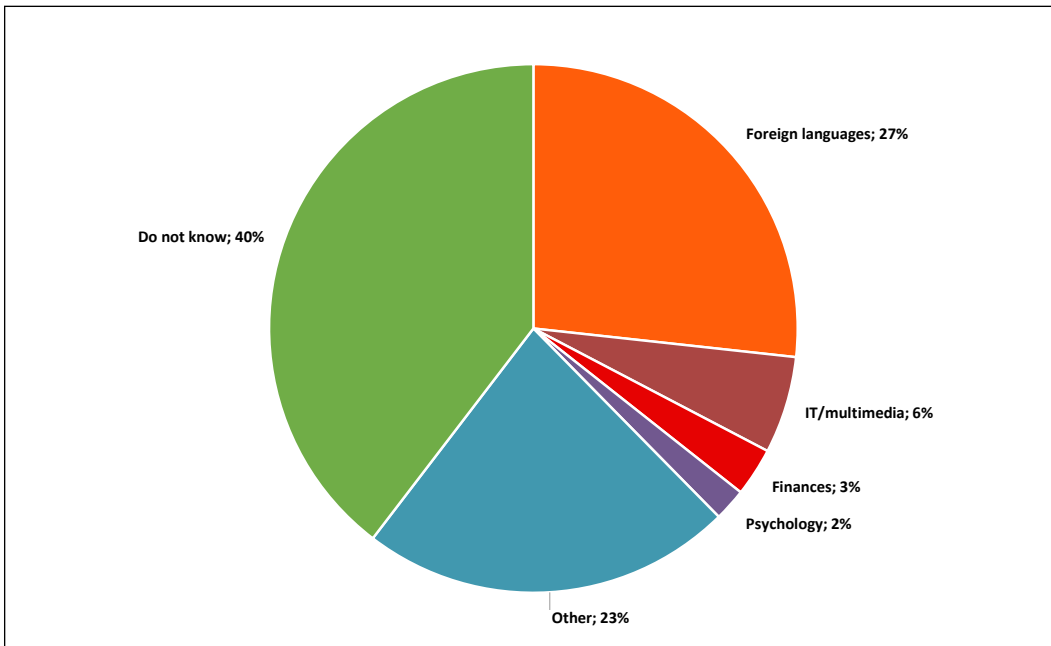


Figure 17. Needs to learn online in subject areas

All the other subjects – IT/multimedia (6%), finances (3%), psychology (2%) – were chosen by a small percentage of participants. As many as 23% indicated various areas of subjects very close to their profession. The professions spread over a wide range of activities, starting from social care, police, agriculture, education, administration, maintenance, industry, management, services and finishing with personal development, like gardening or cuisine. This copious array of wishes seems to suggest that adults do not see any limits to where online learning could not be applied.

In summary qualitative research demonstrates the key characteristics of a digital and network society, first of all, being *constantly connected and learning online*. We use digital means from morning till night, employing digital tools to help us organize the day, to remind us of activities, to connect us to family members, friends, watch movies, review records. The quantitative research has allowed us to explore what digital and network society needs are for open and online learning, focusing on motivation, acceptable forms, areas and activities as well as with regards to the online delivery. Further on we are going to explore higher education curriculum and its characteristics for open and online learning.

## 2. Transformation of higher education curriculum for open and online learning

The main research question addressed in this chapter is how should higher education curriculum be transformed for open online learning? In order to clarify the answers to this question, first, the new roles of universities in the changing society will be discussed, explaining how universities strive to prepare students for a technologically advanced workplace and to serve the DNS, as promoters of lifelong learning and knowledge-based hubs. This new role of universities is revealed through curriculum transformation to respond to innovations, through changes in assessment and recognition, as well as new roles of teachers.

Next, emerging learning needs of DNS will be addressed, highlighting how universities should empower learners through OOL, and what kind of empowerment DNS members expect. Empirical research data analysis will bring forward the results from quantitative and qualitative studies, which will demonstrate the needs of DNS for new ways of learning.

Having discussed the needs for the new learning ways, we will address theoretical research findings to define the characteristics of the new HE curriculum, which meet the emerging ways of learning of DNS, with a special focus on the importance of OERs and their impact to transformation of HE curriculum into OOL. The questions why OERs are important when transforming OOL curriculum, and what university teachers' attitudes are towards OER and their needs to introduce those to teaching practices will be addressed.

Finally, all theoretical and empirical data will be summarised and assembled into transformed OOL curriculum characteristics described at the end of this chapter.

### 2.1. How should higher education transform for open and online learning?

#### International expert position

##### 2.1.1. Universities as knowledge-based hubs

The findings of the qualitative research (thematic analysis) confirmed that in the DNS the role of universities changes, as they need to fit into a new context and to cope with new actors in the education field, to respond to technological innovations, to find out how to balance between tradition and openness. We may not expect DNS members to fit traditional HE framework any longer, as they live, work and learn globally, in a "virtual reality", through "timeless time" affected by the "space of flow" (Castells, 1996). Thematic analysis results prove that universities become knowledge-based hubs (see Figure. 3). As one of the interviewees in the above-mentioned qualitative research has put it:

*"And so that means universities [perform] as knowledge transfer hubs, universities as the team leaders and professional networks, universities as research hubs" (I9).*

The new role of universities was described by interviewees in the following ways: universities should transform their curriculum (the way that it responds to innovations), their assessment

and recognition regulations and procedures (to ensure open learning recognition and lifelong learning possibilities, as well as non-formal and formal learning synergies), and identify and agree upon the new roles of teachers (see Figure 18):

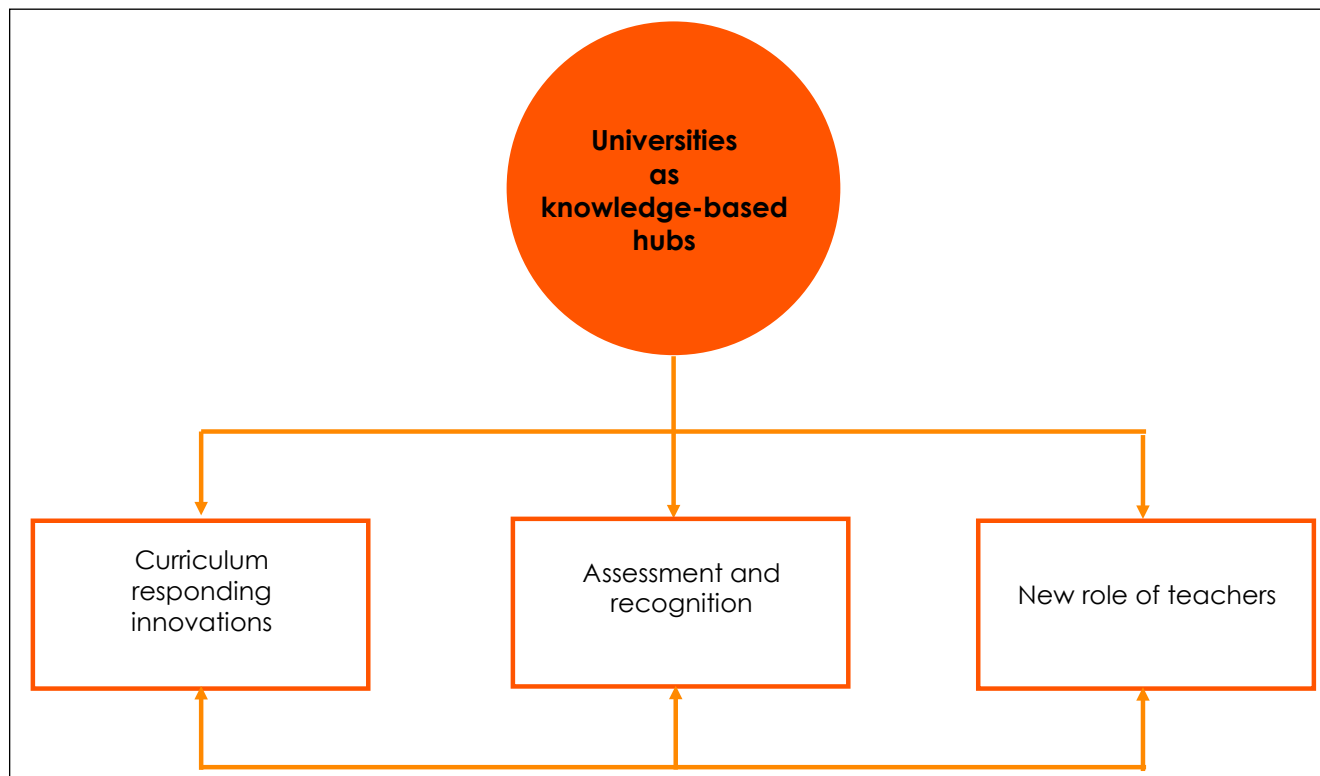


Figure 18. Universities as knowledge-based hubs

### 2.1.2. Curriculum-responding innovations

On the one hand, universities strive to prepare people for a highly technologically advanced society, a technologically advanced workplace, therefore they are important actors in digital and network society, as well as promoters of lifelong learning and knowledge transfer hubs. On the other hand, universities are in great competition with other types of knowledge providers; besides, some individuals still choose a university because of the diploma and certificates rather than gaining knowledge. Moreover, a popular belief is that one can get the necessary knowledge from the Internet, from private providers, from open online courses, etc.

*"<...> if this person has gained knowledge through the Internet, through online courses, through MOOCs provided by private institutions, companies don't care anymore if they have no official certificates from the university" (17).*

Indeed, companies have less focus on certificates, but stronger focus on skills. If universities do not respond to the change, the market and society members will change faster than the former. More and more people will start exploring alternative routes, which are much more diverse than the higher education landscape.

*"<...> and perhaps the new generation 'll choose some other ways, not the ways we did, our generation did go to university to achieve university diploma, perhaps their way of doing things and learning will be different". (I4)*

*"Definitely the idea of open learning is something that was revolutionary, more or less like the first radio transmission because it changes completely and instantly the idea of learning. The idea of openness is something that you can reuse it.... we need to reprogram the university like they did it from the Bologna process, it's exactly the same". (I2)*

*"Definitely we have to maintain the contact with the past, but at the same time we need the digital way of learning and we need to network with not only the local sites, but we need to cross geographical language barriers necessarily" (I2).*

*"<...> it's not money this time because we need time to make them change, because first of all we have the students, then we have the teacher and we are moving slowly towards this idea of open learning" (I2).*

The concern expressed by the interviewees is that campus-based universities are not coping well enough with the changes needed. There is a chance that distance education universities might have a much bigger possibility to adapt to the new modes of teaching and learning, particularly for lifelong learners. Therefore we need to explore the characteristics of the transformed open online learning curriculum more deeply.

### **2.1.3. Assessment and recognition**

For learners worldwide, open online learning offers accessibility and opportunity to learn regardless of time and space. With ever advancing technologies for teaching and learning and the continuing expansion of the Internet, even to remote places, but also with the growing demand for education on the increasingly globalised labour market, the creation of an open space for the delivery and recognition of lifelong learning is seen as the key enabler for the promotion of social inclusion, employability and mobility of the DNS members. In 2016, the *"Bologna Open Recognition Declaration"* by the Open Recognition Alliance called for a universal open architecture for the recognition of lifelong learning achievements. The key issue of the document is incentive for everyone – learners, educators, citizens and organisations – to participate and foster the open recognition movement. Participation means personal responsibility for one's own learning, while in the recognition of the achievements of others contributing to the design, implementation, and exploitation of systems of recognition.

Witthaus et al. (2016, 6) indicate threefold benefits for recognition of non-formal open learning at universities:

- through recognition of non-formal open learning individuals can gain access to study programmes offered by HE institutions;

- registered students can be exempted from part of the study programme in order to be fast-tracked through their studies;
- a full HEI qualification could be provided as distance learning offer.

Recognition can provide learners with confidence in what they have achieved and what they can present as the result of their participation in an open online learning. Diverse models for recognition of open learning (which is very much the same as recognition of prior learning (RPL)) can provide a bridge between learners' "open" accomplishments and tertiary education, offering opportunities for more flexibility and more authenticity than do many traditional assessment tools and procedures.

Recognition is a two-step process: firstly, the learner receives a credential for his/her learning outcomes (LO) and achievements. This is followed by recognition, which can be given either through the education provider that has awarded the credentials, or an external institution, e.g. a university or an employer, see Figure 19 (Witthaus et al., 2016: 5).

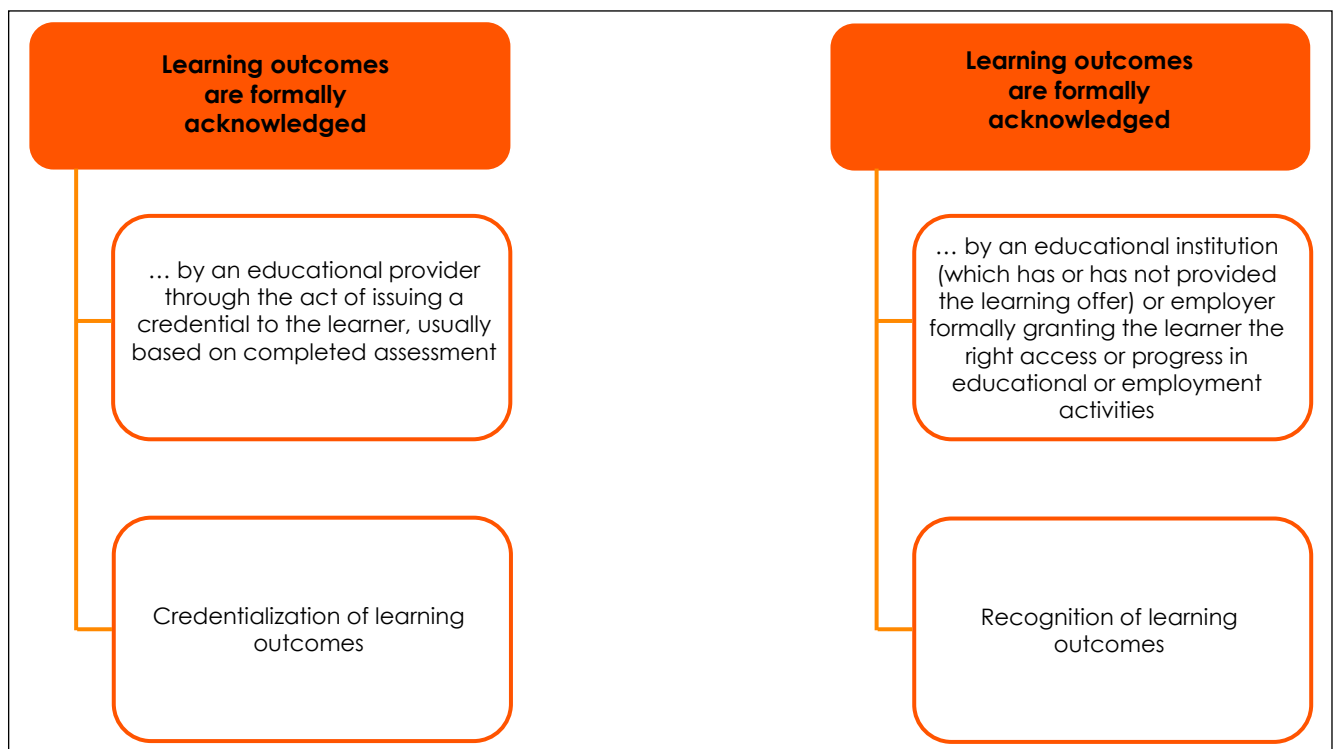


Figure 19. Credentialisation versus recognition of learning outcomes (Source: Witthaus et al, 2016: 6)

Both processes, credentialisation and recognition are parallel in the validation process and include elements as documentation and certification. As validation also refers to informal learning embracing all prior learning of a person, the assessment is competence oriented, and by documenting the learning outcomes, individual experiences become visible, certifiable and thus recognisable. The main difference is that recognition usually is connected to the granting of access, either to new career levels or to university studies.

As our interviewees put it:

*"Yeah this is again - if the students finish the MOOC. Who will accept this one? Speaking about recognitions. What, for example, if the employer recognizes this course? Because till now [they didn't]. In future, maybe - yes. But until now it depends. They look at first at your university. What diploma do you have? And then look at you working. So, and if the MOOC is recognized... and how to know that the same person is behind the MOOC, but [that's] not enough." (I2)*

*"What I strongly believe is that now we are learners in everything that we are doing online, but at the same time we don't have a recognition of what we are learning during this time spent online, on Facebook, on YouTube, and so on". (I2)*

The new systems of digital credentialisation and certification are in the process of development, but they need valid solutions set in place. Other challenges addressed by open and online learning include recognition of learning by companies and the private sector.

*"We need something more like the Bologna process once again, to have something that could be recognized everywhere at organizational level and also the virtual mobility so structurally related, because as soon as you have a common framework, you will have the possibility to obtain your knowledge and your formal recognition everywhere independently of where you are and where you want to study and whatever". (I2)*

Assessment and recognition of prior learning used in formal higher education institutions must adapt to the emergence of much more diversified learning paths. The problem of the open learning is the recognition of learning outcomes in the formal curricula which you cannot do without paying the tribute to formal bureaucracy.

#### **2.1.4. New role of teachers**

However, connecting digital technology with new teaching practices is a great challenge for universities as organizations, and teachers. The future teacher will need to manage more diverse learning styles with more diverse teaching strategies. The new teacher will need to function outside institutional settings and single subject boundaries, organize and manage learning in contexts more relevant to learners. The teacher will need to bridge professional and institutional sectors, operate beyond national boundaries, combine face-to-face and online learning with more extensive interactions across more widely distributed settings.

Universities have been criticized for insufficient efforts to provide training and learning which meets the needs of modern society in the knowledge economy. This criticism includes the role of the teacher who provides learning and teaching on outdated principles from the DNS point of view.

*"<...> it's a question of the quality of the teaching that is actually being offered, how it is actually being offered and what the students can actually make the most of. And also,*

*in terms of how you package that information, are we talking about the degree or mass qualifications... or is it some kind of lifelong learning" (18).*

When transforming traditional university curriculum to open and online learning curriculum it is worth emphasizing the need of training of the teaching staff, and support in their new role, as the role of the teacher in open and online teaching is completely different from the traditional teaching.

The transformation of open and online curriculum is related to the transformation of teacher's way of thinking. Learning is more likely to happen when a learner is engaged, active, and not passive. The learning process needs to be organized in a way which makes it increasingly learner centred. Of course, learner-centeredness sometimes requires teacher's input, which should be prepared beforehand.

### **2.1.5. Empowering learners through opening online higher education curriculum**

The experts of our research confirm the need for empowerment of learners through OOL HE curriculum. Flexibility and openness is crucial for online HE curriculum as learning with no geographical or time borders is an increasingly preferred form of learning, particularly for students who are employed, study part time, live in remote areas with preferences to learn virtually asynchronously and with possibilities to access information and materials while traveling (see Figure 20):

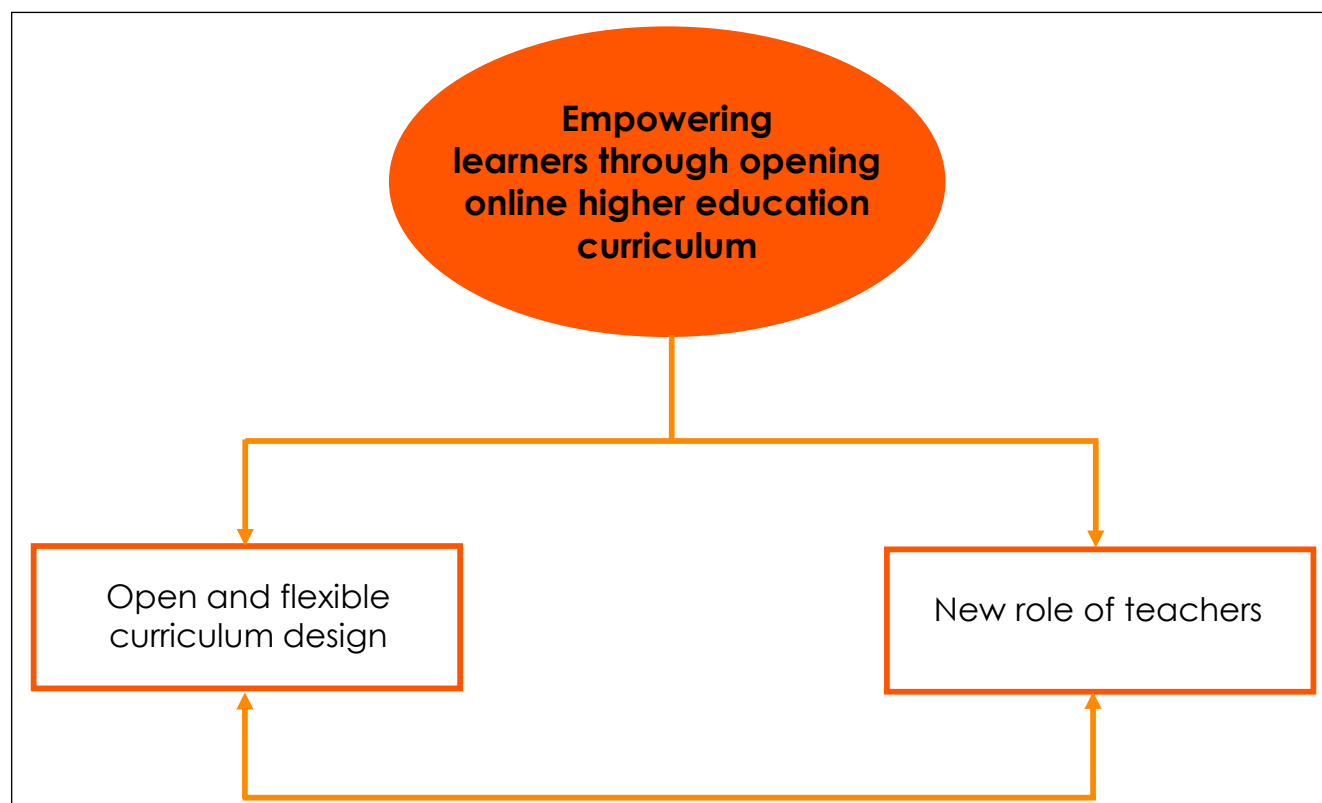


Figure 20. Empowering learners through opening online higher education curriculum

## **Learning support**

Obviously, we need to emphasise pedagogical and technological support for students. The pedagogical support may be provided by the teacher, while the necessity for technological support depends a lot on the students' digital competence and information provided. There is also a need to present students with suggestions on how to learn online. The possibility to ask for help should always be open at universities. When changing their curriculum to open online learning, universities will become 24-hour institutions, offering full time (night-time included) digital studies to different parts of the globe.

*"<...> and that's how we get into this whole lifelong learning experience and that's why I think it is so important, the way we can package up learning into smaller, more agile components that can be actually purchased by our students." (18)*

The needs of lifelong learners will also be met by universities who will arrange their curriculum in smaller units of credits and shorter programmes, developing learning programmes together with industry and DNS members, all these efforts yielding a learning empowerment effect.

### **2.1.6. Open and flexible curriculum design**

The transformation of open and online curriculum at universities should be implemented through the transformation of online environments and flexibility of learning offers.

We should consider the fact that open online learning could have different meanings. To some 'open' means 'open access', or that there is no registration; to other people it means that it is free, that it allows more participation of all the stakeholders.

*"So, for me, it means that I have open access to online learning curriculum. And also, I like this better because it somehow gives more room for the institution, for the teacher to define their ownership or their intellectual property rights to the curriculum". (112)*

We need to think about how to structure the curriculum and the interactive learning process. Short exercises, short videos, immediate feedback on quizzes and tests, the technology that supports learning: all these elements lead to re-thinking about how universities should organize their curriculum, teaching and learning process, in addition to how the curriculum is structured in terms of competences and learning outcomes. If individuals are learning by taking a course, they should be able to get a feedback, a constant feedback during their training so they can make judgement of how well they have done or how much there is to be done, and whether they are satisfied with their own progress.

*"<...>more flexible, motivating, evaluating learner characteristics tailored to their needs. Wider use of tools available online. For example, Social Networks, Open Educational Resources, various platforms" (11).*

*"What is obvious that learners.... don't want to sit for an hour and watch a lecture, then what you can do is take a curriculum and slice it into the learning achievements, learning*

*outcomes, whatever you want to call them, and create it focused, it might be a lecture or more of an animation... but short... Then you have to really think about your teaching, then you have to think about how you organize your teaching, and how your curriculum is organized.” (113)*

The structure of the curriculum can be very different: based on linear learning, what we usually do in our universities, or individualized learning, self-paced, or an entire study programme modularly built by a student, and if an institution would be offering these as modules then the learner could have his own personal curriculum.

*“<...> so [we have to]begin to rethink the typical course environment and how can we differentiate between courses and how they are structured, often very linear, doing Google search is completely unstructured and non-linear, but some of that structure you want, if you want to come in the middle; and, say, what the next generation learning experience looks like, that's beyond courses, a little more like doing Google search, but somehow exists within an educational context. That some organization would say: this is the extent of what we are trying to learn here; and so I think it leads to new ways to think about individualized learning, self-paced learning and it can be really interesting” (17).*

## **2.2. What should higher education curriculum look like?**

### **Responses from digital and network society members in Lithuania**

Digitalization allows more open and flexible pathways for teaching and learning in higher education, particularly for lifelong learning programmes offered for the society. The perspectives of both society and university teachers in digital supported teaching and learning environments are important here. Based on findings of quantitative research in Lithuania, here we outline society members' approach to higher education services provision for DNS that addresses a possible HE transformation.

A quantitative survey of Lithuanian adult population (n=1241) demonstrates adults' approach towards learning and teaching organization aspects in higher education and how it is suitable for DNS (Figure 21 and Figure 22). More than half of the respondents (51%) indicate that a daily format of classes is not acceptable to them.

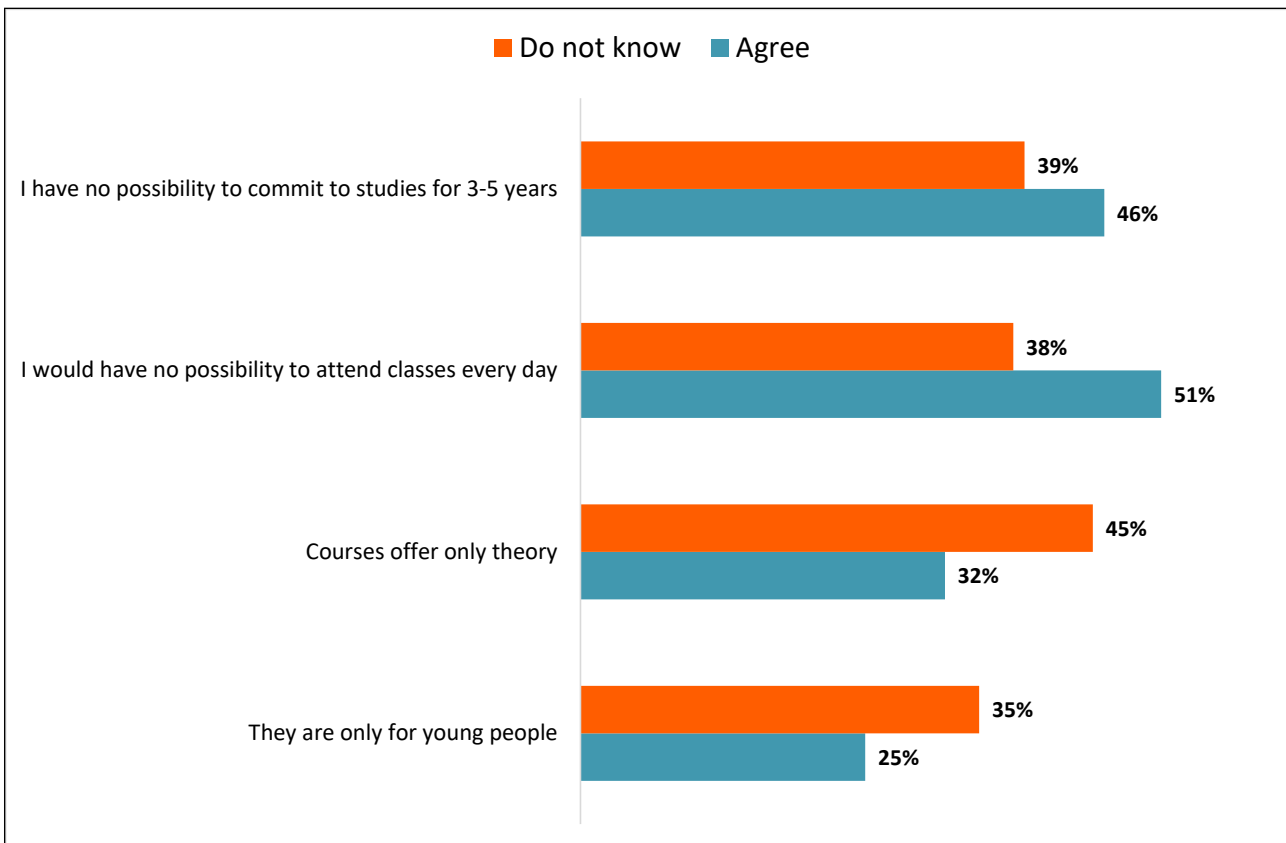


Figure 21. Respondents' approach to a potential learning offer in today's HE institution

As Figure 22 illustrates, almost half of the respondents (46%) indicate that they have no possibility to commit themselves to study for 3 to 5 years and it is hard to combine studies and work (49%). As far as lifelong learning possibilities are concerned, they assume universities offer online courses for adults (42%) and courses for professional development (45%), even intensive ones. They also assume that there are possibilities to get validation of prior learning (44%), while quite a small percentage thinks that university serves only young people (25%). However (Figure 21 and Figure 22) shows that society in general are not familiar with the possibilities provided by HE that could be used for online professional development (43%); or that there could be online university courses for adults (46%); and even 39% are not sure if it is hard to combine studies and work. In general participants of survey treat higher educational institutions as a traditional establishment or they are now aware of what is going on there and what provision or learning innovations for DNS higher education could offer.

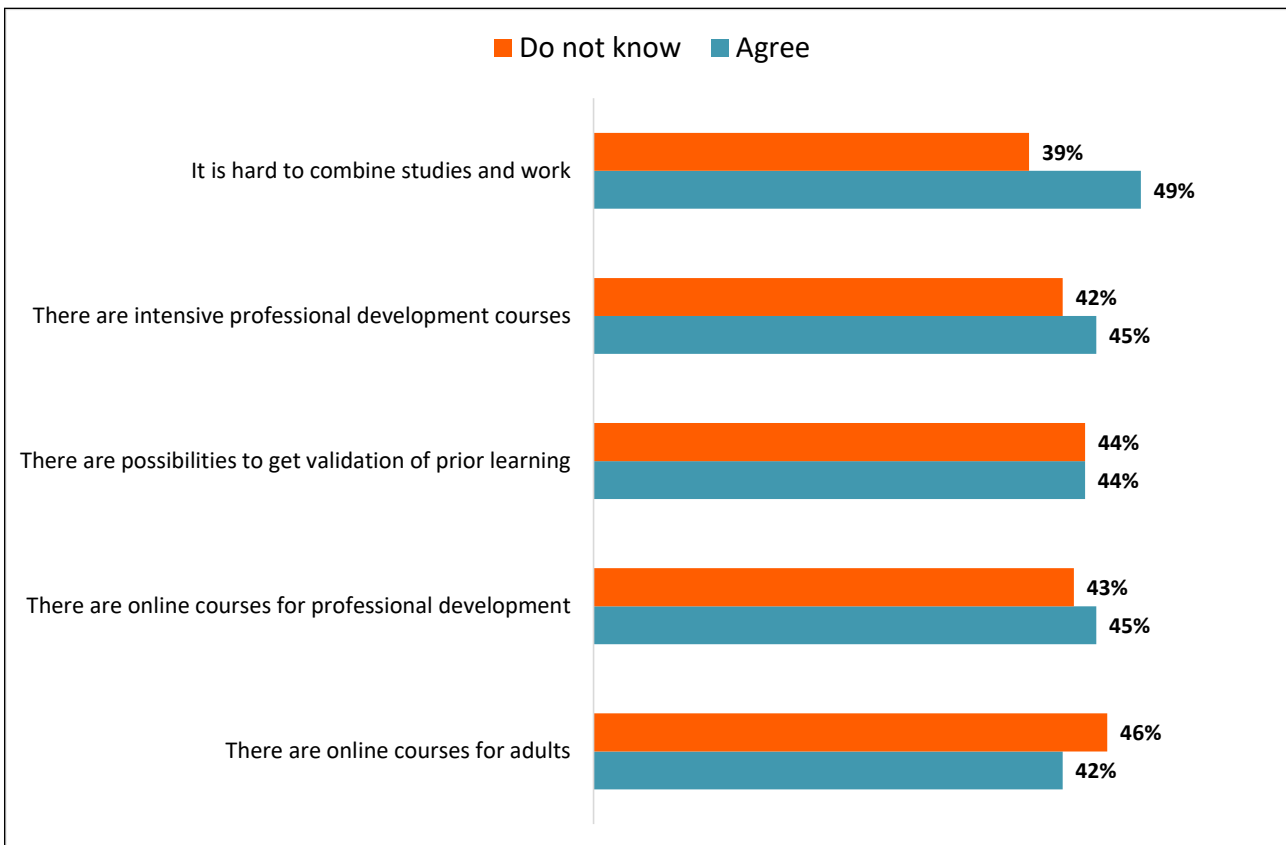


Figure 22. Respondents' assumptions towards learning and teaching organization in higher education to meet the needs of DNS

Even though many of adults do not know about the possibilities offered by HE institutions, they have clear answers on *how* they would like to learn online. When learning they would like to use open educational resources (Figure 23), reading materials (80%) in particular, watch lectures or other video recordings (80%).

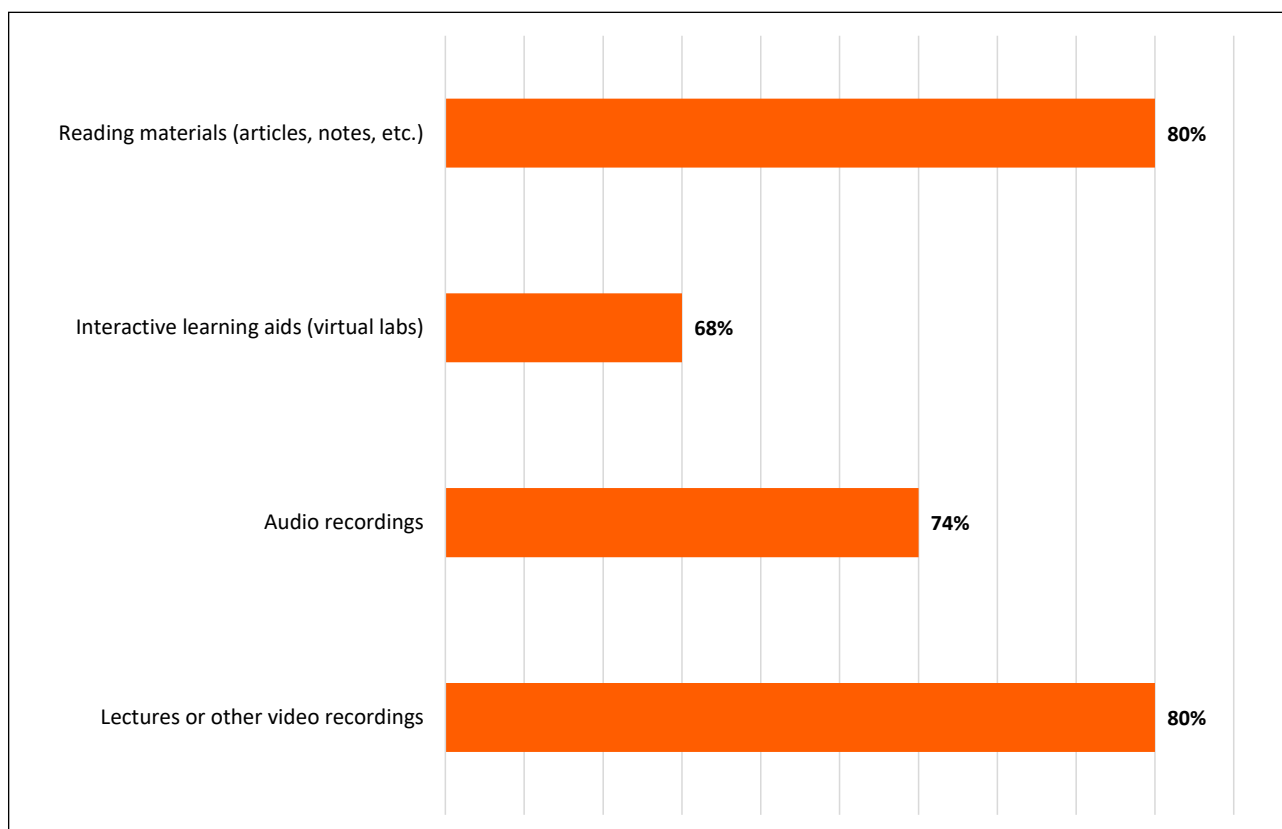


Figure 23. Preferences for using Open Educational Resources when learning

Participants also prefer to have audio recordings (74%) and interactive learning objects, such as virtual labs (68%) when learning online. Which means in general that learners would prefer a modern HE curriculum which includes Open Educational Resources. This allows us to shed light on the research question – why OER are important when transforming open and online learning curriculum.

## 2.3. Trends and complexity in open and online learning curriculum developments

### 2.3.1. Conceptual perspective

It is beyond any doubt that the future of learning is digital, and new learning opportunities supported by digital technologies open up new perspectives for universities. OOL opens doors for more and a broader range of students and ensures more equitable learning opportunities for a growing number of students (Meier, 2015), also creates several advantages, such as smaller classroom size to provide more effective student–teacher interaction, the ability to reuse pre-formatted courses at lower costs, student flexibility, and last but not least, a new source of revenue for universities facing financial deficit from state appropriations (Byrd, & Mixon, 2012).

OOL has a variety of forms and flexible formats that need to be chosen and adapted by universities. MOOCs is one of these. Promoters of MOOCs have several arguments about their

potential to change the nature of education, particularly HE, namely, the global contribution, community engagement, participation in a collective process, access to people who, as a rule, would never take part in HE, application of flip classroom when students access content outside of the class and spend class time discussing, analysing, and applying that new information (St Clair, 2015).

Many universities have already chosen their way forward to digitalise their curriculum resources, incorporated video and uploaded digital materials to online learning environments, even started blending learning and teaching process, integrating traditional physical and new digital spaces. Various digital tools provide an easy way for a learner who has missed a lecture to catch up, but also enable others, especially slow learners, to review difficult concepts. Many professors in HE use video lectures in a variety of ways, such as broadcasting lectures, delivering lecture recordings before class as home assignment or including videos for demonstration on the course topics, as well as providing supplementary video learning materials for self-study (Giannakos, 2014). Although there are many and diverse ways of designing online learning, there is a limited understanding of the efficacy and usefulness of each method particularly when we talk about non-formal open learning.

A curriculum inevitably changes, and for teaching practitioners it is important to comprehend the processes of the change. Hoadley (2012) outlines three positions to curriculum development: 1) curriculum development is a technical matter that should be carried out by curriculum experts in an apolitical manner and based on clearly defined learning objectives; 2) curriculum development based on a belief that meaningful learning cannot be planned on predetermined by outcomes, but is developed in the process of teaching; 3) curriculum development is and should be clearly political.

When discussing the nature of curriculum *per se*, Graham-Jolly (2003) describes curriculum through different perspectives: a) *curriculum as a plan* – what is expressed in state and institution formal documents about what, how and when should be taught and how this should be assessed; b) *the curriculum as practiced* – what actually happens in the classroom because of institution and teacher choices and circumstances; c) *the curriculum as experienced* – what each individual learner actually internalizes and takes away from the educational experience; d) *the hidden curriculum* – the things influenced by the preceding three dimensions (e.g., the aspects that teacher emphasizes, the forms he/she chooses, the allocation of time and importance in the timetable, etc.).

A threefold approach towards curriculum is presented by Mays (2017) as he refers to it through: 1) *curriculum as a product* (approach rather technical in nature), following four key principles

– set a purpose/objectives, identify appropriate educational experiences, organise them and then evaluate them, closing possibilities for more open-ended learning or possibilities for learners to participate in decision making about what and how to teach; 2) *curriculum as a process* (non-technical in nature) emphasising curriculum development and implementation as a process negotiated between teachers and learners rather than imposed on learners; and, finally, 3) *curriculum as a praxis* (non-technical in nature) where curriculum is evolving as continuous reflection on experience feeds seeking to empower learners. Mays (2017) argues about a possibility to combine all these three approaches while making an attempt to develop and implement a curriculum which empowers learners and leads them into an increasingly learning autonomy and self-responsibility. The recent developments in curriculum design of open online learning, where learners are sought to be increasingly treated as curriculum co-constructors, is very much in line with the approach to curriculum as a process. Mays (2017) agrees that an approach to curriculum as an unfolding plan rather than a rigid blueprint prepared by competent policymakers requires highly competent teachers and is not easily implemented in schools. On the other hand, an increasing access of learners, including school children, to technologies that open up digital resources and OER, should not limit the curriculum to rigid printed materials.

Curriculum organisation and development is a complex process. Ornstein & Hunkins (2004) identify three ways of organizing it: i) subject-based curriculum design; ii) learner-centred curriculum design and iii) problem-centred curriculum design. Hoadley (2012) indicates trends, especially in the school sector, where the curriculum is based on integrated knowledge that is taught thematically, more focusing on the learners' competencies at the end on the process, and linking between school knowledge and everyday knowledge than the reproduction of the content of the subject.

A study by Bernard, Abrami, & Borokhovski (2009) discloses another aspect of the complexity of curriculum and indicates that it is important for the staff to invest time when designing a curriculum and developing activities that encourage more intensive and creative student engagement with the content by allowing learners to take existing OER, e.g., openly licensed textbook, and re-contextualize it for their own needs by replacing existing examples with local examples or translating the resource or its parts into a local language. Such learner engagement with the open learning content could achieve much higher efficiency than learner-teacher engagement. Mays (2017) suggests interrelation between the nature of resources that are chosen to achieve the learning goals and the methods of assessment that need to be adjusted accordingly to best measure the learning achievements.

Hutchison, Tin & Cao (2008) indicate that the existing dominant systems of education were built by and for baby-boomers in the industrial world, whereas the current Net Generation users or millennials operating in the networked society with mobile devices in hand are creative, result-oriented, customizing, self-focused, achievement-oriented and comfortable in image-rich interactive environment, preferring to learn by doing. These users are entering the education market with specific expectations that need to be met by curriculum builders and designers. Contrary to the past, nowadays mobile learning has its potential to individualize learning and choice of curriculum. For instance, the majority of students of Athabasca University are employed, they study part time, with preferences to learn virtually asynchronously and with possibilities to access information and materials while travelling (Hutchison, Tin & Cao, 2008), therefore, flexibility and mobility is crucial for them, and mobile learning is an increasingly preferred form of learning.

As a result, the curriculum is expected to respond to society needs, with regard to different learners' characteristics, experiences, cultures and learning abilities (Hood & Littlejohn, 2016). Tate and Klein-Collins (2012) refer to increasing numbers of "non-traditional" learners or adults, sharing some of the traits such as having dependents, being a single parent, working full-time, being independent from parents or attending school part-time. These learners experience barriers of time and space, need relevance in learning, are frustrated that their college-level-worth experience is not recognized and are challenged by the navigation of labour market requirements and the system of education. Thus, technological innovations may offer some of the solutions for these adult learners.

### **2.3.2. Learning theory perspective**

Siemens (2004) mentions that in the digital age there is a need for a theory to guide curriculum development in the networked world, which would answer questions about the impact of networks on learning and how to stay current in terms of teaching in the constantly changing information ecology.

Ally (2008) observes that designing online learning materials may include principles from different learning theories – **behaviourism, cognitivism, connectivism and constructivism**. The author explains the application of learning theories in the perspective of MOOCs. cMOOC stands for **connectivism**, when learning design contains content and promotes interaction through blogs, learning communities and social media platforms. In this environment, participants are all considered teachers and learners, which stand in contrast to the structure of xMOOCs, where each individual is either a student or a teacher.

Despite the fact that different authors relate the same characteristics to different types of

MOOCs, Kovanovic et al. (2018) and Guardia, Maina and Sangra (2013) emphasize that there is a very clear distinction regarding open online pedagogical course design. **Behaviourist** pedagogy emphasizes the role of the course instructor where s/he is seen as the main actor of learning process and the most reliable source of knowledge. This type of MOOCs is based on the idea of "knowledge transfer and duplication" (Guardia, Maina & Sangra, 2013, 2), while now courses are more concentrated on **constructivist** learning theories as they are transformed into being less structured and more oriented on enabling learners to self-organize and regulate their own learning. The learning itself is based on content and peer evaluation, thus, as a result, this type of courses promotes "knowledge creation and generation" (Guardia, Maina & Sangra, 2013, 2). To conclude, the **behaviorist** theory could be used to teach facts (what), the **cognitive** theory could be used to teach processes, principles and causality (how) and **constructivist** – to cause meta-cognitive way of thinking and contextualized learning (why) (Ally, 2008).

It can be noted that there is a shift from courses being equally distributed between course organisers and 'self-directed student learning' into 'the transmission of content' (Kovanovic et al., 2018, 45). Instead of being knowledge consumers, learners choose to be active participants of their own learning and, in this way, construct their own knowledge. This knowledge construction emerges as a result of interactions with course content, course instructor and peers. Knowledge and experience that the learner has had prior to the course are very important factors for knowledge construction, together with meta-cognitive processes and learning environment. As a result of the shift mentioned above, the learning content has changed as it is supposed to focus on learning process by provoking learners' experiences that induce development of skills and facilitate self-directed learning (Sun, 2014).

Ornstein and Hunkins (2004) outline four major "camps" in curriculum development: a) traditionalists, who believe that curriculum can be planned and that teachers can be trained for its implementation; b) conceptual empiricists, who are interested in theorising about the curriculum development and questioning what is and what is not included and how learning is assessed; c) re-conceptualists and critical theorists, who are strongly rooted in phenomenological theory and are less interested in how curriculum is constructed rather thinking about how curriculum is individually experienced and d) postmodernists, who comprehend curriculum as emergent and not planned. The curriculum in the postmodern era is more interested in the discourses related to cultural, historical, political, ecological and autobiographical impact on the individual and society rather than curriculum planning, design and implementation in a context and value-free environment.

### 2.3.3. Learning design (MOOC) perspective

While learning design is researched from many perspectives and is a common topic among many researchers in education, OOL curriculum design still lacks research findings and research-based recommendations due to rapidly changing conditions and factors in this dynamic area that we address. The fourth industrial revolution, emerging technologies, DNS needs, OER, artificial intelligence, data and learning analytics, lifelong learning and globalization: all these are important and rapidly developing factors that shape the research and solutions in OOL design and its perspective.

The main trend in research in OOL curriculum designing is directed towards studying MOOCs for their innovative pedagogy, learning design solutions, quality of OOL and many more. As a next step, recent studies address the topic of integration of MOOCs into university blended online learning curriculum as OERs.

To start the integration of MOOCs into university level curriculum, the most general principles of MOOCs design should be considered, and the most prominent aspects of the courses should be brought to the fore. A summary of characteristics of MOOCs instructional design and good practices of university curriculum development could be treated as conceptual directions towards OOL curriculum transformation. Guardia, Maina and Sangra (2013, 3-4) provide an analysis of the main characteristics of MOOCs design and distinguish the following principles (Figure 24):

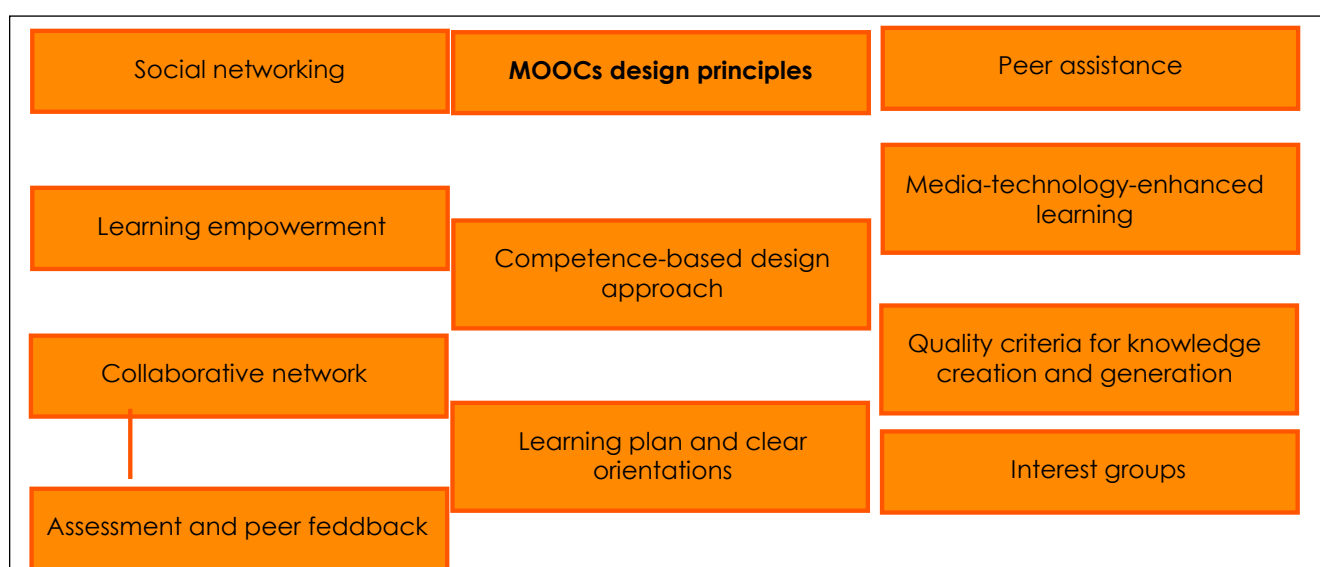


Figure 24. Characteristics of MOOCs instructional design. (based on Guardia, Maina & Sangra, 2013)

**Competence-based design approach**, focusing on learning outcomes which are oriented towards what learner needs to learn to do, rather than what they need to learn to know. This approach engages participants to learn by developing skills through situating, problem-

based or project-based learning and not so much from reading resources. Therefore, it is more oriented towards learning activities, rather than learning content (Guardia, Maina & Sangra, 2013). The content should encourage teamwork, experiential learning and reflection to experienced reality. In this way, the course content enables learners to develop their critical thinking, analytic or problem-solving skills, as well as manage and control the process of self-directed learning (Sun, 2014; McLoughlin & Lee, 2010; Hew, Cheung, 2014; Hew, 2015), by relating it to their individual needs and experiences.

**Learning plan and clear orientations.** Regarding the fact that MOOC learners represent highly diverse groups, preparation of a clear and precise course plan and schedule must be taken into consideration from the very beginning. This plan should include detailed information about activities that will be developed during the course, clues and tips on how to assure peer assistance, prepare personal learning plan, and criteria for course assessment (Guardia, Maina & Sangra, 2013). Next to this, OOL curriculum design needs to develop learning strategies by considering learners' motivation and different learning skills, responding to different learners' experiences, providing access to OER and finding strategies helping to reduce the number of learners' retention. Fitzgerald, Anderson and Thompson (2015) confirm this idea and develop it by stating that systems such as badges or peer rating awards should be treated as positive factors, engaging participants into learning activities.

**Social networking.** Course design should have space for learners' interaction and exchange of knowledge. Personal learning environment is seen as a very useful tool where learners can create their own blogs, collect and manage course material, develop personal networks (Guardia, Maina & Sangra, 2013). Learning environment has to promote and create learning communities or communities of inquiry by encouraging learners to communicate, discuss, share and be active participants of the learning process (Bates, 2014; Kovanovic et al., 2018; Miller, 2015; Kop et al., 2011).

**Learner empowerment.** Learner-centred design should create opportunities for learners with different prior subject-related experience and knowledge as well as enable learners to become active part of the curriculum and develop their own learning pathways by developing their own learning goals, organizing their learning and self-assessment processes, etc. (Guardia, Maina & Sangra, 2013; Istrate & Kestens, 2015). Margaryan, Bianco and Littlejohn (2015) emphasize that while MOOCs are oriented towards the development of personal learning opportunities, the online courses still miss personalization that would meet participants' characteristics.

DeBoer et al. (2014) argue that a standardized curriculum of MOOCs' courses, covering course syllabus, learning materials, lesson plans, etc., quite often transforms during the course delivery

time, from the one that is formally planned to the one that is taught and delivered during the course. Learners as active participants of the course have direct impact on curriculum, and therefore individual learning pathways may form. As it was noted, instructors have the possibility to promote individual pathways by including them into their courses. For example, facilitators of the course "Introduction to Biology - the Secret of Life", allow students to designate themselves either as "auditors" or as "enrollees", and in this way, develop their individual learning pathway. Designation of learners' roles can be organized by "asynchronous interaction or by designing intentional 'choose your own adventure' pathways" (DeBoer et al., 2014, 18). Within this transition process, online courses are expected to have developed self-access centres having all needed learning resources and technologies that help to support and facilitate process of self-directed learning (Sun, 2014).

**Collaborative network.** Course discussions and other group or teamwork should have clearly defined requirements for participation in these activities (Guardia, Maina & Sangra, 2013).

**Assessment and peer feedback.** Different assessment tools and objective criteria should be designed to ensure precise assessment requirements. Moreover, learners should be encouraged to develop their personal blogs or e-portfolios that would help to follow and observe their learning process and trajectories (Guardia, Maina & Sangra, 2013). Formative and systematic assessments of learners' learning progress should be assured by the course instructor from the very beginning of the course till its end. This maintains that a possibility to check one's understanding of the topic by implementing self-assessment tasks or participating in discussions will encourage learners' deep thinking and understanding of the topic.

**Peer assistance.** Corneli and Danoff (2011) present the concept of 'paragogy' which is related to peer production environments. This environment should have spaces for co-creation and support. Guiding tips should be prepared explaining the learners how they should read others' assignments, how to provide recommendations or feedback (Guardia, Maina & Sangra, 2013). Miller (2015) distinguishes between three main types of interaction, i.e. "learner/content; learner/instructor, and learner/learner" (p. 105). It confirms the idea that despite the learner's need to develop one's own learning pathway, the roles of instructor and peers might become crucial.

**Media-technology-enhanced learning.** Bali (2014) adopts a learner's role and discusses MOOCs pedagogical approaches. He argues that, despite the fact that most of MOOC courses are based on videos that learners can watch repeatedly and in any place, it should be taken into consideration that this type of learning is not acceptable to all groups of learners (Bali, 2014).

**Quality criteria for knowledge creation and generation.** The course instructor should demonstrate the learners how their knowledge can contribute to the knowledge construction, how the

learners can transform from being 'knowledge consumers' to 'knowledge producers'. Clear quality criteria should be prepared to distinguish how original thinking and personal cognitive input will be valued regarding the development of course content (Guardia, Maina & Sangra, 2013).

**Interest groups.** Instructors should encourage work in small groups and create a course which enacts learners to create network of interest by collaborating with colleagues in group or teamwork. Collaboration activities help the learners to construct their knowledge by learning different learners' approaches or opinions (Kennedy, 2014; Miller, 2015). To achieve good results and assure emotionally safe group environment, tips on how to create the group based on personal interests, culture, language or other criteria might be very helpful (Guardia, Maina & Sangra, 2013).

Hew (2016) has discussed reasons for students' engagement into Massive open online courses through MOOC design and use of resources and teacher's / instructor's role. The analysis was based on the results of three most highly rated MOOC courses in different subjects (computer programming language courses, literature courses and art and design courses). Research results allowed to distinguish five factors that prompted learners' engagement into learning process, i.e. "1) problem-centric learning with clear expositions, (2) instructor accessibility and passion, (3) peer interaction, (4) active learning, and (5) course resources to address participant learning needs" (ibid, p. 328). Learners emphasized the importance of a very clear course aim, which is not too general, and activities that promote problem-centric and active learning. Mini quizzes, prompt feedback, virtual meetings and discussions with experts of the field, peer review and feedback on ones' project / homework are distinguished as some of the strategies that were used in most highly ranked open online courses. Similarly, the instructor's role (his/her enthusiasm, passion and accessibility) and collaboration with peers appeared as very important factors, promoting learners' motivation, social well-being and engagement. Orsini-Jones (2015) integrated MOOC materials into the module "Theories and Methods of Language Learning and Teaching" in Coventry university (UK), where blended learning mode was used previously to combine face-to-face contact with materials and activities offered on an indicated Moodle page, where students could engage in interactive quizzes, discussion forums, watch suggested videos, etc. The introduction of MOOC into the course offered the opportunity not only to use online materials, but also to access additional 'expert voices' and to engage with a considerably wider community of practice. The students shared some of the tasks that the MOOC participants had performed, such as doing reflection on discussion forums in Moodle. The student and teacher survey (Orsini-Jones, Conde Gafaro, Altamimi, 2017)

conducted before and after the usage of MOOC reported a considerable increase in belief that using a MOOC may enhance students' motivation (from 58% in pre-course survey to 75% in post-course survey) and teachers' confidence (42% and 75%) and most of the participants suggested using MOOCs in such a course in the future as well.

Fair, Harris and León-Urrutia (2017) describe threefold benefits that learners get when undertaking a university course in which participation in a MOOC is part of the syllabus: firstly, there is the opportunity to learn from the latest research in the subject, often before it is published more formally; secondly, they can collaborate not only with their peers, but also with the broader learning community, gaining from a diversity of ideas, approaches, experience and knowledge; thirdly, there are benefits of being able to study in one's own place, time and chosen company.

Over the years, the overall approach towards MOOCs has transformed. Bozkurt, Akgün-Özbek & Zawacki-Richter (2017) investigated 362 empirical articles published in peer-review publications and indicated a change of the perspective towards MOOCs from a disruptive innovation to a sustaining innovation because of strategic moves of prestigious universities and businesses to offer massive courses.

Caulfield, Collier & Halawa (2013) describe a phenomenon called the 'distributed flip' when multiple universities and colleges use materials of MOOCs and eventually the materials are used in classrooms for which they were not designed. The online scenarios are not designed for simple blended scenarios of these universities. In case of the 'distributed flip' course curation, sequencing of the learning process could be applied: the teacher of the face-to-face course has at least to partially synchronize with the other time stream or even streams and maintain control of such a course with a looser structure than in traditional blended courses.

In summary, the principles of MOOCs design allow and promote MOOCs integration into the university curriculum, bringing forth broader choices, gaining experience with the global learning community, and flexible input into one's own curriculum. Some unexpected results of the integration, such as 'distributed flip' of the courses may happen, but those can be overcome with a practical study of the MOOC integration.

#### **2.3.4. Openness and community engagement**

Dalgaard and Thestrup (2015) developed an educational approach to openness by developing new educational practices that interact with the society where digital technologies play the key role. The authors outline three pedagogical dimensions of openness: transparency, communication, and engagement:

- Transparency relates to the opening up of learners' work, thoughts, activities, and products in order to provide learners with insight into each other's activities.

- Communication relates to establishing interaction between educational activities of an institution and practices outside the institution.
- Openness aims at establishing interdependent collaborative relationships between educational institutions and external practices.

The three dimensions of openness can be achieved by a combination of technologies that play different roles. Digital technologies for collaborative work (possibilities to share and collaborate in developing a content and resources in written, audio and video forms, save them and synchronise with online and off-line technology) could provide support for internal transparency. Social networks and broadcast technologies extend the transparency and develop a basis for communication and engagement with the outside institutions.

Despite the fact that learners are encouraged to be creators of their own knowledge and they prefer self-regulated learning, the role of the course instructor is seen as very important for keeping an eye on the course progress and demonstrating the learners that she or he supports their learning process and is available for timely consultations or discussions (Miller, 2015).

Ouyang & Scharber (2017) assert that participants' engagement in the learning process, active participation and interaction are critical factors for the development of online learning communities. These processes mainly happen during discussions, which, if moderated and facilitated by course instructors, become an important part of the learning process and community development (Ouyang & Scharber, 2017; Thorman & Fidalgo, 2014). Instructor's involvement and online presence foster discussion and engage learners into more active discussions most of the time. Their role may vary within discussions during different time frames, i.e. most commonly, the instructor starts discussion by guiding it, later on he/she may move to becoming a facilitator, an observer, and, finally, at the latest course stages, a collaborator (Ouyang & Scharber, 2017). These roles usually vary depending on the group size and overall group dynamics.

Different strategies can be applied for the online course facilitation, although Hew (2016) and Epp, Phirangee and Hewitt (2017) focus on two main facilitation categories, i.e. peer facilitation and instructor facilitation. Peer facilitation demonstrates the process where course participants have most of the power to moderate and control the learning process, and instructor facilitation involves the course instructor as the main actor coordinating and moderating learning process and ongoing online discussions. While the latest approach has been widely discussed because of the workload that the instructor gets if he is required to monitor and coordinate learners' discussions, peer facilitation process is seen as the one, inducing the participant for the more cognitive learning processes. According to Belcher, Hall, Kelley and Pressey (2015), when the

instructor's role is more passive and most of the learning process is delegated to learners' responsibility, they develop cognitive skills by finding individual learning patterns, summarizing learning material, connecting it to their real-life experiences, critically and objectively evaluating their personal ideas within the context of other participants' ideas and experiences, and raising concerns and questions. On the other hand, research results presented by Hew (2015) revealed that the instructor's engagement into online discussion allowed to keep them up to the topic, discussions were more concentrated and alive, as the instructor tended to encourage learners to share their ideas and opinions. Epp, Phirangee and Hewitt (2017) confirm the idea that the instructor's role has a significant impact on the development and maintenance of learners' support, which, in its turn, leads to the development of a more effective online learning community.

Anderson (2008, 2010, 2017) distinguishes the importance of **interaction** for the course and discusses the types of interaction that are present in open online courses: *student-teacher interaction*, that has recently expanded from traditional forms into different media formats of audio, video and digital texts. The sophisticated developments in technologies start allowing student-teacher interaction to be partly replaced by *student-content interaction*. The easiest way for the teachers is to record the student-teacher interaction and post it for the students. However, the most cost-effective and possibly the most pedagogically effective form of learning interaction is *student to student interaction*. The flexibility that is attained through self-paced individual courses, where a learner plans himself his own learning pace, time and schedules as well as personal interactions with the teacher, is not outweighing the benefits of the student to student interaction. Therefore, to achieve better results, students are grouped to implement group tasks and hopefully grow into an effective learning community.

Our research confirms that the transformation of open and online curriculum at universities should include open and flexible curriculum design and learner support that allows empowerment of learners.

Bell, Mackness and Funes (2016) analysed the formation of the course learner community in the MOOC and their contribution to the MOOC curriculum to the extent that the community itself was called the curriculum of the course. In that MOOC the content was not pre-planned and learning outcomes were not prescribed. Each week started with a video from a convener with a provocative question, while the participants were encouraged to organize materials and links, have their own space of reflection (a blog, a forum or a hashtag), connect to other people and their work, cluster to people with similar interests and focus to what they have learned in a project for their use in the future. The official course lasted 6 weeks, while the other 6 week learning continued in non-formal groups, blogs and forums.

Even though curriculum is more associated to formal education and a body of knowledge to be transmitted to learners, but in it may also be negotiated with students in the learning contract, where students participate in the selection of topics to be covered in the course, whereas Bell, Mackness and Funes (2016) treated curriculum as a co-creation process of tutors and learners, leading to emerging learning outcomes that were not set *a priori*.

Patrick, Bliss and Tonks (2013) emphasize the importance and potential of collaborative content development to increase the quality of curriculum offered in the US schools, as students are ready to embrace personalized learning resources, but there is lack of quality materials. The collaborative development of content could allow OER developers to split the topics and share the results across the country.

Mays (2017) investigated transformation possibilities of African universities using OER. The four-year study involved four African universities (in Kenya, Tanzania and South Africa). The research project started with developing supporting policies and capacity building of teaching staff of the universities to integrate OER into courses, to revise and publish materials under open licenses. However, the research project showed a need to review the institutional policies in general reconsidering their business model to meet the increasing needs of the students. The main contribution of this study is the suggestion that “engagement with OER is more likely to move from an individual to an institutional focus unless such engagement is aligned with the overall vision, mission and business model of the university” (Mays, 2017, 387).

OER should contribute to the curriculum development by making it more responsive, increasingly accessible and of higher quality, at the same time remaining affordable and allowing to expose students to a wider range of opinions than they might get acquainted to (Mays, 2017). Mays (2017) argues that systematic sourcing and adaptation of OER as well as sharing back the adapted OER has a potential of making the OER community self-sustaining in terms of time, cost and quality. Using OER then broadens access to quality learning by offering equitable opportunities for learners and those especially from less advantaged populations (Vianna & Stetsenko, 2015).

## **2.4. The importance of OER for open online learning curriculum**

### **2.4.1. Definition, dimensions and elements of openness**

Hilton & Wiley (2010) identified a four ‘R’s framework that reveals the characteristics of what an OER formally permits users to do by its license. Belawati (2014) compares the idea of opening the content with open doors – it may be widely open, or just a little – “the extent of the rights the creator wants to grant to the users defines how open the content is.” (p. 3). The four ‘R’s framework by Hilton and Wiley (2010) includes such levels of openness:

- Reuse – the most basic level of openness. Users are allowed to freely use all or part of the same, precise, unchanged work in different ways.
- Revise – people can adapt, modify, translate, or change the form of the work.
- Remix – people can divide or combine existing (revised) resources and create a new resource.
- Redistribute – people can share copies of the original or revised, remixed work with others.

Later (in 2012-2014) the framework was revised and complemented with one more option – *retain* (Wiley, 2014) – which became the most basic level of openness and which signifies that people can create, own, and control copies of the content (e.g., download, duplicate, store, and manage).

Bliss, Robinson, Hilton, and Wiley (2013) introduced a framework, which categorized the major areas of OER research as follows: cost, outcomes, use, and perceptions (COUP model).

According to Bodily, Nyland and Wiley (2017) the majority of studies on the use of OER focus either on (1) faculty adoption of OER, or on (2) the ways that users exercise the 5R permissions. Hilton et al. (2010) also suggest using ALMS analysis for OER openness from technical aspects, as “technical aspects of OERs will affect how ‘open’ they really are” (p. 43). The ALMS here stands for: (A) user Access to editing tools; (L) Level of expertise required to revise or remix created OER; (M) Meaningfully editable OER by others; (S) Source-file access to users editing OER.

Dalsgaard and Thestrup (2015) emphasize that the objective of open education is not pedagogical, but rather political – it “is mainly derived from education policy” (p. 79), however if you address pedagogical opportunities of openness in education you have to change and move beyond the course with different educational activities. “Openness is not only a matter of opening up the existing, but of developing new educational practices that interact with society” (Dalsgaard & Thestrup, 2015, 78) Authors analyse openness from educational perspective spotting **the three dimensions** of openness: *transparency*, which relates to opening students’ (who are not collaborating with each other) work and activities; *communication*, which aims at interaction for sharing and connecting of educational practices in and outside institution; and *joint engagement*, which establishes collaborative relationships of institution’s educational activities and external practices in the world.

Rolfe (2017) introduces **five elements of openness** (Table 3) which are grouped by interview results from higher education teachers. These elements show that teachers have positive attitude towards OER and they clearly understand the benefits of OER and open learning.

Table 3. Five elements of openness. Rolfe (2017)

Elements	Descriptions
Personal practice	<ul style="list-style-type: none"> <li>• Open having a personal benefit in enhancing the practice of teaching</li> <li>• Part of a community of practice</li> </ul>
Learner benefits	<ul style="list-style-type: none"> <li>• Open serving to address accessibility issues</li> <li>• Open providing access to education</li> <li>• Supporting the digital learner and developing open literacies</li> <li>• Open to promote science at open-days</li> </ul>
Content	<ul style="list-style-type: none"> <li>• OER creation by teaching staff</li> <li>• OER creation by students</li> <li>• OER reuse/dismantling</li> <li>• OER sharing</li> <li>• Knowledge of open licenses</li> <li>• Open licenses for more control over your resources</li> </ul>
Institution	<ul style="list-style-type: none"> <li>• Institutional OER agenda and policy</li> <li>• Tension with institutional priorities</li> </ul>
Value and culture	<ul style="list-style-type: none"> <li>• Openness as a personal value</li> <li>• Openness as a trait within the community "the spirit os open"</li> <li>• Culture of open within the university</li> </ul>

Bodily, Nyland and Wiley (2017) present the framework for using learning analytics to evaluate OER that are used by students in the courses and automatically identify if these OER need to be either eliminated or improved.

OER can be created by different groups of interests: institutions, project groups, individuals. There is a difference between these OER, as resources created by institutions (for example MIT, OpenCourseWare) are usually created for specific teaching aims, have high quality, and are used for a specific topic. It could be a free course about, for instance, the earth atmosphere, robotics, finances or any other topic. Resources created by individuals can have a different quality and usually do not have any specific teaching aims, e.g., it could be a picture, a slideshow presentation or any other resource which could be used broadly not only for learning aims: the created picture and uploaded to Flickr could be used as a learning resource or shared with friends as a nice picture.

Some authors (Rennie & Reynolds, 2014; Weller, 2010) suggest such OER should be called big OER and little or small OER. They refer to big OER as resources which are created by institutions and/or projects, while little OER refers to resources which have been created by individuals.

#### **2.4.2. OER development and integration into curriculum**

Based on the four 'R's and ALMS frameworks, Hilton et al. (2010) propose the following suggestions for instructional designers constructing educational materials:

- The degree to which learning content will be open should be contemplated before its design process is started;
- In order to reach the maximum level of openness, OER are recommended to have such a license that enables users to reuse, redistribute, revise and remix the OER. Creative commons<sup>1</sup> licences may be used here, focusing on the use of open culture license.
- “OER will be easy to revise or remix technically if they are meaningfully editable (like a web page), if access to the source file is provided (like an HTML file), if they can be edited by a wide range of free or affordable software programmes (like an RTF file), and if they can be edited with software that is easy to use and is used by many people” (Hilton et al., 2010, p.42).
- “OER will be difficult to revise or remix technically if they are not meaningfully editable (like scanned handwriting), are not self-sourced (like a Flash file), can only be edited by one, single platform, are from an expensive software programme (like a Microsoft OneNote file), and can only be edited with software that requires extensive training and is used by relatively few people” (Hilton et al., 2010, p. 43).

Armellini and Nie (2013) name four practices for using OER in the development and running of an online course: use of OER as is during curriculum design process, adapt OER to the needs of the course during curriculum design process, add additional OER during course progress, add adapted OER during course progress.

Developing course curriculum using only OER can be quite challenging for teachers, especially for those who have not used OER before. Allen and Seaman (2014) in their research of OER usage in U.S. higher education institutions indicate that faculty teachers use OER not only as primary course material, but also as supplementary course material. Almost 50% reported that they use OER as supplementary course materials. Most popular OER types were images, videos, and video lectures. Using OER as supplementary course materials can encourage teachers to start using OER, and later on to develop and adapt existing resources.

Analysing difficulties and challenges of developing curriculum by using OER, Rennie, Jóhannesdóttir, and Kristinsdottir (2011) point out the following:

- time spent for OER search and identification of suitable ones;
- identification of a proper quality, as well as length and complexity of OER;
- defining OER functional roles in course curriculum;
- filling in the course gaps that lack OER with other type of resources.

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<sup>1</sup> Creative Commons is a non-profit organization that provides ready-made licensing agreements that are less restrictive than the “all rights reserved” terms of standard international copyright.

### **2.4.3. Students' attitude towards OER in the curriculum**

Afolabi's research (2017) demonstrated that student attitude or positive perception of OER resulted in better results when studying and understanding difficult concepts of physics. Her findings also support the observation that "understanding of online learners' skills, acceptability, perception, and competencies is necessary to provide intervention strategy which could facilitate their understanding and learning of difficult concepts." (Afolabi, 2017, 123). The author also stresses the importance of facilitators' role when introducing the use of OER in the learning process: "The findings of this study could inform that there is need to guide, support, and enhance online learning to reduce the dropout rate" (ibid.)

De los Arcos et al. (2014, 49) observe that "OER can also improve student performance, although such improvement is often achieved indirectly through increased confidence and satisfaction with and enthusiasm for the subject, as well as a willingness to learn more deeply from a variety of sources". They are positive that studies have also shown that the use of OER benefits former students in their lifelong learning processes, as they can access resources freely at any time. The authors observe that exposure to OER tends to encourage users to seek additional information beyond what their educators suggest from a variety of professionals and international resources. Elf et al. (2015) findings show that using OER promotes learning: students become more self-directed and highly prepared for practical training, while using OER for studies provides more time for collaboration and discussion during the practical training meetings and seminars; however the authors also indicate that students need higher digital literacy to be able to incorporate OER into their studies.

### **2.4.4. OER as learning resources**

Harsas' (2015) research showed that of different types of OER enriched learning content, videos are mostly preferred by students, as they provide links and examples of real life, however the language of OER video may be difficult to understand for the non-native language users. Afolabi (2017) indicates poor quality of some OER as the limitation of OER use for teaching. Yousef, Chatti, Schroeder, and Wosnitza (2014) identify learning analytics and assessment as the most important criteria of effective MOOCs.

Feng-Ru Sheu and Meilung Shih (2017) analyse OpenCourseWare (OCW) as a "part of a larger subset of OER", where OCW "includes syllabus, handouts, course slides, lecture videos, and other teaching and learning materials that are "organized as courses", while OE resources can range from "any digitized form". The authors (ibid., p. 105) indicate "economic consideration and the ordering of intellectual property rights" as the main challenges for effective OCW adoption. Discussing further development of OCW Feng-Ru Sheu and Meilung Shih (2017)

indicate that “OCW and MOOCs users have different learning needs and patterns, which might require that different instructional designs be applied” (p. 118). The researchers recommend teachers using OCW materials for flip-teaching and blended learning.

While designing OER for corporate training, Geith, Vignare, Thiagarajan, and Bourquin (2010) suggested to focus on the development of separate OER instead of the whole course, as they create possibilities for individual learning and have more possibilities for combining into courses, as well as their development is of lower cost: “For creating content, it was integral to think strategically about instructional use of materials. This meant moving beyond the concept of a whole course and into the level of individual learning resources. The goal was to enable learning resources to be combined to create a full course <...> or to be used separately if a learner, or trainer, desired to work on only a certain sub-set of competencies” (p. 6). The authors (ibid, 2010) suggest that capturing an individual resource and later sharing it in different file formats (such as PPT, Flash, MP4 and ap3) provides more possibilities for the re-use of the resource (or its separate parts) and it comes to lower costs.

Comiskey, McCartan and Nicholl (2013) carried out a research to “investigate the potential for iBooks to be used by students and teachers. iBook contained a spectrum of interactive features (such as three-dimensional building details, screen casting recordings, quizzes, images and video presentations by building professionals, along with supporting text). Comiskey, McCartan and Nicholl commented that the “study has shown that the iBook created a format that the academics who were surveyed believe is better than the current alternatives they had at their disposal. The iBooks can bring together a myriad of resources into a single, user-friendly, eye-catching ‘book’ which can engage the reader more than static text or images can alone. The iBooks were praised for their user-friendly design, which could help students to keep on track as they don’t need to worry about getting distracted by typing in references for web-links or online articles as they can all be incorporated in the design of the ‘book’.” (ibid., p. 91). The created iBooks were also saved as pdf versions, which provided access (although not as interactive) to those, who found iOS<sup>2</sup> challenging or did not have access to iOS products.

#### **2.4.5. OER contribution to higher education organization**

OER change organizational culture and transform organizations, since “for educational establishments, the development of high quality OER can promote courses and indeed institutions to a global audience.” (Comiskey, McCartan, & Nicholl, 2013, 86). As Misra (2012) indicates “OER can also help teachers to teach digital natives in technology dominated world of teaching and learning”. The author also notes that institutions associated with

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<sup>2</sup> An operating system used for mobile devices manufactured by Apple Inc.

OER movement should support teachers in using OERs by including OER training in teacher education programmes, supporting usage of OER, organizing workshops, seminars, trainings, providing tools for OER storage, search and development. Education departments should also play key role in promoting OER by providing infrastructure, trainings, motivating teachers.

The usage of OER in an organization is usually impacted by the organization policy (Carson, 2009; Lesko, 2013; Corral & Pinfield, 2014). Teachers might be interested in the usage of OER, but organization should also support this, it should be included in their strategy plans. Cox and Trotter (2016) stress two organization policy types: hygienic and motivating. The first one refers to policy which does not encourage teachers to use OER, while motivating policy promotes the usage of OER, in particular academic departments or the whole organization.

A big number of authors (Lesko, 2013; Abeywardena, Dhanarajan, & Lim, 2013; Yamada, 2013; Daryono & Belawati, 2013) agree that the main criteria which should be taken into account are the existing organization intellectual property policy, teacher support, copyright and open licensing, incentive for developing, using or reusing OER. Teachers lack knowledge about intellectual property, about copyright of teaching resources, how to use open licensing such as Creative Commons. It should be institutional strategy to organize such trainings for teachers to get them comfortable with understanding of teaching resources ownership. In the survey by de Hart, Chetty, and Archer (2015) 23% teachers indicated that they do not know about open licenses. A similar situation could be found in other studies (Kursun, Cagiltay, & Can, 2014; Wild, 2012; Bossu, Brown, & Bull, 2012), thus teachers, who would like to use OER, must have at least basic knowledge of copyright and institutional intellectual property.

The above mentioned study by de Hart, Chetty, & Archer (2015) indicates another important aspect of OER policy in an organization in relation to ICT infrastructure: almost 2/3 of respondents indicated that there "was lack of adequate ICT infrastructure to support the creation and/or use of OER". The organization should consider proper tools for the development of OER, for storing them, adapting and using, such as repositories with easy search functionality, editable file versions for OER adaptations, and licensing tools to prevent copyright issues.

The organization which decides to promote OER for their faculties should also foresee barriers its teachers might have (Atenas, Havemann, & Priego, 2014): language barriers, difficulties finding and determining quality of the resource, time spent searching for OER, licensing issues, teacher training and technological challenges, which could also be solved by additional training. These barriers are critical ones and need to be investigated more deeply, as it might be a waste of time and effort if an organization would invest a lot of money for the infrastructure of OER, but would fail to organize teacher trainings.

#### **2.4.6. OER for teaching and learning improvement**

Different researchers (Wiley, Williams, DeMarte, & Hilton, 2016; Pawlyshyn, Braddlee, Casper, and Miller, 2013) support the idea of replacing commercial textbooks with OER textbooks, which, eventually, increase the course passing rate of students. Other (Allen et al., 2015) indicate that there were no significant differences regarding the results of students using traditional textbooks from those using OER. Moreover, it should be mentioned that “the literature to date is relatively sparse” (Hilton, Fischer, Wiley, & Williams, 2016, 20).

Feldstein et al. (2012) researched students' attitude and results in using OER instead of traditional textbooks. Their findings show that most of the students support the idea that OER are “easy to use”, provide more up-to-date information than printed textbooks, and as digital learning resources are more useful and preferred against traditional printed textbooks.

Petrides et al. (2011) emphasize that the use of open textbooks is not only financially effective, but also increases the interactivity of teachers and students: students are more likely to collaborate online, participate in online activities and class discussions. Hilton and Laman's (2012) research on comparing students who used open textbooks in an introductory psychology class with students using traditional textbooks for the same course revealed that students' choice of digital textbooks resulted in better grades of the course, better scores of the final exam, and a lower withdrawal rate. A research by Hendricks, Reisenberg and Rieger (2017) on the use of open access textbooks in a large course of physics points out that the majority of students appreciate open textbooks, which are “of the same or better quality than commercial textbooks used in their other courses”, while the analysis of student learning outcomes is found to be similar no matter which type of textbooks is used, open textbooks or commercial textbooks.

Some authors (Hilton et al., 2016) also emphasize that usually the replacing of traditional textbooks with OER goes along with changes in pedagogy. Wiley, Williams, DeMarte and Hilton (2016) indicate the following challenging activities for institutions while integrating OER into university studies:

- time spent for searching and finding a proper OER; and for review of the selected OER with the aim to check the quality, accuracy, accessibility, and other preferred characteristics;
- tracking and managing of the different OER with different type of open licenses;
- effective integration of OER into learning practices and learning management systems (teachers may require training for these activities);
- having an institutional policy in sustaining and adapting OER, which deals with criteria for licensing, course standards, use of learning analytics data analysis, and course quality assurance and support for adapting faculties.

According to Sclater (2010), OER support learning by providing accessibility, and ability to lower obstacles to learning through **enhanced attention, motivation, and engagement** of students. A research by Bodily, Nyland and Wiley (2017) focused on students' use of OER. Their research analysed data from different data aspects: research based on self-report user data, digital download data, and digital access data tied to outcomes. Their main outcomes how students may use OER, could be summarized by the following ideas:

- a variety of features how students use OER may be identified;
- in online studies, students use OER more frequently than in traditional studies;
- availability of resources had a positive impact on student study habits (such as marking or making notes on resources);
- OER from online textbooks were accessed more frequently than those from traditional textbooks;
- the analysed research showed there was a positive (but different) correlation between time spent on activity and achievements.

Alves, Miranda, and Morais (2014) analysed 315 students' results on OER advantages asking them which features of OER are most important for them. The results showed that students mostly value features such as *any time access* and *free access*, which indicates that students wish to access learning material in different places, at different times, when they want to learn, when they have time for that, and OER create this possibility. However, the study revealed that the term *Open Educational Resources* is not familiar to them, only 10% knew this term.

A study by Ikaiahifo, Spring, Rosecrans, and Watson (2017) indicates that not only the use of OER reduces the study price for students (as they do not need to buy textbooks), but also OER provides great flexibility and adaptability in the context of curriculum development and course creation, as observed by professors.

In our research, international experts confirm the importance of OER, however they do not agree on the contribution OER has already had on the opening up of higher education:

*"I think, it is very difficult because there is a positive factor and a negative part, because on the one hand, it's great for teachers of subjects to adopt the use of open educational resources, when they have the curriculum actually set up and also to propose new courses, <...> we can complement that with open educational resources and practices and access to different groups. <...> The downside is that quite often, students are paying a considerable amount of money for their qualifications for studying so, if you pay, now, tens of thousands of Euros a year to be studying a particular degree or masters course, and you come across open educational courses and practices, then you start to think, I am paying for this." (18)*

But the research experts also see and indicate the OER potential for the future:

*“if you extend the concept of OER a little bit, and you start talking about open data, <...> opening up the data, <...> that has the potential to radically transform things.” (I9)*

Besides the OER importance, the main following ideas were indicated by experts in the research about how OER influence and have impact on higher education: they influence and transform teacher awareness, attitudes, and skills; they could be used for achieving various aims, and they contribute to the quality, adaptability and transparency of HE curriculum (see Figure 25).

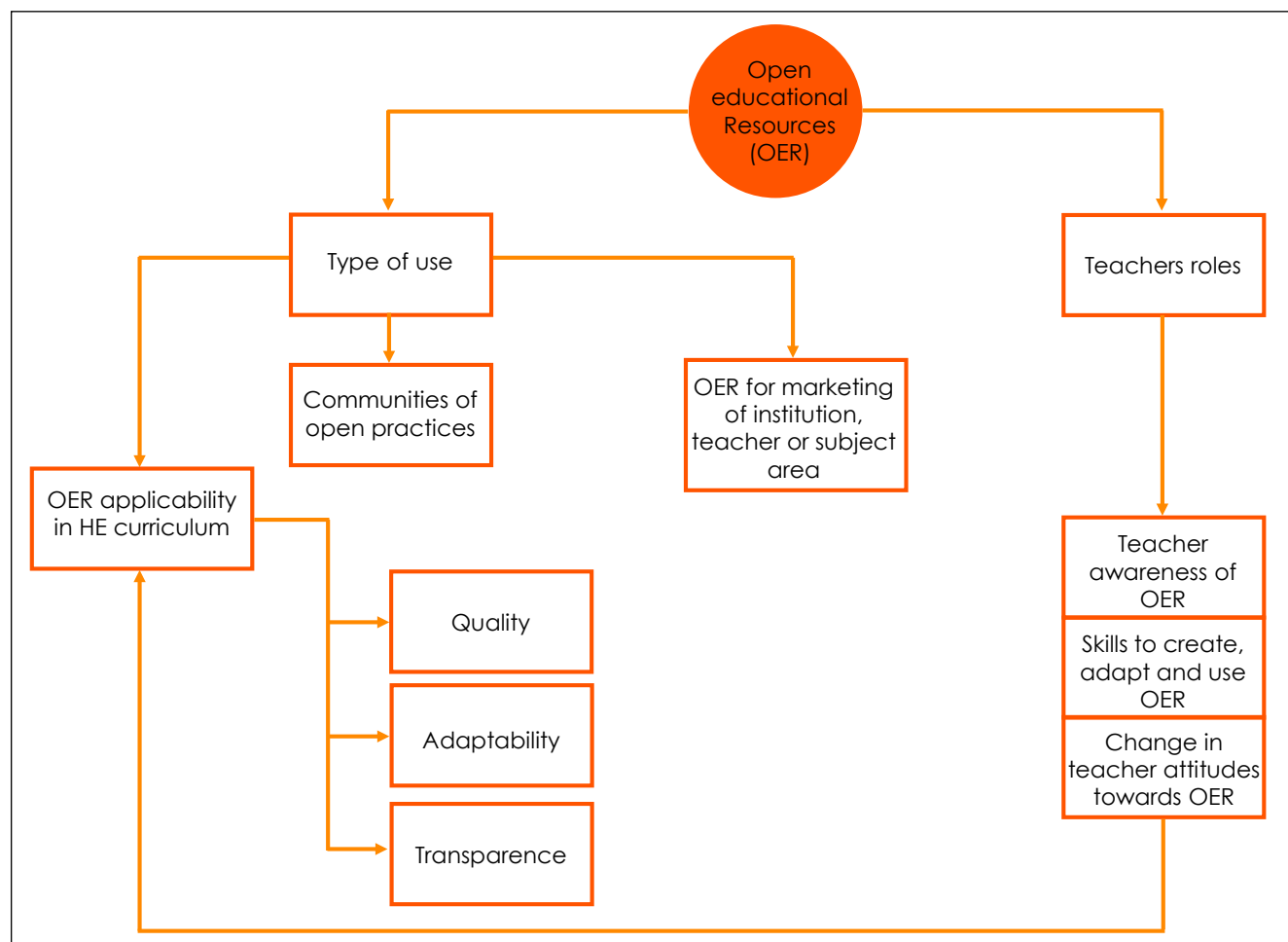


Figure 25. OER use and contribution to teachers in HE.

Although most of the experts agreed on the importance of the OER, however they stressed the need for change of teachers' attitude towards openness, sharing and use of materials, created by others:

*“Academics have always found a way to pirate what they did not get, which is not a proper way to do things <...> And I think that is something that at some point has got to change.” (I9)* *“A lot of university teachers still don't feel the need to share their created learning resources as OER<...> not all teachers may be open to confront their mistakes” (I10)* and *“every change has to come from the inside of educator” (I12).*

Experts in the research indicated different ways how OER can be used in higher education. First, as a tool for marketing the institution, the programme, the teacher or even the subject area:

*"<...> so they can begin to come in contact with open educational resources, information can get online and start to study them <...> the more you share, the higher the visibility" (I8).*

Second, there are many ways how and reasons why to integrate OER into HE curriculum. OER may be used as a way to optimize curriculum development process:

*"It's a natural way to solve the problem of optimization of the processes" (I3);*

*"Do not design a new Simon<sup>3</sup> if you know exactly that the Simon already exists, just use this Simon and say thank you to this person that I can use this assignment" (I6);*

*"It is important not to repeat and not to „discover the bike“, but to use what has been found and has already been done." (I1).*

Also, students want high quality multimedia to be suggested; the teacher may use OER for that:

*"<...> higher education teachers are aware of the things that they cannot produce everything, they cannot produce higher quality videos, they cannot produce some animations that are higher quality and in the way that students expect <...> open educational resources are actually the way to solve that problem, because teachers can use some other resources that are not produced by him or her" (I3).*

Teachers may also increase, enrich their courses with OER after they were already developed:

*"<...> using more information, more documents, can make only more quality and transparency and it can bring only benefits" (I4)*

Third, not only students' knowledge and skills may be developed via curriculum, but it is also important to spread the idea of sharing, to develop a habit of sharing and knowledge validation after the learning process in university is over, and open communities of practice may be a way to do this:

*"We have to actually inculcate into our students the added value of using not just the educational resources, but the practices and their communities, because I think it's a usual skillset, usual access to information that will always be there for you in the future when you are not in the university." (I8)*

#### **2.4.7. Teacher skills for OER development**

Teachers who use OERs in their curriculum, create open courses and can be named as *Open Educators*. Wiley & Hilton (2009, 12) define open educators as those who "publish their course materials online under an open license before the beginning of the course and invite others from outside their university to participate in the course together with the "official students" of the course". While Nascimbeni & Burgos (2016) agree with this term, they also indicate that

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<sup>3</sup> An electronic memory game.

nowadays an open educator is a much broader notion than a teacher who uses OER in his/her curriculum. They emphasize that the teacher nowadays should take into account learners as individuals who learn in their own pace, using different scenarios and connections, but also should support students in learning and preparing assignments in peer-to-peer or group activities, should encourage students to think differently, allow them to make learning choices and participate in learning communities.

Bliss et al. (2013) provide the results of teachers' time estimate for course preparation with OER textbooks. More than half of the teachers reported they spent more time preparing the course with OER than they did in the past. However, despite the course preparation time, teachers saw some advantages, such as OER online books were available from the very first lecture, all students had access to those, and learning could start from the beginning of the class.

A research by Guo, Zhang, Bonk, and Li (2015) showed that "lack of time and skills were significant obstacles for faculty members to develop OER" (p. 59), while lack of motivation was a probable difficulty. They indicate 5 groups of OER development and usage barriers, stressed by university teachers from China – (1) content, (2) experience, (3) institutional, (4) interface, and (5) habit (of online learning). The authors (*ibid.*, p.63) noted that most significant obstacles were participants' viewpoints, time and skills allotted to the development of OER.

Minguillón, Rodríguez, and Conesa (2010) indicate that OER have not been using all their potential for adult learning, and they need to be exploited more widely. Nowadays OER are usually used and reused, however looking to the future, teachers need to start using remix and repurposing potential of initial OER (Castaño et al., 2013).

## **2.5. Characteristics of the transformed open and online learning curriculum**

Research findings allow us to formulate characteristics of the transformed university curriculum for OOL (Figure 26). "Curriculum involves a dynamic process and as such must move with the changing trends in the society" stresses Modebelu (2015, 259), therefore complex changes await OOL curriculum, introducing new characteristics to well-known parameters of curriculum in HE. Research evidence shows that five areas of curriculum design are affected by change and transformation. All of them require new decisions made by a wide participation of stakeholders (politicians, university administration, teachers, learners) with the main aim to continue the intellectual and personal development of learners, to help them gain the skills and knowledge they will need to carry out their plans of life, fulfill their capacities as citizens, creators, and leaders.

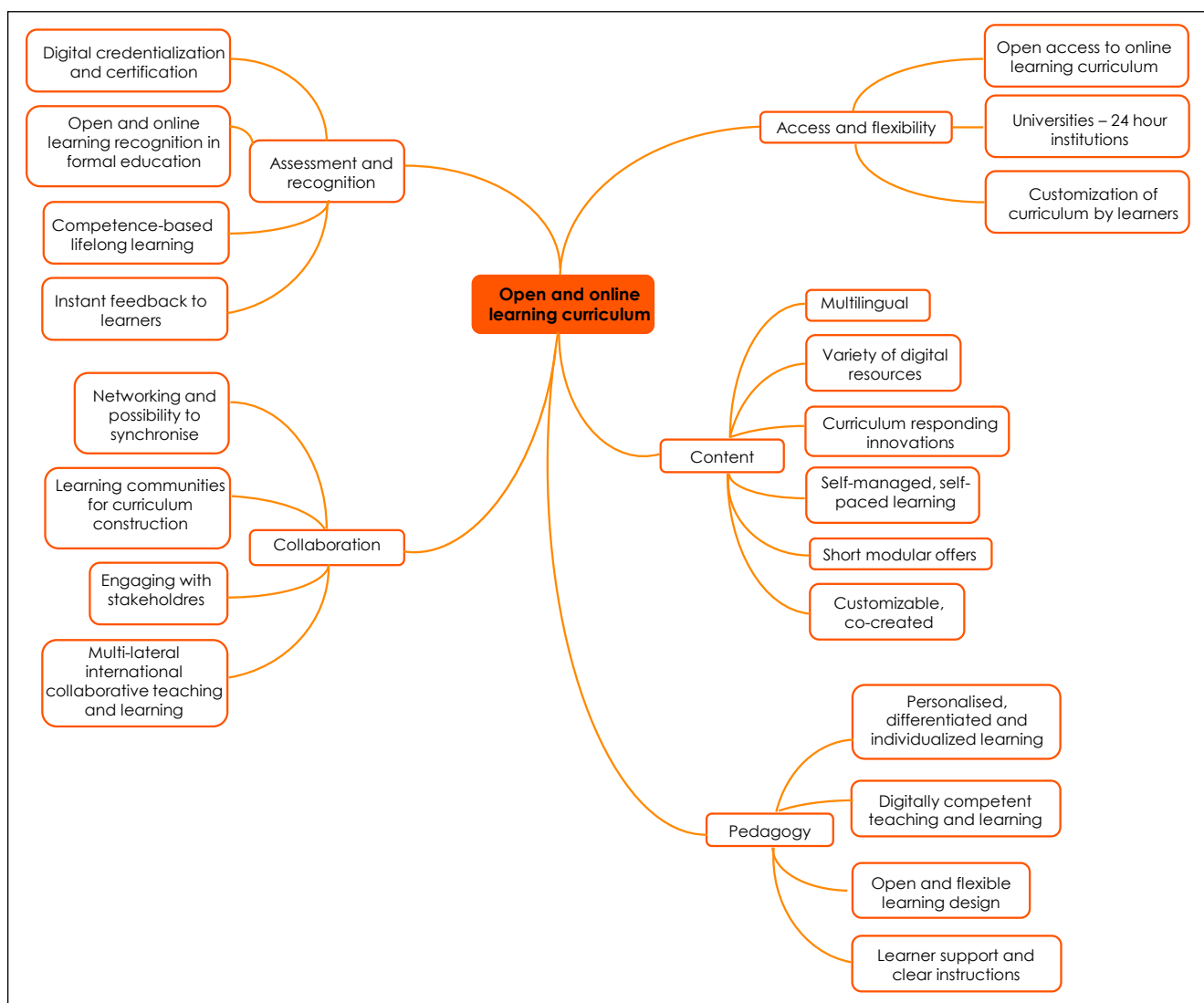


Figure 26. Characteristics of the transformed OOL curriculum

Following theoretical findings and their comparison with the needs of DNS, we can state with confidence that OOL methodology is one of the best solutions for HE curriculum transformation. However, the solutions that universities will decide upon should be based on systemic analysis of their practices already in place, and the new aims they are targeting at. The model of OOL curriculum characteristics presented in Figure 25 explains the elements that are requested by DNS members. Some of the elements that are a part of traditional HE curriculum may be added to this concept map as well, while others need to find their proper place under one of the five categories that will be discussed in short in the following paragraphs.

Implementation of such OOL curriculum in digital space, preparing the ground for OOL and teaching through digital media and with digital tools need the environment that maintains the features and technical possibilities to allow such learning design. The next chapter of this study will be dedicated to create the model of such an environment.

If we look at the characteristics of the transformed OOL curriculum, we can identify which elements exist in standard and most popular solutions for blended and online studies at European universities nowadays, and which may be most probably missing or not implemented and frequently used. The next sections will describe each category and will highlight those characteristics that need to be developed or better used while designing curriculum for OOL in HE.

### **Access and flexibility**

Access and flexibility remain crucial elements for OOL which meets the needs of DNS. The transformation of OOL curriculum at universities should be implemented through supporting access and flexibility of learning offers. It is expected that online delivery systems will respond to the main features and differences of learners allowing them to learn flexibly. Flexibility is crucial for OOL HE curriculum as learning with no geographical or time borders is an increasingly preferred form of learning, particularly for students who are employed, study part time, live in remote areas with preferences to learn virtually asynchronously and with possibilities to access information and materials while traveling. OER support learning by widening accessibility but also OER provides great flexibility and adaptability in context of curriculum development.

There is also a need to present students with suggestions on how to learn online. The possibility to ask for help should always be open at universities. When changing their curriculum to open online learning, universities will become 24-hour institutions, offering full time (night-time included) digital studies to different parts of the globe. A student will be able to access learning material at any time, get clear instructions when learning online; more than that, the curriculum will also include variations of activities when it comes to curriculum offers.

Open and online curriculum tends to be a customized curriculum supporting learning through enhanced attention, motivation, and engagement of students; it is able to adapt and be adapted to the students' needs. A customized curriculum is market driven, yet selected by the learner. This emphasizes that the environment itself is driven not by institutions, but by the learner, and the learning offers are linked with the industry needs. It is nothing else, but lifelong learning process tracking system which enables not only lifelong learning customization and record, but also suggests recognition of available skills and competences sought by employers.

### **Content**

Universities are an effective place that brings together the creation of knowledge and teaching, creates a link between research and teaching however the curriculum needs to respond to a variety of innovations in the area of digital resources as well as content. Digital resources are mostly related to OER integration in the curriculum, which usually means replacing traditional

sources as textbooks or handouts with OER. OER could be used as primary course material, but also as supplementary course material. Most important applications of OER may be defined as video and audio recordings, reading materials and interactive learning objects like virtual labs. We need to think about how to structure the curriculum as the interactive learning process. Short exercises, short videos, immediate feedback on quizzes and tests, the technology that supports learning: all these elements lead to re-thinking about how universities should organize their curriculum, teaching and learning process, in addition to how the curriculum is structured in terms of competences and learning outcomes.

Instead of being knowledge consumers, learners choose to be active participants of their own learning and, in this way, construct their own knowledge. This knowledge construction emerges as a result of interactions with course content, teachers and peers. Knowledge and experience that the learner has had prior to the course are very important factors for knowledge construction, together with metacognitive processes and learning environment. As a result of the shift mentioned above, the learning content should be changing as it is supposed to focus on learning process by provoking learners' experiences that induce development of skills and facilitate self-directed learning. The multilingual open and online curriculum would promote understanding and contextualization of learning too.

The specific feature of digital and network society is searching and sharing knowledge in smaller portions, small chunks, small bits of learning as confirmed by qualitative and quantitative research. The needs of lifelong learners will also be met by universities who will arrange their curriculum in smaller units of credits and shorter programmes, develop learning programmes together with industry and DNS members, all these efforts yielding a learning empowerment effect.

### **Pedagogy**

It is the technology that motivates us to think more carefully about how we organize teaching and learning online through open and online curriculum. There is no doubt that pedagogy should be based on Andragogical principles. Considering the range of individual differences and a possible age span of learners within one online class, accommodating these individual differences is important. An application of adult learning principles can strengthen personal and professional development when organizing online learning.

In discussions about the embedding of teaching methods into open and online curriculum, student-centred active learning, enhancement of interactivity or certain common principles as participative culture, network learning, cooperation and openness are stressed. Open online learning experiences require different training methodology than

traditional learning experiences, and learners should be able to self-regulate. Training methodologies can integrate the development of self-regulation among learners through use of performance-progress tools, time-management tools, and learning-enhancement tools. Looking to the future, to the trend of individualization and personalization of learning following learner preferences it would be extremely difficult to always ensure human approach, teacher or consultant and trainer support and feedback to individual learners, especially, if their numbers are massive. Therefore, experts claim that the feature of artificial intelligence is mandatory in the open and online learning environment which would allow timely learner support. It is important not only to get information in different forms like video, audio, or written, but also get clear instructions and feedback when learning online.

Change in pedagogy shows the necessity of providing relevant and innovative study programmes and discuss how to reinforce the teaching mission of universities, introducing new approaches to teaching, offering flexible personalized learning paths adapted to the needs of different learners and also stressing digital competence of the teacher and artificial intelligence.

### **Collaboration**

The need to work and learn in a network is characterised today as one of the greatest benefits that technologies brought to our lives. We learn through networking, through communicating, collaborating, sharing information, knowledge and resources in our personal and professional networks. Therefore, networking enabled open and online curriculum implies the requirement of seamless collaboration and communication in all formats.

No wonder that formal education providers have technological solutions that ensure safety, secure users from external access, but are closed and rigid enough, often restricting links with external social networking tools, informal and non-formal learning activities. However, in the case of open and online curriculum, networking, so indispensable in daily and professional life, acquires great importance. When learning online, adults need social interaction, it is important for them to communicate with others, participate in discussions: in other words, they need to use social network. When learning online it has to promote and create learning communities or communities of inquiry by encouraging learners to communicate, discuss, share and be active participants of the learning process.

The collaboration component includes tools that help participants interact by using text, video, or audio in two different ways: asynchronously (e-mails, forums, social networks), or synchronously (video meetings, chats, messengers), and also engage with different stakeholders.

## **Assessment and recognition**

The labour market imposes the need for digital and network society to update their skills and competences as frequently as ever. The tendency of an individualized approach to professional competences is evidently supported by industries, but the needs for diverse professional competences are expressed by the society, most clearly by professionals aiming to remain in the labour market. To HE it signals embedding the overall process into lifelong learning settings. Experts claim that the open and online curriculum should be tracking lifelong learning and suggesting recognition options, as well as implementing career guidance and marketplace driven training based on the profile and achievements of individual lifelong learners. In other words, assessment and recognition of (prior and current) learning used in formal higher education institutions must adapt to the emergence of much more diversified learning paths.

Recognition can provide learners with confidence in what they have achieved and what they can present as the result of their participation in an open online learning. Diverse models for assessment and recognition of OOL (which is very much the same as recognition of prior learning (RPL)) can provide a bridge between learners' "open" accomplishments and tertiary education, offering opportunities for more flexibility and more authenticity than do many traditional assessment tools and procedures.

Recognition is a two-step process: firstly, the learner receives a credential for his/her learning outcomes (LO) and achievements, secondly, s/he may be awarded recognition in a state recognized form.

A reasonably new form of credentials is a digital badge. A digital badge is a validated indicator of accomplishment, skill, quality, or interest that can be earned in many learning environments. Their application is of a very broad range: badges may be used to accredit learning, learning analytics, learner motivation as well as various collaborative and social learning opportunities including gaming and maker culture. The badges become important evidence of learning outcomes and elements of credentialisation. This is why to get a badge for synchronized social and professional networks is important for learning environment. Also, an automatically synchronized badge is prioritized and wanted particularly for younger generation.

This is followed by recognition which can be given either through the education provider that has awarded the credentials, or an external institution, e.g. a university or an employer. The new systems of digital credentialisation and certification are in the process of development, but they need valid solutions set in place.

In summary, our research confirms that the transformation of open and online curriculum at universities should include openness and flexibility in both, selecting the programmes and

modules for personalized, differentiated and individualised learning, or competence-based approach suggested by the university, or in drawing the perspective of learning design and learner support. As DNS members emphasize, learning possibilities should include different scenarios, namely, self-managed and self-paced learning possibilities, or, vice versa, teacher led learning with clear instructions and sequential learning. A possibility to engage communities and different interest groups should be established, and teachers and learners should be enabled to make decisions on the preferences of OOL openness, possibilities to share and involve outside communities into learning, interaction and assessment and evaluation.

Multiple requirements are raised for the content and digital resources used in learning and curriculum design. These should include OER for learning that allows empowerment of learners, knowledge co-creation and content customization. Assessment and evaluation strategies should lead to the possibilities for enabled lifelong learning memory, which should be linked with open learning recognition options and competence-based lifelong learning.

The characteristics of the transformed open and online learning curriculum include changing the structure, organisation, pedagogy, content of the curriculum and also assessment and recognition, such as is currently in place in the majority of European HE institutions. Further we will focus on modelling OOL environment in order to meet the needs of digital and network society.

### 3. Characteristics of open and online learning environment

In this chapter, theoretical research and state of the art will be discussed to present a brief overview of Open Online Learning (OOL) environments, discuss existing OOL concepts, its elements, best practice examples and factors that stimulate learning. Results of a qualitative research with experts worldwide in the form of semi-structured interview, as well as results of a quantitative research from a survey conducted in Lithuania will be presented and discussed to see how experts and digital and network society characterize the OOL environment that would meet their needs.

In the 21<sup>st</sup> century, education takes place in a very special space, which is focused on networked society: the space is called Open Online Learning environment. As Newman & Scurry (2001) point out, the learning environment based on online technologies helps society to be more educated, since students can gain access to huge amounts of information, including schemes, graphics, pictures and videos. Also, OOL offers lots of opportunities to teachers, because their teaching style can be tailored to individual student needs, as the technology provides mechanisms to access student profiles and compare the students' participation. As we can see, the OOL environment has its own characteristics, which makes it recognizable in the context of other learning environments, for instance, classes, individual rooms, closed virtual learning environments, etc. Thus the question is about the differences which make the OOL environment unique, and the similarities which attribute the OOL environment to the category of learning and teaching spaces.

#### 3.1. The concept

In contemporary digital society, young adults grow up with digital technologies conceivable as an integral part of their life. Young people use technologies differently compared to more mature generations. They can execute simultaneously more than one programme or task: use mobile phones, players, online games, instant messengers, etc. Whereas the use of digital technology is different, the learning environment must be adapted to their needs. Andone et al. (2007, 41) suggest the learning environment should contain "a blend of Internet and mobile technologies which enhance student-tutor and student-student communication through multiple media channels, providing responsiveness, customizability and flexibility to adapt and be adapted to the students' needs".

When talking about the OOL, we must discuss, first, the issue of accessibility and openness. The OOL environment, by the name alone, must be open. The environment must be open to ensure easy ways of reaching the curriculum. The first meaning for *openness*, as Oxford Dictionary puts it, is lack of restriction; *accessibility*, while *open*, means allowing access. Openness is presented

in a very positive way, as acceptance of or receptiveness to change or new ideas, however, Collier and Ross (2017) discuss three critical arguments about openness.

Firstly, they say, there is a false binary between 'open' and 'closed' which needs to be challenged. We must consider the word, the concept, the meaning: if it is useful or not, because we deal with big issues about intellectual property and copyrights. As Mentor (2007) has observed, educational institutions have been using (and they still are) not open but closed educational environments and hiding learning materials in password-protected areas or repositories. Mentor is concerned about us going too far without considering such caution. Mentor points out that the "open" is not open – it is even private: "Many of today's online learning environments are private. This privacy is the consequence of institutional decisions that have resulted in the closing of learning environments to all but those who have officially enrolled in an institution or course. While many of these decisions are logical from an administrative standpoint, educators interested in making learning opportunities available to the masses may have a different perspective". (Mentor, 2007, 1). When linking this problem with the pedagogically well-organized category, we must consider Mentor's focus on developing teaching tools for teachers, as well as students. Educators teaching in a private online environment of the university cannot use different tools, their experience may be limited, and they may not be able to deal with students' special needs. Thus, openness is important for educators too in the way they get more tools and more experience to express their teaching style.

Secondly, as Collier and Ross (2017) discuss, an overemphasis on access to content homogenizes learners and their contexts. The authors suggest that is a utopia that people are innately disposed to self-education and that individuals simply require access to content to learn, unless, the authors argue, there is a strong reason for learners to learn.

Thirdly, the authors (Collier & Ross, 2017) observe that open online practice does not attend sufficiently to issues of power and inclusion. The main issue open education faces is how to separate content from elitist, restrictive, or exclusionary processes and make it more widely and freely available. This perception has been drawn by Dalsgaard and Thestrup (2015), who describe it as an "ideological" motive for openness: access is not enough unless it is seen in a very broad context of social inclusion and social justice. As Rolfe (2015) puts it, seemingly anyone with an Internet connection can access global higher education content and tuition, but it is not true. We should work to expose "social, economic, political and educational factors that have influenced the production of technology infrastructures, as well as the forms of open education that are subsequently made possible" (Knox 2013, 27).

The necessity of openness, open-ended learning environments is widely discussed. Open-ended learning environments are extensive, integrated systems that induce cognitive engagement of learners through problem-based, inquiry learning activities, technological tools and resources, and guided investigation. Openness has the essential role of adaptivity in promoting learners' effective, individualized learning. For pre-service teacher training it could be used in monitoring and controlling certain aspects (Poitras et al., 2017) of their own learning while navigating the web and designing a lesson plan.

Kinnebrew, Segedy, Biswas (2017) illustrate the benefits of students' learning activity when they combine model-driven strategy detection with data-driven pattern for analyzing data in open-ended environments. As found by Tissenbaum, Berland & Lyons (2017), such environments can support communities of practice and legitimate outer participation. Organization and modeling of open-ended learning environments by integrating variety of technological and pedagogical tools can provide guidance to students on time and on demand, help to reflect on learning process (Yongwu, 2012) and monitor or analyze students' actions. Ng et al. (2014) claim that the same goals could be reached regardless of operating system by using a cross-platform video communication tool. For instance, Adobe Connect was selected for problem-based learning purposes, and students liked it as it supported high-speed multi-node, synchronous audio and/or visual communication with reliable quality of service; it possessed archiving functionality which allowed the asynchronous access of files by students.

Rolfe's (2017) research results can be used to help create meaningful messages for communication on openness for learning. The role of personal practice, learner benefits, content, institution, value and culture need to be stressed. Table 4 provides five aspects, or elements, of openness, their description, and messages how it could be communicated. The messages could be further explored for their effectiveness on teacher and learner communication.

Table 4. Five elements of openness and messages for communication (Rolfe, 2017).

Elements	Description	Message
Personal practice	<ul style="list-style-type: none"> <li>• A personal benefit in enhancing the practice of teaching</li> <li>• Part of a community of practice</li> </ul>	Open education is a means of enhancing your teaching practice and allows you to participate in communities beyond your institution
Learner benefits	<ul style="list-style-type: none"> <li>• Open serving to address accessibility issues</li> <li>• Open providing access to education</li> <li>• Supporting the digital learner and developing open literacies</li> <li>• Open to promote science at open-days</li> </ul>	Open educational resources in their truest sense provide accessible materials for students; these practices widen access to education and support diversity
Content	<ul style="list-style-type: none"> <li>• Open Educational Resources (OER) creation by teaching staff</li> <li>• OER creation by students</li> <li>• OER reuse / dismantling</li> <li>• OER sharing</li> <li>• Knowledge of open licenses</li> <li>• Open licenses for more control over your resources</li> </ul>	By creating content, you will understand (technical) and legal aspects of applying open licenses; open licenses will help you keep control over your resources and specify how you'd like them to be used
Institution	<ul style="list-style-type: none"> <li>• Institutional OER agenda and policy</li> <li>• Tension with institutional priorities</li> </ul>	(Research suggests that policy alone is less motivating for staff, but culture and support is – below)
Value and culture	<ul style="list-style-type: none"> <li>• Openness as a personal value</li> <li>• Openness as a trait within the community “the spirit of open”</li> <li>• Culture of open within the university</li> </ul>	Engaging in open education will catalyse change within your teams and institution; you will connect with global open communities united by “the spirit of open.”

Openness is strongly related to the implementation of OER at the course level in higher education, which implies challenges not only to university teachers but also at the faculty level, the programme level and institutional level (Judith, Bull, 2016; Santos-Hermosa, Ferran-Ferrer, Abadal, 2017).

Caron, Beaudoin, Leblanc, Grant (2007) have discussed a lifelong online learning environment and they propose ten dimensions which are the background for successful open online learning environment, see Table 5.

Table 5. Dimensions of lifelong open online learning environment  
(adopted from Caron, Beaudoin, Leblanc, Grant, 2007)

<b>Dimensions</b>	<b>Description</b>
Administration dimension	Administration of actors (course registration, grades), objects (tagging, access, rights), and the system (access, policies)
Communication dimension	The communication dimension consists of tools that help actors interact. Usually in two different ways: (a) asynchronous (e-mails, forums, distribution lists, newsgroups), or (b) synchronous (chats, net meetings, messengers)
Content delivery dimension	This dimension represents the transfer of knowledge relevant to the learning experience, and programme learning objectives to the learner. Content knowledge delivery involves objective identification, knowledge modeling, and contextualization and planning of interaction between involved actors
Knowledge content dimension	The aim of all knowledge dimensions is to maximize the reusability of objects relating to different knowledge sources
Knowledge management dimension	Knowledge management consists of knowledge creation, knowledge codification, knowledge transformation
Knowledge discovery dimension	Knowledge discovery consists of ways to extract, reorganize, and associate relevant knowledge from a variety of sources
Knowledge analysis dimension	Knowledge analysis is essential for content evaluation, actor profiling, object comparison, and many other possibilities. Knowledge analysis can also be used for object mining (applying classification, clustering or other machine learning techniques to use repositories in conjunction with a glossary, bibliography, or other resource database)
Application integration dimension	Integrating real life applications into education is possibly the most difficult part of the environment, but crucial for continuous learning, professional practice and innovation
Evaluation dimension	Learner performance and an integral part of the process for continuous improvement of the actors and of the system
Pedagogy dimension	Contains all the ways to present knowledge to the learner as well as how to interact with the learner. These ways include learning style, learning needs, learning strategies, reusable learning templates

Finally, Rodriguez (2012) describes openness as related to several concepts: software is an open source, registration is open to anyone, the curriculum is open or structured, the sources of information are open, the assessment process is open, and the learners are open to choose from different learning environments.

### 3.2. Researching the elements

When investigating mobile learning, which becomes more and more popular in the digital society due to the unprecedented technological availability, five categories of models or frameworks were found:

- 1) pedagogies and learning environment design;
- 2) platform/system design;
- 3) technology acceptance;
- 4) evaluation; and
- 5) psychological construct (Hsu, Ching, 2015, 15).

A lot of approaches have been used when discussing and exploring modeling of open learning environment when creating MOOCs or developing an adaptive framework. It could be based on learning style (Fasihuddin, Skinner, Athauda, 2017), collaboration (Barbosa, Barbosa & Rabello, 2016; Tissenbaum, Berland & Lyons, 2017), issues related to concepts and skills, collaborative problem solving opportunities, motivation of learners and context of learning (Lubin, Ge, 2012) or personalized learning (Rahimi, van den Berg, & Veen, 2015).

A review, categorization and analysis of the models can help design effective environments and develop the curriculum for meaningful learning experiences. It is possible to look at the models in various ways and to characterize them differently, yet, since open online learning and mobile learning are happening simultaneously, it is worth taking into account the above mentioned characteristics of learning environment.

Curriculum change is in the focus too when designing learning environment. The model developed and investigated by the Canadian Critical Thinking Consortium involves five categories of intellectual tools into the teaching of curriculum content. "These tools for thought include addressing the need to focus critical inquiry on relevant background knowledge, using criteria for judgment, explicitly addressing thinking concepts, using specific thinking strategies and supporting the development of certain habits of mind" (Balcaen, 2011).

When blended learning environment models (Tritrakan, Kidrakarn, Asanok, 2016) were investigated, four types of learning environment were found:

- physical, characterized by 5 senses (sight, hearing, touch, taste, and smell), which is typical for face to face class or laboratory rooms;
- mental, which refers to learner attitude, enthusiasm, personality, and teaching methods;
- social, characterized by interaction between lecturer to students and between students;
- information environment, which refers to the storage, retrieval, and transfer of information and knowledge.

It is obvious, that mental, social and information environments are of the same importance in open online learning, thus elements from blended learning environment models can be successfully adopted.

Simonson, Hudgins, Orellana, (2009) discuss that there are 4 directions how the interaction in OOL could be created: 1. Learner – learner; 2. Learner – instructor; 3. Learner – content; 4. Learner – interface. Each direction needs special tools to be integrated in the online environment, such as forums, text messages, e-mails, pop-up windows, simulations, animations, etc.

When discussing OOL environment, the links between learner characteristics and learner achievements, learning styles and adaptive environments, teaching strategies, as well as teaching methods are often investigated. Research in the area of OOL environments highlights six most common research components of OOL environment (see Figure 27), which are administration, learner behaviour, communication and collaboration, learning design and methodology, as well as assessment and evaluation tools.

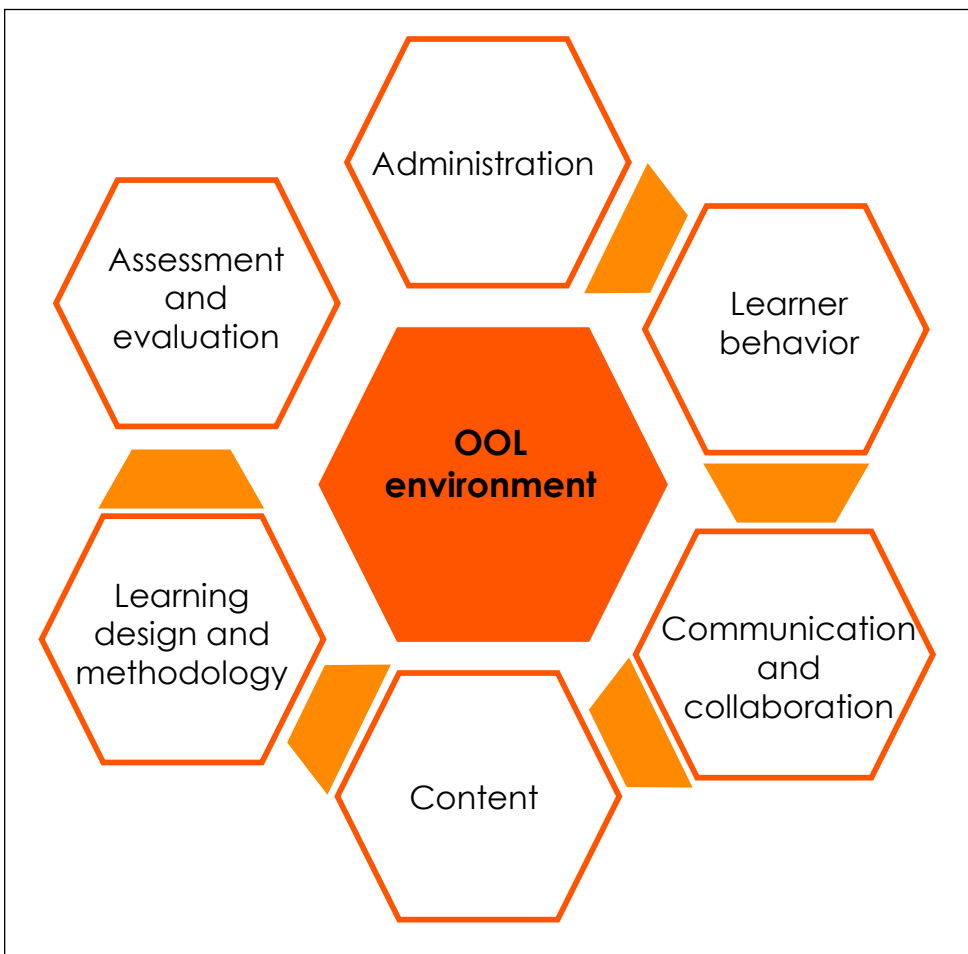


Figure 27. Open online learning environment components

The administration is crucial for the successful functioning of the platform, including all stakeholders: students (course registration, grades), objects (tagging, access, rights), teachers

and the system (access, policies). The communication and collaboration component include tools that help participants interact using text, video, or audio formats in two different ways: asynchronously (e-mails, forums, social networks) and synchronously (video meetings, chats, messengers). The implementation of tools for teacher–student and student–student interactions and of promoting certain types of collaboration between them in accordance with the learning objectives ensures social aspects of human learning.

A properly designed course encourages intrinsic motivation, creating a space for discoveries, and challenges that require creative and collaborative actions. For learner behaviour analysis, it is recommended to use tools appropriate for the investigation of learning objects present in the OOL environment. When transparently used, such tools as learning analytics or data mining can help trainers and administration to monitor and predict student performance.

Presentation of the learning content may preferably depend on the learner's characteristics. The content implies the nature of the teaching material; the level of chosen interactivity with which the learners interact between themselves and with learning resources; the level of difficulty of the subject knowledge; the intensity or time spent by the learner when studying the material. It is necessary for content providers to offer sufficiently adequate open educational resources to enable learners to study independently. Priority should be given to small volumes of open educational resources that can be used for generating various learning scenarios.

Student-centered, active learning, enhancement of interactivity, cooperation and respect of learning styles are the central issues of training methodology.

The establishment of evaluation for educational activities is often limited to learner performance and course content. However, the evaluation and assessment need to be an integral part of the whole learning process. This ensures the quality of delivery, support collaboration, and provides tools to measure the performance of different learning activities.

### **3.3. MOOCs again**

One very specific group of OOL environments, which is probably the most advanced examples of OOL environment, refers to Massive Open Online Courses (MOOCs) environmental models. Kennedy (2014) has carried out a research for the characteristics of MOOCs: she has stated that the meaning of openness differs when we talk about different types of MOOCs, which in that sense fall into two categories, specifically, xMOOCs and cMOOCs.

The xMOOC model is typically more structured and therefore less open to learner autonomy in aggregating and filtering resources, use of learner-selected tools, and forms of assessment (focus on content and transmission of information). cMOOCs are situated within open and distance learning initiatives, which are characterized by open technology and open software

for educational purposes; open content and open educational resources; and open knowledge in which participants and facilitators openly share educational practices (Fini, 2009). The differences are accurately presented in Table 6 below, drawn up by Yuan, Powell, and Olivier (2014).

Table 6. MOOC typology (Yuan, Powell, & Olivier, 2014)

<b>xMOOCs</b>		<b>cMOOCs</b>
Scalability	Massive	Network and connections
Open access and restricted licenses	Open	Open access and free licenses
Individual learning on a single platform	Online	Network learning through various platforms and services
Acquiring knowledge and skills	Course	Common practices, learning and understanding

Sánchez-Vera, Prendes-Espinosa (2015, 120) clarify differences between xMOOCs and cMOOCs:

“Relating this idea to that of xMOOCs comes from the fact that massification here focuses on participation in a training system that grows in terms of resources and people, while the massive nature of cMOOCs lies in their potential to establish learning communities and create new connections.

Moreover, cMOOCs are usually run on various platforms and do not usually have a single virtual environment, as occurs with xMOOCs. Many cMOOCs use blogs, wikis and open social networks to establish connection networks.

Basically, xMOOCs focus on content and its acquisition individually, while cMOOCs focus on community learning and the potential to learn by creating and joint collaboration, designing resources and generating the actual content.”

To encourage learners' motivation and engagement, MOOCs researchers also analyzed OOL environment models from the point of view of contextual factors (i.e., demographic, classroom, and individual needs), student behavior and learning outcomes (Joksimović, 2018), or how they adapt OOL environment to support a work place professional learning as a link to formal, non-formal and informal learning (Colin, Littlejohn, 2014).

### **3.4. Open online learning environment which enhances learning**

When we define what promoting learning means, we consider everything that motivates to study, to enter the OOL. Starting with motivation, we may observe some existing differences between the OOL environment and class environment, because this category focuses on

different methodology. First, educational environment must motivate. There are two types of motivation – external and internal. External motivation could be related to the emotions students get from outside, from the closest environment. As Artino (2012) puts it, emotions, differently from classroom education, have more important effects on learning, engagement, and achievement in online settings, since emotions emerge and are regulated, relate to important behavioral, motivational, and achievement outcomes. It is very important that OOL students get the possibility to express their emotions. Sarsar and Krisla (2016) propose using both ways when thinking about emotions: receiving and giving. Classroom educators systematically apply the method of reflection after each class. But how often do we use the reflection in the online environment? Sarsar and Krisla (ibid) suggest that questions about how the student has understood the theme must be included in the session. This step would show that online environment not only promotes the student's intellectual aspiration, but also livens his/her emotional state by asking his/her opinion on the subject matter. Emotions can be promoted by visual dimensions. Visuality is an important point of external motivation. Visuality is based on effective design, which should deal with the students' inquiry. There are some problems, however:

1. If online courses are very open, that means the auditorium could be from different countries (so cultures), with very different aesthetic taste. Even the category of age has influence.
2. There are not many designers who would do very simple and appropriate visuals for the massive auditorium design. And if they do, even though such design produces aesthetic feelings and emotions, it does not promote being in the online environment very often.
3. There is no one example of the perfect environmental surface for being an excellent OOL and emotionally sensitive for a massive auditorium.
4. If the auditorium is not very different and that massive, and the environment is visually related with the theme, such environment brings emotions up, which eventually indicates that designers should work with all the programmes offered, and that is related to additional costs.

Still a good design of the online learning material is important to help students learn better, some authors insist (Redzuan, Lokman, Othman, & Abdullah, 2011), and educators and administrators should pursue solving those problems.

The learner behaviour could be characterized by a number of variables, such as motivation, time spent for interacting and learning in the OOL environment and learning style. The learning style depends on several factors: personal cognitive characteristics, instruction preferences,

and information processing techniques. Learning styles can be described as cumulative cognitive, affective and psychological factors that serve as quite stable indicators as learners perceive, respond, and interact with learning environments. Therefore, in order to encourage learners' motivation and engagement it is necessary to identify tools of the analysis for learning needs, the students' characteristics, so that the OOL environment produces the maximum cognitive profit for the students (Letiția, 2012) by creating an online learning community.

External motivation is very close to inner motivation, which is also very important for online learning. Wandler, Imbriale (2015) suggest prompting students to consider their actions in relation to their courses. It should provide reminders as to what is necessary to succeed in their class. It should be better to ask them to fill a questionnaire – to achieve self-regulation about knowing, understanding the themes (the questionnaire could contain several questions aimed at student self-regulatory practices) every week, month or any other regular period. Sometimes it happens that a participant does not appear to engage (i.e. does not make an attempt at earning badges, contributing to message boards) in the course, but is actively logging in. One might then assume that this person is unmotivated, technologically inept, or even has limited proficiency on a topic – which might be an erroneous judgement. That is why questionnaires are important – they can reveal problems of participation. Neagu (2016) suggests to create and design a flexible, dynamic and efficient training system, able to meet the needs and lifestyles of adults.

When discussing pedagogies and teaching methods used in OOL, researchers (Santoveña Casal, 2012; Wang, Chen, 2010) stress student-centered, active learning, enhancement of interactivity or distinguishing certain common principles as participative culture, network learning, cooperation and openness (Ricaurte, 2016) and respect of learning styles. Open online learning experiences require a different training methodology than traditional learning experiences, and learners must be able to self-regulate. Training methodologies can be interrelated with and enhanced by the development of self-regulation among learners, through the use of performance-progress tools, time-management tools, and learning-enhancement tools (Sharp, Sharp, 2016).

### **3.4.1. What do the experts say?**

There are great achievements from big companies which design learner friendly environments connected and synchronized with other systems and tools, as well as social networks. However, in case of university OOL environment, in order to meet the requirements of digital and network society and HE regulations, high level requirements are unavoidable. Our qualitative and quantitative research confirms the complexity of the characteristics defined for OOL

environment from the perspective of social sciences. However, in future high expectations would need to be raised for computer science professionals as well, to comply with the requirements of DNS and HE in practice.

Expert interviews were used to collect data on OOL environment that have been analysed through thematic analysis. The results revealed that the experts describe the online open learning environment as a) open, b) flexible, personalised and individualised, c) enabling lifelong memory, d) interactive, supporting user with feedback and suggestions, e) synchronised and integrated, and f) easy to use and accessible (see Figure 28):

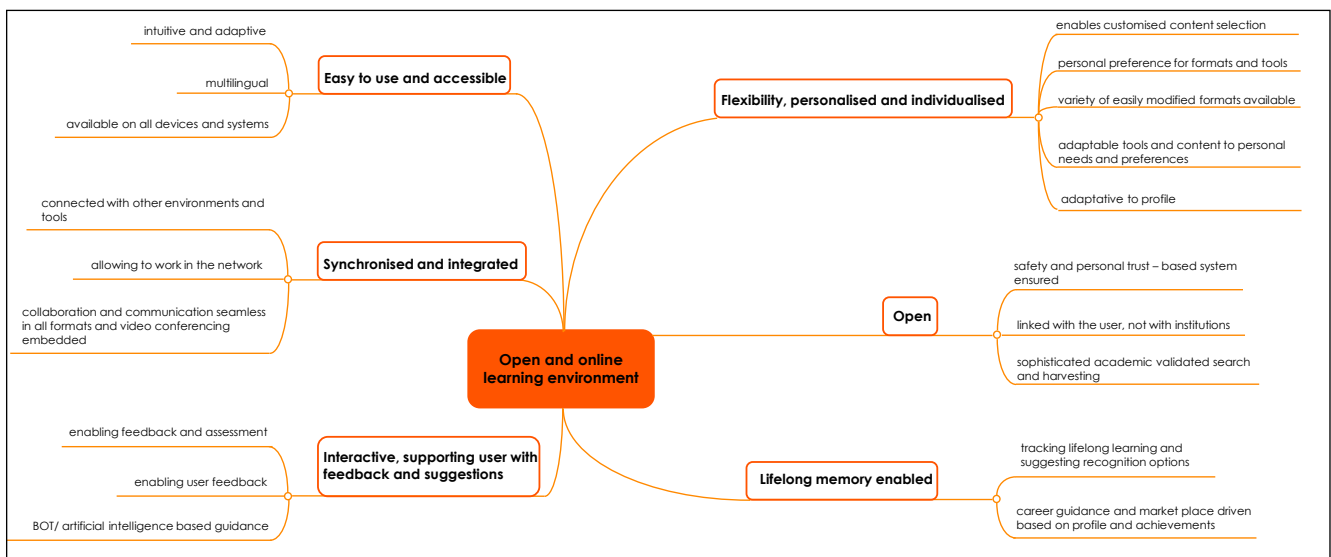


Figure 28. Open online learning environment thematic analysis results

## Open

As the concept suggests, first of all the dimension of openness was identified by experts as one of the key characteristics of open and online environment. Experts stated that

*"...it should be completely open. ... I strongly believe that not only the content should be open, but also the container, so also the virtual learning environment should be open. Open and to be free, but also free to be modified... It should be open learning from one side that is two parts, the open content and the open container ..."* (I.2)

As a matter of fact, this statement was strongly supported by all experts, however, openness was described in a great number of ways and scenarios, but several related important aspects (one may also call them as risks and their management) were mentioned as well.

As soon as openness was introduced, the topic of safety was touched upon: safety guaranteed for the users, i.e. safe and trusted learning management systems for institutions and learners. This important requirement may be ensured by:

*"I think our learning management systems, on the other hand, have to protect the learners in the same way, which is not easy to do: the liberty and the protection is something that*

*is against each other, but some learning systems already found the balance between the two" (I.5)*

This is how safety and personal trust-based system emerges as an important characteristic of open and online learning environment. This is not unexpected, but properly emphasized by experts.

However, a truly unexpected development emerged from the interviews when the topic of affiliation – who and what is affiliated with whom and what questions – arose. The environment, in traditional understanding, is established and secured by education provider, the institution. Therefore, we are all inclined to think that education provider institutions establish online learning environments where users get registered, find their material for learning, implement assessment, and receive other important administrative and learning support. New ideas were expressed by the experts who refer to a different understanding of affiliation of open and online learning environment:

*"It will be open and open learning environment, not linked anymore to institutions like universities or professional education institutions". (I.7)*

A very interesting observation should be highlighted that this theme is related with the topic of openness, in terms of open choice of the courses, open offer of learning possibilities by a variety of different providers, and users should be the ones who "own" the environment, track their personal plans and pathways and collect learning outcomes from a variety of courses online – this is all recorded in the open and online learning environment that is affiliated to them, to the learners:

*"Down the road, an institution probably will provide just the basic study of engineering, where someone will study all the basics in physics and mathematics and etc. And then the user will look to this entire world of online courses, provided by other institutions or by private providers out there, adapt and these knowledge and skills to his own personal plan ...; the students ... are becoming more intelligent about understanding what the pathway of his own education will be and then he will decide that ... if my university cannot provide me that skill, I will get it somewhere else."(I.7)*

Learners, in this case, are free to choose their affiliation with any institution they want, while learning then is available through open solutions in their environment which is open and online for their personal learning.

Of course, such extremely complex scenario of openness should bring a lot of confusion and messy resources around the learner's profile. No doubt there were experts who suggested that one of the requirements for such environment is sophisticated academic validated search and harvesting. This thematic reference is related with two other important objects which

are not directly mentioned in the data collected from the experts, but they appear here and there, namely, artificial intelligence (which should be used for facilitation of different functions, interactions and support systems), as well as open educational resources or online learning resources, which naturally are also mentioned under the dimension of openness:

*"<...> is playing an important role these days, because the big problem with the Internet today and really online resources, is that there is just too many of them... I used to teach English classes ... and I used ... to talk to ... my students about how they find quality resources for their learning, ..., there are possibly millions, hundreds of thousands resources, how do you find them, how do you harness them, how do you use them? But I think what we are finding these days is more AI incorporated into the interface of searching, so we are going to recommend these systems, ... which are handy for us". (I.8)*

Actually, what the expert says is that we already have too much of available objects identified during our search, and even resource harvesting and filtering does not help to identify validated academic resources. Open and online learning environment should facilitate resource harvesting with artificial intelligence elements installed. The elements should identify academic validated resources following academic level of learning content used in the course and following learners' or teacher's preferences.

### **Flexible, personalised and individualised**

Following expert opinion, digital and network society members prefer to have short and customized learning proposals which are offered by diverse learning providers, and the learners themselves select and/or customize them according to their personal preferences:

*"short courses, modular – is a big word, so short, small courses, topics, themes which can be taken like in the shopping mall, you know, just what they need. I will choose and create my own training programme - and this is where we should go". (I.11)*

It is evident that the duration of the learning sessions and the size of learning and teaching events are very important, and the preference goes for shorter time and smaller size:

*"People do not have time for big programmes for longer time learning and they need small, short and very well described programmess with clear goals and the ways how will they achieve ..." (I.11)*

*"I think the requirement is more and more to ... quick test making, quick listening to the videos, the videos becoming shorter and shorter, we started somewhere at 5 minutes and now we arrived under 1 minute. If it's longer then people just don't listen to it". (I.5)*

Clarity and measurable description of promised learning outcomes and results are highlighted in several expert opinions, as the well-known speed of modern life and the need to save time and attention to whatever information is provided is a recognised characteristic of the modern society. This is once again re-confirmed by experts who state that open and online

learning environment should not only provide a clear description of the learning offer, which is divided into small and short programmes, but also allow the learner to manage and tag learning programmes or resources, marking the ones that have been used and the ones that are pending:

*“you should have the possibility to mark which part of this chunk you've already watched/ read or did, and which not.” (l.11)*

Thus, the environment should either suggest to the learner to classify resources or to mark them according to the learner's personal preferences, while it may also do the classification for the learner automatically, still maintaining learner preferences retrieved either from his/ her profile or behaviour characteristics.

Notably, flexibility, personalization and individualization are important not only for the learning material and content. Personal preference for formats and tools is also emphasized by the experts. Modern learners are often challenged with collaboration, active learning, integrating social networks, informal and non-formal learning activities in formal learning settings, and the main obstacles they face is the flexibility of the tools that are used in formal education:

*“And if we move into the want-to-have area, if you really think about how I really begin to work together with my learning in a very active and if you like, the web 2.0 kind of way of undertaking this sort of online activities and social learning for example, then you really need to have flexible tools which are not offered by a lot of these particular platforms” (l.8)*

It is no secret that formal education providers have technological solutions that ensure safety, secure users from external access, but are closed and rigid enough, often restricting links with external social networking tools, informal and non-formal learning activities. The experts raise a requirement for an open online learning environment to ensure flexibility and individual user preference to choose the tools and formats of the learning contents for their learning programmes.

Thus, the environment prototype should offer both learners and teachers a variety of easily modified formats available:

*“The content is presented in a variety of ways that matches different styles (visual, verbal, written).” (l.1)*

*“... infographics, it's a new presentation technique how teachers can, and not only teachers, but also in companies, ... transfer very quickly the most important and key information of something [in] infographics – information plus graphics.” (l.5)*

Both expert citations indicate that the environment should allow the user to easily transform one or another resource into a different format according to personal and individual preferences and needs. Since this, no doubt, is one of the most desirable functions of the open and online

learning environment as mentioned by the majority of educators and learners, there is the need for considerable research and technology development to achieve this to enable the function for open and online learning environment as such.

Experts are very unanimous in persistently suggesting availability of adaptable tools and content to personal needs and preferences in the open online environment:

*“Steven Don ... talking about the personalization ... was saying that we will not have a virtual learning environment anymore, but we will have a personalized learning environment. And it means that you will not have only one platform, but you will have lots of platforms around you”. (1.2)*

Personalised preferences now are conceptualised into a personalised learning environment, with a small ambiguity whether the learning should be personalised or a personalised learning should be happening in such an environment that allows personalization. The comment above reassures that any solutions of the environment should be based on the learner's needs to allow personalisation of learning and individualization of learning. As it this, the idea is very challenging, and the experts continue with new skills of learners and teachers who would be able to use coding simplified languages to implement their learning and teaching personalization by adapting the environment to their needs on their own:

*“I am imagining the next future of virtual learning environment will be also the possibility to have a module to it in a very simple language, coding language ... coding language. ... my idea is that, you know, to provide to them the very simple language, for example the Apple created this wonderful language to developing apps. So you will have this very simple language and develop your own modules as a teacher without any knowledge in programming.” (1.2)*

The open and online learning environment should be adaptive to learner profile. If we merge expert opinions, we should clearly understand that future open and online learning environment should be able to adapt to the learner profile itself (e.g. using artificial intelligence and other programming solutions):

*“... the idea is that I can connect to an environment, either by harvesting information available about me online or just by me typing information into my profile on a particular platform, then it should be able to identify the sort of things that I want to learn and how I like to learn, am I more of a social learner, am I an individual learner... do I like to actually do active or more passive activities? And all these need to be involved in the environment”. (1.8)*

The learner profile should indicate preferences, but also should be accessible from any devices, places and spaces used by the learner, should adapt to the learner's regime-suggested customised settings suitable for different places:

*“...the modern digital environment is student-centered and it's super flexible, which means*

*you need to be able to support a wide, wide, wide, wide variety of student needs. You're going to have... some students, which are working from home nearly entirely, other students that are working at night, other students who want to have a full campus experience, and you need to be able to support all these different types of learning.”(l.9)*

To sum up, an open and online learning environment should be smart enough to match the learner, the context, the settings, the preferences and further settings, to ensure most efficient and customised solutions possible.

### **Lifelong learning enabled**

The third group of characteristics of the future open and online learning environment is directly linked with the latest phenomenon of unbundling of higher education. Experts refer to changing labour market needs and the need for digital and network society to update their skills and competences as frequently as possible. The trends of individualized approaches to professional competences are naturally supported by industry. Thus the needs from industry for professional competences and individual preferences of professionals aiming to remain in the job market merge, embedding in such a way the overall process into lifelong learning settings. Experts claim that the environment should be tracking lifelong learning and suggesting recognition options, as well as implementing career guidance, making it job market-driven and based on profile and achievements of individual lifelong learners. Here is a lengthy citation from the expert interview, but worth attention and deserving a larger context explanation to the reader:

*“An entire study programme can be modularly built by a student, and an institution is offering these as modules, then you could have your own personal curriculum, so that shows me that down the road, in 5 to 10 years, they will change completely, and again, this is not driven by the institutions, they are lagging far behind, this development, this would be driven by the market, this will be driven by the industry, because there they feel the competition... they have to stir the power to change and to adapt to newer ways, they will hire those people, fit in their needs and the user understands, okay, I don't care what the institution is offering, I care what the industry needs... and if they can show it and prove it in their C.Vs, wherever it comes from, they can prove it, and the employer in HR department will accept it, then the entire education market and teaching market will change“.* (l.7)

Actually, several things are merged, as demonstrated in the expert interview citation: market driven curriculum should be customised in the open and online learning environment by the learner, and the learning offers are linked with the industry needs. It is nothing else, but a lifelong learning process tracking system which enables not only a lifelong learning option customization and record, but also suggesting recognition of available skills and competences by the employers. Moreover, if industry and employers influence the offer of the learning

options available in the environment, then personalized suggestions and career guidance (links between the needs from the market and educational offers) are adaptable to the profile of the learner declared and identified in the open and online learning environment.

### **Interactive, supporting guiding**

Several experts identified the need for interactivity, user support by providing feedback in the process of learning and during the assessment, as well as enabling the user to feedback the system itself. The requirement towards the environment to enable feedback in the learning process and assessment is not a new one, but clearly confirmed by the experts for reaching interactivity:

*"We want interactivity. So if someone is learning or taking something they should be able to have a feedback, constant feedback during their training so that they can make judgement of how well or how much more will they do something or if they are satisfied with their own progress". (I.11)*

Experts claim that not only educators and the environment should be enabled to provide feedback to learners during and after the learning process and assessment, but also the environment should enable user feedback towards learning options, learning offers, towards expressing one's position, opinion and even emotional state:

*"There is a possibility to receive and provide feedback". (I.1)*

*"...should provide you as a learner with a comment or even to express your feelings about the learning content" (I. 11)*

As it has been mentioned by experts, artificial intelligence-based guidance BOTs may be one of the best solutions for the implementation of interactivity and feedback in open and online learning environments towards a variety of individual learners. Experts take a look into the future and identify the tendency of individualization and personalization of learning following learner preferences (this is also evident from the data described above). It would be extremely difficult to always ensure human approach, teacher or consultant and trainer support and feedback to individual learners, especially, if their numbers are massive. Therefore, experts claim that the feature of artificial intelligence is mandatory in the open and online learning environment:

*"First of all, I believe that we cannot have something that doesn't have artificial intelligence in it. We have artificial intelligence in our speakers, in our TVs and our phones, and we need to have it in virtual learning environment. Why? Because we need to achieve, first of all, individualization. We could not think about virtual learning environment that creates materials for everyone, but we would tend to have as small as possible personalized material to everyone." (I.2)*

*"<...> you will have someone ..., a BOT, a robot, and it will answer to you directly with contents and procedures and so on. They will ask you also if you are satisfied with it... We need to do*

*tutoring ..., but it's not possible to do it with human beings because otherwise you will need lots of tutors. But we could have a chat BOT and we could have a lot of artificial intelligence to manage this.” (I.2)*

Experts also think that the BOTs may help teachers to adapt curriculum and learning tasks to their needs and even help them to implement assignments with the learners:

*“...a BOT could be built, the new BOT that you, that you enrolled in a course that you have this, that you've achieved these learning outcomes, that your next quiz looks like this and maybe the BOT can deliver the quiz and say, hey, are you ready to take the task now? I will ask you the questions, type in the answers.” (I.12).*

It should be well estimated that the suggestions brought by experts do not become futuristic. These solutions should be taken very carefully into consideration while drafting requirements for the open and online environment already today, as the tendency towards too much personalised, individualized learning are already at hand in higher education institutions and disrupt existing administrative and teaching methods, raising challenges towards the ration of cost and quality.

### **Synchronised and integrated**

The recent decade left no doubt that we are all working with various technological devices that are synchronised and integrated through data sharing, information and tools availability, as well as smooth transfer of our documents and files from one to another device, application and programme. Obviously, this was also indicated as one of the key characteristic features of an open and online environment. Experts claimed it should seamlessly function and be integrated throughout various platforms, devices and programmes.

First, open and online learning environment should be connected with other learning environments and tools:

*“It is important that VLE is ... connected to other instruments like Google, social networks, etc.” (I.11)*

*“There are ways around that, there are quite nice online tools, we might use for example, Google docs to handle tools, there's Blogger, another sort of tools for having sorts of blog, what we are actually doing, if you want to do a collaborative writing, and there are also other tools which we can actually pull together in a decentralized system of tools, which we can actually use for our learning quite nicely, this in a way, the underlining philosophy or connection of idea, we are not going to have one big platform, we have a lot of decentralized tools“ (I.8)*

It is commonly accepted that users are attached to one or another instrument personally, so their preferences should be taken into consideration and the environment that they will use for their learning should allow this connection and synchronization.

One of the most popular and important features for open and online learning mentioned throughout the literature and evidenced by empirical data is that the environments should allow to work in a network.

*"I would argue that is one that is highly, highly networked. ... So we are talking digital and networked, so the focus has to be under the networking in the physical and digital spaces" (I.9)*

The need to work and learn in a network is characterised today as one of the greatest benefits that technology brought to our lives. We learn through networking, through sharing, through communicating, collaborating, sharing information, knowledge and resources in our personal and professional networks. Therefore, no doubt the need to have the environment with networking enabled complies with the requirement to implement seamless collaboration and communication in all formats.

Integration and synchronization opportunities refer to both, integration and synchronization of personal networks with professional ones:

*"A part of this vision is ...[to] start blending your educational environment with the other technologies and the other contexts you are having in your life. So, could you use the tools that you are using in your business in your workplace to actually do education as well. So, ..., here is the system I got it for education, it could be part more of the fabric of the Internet that we are using for various kinds of things, I think that's where a lot of us who are visioning next generation environment really wants it to live. I think about smaller, personalized applications integration with workforce, tools and less about these sort of models and these sort of systems that they offer us today." (I.12)*

All tools, all systems and all formats, as well as integration and synchronization of the tools we use should work as one and ubiquitous system in synergy:

*"...video conferencing should be seamless. Uh, in my ideal version, no budget required: you've got a video conference screen in every workshop, you can just connect to your classmates anywhere, where you, where you are having, let's say a software infrastructure that connects people, who are studying anywhere, anytime, but as a single set of students, as the single classroom. And part of that is physical and part of it's digital, but in particular it's about linking the physical and digital together seamlessly. And I mean technically, the big focus is the simple stuff – easy video conferencing is a major, major part of that, but, I mean, easy seamless video conferencing." (I.9)*

### **Easy to use and accessible**

Last but not least, the open and online learning environment should be simple and easy to use, as well as accessible in every sense. The experts indicated that this condition should comply with a number of requirements. The experts say that the system should be intuitive and adaptive:

*"It is important that VLE is easy to use, very intuitive, supporting help..." (I.11)*

*"Easily accessible, conveniently positioned, integrated tools ..." (I.1)*

*"MOOC's VLEs were more user friendly, easy access, and more sophisticated... I think there is a quick evolution of the virtual learning environments towards an easy access way, so that you don't have to register too much. ... So I think the requirement is more and more to this easy, contradicting requirements – easy access, quick access." (I.5)*

One very important characteristic in line with the accessibility option, as well as promoting understanding and contextualization of learning, is the need to have the environment multilingual:

*"I would stick to the artificial intelligence, have it individualized and for sure multilingual and it should be possible to scale it up as you want." (I.2)*

Finally, all else being touched upon, the open and online learning environment should not only ensure that it is synchronised with all other systems, but that it is **available** on all devices and systems:

*"I strongly believe that we need a virtual learning environment that is usable from a mobile point of view. And mobile doesn't mean only small screens, but also means wearable devices like watches or for example a jacket and whatever. This is not a utopia. We already have the technology. Unfortunately, it's not so cheap" (I.2)*

In general, experts define OOL environment as open, interactive, supportive, flexible, personalised and individualised, easy to use and to access.

### **3.4.2. What does the digital and network society prefer?**

Following global trends, universities in Lithuania plan and register online and distance learning programmes. However, fast technology development, new trends for digitalisation of organisations, learning at work place, digital spaces for discussing and content sharing, growing requirements for teacher digital skills pose new challenges for higher education establishments in terms of accessibility of curriculum, inclusion of society members, flexible and innovative learning methods, flexible learning assessment and recognition schemes.

Quantitative research (n=1241) indicates that society needs for studies and professional development at university level are quite high. Our respondents find studies in the daytime compatible with the work schedule (83%), also flexibility in choosing separate courses when studying (82%) most attractive. They would prefer online study programmes (78%), courses for professional development (76%); online connections to video conferences or viewing lecture recordings would seem engaging too (73%), see Figure 29.

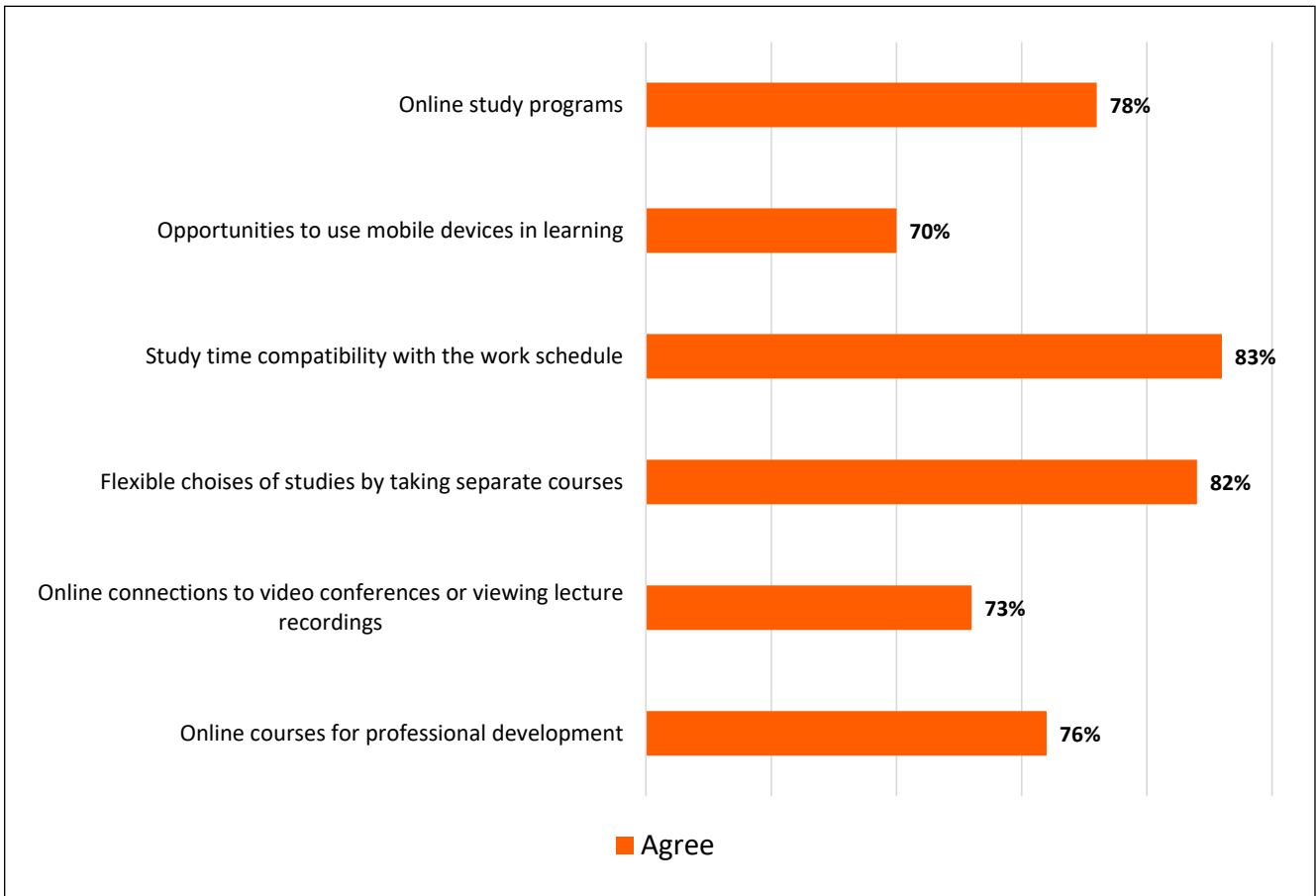


Figure 29. Characteristics of engaging in studies at tertiary level

The least attractive seems to be the use of mobile devices in learning, however even 70% of respondents think such an alternative makes studies at tertiary level more attractive.

The features of virtual learning environment for OOL participants relate mostly to training methodology, such as integrated platform functions, content delivery, communication and collaboration assessment and evaluation. Most important for the participants is to learn at the right time (86%), to connect in real time (84%), and to get learning content in written, video and audio formats (81%). The least important is to get a badge synchronized with social and professional networks (37%).

A comparison of age groups shows a general tendency that younger adults rate all those features higher than the adult age group over 53. Mann-Whitney criteria show that for respondents up to 53 years to learn in their own suitable time ( $U=117802,500$ ,  $z = -4,957$ ,  $p=0.000$ ), to connect in real time ( $U=119812,500$ ,  $z = -4,494$ ,  $p=0.000$ ), to get learning content in written, video and audio format ( $U=118485,500$ ,  $z = -4,859$ ,  $p=0.000$ ) and to get a badge synchronized with social and professional networks ( $U=122851,500$ ,  $z = -3,744$ ,  $p=0.000$ ) is more important than to respondents over 53.

In Figure 30 ratings “agree” and “strongly agree” with regards to communication and collaboration, training methodology and content delivery are presented. The most important characteristic of virtual learning environment during OOL is the possibility to learn in most convenient time. More than 80% of respondents in all age groups rated that, namely, group up to 27 years of age - 89%, group 28 to 38 - 92%, group 39 to 52 - 88% and group over 53 - 80%. The second most important feature is content delivery characteristic: “learning content presented in written, video and audio” formats. In group over 53 years of age 78% agree with this statement and in all the remaining groups 85% and more support such a statement.

More than 80% of adults with the exception of the group over 53, where 73% supported the statement, express preference to participate in OOL where a VLE includes time management. Mann-Whitney criteria show that there is a statistically significant difference between age groups over 53 and younger respondents (up to 53-year-old) ( $U=119711$ ,  $z = -4,593$ ,  $p=0.000$ ). When opinion on “tools for communication and collaboration” was given it appeared that it was more important for all younger adult groups. The least difference between age groups is adults’ opinion on the presentation of the material. All above mentioned groups (with the difference of only 3%) agree on the importance of “material presented in small chunks”. As it was already discussed in Chapter 1, searching and sharing knowledge in smaller portions, small chunks of learning is a specific feature of digital and network society, and this is confirmed by the qualitative and quantitative research.

“A possibility to write a message” is more important for younger adult groups, 79%, 82%, 78% accordingly, and for the group over 53 it comes to 67%. This could be explained by the decreasing senior participation in training and learning activities, lessening social networking. The importance of “connecting in real time” decreases with age: 79% of young adults would like to do that; age group 28-38 finds it slightly less important ( 76%), in age group 39-52 it decreases to 73% and in the group over 53 it comes down to 65%.

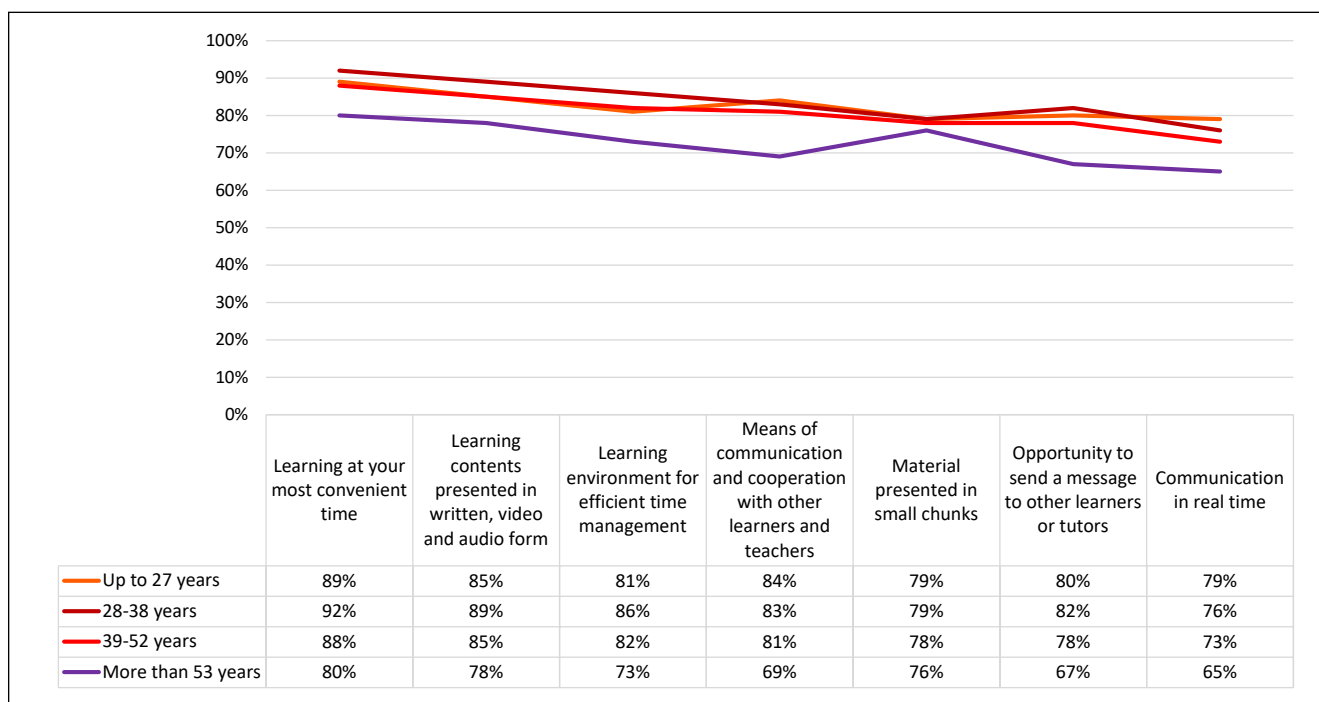


Figure 30. Features of OOL environment in terms of training methodology, communication and collaboration, and learning content delivery

Figure 31 indicates the need for assessment and evaluation in OOL environment. Adults would like to have a “periodic progress feedback” for their learning and “to see progress of others in the VLE”. This is more obvious in groups up to 53 years of age. For adults it is more important to get some progress feedback (80%, 81%, 77% accordingly) than to see the progress of others (51%, 48%, 46%, 34% accordingly). The tendency is the same with the group over 53, yet less enthusiastic (62% and 34% accordingly). In general, in all items older adults allocate smaller rates than younger adults. Earlier (Chapter 1) it has been mentioned that younger respondents tend to engage more in social networks for all purposes, including learning. The responses about the use of social networks in OOL environment confirm the same: 48% of adults aged 53 and more consider it important to use social networks in OOL environment and 34% agree with the synchronization of the VLE with the social networks. In comparison, young adults up to 27 agree with a periodic progress feedback and 55% with synchronization of the VLE with the social networks.

Uneven distribution of opinion of the respondents is observed concerning “a VLE with smart plug-in counsellors (robots)”, as the two groups of respondents (up to 38) see them more important, (63%), while the group aged 39-52 rates it with a hesitation mark 52% and so does the group over 53 (45%).

Responses to the question whether it is important for a VLE to “to get a badge synchronized with social and professional networks” show the lowest ranks and the least important feature in

OOL, as all answers are below 47%. And again, younger adults tend to give more importance to this item than others, accordingly in the four age groups the distribution of answers is as follows: 47%, 43%, 38%, 29%. Earlier in Chapter 1 a similar tendency was indicated: 86% of young people of 18 - 24 (n=197) would like to get a badge synchronized with social and professional networks, compared with other groups of respondents (37% (n=1044)). This could mean low awareness concerning digital badges in society in general.

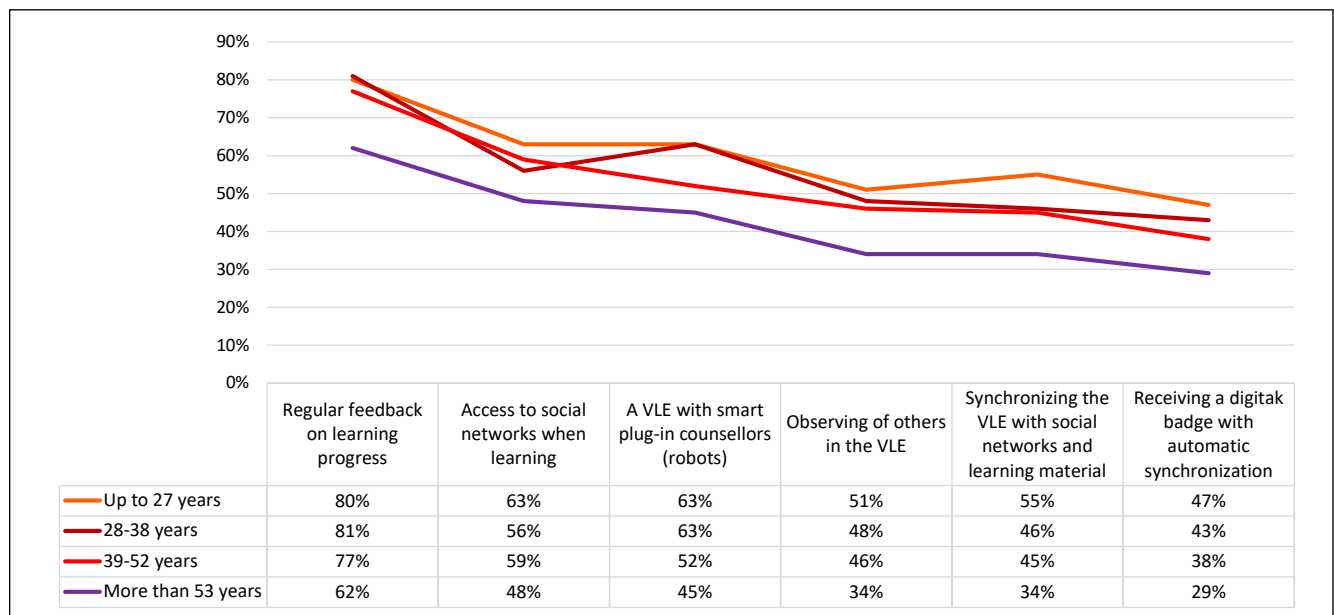


Figure 31. Features of OOL environment in relation with assessment and evaluation, social networks, and learner behaviour

Research data confirms the learners' need for flexible, individualized environment with learning content presented in a variety of formats (written, video, audio, small chunks) and functions allowing ease to use, ease to communicate, get feedback, to be synchronized with social and professional networks or even installed counselors (robots) and badges. When evaluating features of OOL environment younger learners with significant difference indicate higher expectations than more mature learners.

### 3.4.3. A closer look into the factor analysis

Factor analysis has been used to find out a variance of factors of OOL environment. The data used was collected during the quantitative research described in the chapters above, using the online and face to face questionnaire, surveying digital and network society members who are Lithuanian citizens. Below we present the quantitative research results of transformed higher education OOL environment taking into account the needs of digital and network society.

For factoring 34 statements, the values were determined by Kaiser-Meyer-Olkin Measure

(KMO=0,949) and Bartlett's Test of Sphericity (27392,117; df=561, p=0.000), which show that the data are suitable for factor analysis. Sufficient information on all the variables remained in the selected core components, since the unity of each variable is no less than 0.20.

Factorial analysis revealed 6 factors (Table 7):

Table 7. Number and name of factors (N=3476)

Number of factor	Name of the factor
F1	Networking and possibility to synchronize
F2	Accessibility and flexibility
F3	Self-paced and personalized learning
F4	Variety of digital resources
F5	Self-directed learning resources
F6	Need for teacher contact

The total explained variance of factors is 66.392%. The descriptive dispersion of the factors varies from 2.949% to 37.683%. Rotation Method: Varimax with Kaiser Normalization). In the following pictures the numbers at the beginning are communalities, and before factors – the weight of variables.

**Networking and possibility to synchronize**

The first factor was named *Networking and possibility to synchronize* (Figure 32):

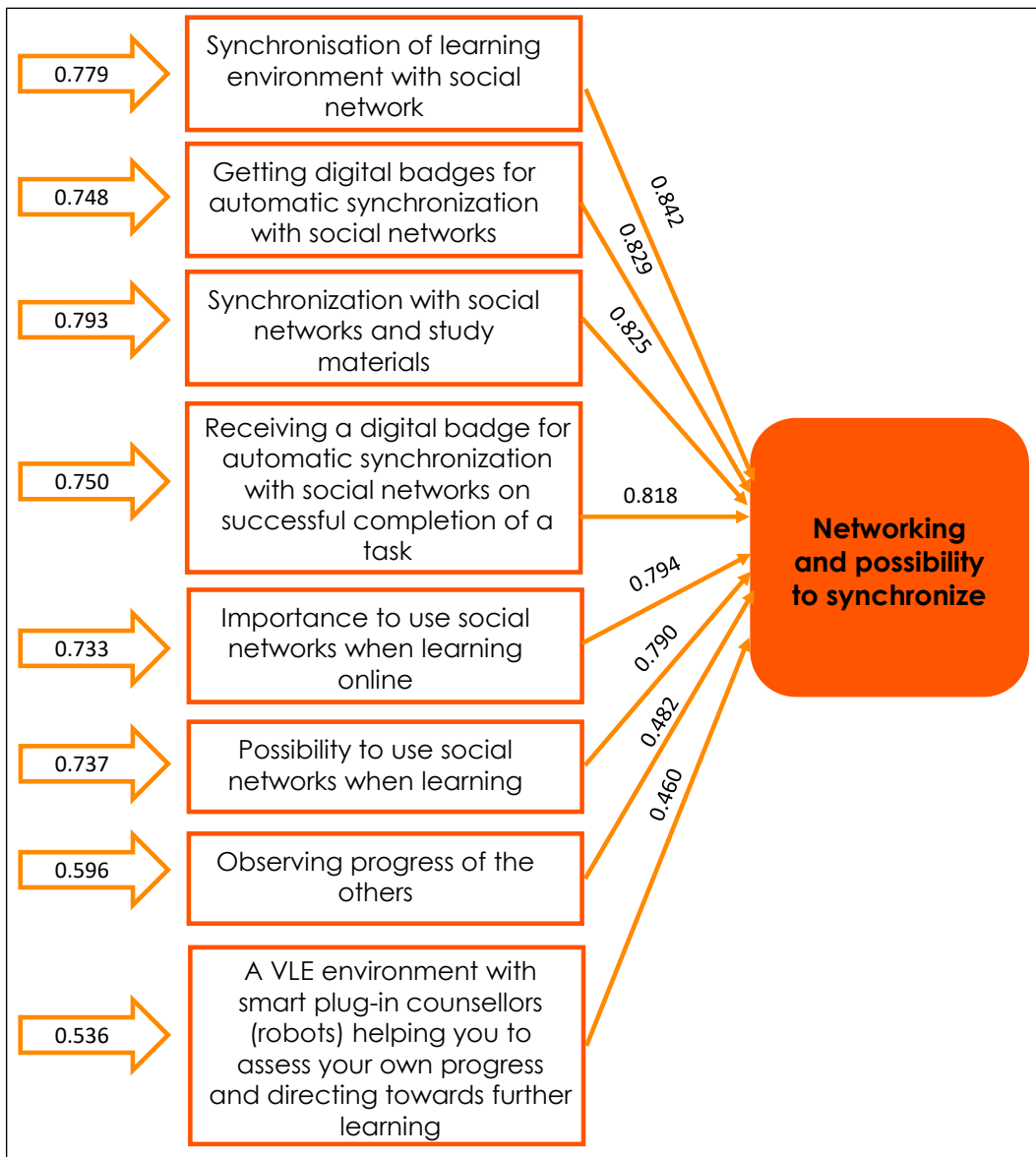


Figure 32. Networking and possibility to synchronize

All eight statements are important for the factor description. From the data we can see that the correlation between the possibility to synchronize OOL environment with social networks and the first factor is the highest and the lowest is the perceived importance of smart plug-in counsellors.

Thus, when learning online, adults need social interaction, it is important for them to communicate with others, participate in discussions and therefore they need to use social networks. Networking, which is so important in daily and professional life, becomes of the same importance when learning online. This is why synchronisation of the VLE with social networks is an essential feature of open and online learning environment. Learners also prefer synchronisation of study materials, as it helps to gain knowledge and stimulates development.

Badges become an important evidence of learning outcomes and elements of credentialisation. To get a badge means to become synchronized in social and professional networks: this is of great significance for the learning environment too. That is why an automatically synchronized digital badges are prioritized and wanted.

Learners prefer open and online learning environment with smart plug-in counsellors which could help in learning situations or guide them during the process. Smart plug-in counsellors (robots) helping to assess one's own progress and direct towards further learning are the least important factor, and the reason of that could be that while not in the learning process respondents are hardly aware of the importance of such help; also, in real online studies such counselors are not a usual phenomenon. It is also a privilege yet to observe progress of other learners in OOL environment: the main issue is one's own progress when learning.

### **Accessibility and flexibility**

The second factor was named *Accessibility and flexibility* (Figure 33), as conceptualized below:

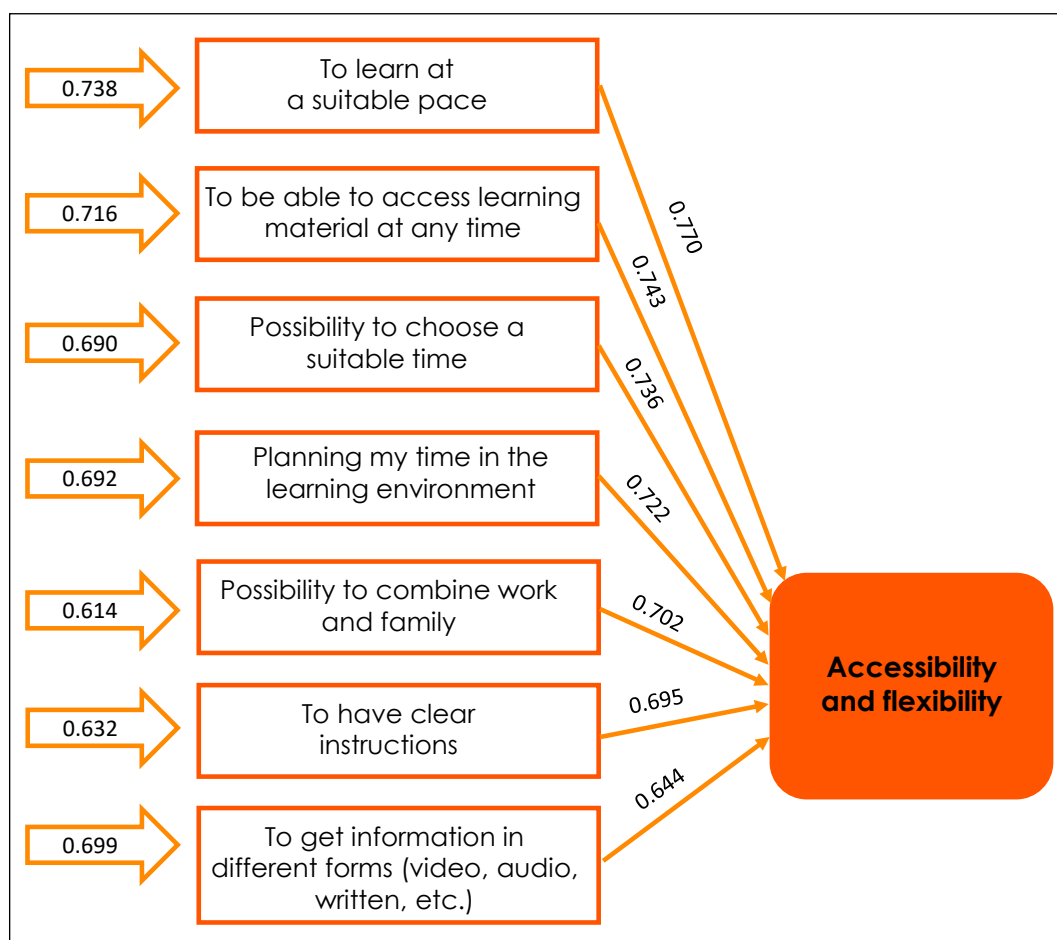


Figure 33. Accessibility and flexibility

All seven statements are important for the factor description. From the data we can see that the correlation between the importance to learn at a suitable pace online and the second

factor is the highest; the lowest is the importance to get information from different forms.

Accessibility and flexibility remain crucial when learning online. It is expected that online delivery systems will respond to the main features and differences of learners allowing them to learn flexibly. The factor analysis highlights the importance of learning at a suitable pace, planning the learning oneself and a possibility to combine work and family. An application of such flexibility when modeling OOL environment or organizing online learning follow adult learning principles and can strengthen personal motivation for professional development. Accessibility refers to OOL environment to access learning material at any time, yet it also includes a variety of activities when it comes to curriculum offers. It is important to get information in different forms, such as video, audio, or in writing, and get clear instructions when learning online.

### ***Self-paced and personalized learning***

The third factor was named Self-paced and personalized learning (Figure 34). The learners may not want to walk along a pre-designed course path but may want to have a choice of a part of the course content from an existing learning course, creating a personally designed unique learning environment where he or she could have a periodic progress feedback, showing the progress made and indicating the direction for further development. A timely feedback helps the learner to see their progress and the need for further actions. The statements of this factor highlight a learning content presented in different formats (written, video, audio), also learning in suitable time where the environment is supported by time management. This means that learning content needs to adapt to the specific needs of individual learners allowing personalization both from virtual environment and curriculum. A properly designed course environment and curriculum encourages inner motivation, creates space for discoveries, poses challenges for the learner. On the other hand, the role of the learner is extremely important in assuming responsibility for one's own chosen learning activity and content and for using internal motivation to achieve the learning goals.

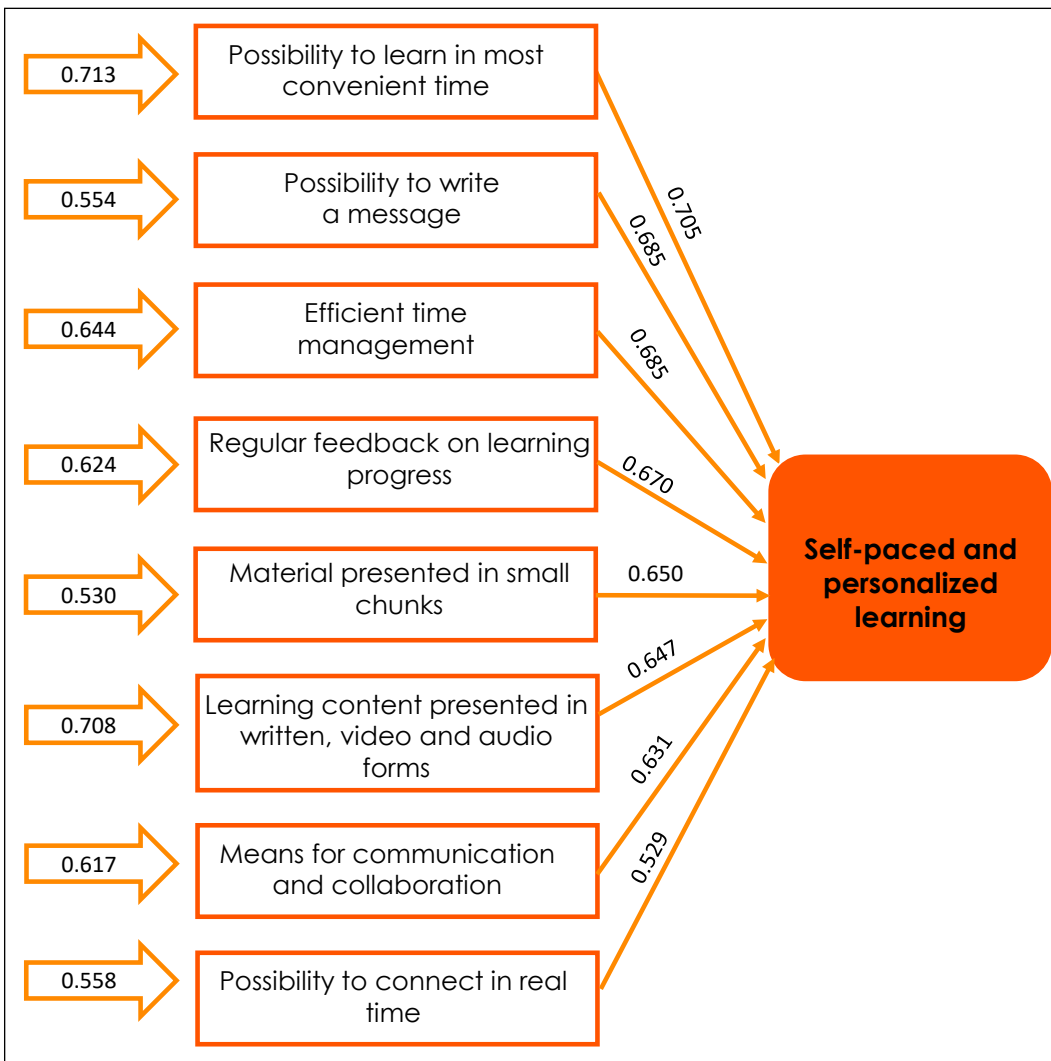


Figure 34. Self-paced and personalized learning

All eight statements are important for the factor description. Judging by the data we can see that the correlation between possibility to learn in my own time and the factor is the highest; while the correlation between the possibility to connect in real time and the factor is the lowest. Social relations are highly important even when personalisation takes place. Wherever an adult person learns, there is always an emotional, social, cognitive dimension, so it would be wrong to assume that if a person participates in online learning, his or her goal is to learn something (i.e. they have a cognitive motive). As an individual, an adult learner has a system of individual priorities and values of his / her own life, which is the product or life of previous years' experience, the influence of his / her environment and his / her individual needs and priorities. In addition, the interaction between adult learners and the system of values of social and societal forces, with its priorities and approach to life has an impact on the learner's learning in any context. Therefore, tools for communication and collaboration, connection in real time or possibility to write a message are important elements of OOL environment.

### **Variety of digital resources**

The fourth factor was named *Variety of digital resources* (Figure 35), and it falls into the following items:

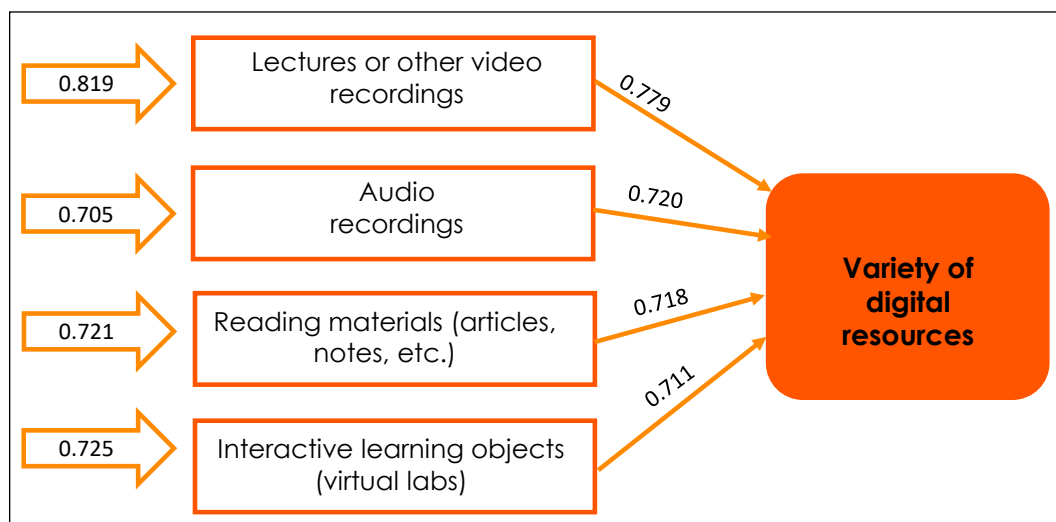


Figure 35. Variety of digital resources

All four statements are important for the factor description. From the data we can see that all statements are similarly correlated with the factor named variety of digital resources, though the strongest correlation is with lectures and video recordings.

The factor of variety of digital resources is mostly related to OER integration in the curriculum what usually means replacing traditional sources as textbooks, handouts with OER. OERs could be used as primary course material, but also as supplementary course material. The most important OER may be defined as video and audio recordings, reading materials and interactive learning objects, like virtual labs. However other digital learning resources presented further are also significant.

### **Self-directed learning resources**

The fifth factor was named *Self-directed learning resources* (Figure 36). It falls into the following items:

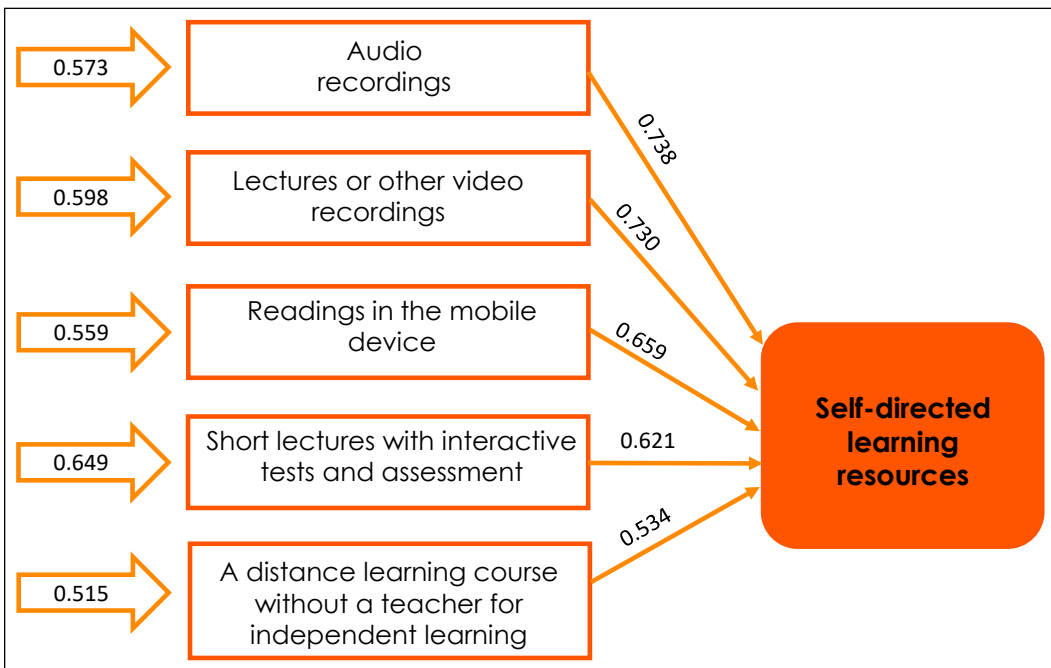


Figure 36. Self-directed learning resources

All five statements are important for the factor description. From the data we can see that the correlation between audio recordings and self-directed learning resources is the highest; while distance learning course without a teacher is the lowest.

It is necessary for learning providers to provide sufficiently appropriate digital educational resources to enable learners to learn independently and to obtain positive assessments during the study process. Priority is given to small-scale educational resources that can be constructed to generate various learning scenarios. A scenario could include a distance learning course without a teacher for independent learning or to offer short lectures with interactive tests and assessment.

Presentation of the learning content is highly dependent on the learner's choice of training. In the OOL pathway, there is no fixed learning scenario that could meet the wishes of all learners. During OOL a passive user engages in an active learning scenario with self-directed resources, where preferences are given to the format of the learning content, such as voice books, short tutorial videos, short lectures, readings, mobile device applications.

### **Need for teacher contact**

The last – the sixth – factor was named *Need for teacher contact* (Figure 37). It falls into two items:

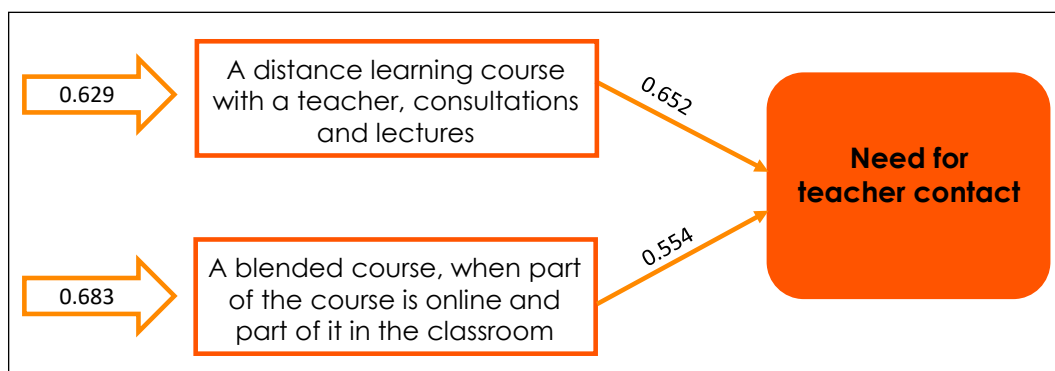


Figure 37. Need for teacher contact

This factor consists of two statements, though the need for a distance learning course with a teacher, consultations and lectures is a bit more correlated with the last factor than a need for blended course, when part of the course is online and part is face to face.

Learning is a complex process, including the fact that learners, especially adult learners, are very different. As learners they have different values, attitudes, self-direction, experience, preparation for learning, this is why quite a significant part of learners prefer to be in contact with the teacher and choose online learning with more or less presence of the teacher. It could be a course with teacher consultations and lectures or even a blended course when part of the course is face to face.

In summary, the factor analysis is that of a conglomerate of six factors: networking and possibility to synchronize; accessibility and flexibility; self-paced and personalized learning; variety of digital resources; self-directed learning resources; need for teacher contact. All of that describes open online environment. Moreover, factor analysis shows that environment and curriculum are inseparable. Factor analysis demonstrates that open and online learning environment is inextricably linked with curriculum. The characteristics of higher education curriculum are inevitably interrelated with virtual learning environment. In other words, the open online university curriculum ought to be supported by an environment in which the learners are challenged and assisted in the development of their intellectual capabilities.

#### 4. The model of open online learning environment

The research performed has enabled us to make conclusions about the description of digital and network (DNS) society and identification of digital and network society needs for open and online learning. Theoretical conceptual research results offered an insight into the concept "digital and network society" definition.

The definition of DNS grounded by Castells (2004) is closely associated with globalization and integration of innovative technologies in people's lives. The society is organized around digital communication and also has a specific structure of networks. The structure and organization of the digital and network society forms requirements for the citizens; on the other hand, each member of the society uses information technologies in their daily life for shopping, browsing the Internet, e-banking, e-voting, listening to music, reading e-books, etc. DNS requires digital citizens to adapt to the changing society, but, on other hand, to make contributions and actions towards the change. DNS refers to persons who use technological means in their daily life, who communicate or relate themselves to a certain digital community, participate in online group discussions or follow them.

Researches confirm the impact of digital skills on better living conditions and greatest benefits to society groups with higher social-economic status and education because of the benefits they receive in various important spheres of life through the Internet (Van Deursen, Helsper, 2015; Haight, Quan-Haase, Corbett, 2014; Mok & Leung, 2012; Wei & Blanks Hindman, 2011) . Learning online could play a crucial role in the reduction of the gap between various groups of the society (De Paepe, Zhu & Depryck, 2017).

Empirical findings from the quantitative research have allowed us to respond to the main research question: **what are the emerging learning needs of the digital and network society?**

Our qualitative research reveals the emerging ways of learning that are preferred by the DNS, first of all, being *constantly connected and learning online*. The DNS refers to persons who use a variety of technological means and employ digital tools to help organize the day, to remind of activities, connect to family members, friends, watch movies, review records. Every single person of the society has a great opportunity to learn online, since new and emerging *smart devices for learning* such as mobile phones, tablet or personal computers become central characteristics of learning online.

DNS can also be characterized by extended *geographic and time borders* as there are no national, regional borders, and time differences are not so important anymore since anyone can communicate synchronously and asynchronously. DNS means domination of digital, rather than physical characteristics: *interactivity and sharing*. The Internet offers us huge amount of

information, knowledge that flows from different channels and sources, while DNS members need to *manage information overflow*, this becoming a crucial characteristic.

DNS members are noted for their particularly diverse learning needs, however knowing the distinguished characteristics allows online education providers organize teaching and learning accordingly (Rotar, 2017). Theoretical considerations were based on andragogical principles introduced by Malcolm S. Knowles suggesting that adult learning experience should be based on work and real-life experience. The discussion how OOL should meet those principles still continues. Herbold (2011) presented a comparison of adult learner needs with online delivery system options (needs for activities, individual and group assignments, networking); time (resources to use synchronous and asynchronous communication); place (anywhere, including work); pace (learning according to one's own wishes and obligations), though excluded the aspect of learning style.

It should be noted, first of all, that the quantitative research that has been performed in Lithuania proves that most society members in Lithuania choosing any type of learning are willing to learn online. The motivation to learn is increased by easily accessible connections to virtual learning environments, watching lecture recordings, videos, learning in MOOCs, reading articles, listening to audio books. Our findings support Farrow et al. (2015) and confirm that adults also want to learn as it means communication and collaboration with others, allows professional and personal development and gives pleasure.

It has been shown that 69% of adults who use the Internet spend a considerable amount of time online, from 1 to 4 hours a day. Only 14% of the participants indicated less than 1 hour a day online. Unfortunately, as many as 66% of respondents indicated spending less than 1 hour for learning purposes. When comparing age groups, it was found that younger people spent more time for learning.

The majority of adults, more than 58%, accept all possible learning forms offered by educational institutions, such as distance learning courses with or without the teacher, blended learning, consultations and lectures online, they are eager to read in mobile devices and use voice books.

The quantitative survey results also prove findings from the qualitative research - DNS members want to learn in small volumes of information, they prefer short tutorial videos, short lectures with interactive tests and assessment. Interactivity and sharing is the second important congruence, as DNS members express the need for communication, collaboration, and sharing of information. Particularly, this is obvious when talking about social networking. 81% of adults have an account of a social network, or several social networks, and they have a willingness

to look for information, conferences, seminars, events, friends, professional contacts, jobs; they also share experiences, photos, and videos with others.

Participation in social networks offers the opportunity not only to search and share, but also to learn. A comparison of age groups shows that young adults use social networks for learning purposes more than the rest of society groups. **As many as 38% of 18 to 24-year-old people are eager to spend time in social networks for learning. Such tendency requires efforts from educational institutions, especially for synchronization of social networks with existing environments and study materials.** Moreover, there is a need to synchronize social networks and study materials for getting a badge to be automatically synchronized with social networks. The last one is the most important for young adults. Those findings confirm evidences provided by Conole (2017) and Morrison (2015) that adults tend to satisfy a wide range of learning needs using informal and self-directed open online learning experiences. Greater emphasis should be placed on understanding sub-groups who may have different skills and knowledge than their own generation because of their past experiences and attitudes towards technologies, as pointed out also by Bencivenga (2017, 18).

Society members indicate a lot of subjects and topics they are eager to learn going online. There are almost no limits, however 40% of them claim they do not know what they could learn. Such uncertainty and ignorance raise the question of whether educational institutions are prepared to provide the right educational offer to the digital and network society. Moreover, the emerging learning needs of digital and network society put much pressure on service providers, universities in particular, for transformation of their curriculum to OOL.

The research performed has enabled us to draw conclusions on the transformation of HE curriculum to OOL and has allowed to answer the research question what the characteristics of the transformed OOL and curriculum are.

The complexity of the nature of curriculum in general stressed by Hoadley (2012), Graham-Jolly (2003), Mays (2017) correlates with the results of the performed qualitative research and quantitative case from Lithuania. Following theoretical and empirical research results, we define several characteristics of the transformed OOL curriculum.

OOL curriculum should be accessible and flexible. Not only the access to curriculum should be open, sometimes requesting the universities to become 24-hour institutions, but also customization of curriculum by the learner and selection of a preferable pedagogy, content and recognition schemes is raised as the requirements behind DNS. The structure of the curriculum should allow very different scenarios, including linear learning (what we usually do in our universities), individualized learning, self-paced, or even modular study programme

choices, made by a student, with the extreme and innovative request for personal curriculum, etc. Collaboration is the key word for OOL curriculum, as learning and teaching among digitally competent teachers and learners should happen in international, multicultural collaborative settings, engaging stakeholders, learner communities and interest groups, through networking and synchronization with other networks.

The content is one of the biggest categories in the curriculum research and one of the most popular elements highlighted by DNS members, and confirmed by research findings: multilingual, rich with a variety of digital resources, with short exercises, short videos, short modular offers, responding to innovations, adjustable and customizable by students for flexible learning design and self-directed, self-managed learning.

Pedagogy is characterised with the focus on personalization, differentiation and individualization of learning, supportive and flexible in terms of technology and content. All these elements lead to re-thinking about how universities should organize their curriculum, teaching and learning process, in addition to how the curriculum is structured in terms of competences and learning outcomes. Flexible and dynamic models should be developed adapting technology in education processes to what the learners actually want, support of learners and support of teachers in their new role, as the role of the teacher in open and online teaching is completely different from traditional teaching.

Assessment and recognition are among the most changing characteristics and innovations awaited. Immediate and instant feedback, quizzes and tests, digital credentialization and certification, instant recognition of OOL in formal education, and competence-based learning characterise how much assessment and recognition procedures should change in HE. The empirical research results fully support strategic political decisions (Bologna Open Recognition Declaration, 2016) and research by other scientists (Witthaus et al., 2016) who claim the need for diversification of formal curricula and learning which takes place outside the formal education, with recognition of OOL in formal learning settings. With the rise of new technologies for learning and teaching, the importance of assessment and recognition at universities and necessity being on top of these developments is an increasingly important factor for competitiveness in a highly diverse and globalized education market.

Theoretical analysis and empirical findings of qualitative research answered the research questions why OER are important to HE OOL curriculum and what university teachers' attitudes towards OER are.

There could be different ways for using OER in the development and running OOL curriculum: OER could be used during curriculum design process (Hilton et al., 2010); OER could be adapted

to the needs of the course during curriculum design process (Armellini & Nie, 2013); additional OER could be created and adapted during the course progress; adapted OER could be added during course progress. OER could be used as primary course material, but also as supplementary course material (Geith, Vignare, Thiagarajan, & Bourquin, 2010). Most popular OER types are images, videos, and video lectures. OER reduce price for students, as they do not need to buy textbooks, but also for teachers OER provide great flexibility and adaptability in the context of curriculum development and course creation. Using OER as supplementary course materials can encourage teachers to start using OER, and later to develop and adapt existing resources. The analysis of research studies indicates that teachers are positive towards the use of OER and see some advantages, such as OER online books are available from the first lecture, all students have access to them, and learning can start from the beginning of the class. Beside teachers' attitudes, experts also see and indicate the OER potential for the future. The use, adaptation, and creation of OER influence and raise teachers' awareness, attitudes, and skills; they could be used for achieving various aims, and they contribute to the quality, adaptability and transparency of HE curriculum, however the teachers stressed the need for change of teacher attitude towards openness, sharing, and use of materials created by others. When transforming traditional university curriculum to OOL curriculum, it is worth emphasizing the need of training of the teaching staff, and support in their new role, as the role of the teacher in open and online teaching is completely different from traditional teaching (Wiley, Williams, DeMarte, & Hilton, 2016). Nowadays teachers should take into account learners as individuals who learn at their own pace using different scenarios and connections, but also they should let students learn and prepare assignments in peer-to-peer networks or groups, encourage students to think differently, let them make learning choices, support them, and participate in learning communities. Those who would like to use OER must have at least basic knowledge of copyright and institutional intellectual property.

Also, an important role is played by the organisational policy. HE institutions should consider proper tools for the development of OER, for storing them, adapting and using, such as repositories with easy search functionality, editable file versions for OER adaptations, and licensing tools, to prevent copyright issues. HE institutions which decide to promote OER for their faculties should also foresee possible barriers teachers might have, such as language barriers, difficulties finding and determining quality of the resource, time spent searching for OER, licensing issues, technological challenges. It might be a waste of time and effort if an organization invested a lot of money for the infrastructure of OER, but would fail to organize teacher trainings. The following ideas were indicated by experts in the qualitative research

about how OER influence and have impact on higher education: they influence and transform teacher awareness, attitudes, and skills; they could be used for achieving various aims, and they contribute to the quality, adaptability and transparency of HE curriculum.

The theoretical and quantitative case analysis of the learning needs of learners indicate that they have clear answers on how they would like to learn online. When learning they would like to use open participation; they also prefer to have audio recordings, interactive learning objects, such as virtual labs. This confirms that learners would prefer a modern HE curriculum, which includes OER, particularly reading materials, watching lectures or other video recordings. Finally, the study was aimed to establish a model of OOL environment which meets the needs of DNS, through answering the question: what kind of OOL environment could meet the needs of DNS? This aim was addressed through the following steps:

- new emerging learning needs by DNS were identified and described (see above);
- OOL curriculum characteristics were defined on the basis of DNS learning needs following the conceptual theoretical research on OOL and how it suits best the new roles of universities and curriculum design for OOL methodologies;
- DNS needs for OOL environment were identified during the quantitative research, and expert opinion on OOL environment features and characteristics was analysed through qualitative thematic analysis, highlighting OOL environment features.
- The model of OOL environment meeting the needs of DNS was developed (see Figure 38), integrating all the above results of the research:

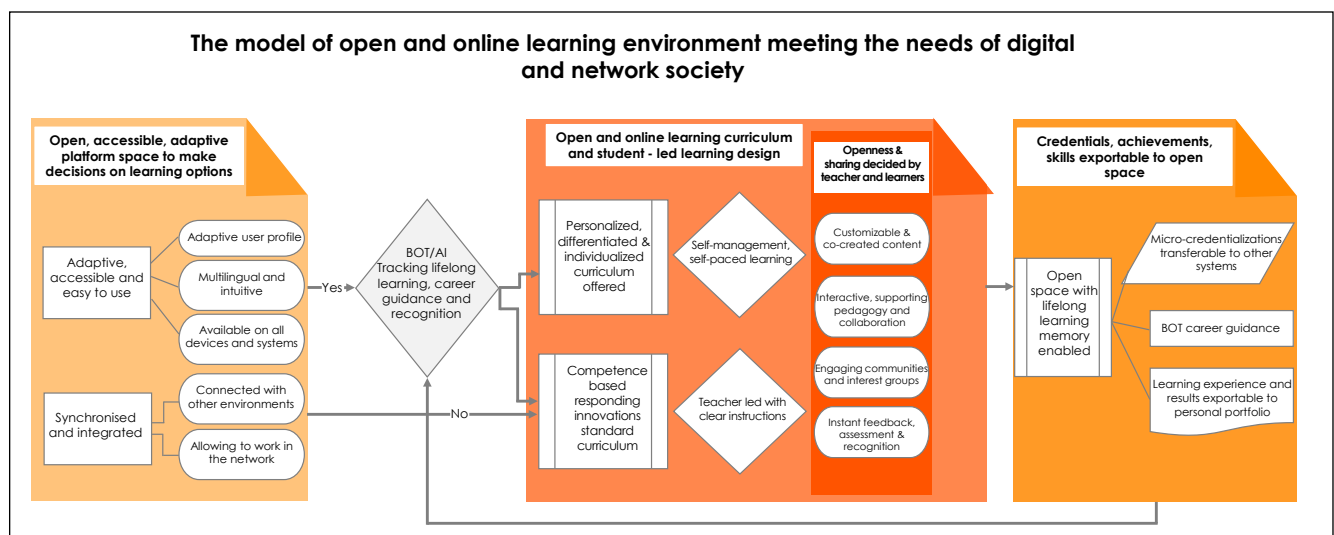


Figure 38. The model of OOL environment meeting the needs of DNS

The model of OOL environment suggests, first of all, three main phases of the process that is awaiting the learner, a member of DNS.

The first phase is related to the open, accessible and adaptive online platforms, where the user, a DNS member finds adaptive and accessible and easy to use learning opportunities described, typically suggesting intelligent solutions (such as an adaptive user profile, multilingual and intuitive interface available on all devices and systems), which are synchronized and integrated with other platforms. Here, the user makes decisions on learning options the s(he) selects, but also, what is more important, how further s(he) wants to be supported by intelligent system solutions, either BOTs or artificial intelligence (AI) that may guide him or her on the choice of the learning option in line with career option and lifelong learning memory enabled. The international experts describing the OOL environment stated that such environment would best suit the needs of digital and networked society nowadays if it were really open for users, easy to access and use, available on all devices and systems. It should be flexible, personalized and individualized, connected with other environment and tools for communication and collaboration.

Researchers (Kinnebrew, Segedy, Biswas, 2017; Santoveña Casal, 2012; Wang, Chen, 2010; Ricaurte, 2016; Yuan, Powell, and Olivier, 2014) discuss various approaches to the modeling of OOL environment, including administrative functions, communication and collaboration, course content, pedagogy, learner behaviour, assessment and evaluation, and many more. Thus, it was challenging for the researchers in this study to find proper places on these characteristics of OOL environment in the process of OOL and placing the learner into the centre of the process itself.

Moreover, the needs of DNS posed high demands on the environment starting with content requirements, technological solutions for collaboration and synchronization with social and professional networks or even installed counselors (robots) and issuing digital credentials at the end of learning, exportable and supportable by new technologies, e.g. blockchain. They also need flexibility when connected in terms of individualized or even personalized learning and need supportive management and periodic progress feedback.

All these requests were taken into consideration and are reflected in the model (see Figure 38). The learner, having chosen the learning options s(he) wants to pursue, should make a decision if and how much s(he) wants support from intelligent tutoring of a BOT or AI, which help the learner to decide preferable learning design, if s(he) wants a personalized, individualized and differentiated learning offer, or a competence-based, responding to innovations standard curriculum offer. Next important decision is if the learner wants a curriculum which allows self-management and self-paced learning, or s(he) prefers teacher led learning process with clear instructions. OOL environment should ensure both solutions for the learners, because DNS

members and experts argued that both possibilities should be available for DNS. Further requirements raised to OOL environment come from OOL curriculum characteristics, mainly from content, pedagogy, collaboration and assessment parameters, when openness and sharing is decided by the teacher and the learners themselves. OOL environment should provide possibilities for teachers and learners to use, design and share customizable and co-created content (see Figure 39):

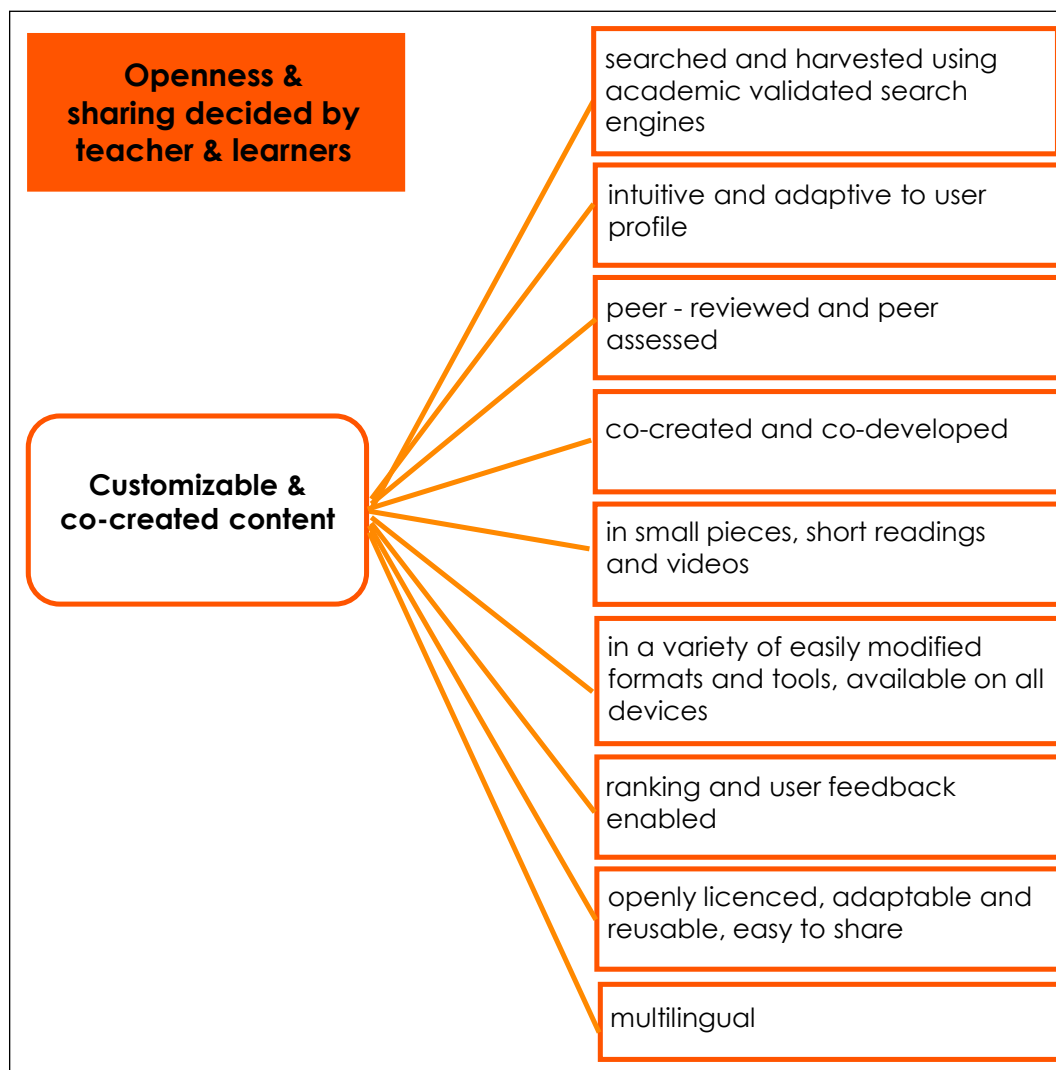


Figure 39. Customizable and co-created content

Academic validated search engines should enable harvested academic content search and validation. Short content pieces and be intuitive and adaptive to user profile, and they should be available in the variety of formats of digital resources. Teachers and learners should be enabled by the OOL environment to easily modify the formats and tools, to rank resources, to co-create them in multiple languages, to peer review and peer assess their quality.

OOL environment should support interactive, supporting pedagogies and collaboration (see Figure 40):

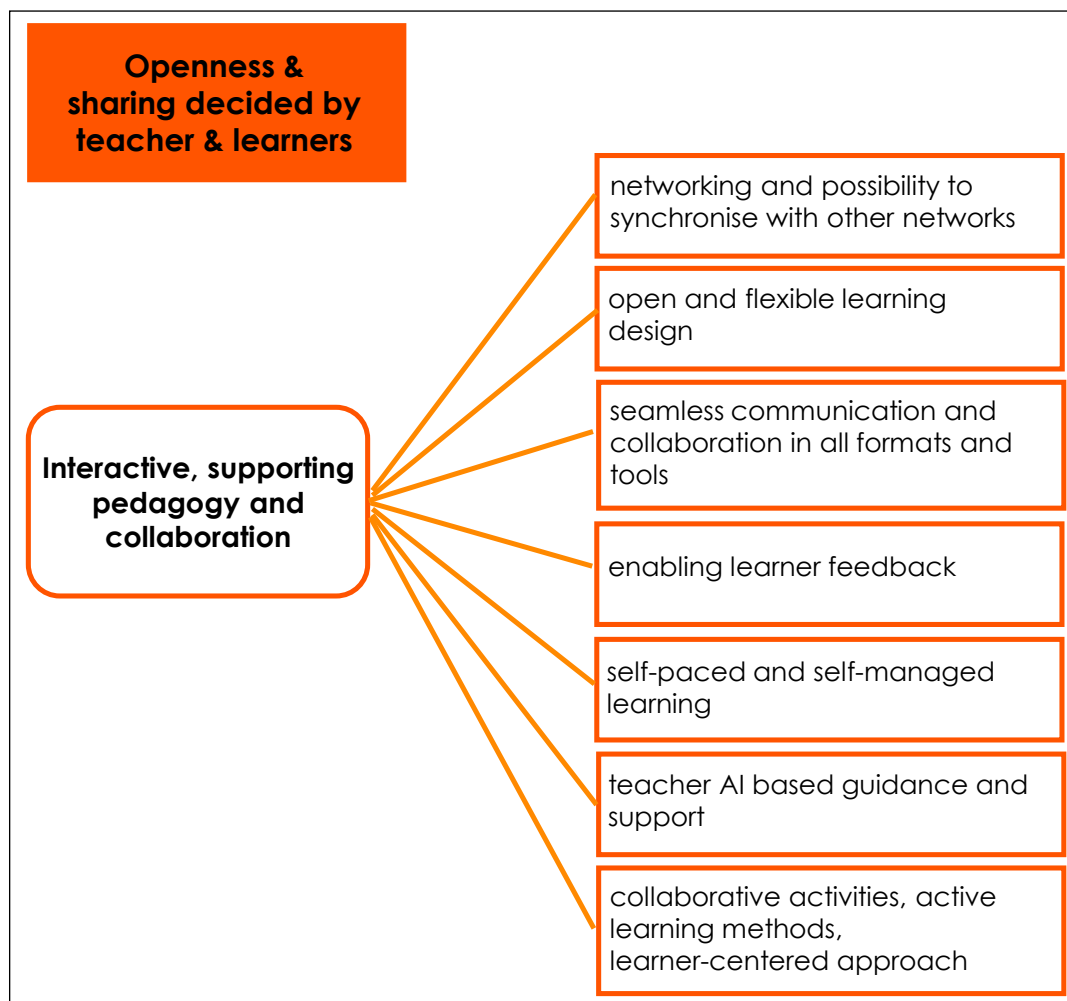


Figure 40. Interactive, supporting pedagogies and collaboration

Being flexible in adaptation, networking, synchronization, learner feedback and collaborative activities, a learning design should also allow learners to adjust and to set up individual preferences for learning pace and management. Seamless communication and collaboration in all formats and with variety of tools should be one of the key characteristics of the new OOL environments.

OOL environment should engage various communities and interest groups (see Figure 41):

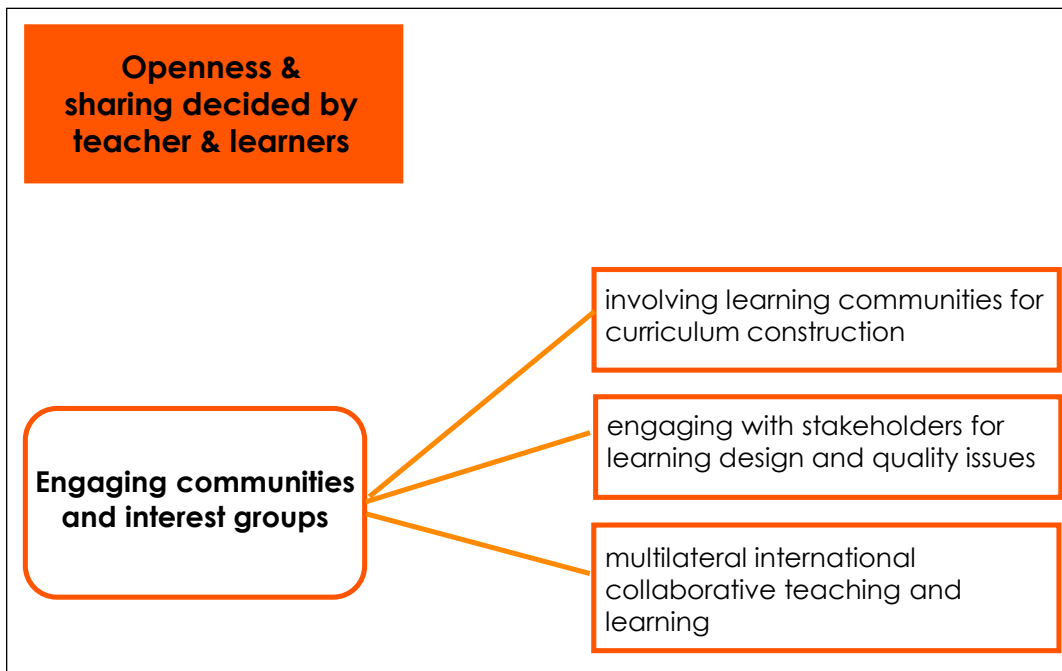


Figure 41. Engaging various communities and interest groups

As openness would be decided by teachers and learners, the platform would need to open up possibilities for open community involvement into curriculum co-development, for collaboration and involvement of stakeholders for co-creation of learning design and assuring the quality by peer reviewing and giving feedback on curriculum. Multilateral and international collaborative teaching and learning should be embedded into the functionality of such OOL environment, taking into consideration potential networking with other HE institutions and individuals, employers and other stakeholders across the world. Safety and personal system trust requirements should be considered as a default requirement.

Finally, instant feedback, assessment and recognition options should be working well, either using intelligent tutoring and credentialization systems, or other settings, on the level of openness decided by the teachers and learners (see Figure 42):

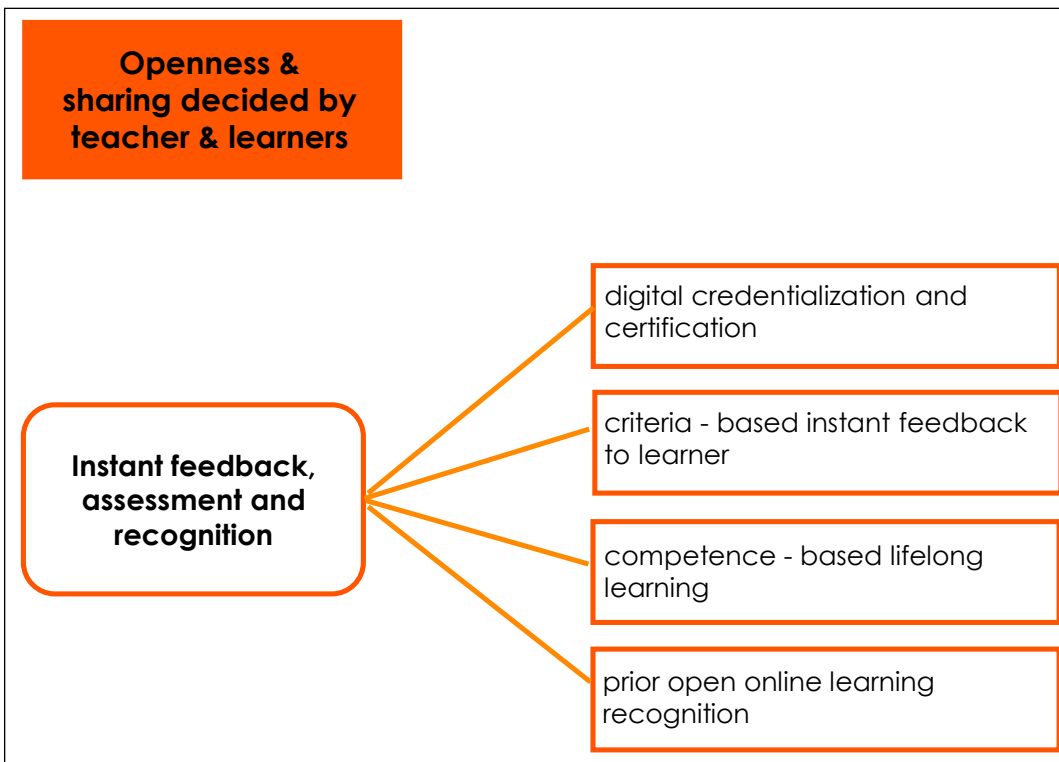


Figure 42. Instant feedback, assessment and recognition

As mentioned previously, digital credentialization, compatible with the latest technologies (e.g., blockchain), criteria based instant feedback to learners (even before they submit their assignments or make tests), competence-based lifelong learning evaluation strategies, and prior learning recognition, importing and transferring learning activities and results, also credits, should be enabled in the OOL environment.

These requirements do not claim to be concise, but only those that are raised by DNS members, and that relate with curriculum preferences and learning design solutions are the distinct features of the future university.

Having completed a learning cycle, the learner's achievements and learning experience, with the consent and upon the decision of the learner, should be transferred to open spaces, stored through and via user adaptive profiles, to lifelong memory data bases, including micro-credentials issued after learning, that are transferrable with other systems and solutions. The learner, we believe, should receive further career guidance possibilities from artificial and intelligence systems, and should be enabled to export learning experience and results to either open or closed portfolios online, for public or private use. The latter steps implemented in the OOL environment will allow DNS members to be further guided by AI and BOTs on career perspectives, learning options and recognition possibilities before new learning decisions are taken.

Taken together, it can be stated that in general, the new model of OOL environment will support DNS, HE students, informal and non-formal learners to make the best choices for their lifelong learning and career, and having made their choice, to improve their cognitive and metacognitive abilities; while in the learning process, to take advantage of the technological tools, technology-enhanced teaching and learning activities and to exploit opportunities to make decisions about his or her learning.

## Concluding remarks

1. Digital and network society (DNS) can be described as reorganization of human activities in relation to the new dimension of time and space, shaped by the real-time communication introduced by digital technologies over great distances. From this point of view, obvious differences can be observed between society groups in terms of demographic characteristics, Internet usage, accessibility, social status, the role of geographic location, as well as communication, digital skills and competences. Our focus, however, was on identification of learners' needs with particular focus on higher education.
2. DNS learning needs are focused in searching for shared - and sharing - knowledge and information in smaller portions, spending less time on analysis, taking faster decisions in a faster world. Acquisition of *small pieces of information* becomes a characteristic of DNS. There is a tendency among DNS members to focus on short news, brief information rather than go into some deep specific reading. Such a specific characteristic – *wide versus deep learning* – allows adults to develop and demonstrate ability to see multidisciplinary connections that others have never seen before. And finally, though online adult learners are diverse in their nature, needs and preferences, but they can be characterized by their *motivation, self-direction* as learning online requires responsibility for one's own learning.
3. The following characteristics of the transformed open online learning (OOL) curriculum have been defined:
  - OOL curriculum should be accessible and flexible. The structure of the curriculum should allow very different scenarios, including linear learning, individualized learning, self-paced, or even modular study programme choices, made by a student, with the extreme and innovative request for personal curriculum. Collaboration is the key issue for OOL curriculum, as learning and teaching among digitally competent teachers and learners should happen in international, multicultural collaborative settings, engaging stakeholders, learner communities and interest groups, through networking and synchronization with other networks.
  - Content, preferably multilingual, rich with a variety of digital resources, with short exercises, short videos, short modular offers, adjustable and customizable by students for flexible learning design and self-directed learning.
  - Pedagogy is characterised with the focus on personalization, differentiation and individualization of learning, supportive and flexible in terms of technology and content.

- Assessment and recognition are among the most changing characteristics and innovations awaited. Those imply immediate and instant feedback, quizzes and tests, digital credentialization and certification, instant recognition of OOL in formal education preferably using digital badges automatically synchronized with learning platform.
  - Systematic sourcing and adaptation of OER, as well as sharing back the adapted OER have a potential of making OOL curriculum self-sustaining in terms of time, cost and quality.
4. To support DNS, the proposed new model of OOL environment includes three main phases of the process that is awaiting the learner:
- The first phase is related with the open, accessible and adaptive online platforms, where the user finds adaptive and accessible and easy to use learning opportunities described, usually, suggesting intelligent solutions, which are synchronized and integrated with other platforms. Here, the user makes decisions on learning options and support possibilities by intelligent system solutions, either BOTs or artificial intelligence that may guide him or her on the choice of the learning option in line with career option and lifelong learning memory enabled.
  - The second phase comes from OOL curriculum characteristics, mainly from content, pedagogy, collaboration and assessment parameters, when openness and sharing is decided by the teacher and the learners themselves. OOL environment should provide possibilities for teachers and learners to use, design and share customizable and co-created content; support interactive, supporting pedagogies and collaboration; engage various communities and interest groups.
  - The third phase includes digital credentialization, compatible with the latest technologies (e.g., blockchain), criteria-based instant feedback to learners, competence-based lifelong learning evaluation strategies, and prior learning recognition, import and transfer of learning activities and results, also credits.

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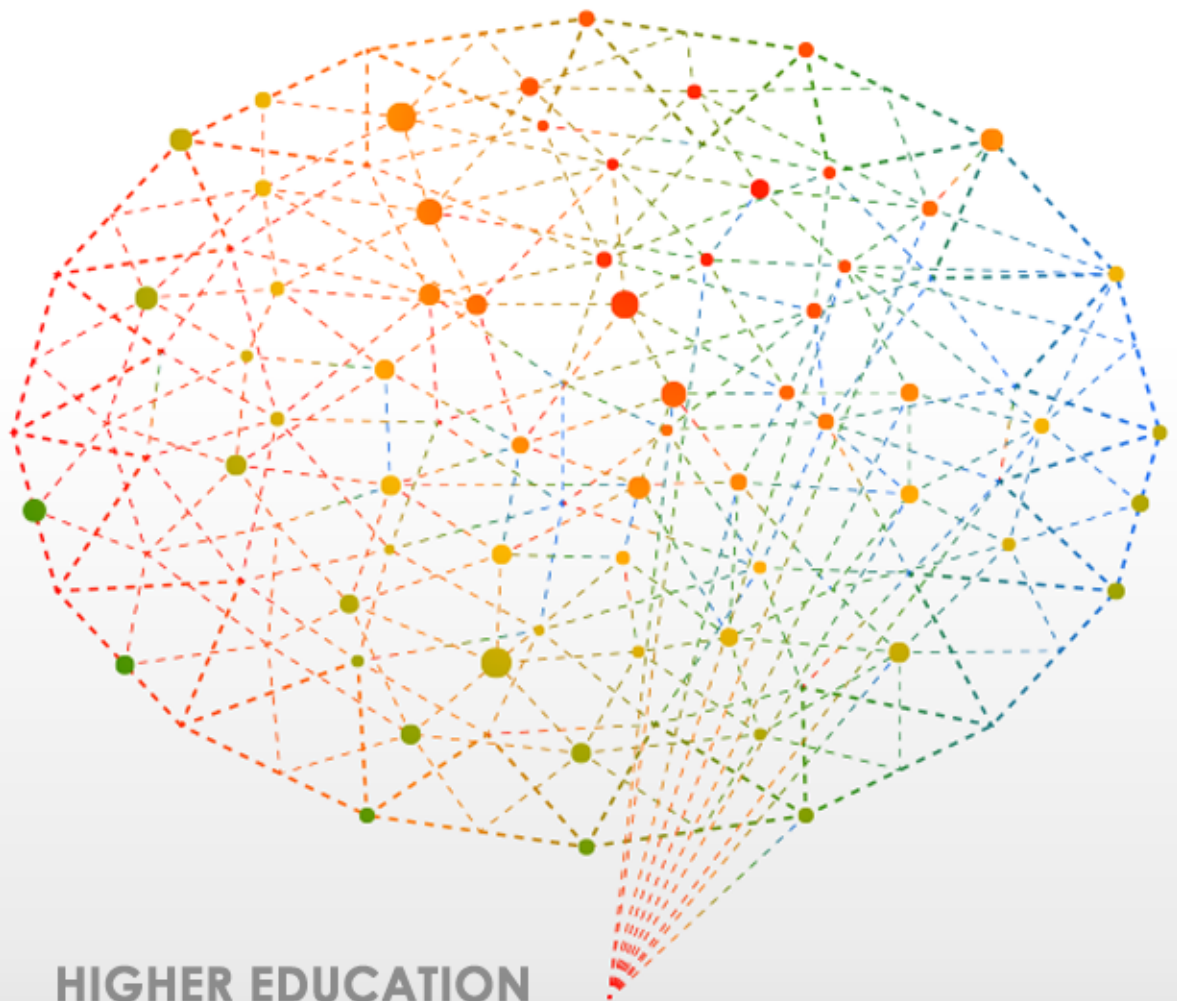
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