FOSTERING ACCESSIBLE
STUDY TECHNOLOGIES:
Accessible Learning Management System
in Humanities and Social Sciences

FAST | the methodological framework

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Fostering Accessible Study Technologies (FAST):
Accessible Learning Management System in Humanities and Social Sciences
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Fostering Accessible Study Technologies (FAST):
Accessible Learning Management System in Humanities and Social Sciences

FAST:
the methodological framework

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1 Introduction

Statistics show that young people studying with a disability experience major challenges in their studies and are in danger of dropping out. A study made by the Danish Disability Organisations in 2017 showed that 83% of students with disabilities experience or have experienced stress or dissatisfaction due to professional requirements, and 39% say that the teachers or the study centre do not take the necessary considerations for their disability. Over half of the students with disabilities are concerned about whether they can complete the study due to the progress of the program.

According to a new study, 44 percent of students with a disability or disabilities have dropped out of education, and 61 percent are concerned about whether they can complete their current study. Danish Universities believe that they get a "disproportionately" big financial penalty for giving students with special needs extra time.[1]

Educational institutions are the key

According to a Policy paper issued by the Danish Parliament,[2] the future inclusion of students with disabilities should be *the responsibility of the educational institutions*. There are students with disabilities at the educational institutions who have qualified to be admitted; thus, educational institutions are already in the job today.

[1] Information, 2017 - https://www.information.dk/indland/2017/07/studerende-handicap-maa-opgive-studierne

[2] Policy paper from the Danish Parliament, https://www.ft.dk/samling/20131/almdel/fiv/bilag/116/1337084.pdf

We would like to clarify the responsibility for inclusion of students with disabilities in the development contracts with the upper secondary school educational institutions: *responsibility is followed by an obligation to deliver the goods*.

The responsibility lies best in the educational institutions, as they are the ones who have the opportunity to handle tangible challenges and solve them without creating needless bureaucracy. Responsibility is about building competences and specialist knowledge in the educational sector, so that the efficiency of the solutions for these challenges is increasing. One way to do this is to decentralise special educational support, so that both funds and authorisation are handled by individual educational institutions. At the same time, the long-term goal is to develop and design educational institutions which would accommodate everyone, thus making some of today's needs for compensation redundant and obsolete.

Pedagogy in focus

Broadly speaking, the principal challenge for higher education is *higher education pedagogy, knowledge understanding and didactics*. More up-to-date teaching methods are needed, so that optimal professionalism is ensured among the diverse students who constitute the reality of the programs today. Such developments in pedagogy would be able to upkeep social inclusion and solve challenges for students with disabilities. One way to work with the educational focus is to create greater prestige in the teaching duties among teachers in higher education.

Increased knowledge in the field

Beside the decentralization of responsibility, it is important that State organs and services embark on creating greater knowledge about this area via documentation and analysis, for example through the establishment of a knowledge center, which would provide evidence of all possible ways in which an educational institution

should look for the best possible inclusion of students with disability.

After the framework is in place

It is important to work within the framework for inclusion of students with disabilities, as this is one prerequisite for the students to be able to participate in the education in the first place. Once this framework is in place, however, all barriers will not be automatically moved out of the way. The students with disabilities themselves may have different challenges and approaches to the identity of a disabled person, and this can be of great importance to the challenges we will experience in his study. We believe that students with disabilities have a responsibility to be open around their own disability. The question is, how do we work to clarify these expectations to the students with disabilities and support them to develop a certain self-understanding for the benefit of both themselves and the relationship with the educational institution?

Social awareness among fellow students may also constitute a barrier. Lack of information on disability can mean that students with disabilities do not feel that it is being taken into account daily. This is especially true for students with mental disabilities who have a harder time explaining their disability to their fellow students due to taboo and uncertainty. This is also a barrier for which we need to develop methods in order to continue our work.

In the pages that follow, we will try to focus on the possibilities of improving the accessibility for students with disabilities in higher education through LMS improvements. However, we feel it is also important to place the results of our research within the frames of a wider societal context, in order to underline that many other factors are important if we are to develop a sustainable inclusion in the HEI. Finally, by doing this, we would also like to underline the experiences of students with disabilities.

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Many students with a disability wish they'd had more information than just statistics on how it is to study with a disability. Last year, the team at *studentum.dk* asked students with physical disabilities how they experience their study time and what advice they would like to give to people in similar situations.

We begin our desk study with these case stories[3], followed by an assesment of the wider societal context that we mentioned above, by exploring some specifics of the Danish HE system.

[3] Based on https://www.studentum.dk/studieguiden/artikler-og-tips/handicappede-studerende-14180

2 Placing disability in an academic context: Denmark as a case study

1. FIRST HAND EXPERIENCES

> "As a student with disabilities, you have the right to the adaptation needed to enable you to complete your education on an equal footing with other students." (*UN Convention on the Rights of Persons with Disabilities, November 13th, 2006*)

SIMON MUNK
First Semester, Communication.

What is your disability?

I was born with a disease called Morquio Syndrome. Therefore, I had to have an operation in 2011, after which I woke up and was paralysed from the shoulders down. I am in a respirator.

How is your study time? And how does it differ from that of the others?

At the time of writing, I have been studying for three weeks, so there are still many things that are in the process of falling into place.

For me, the studies started with a two-week intro before the official start on September 3. In general, I think that the supervisors and the other new students were good at taking into account my condition, but like most other introductory courses, [there are activities that] are not made for sitting in a wheelchair. There was a part of the social events, for example the cab trip, which I could not

participate in, as there was not enough planning time. I had two weeks since I was admitted to intro, which is not enough to arrange the things it would have required for me to participate. In this way, the start of my studies was separate from that of the others.

I think my studies are interesting, and I will definitely complete my bachelor's degree, but there are many things here at the beginning that need to be changed and adapted to my needs, if possible. My case of receiving aids has not yet been completed, which means that I have already had to make the decision to extend my bachelor's degree by one year.

Good advice for people in a similar situation to you?

Contact supervisors and SPS as soon as possible so they have time to start the process quickly. I have learned that things that have to go through a system always take a long time.

Examine or make a list of all the practical things that are necessary for you to have a good daily life at the studio and send it to the supervisors. For example, it could be about *parking opportunities* (at CBS, there are only two disability places, so I am often forced to park illegally); *lecture rooms* (I have primary education in a room where I have to sit at the back. A good advice is to ask if it is possible to have the teaching take place in a room that is more suitable for a wheelchair); or *educational material* (I can only read through e-books, which resulted in me still missing 3 out of 5 books.)

NINA SKOVGAARD SCHNEIDERMANN
BA, Linguistics.

What do you study?

I have a BA in Linguistics and now I am a graduate of IT & cognition at the University of Copenhagen.

What is your disability?

I was born completely blind.

How is your student life? And how does it differ from that of the others?

Professionally, it differs mainly in that I must constantly be faster and plan more to keep up with the same conditions as others. This is particularly evident in relation to study materials; especially if they contain much mathematics, they can take a long time to produce, so that a blind person can read them. This means that I sometimes spend extended time on many tasks. In addition, I have a secretary system, where another student is employed to help with practical problems, such as figure descriptions, correction of task layout, etc.

Good advice for people in a similar situation to you?

Read what you want rather than what is easiest with your physical disability. Get to know your needs and find solutions to potential problems that suit you. You do not have to be the best at everything to overcompensate your disability; enjoy the learning process!

SIGRID STILLING NETTEBERG
MA, Communications.

What did you study?

I have a BA and a Master in Social Science and Communication from Roskilde University (RUC). I graduated in 2016 and now I work as a development consultant in DUOS.

What is your disability?

I was born with a disability called Cerebral Palsy, also known as CP. This means that I have poor balance and therefore go with a walker.

How was your student life? And how did it differ from that of the others?

As a starting point, my study time was not unlike everyone else's. The big difference for me was that everything was a bit more difficult for me purely logistically. I cannot climb stairs and I cannot get around very fast. With a large campus like RUC, I had to plan where I should go when I was going to some places, and who was going to help me. I had one helper with the studio every day that helped me with the practicalities. In terms of planning, the same was true of social events, as I could not simply jump on a train, but had to have a helper to drive me there. My student life was therefore not as spontaneous as that of others.

There may have been some complications for me when I first came and got information about locations. If the class was on the first floor, there was no lift, and it took me longer then, as I was forced to take the stairs. It was fortunately not that often, but it happened that communication from RU occasionally lingered.

I was happy to go to RU – especially because of the form and the group work. It meant a lot to me that we were more about fulfilling tasks. I do not know if it has anything to do with my disability, or with the way I am as a person. The flexibility of the program also made it possible for me to enjoy leisure activities such as training etc.

I also really liked the way RU starts at, by dividing students into different houses, so you get to know many different people at the start. It meant a lot to me; you were not left alone.

Do you have any good advice for people in the same situation that you were in?

Get acquainted with what is available from aids right away. I had, for example, a ballpoint pen that functioned as a voice recorder and scanned the sound into the computer.

Time is really the greatest aid you can get. Take things at your own pace and do not push yourself. One's study time does not have to go as fast as the politicians want it to.

Learn if it is possible that they mark you in a certain way in the system, so you can avoid places that are hard for you to access.

ROSA BOEHM: It makes me angry that we students with disabilities are forgotten and let down by the system.

"Should the lack of rules and rights in the field of education, when it comes to people with disabilities, really be allowed to mean that we fall out of the system unless we have empathetic teachers and counsellors who will bend the rules for us?", Rosa Boehm asks. Born with a rare spinal cord handicap, she wrote an article on her experiences while studying to become a pedagogue.[1]

I am 22 years old and born with a rare spinal cord handicap. I was born with a hole in my back that at my time of birth filled the entire lower back. Most spinal cord patients are wheelchair users throughout, but I have been fortunate to be able to walk, run and jump.

However, lack of mobility is only one of the many consequences of this condition. Consequences that are invisible to the outside world include different degrees of muscle paralysis, lack of bladder control and intestinal function, decreased sensation of the skin and – the problem that turned out to be the worst in terms of being able to complete an education – fatigue far beyond ordinary levels, as well as head and back pain, which lead to daily use of painkillers.

My disability would prove to have major consequences for my educational opportunities. During high school, it became clear to me that I would not be able to complete everything in a normal

[1] https://www.information.dk/debat/2018/11/goer-vred-studerende-handicap-glemt-svigtet-systemet

timespan. I could not physically handle the long, 8-to-4 school days. I have always loved going to school and wanted to do high school education. I therefore asked for a meeting with the rector to discuss my options for finishing high school over a longer period. He said: "In principle, I must not do what I do here, but now I do it anyway. You are a skilled, conscientious student with very good grades, and you must have your diploma."

Then, the agreement was made that I would become part of the so-called *Team Denmark* scheme, a scheme for students who practice high-level sports and therefore have the opportunity to take *STX* education[2] in four years instead of three. Thanks to the rector's understanding, I got my student hat in the summer of 2017 with an average of B+.

I was happy I had done it! Now I had all educational opportunities open; except that I still had to choose certain programs to take into account my body, my well-being and myself. I have always felt that my strengths were in establishing relationships with other people, and the choice therefore fell on the education of educators. It comprises three practical internships. The first internship lasts six weeks and the next one lasts six months.

In the first internship, I was in a nursery with 13 beautiful children and colleagues. Even before I started the internship, I was worried if I could cope with the requirement of 32.5 working hours a week to pass. I therefore contacted the student counsellor, who told me: "In the short internship you cannot get reduced time due to your disability; you can do so in the long one, with the right documentation. It's also only six weeks."

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[2] The Danish *Gymnasium* offers a 3-year general academically oriented upper secondary programme which builds on the 9th-10th form of the *Folkeskole* and leads to the upper secondary school exit examination (the *studentereksamen*). This qualifies a student for admission to higher education *Preparatory*, subject to special entrance regulations applying to individual higher education programmes. Colloquially *gymnasium* refers to what is formally called *STX*.

I later found out that this rule also applies to the short practices of nursing and teaching students. Hmm… Will my consequences for my disability be less if, for "only" lasts for six weeks, I have to have six to eight hour working days? "Only" six weeks during which I overload my back, "only" six weeks with chronic headaches, "only" six weeks of going home after every workday and crying over the extreme exhaustion I have to face to complete my education. What about my rights? Does that mean that I and other disabled students cannot become educators? I cannot possibly be the first to have been in this unpleasant and vulnerable position.

I joined a web forum for education students to check if others had similar experiences. Those who reported simply wrote that they either dropped out or got through the internship by utilizing the allowable absence rate of 25% to pass. And then there are those who do not survive, because their disability means that they simply cannot work 6-8 hours a day.

I decided to contact my union (PLS). They explained to me that they have won the battle for the possibility of reduced time in the long practices, but that there are still no rules and rights in relation to the first practice. And I hear yet again that it is a matter of "only" six weeks.

I also contacted the Agency for Research and Education. "You can try talking to your student counsellor again", I was told, "and see if you can find an internal solution so you can pass anyway; you have 25% sick-leave to do well with."

Can it really be true that the only way in which a disabled student can have reduced time during their internship is to deprive them of the right to actually get sick?

In addition, the Danish Agency for Research and Education also emphasizes that they are very strict with regard to giving students reduced time in the paid internship – on the grounds that, during the program, one should be prepared for a regular position of 37

hours a week after graduating, which never becomes reality for many people with a disability. Most of us will actually end up in a flex job. Therefore, that argument is just not good enough. And I do not want to accept the "offer" to take advantage of my sick leave, as this means, for example, that I do not have the right to actually get the flu during my internship.

Here I stand, a few weeks after a completed internship. The first half of the week, I tried to get through the long days. I came home crying because of headaches and back pain and felt no other way out than to make an appointment with the supervisor in order to take advantage of my sick leave – and hope not to get sick. Halfway into my internship, I was urgently hospitalised with pelvic inflammation. I was put on two different types of penicillin and became so sick that I could barely get out of bed. I wrote my internship report in the hospital, and after it was sent off, I only had to pray that my internship counsellor would show compassion and set me up for the exam, despite having exceeded the upper limit for sick leave. She did, fortunately.

In the end I passed with *bravura*, but left with an empty feeling. What about all the other professional students in the same situation? Those who are not blessed with supportive parents, compassionate teachers and good grades? People who are born with a disability and whose lives are difficult enough as it is, people who, despite a tough upbringing and lots of daily challenges, still want to be trained and educated, so that they can contribute to society like everyone else? Should the lack of rules and rights in the field of education, when it comes to people with disabilities, really be allowed to mean that we fall out of the system unless we have empathetic educators and counsellors who will bend the rules for us?

I feel let down, angry and powerless.

2. THE DANISH CONTEXT OF HIGHER EDUCATION

It has long been a declared ambition across the political spectrum to reduce the time in which students are expected to complete their education. With a broad majority, the Parliament has adopted the progress reform and SU (study allowances) reforms, which have increased the activity requirements for the students and tightened the conditions for receiving SU. And it has succeeded. Danish students are now graduating an average of six months faster than in 2006.

However, students with special challenges and disabilities have difficulty living up to the stricter requirements. They are disappointed, stressed and many have to give up their education. This is shown by a survey conducted by the Danish Association of Organisations for the Disabled (DH) among 700 students with disabilities.[3] In the study, 44% responded that they had previously dropped out of one or more education programs, 61% are concerned about whether they can complete their current study due to the progress reform, while 83% have experienced stress or dissatisfaction due to the increased activity – and SU requirements.

The progress reform has meant that students now have to pass at least 45 ECTS points per year, corresponding to three-quarters of a full-time study. In addition, a prerequisite for receiving SU states that a student can fall back with his education for a maximum of half a year. It is still possible to dodge the requirements. However, the students are asked to document that they have a reasonable and realistic need for extra time to complete the studies. The students must also apply for an extension of the exemption every semester or every year, depending on how the educational institution manages the rules.

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[3] Information (2017): https://www.information.dk/indland/2017/07/studerende-handicap-maa-opgive-studierne

The chair of DH, Thorkild Olesen, believes that the study points out that with the increased activity requirement "the disabled are not pushed faster through the studies, but completely out of the education system instead". And this is not only unreasonable, but also bad for the society, he believes. A few weeks ago, SFI published a report concluding that education is even more important for disabled people's affiliation with the labour market, than for the rest of the population. "We know that for many people with disabilities, the alternative to having an education is long-term public support," says Olesen.

It is not only the disabled students who experience stress in higher education, but DH's study suggests that they are hit particularly hard. By comparison, a well-being study at Aarhus University earlier this year showed that 20% of all students experience strong symptoms of stress, while a survey conducted among students at the University of Copenhagen by the Danish Masters Association last year showed that just over half of the students experience milder stress symptoms.

There are no figures for the proportion of all students who have previously dropped out, but an inventory published by the Ministry of Education and Research shows that a quarter of all students starting higher education drop out again.

The Chairman of the Danish Universities and Rector of the Technical University of Denmark (DTU), Anders Bjarklev, has no doubts that students with special needs have been hit disproportionately by the stricter requirements. "After the progress reform, our experience is that students who have problems like disabilities fall off as flies. The dropout rate among the group of students is much higher than in other groups. This is deeply regrettable," says Anders Bjarklev. He points out that many students experience the dispensing system as heavy and distrustful. And students who struggle with mental illness, disability or who have been involved in serious accidents during their study time, are already hard

pressed by the studies as it is, without having to argue for, or document, that they actually need extra time. "This summer a young man with a mental diagnosis graduated as an engineer from DTU after 11 years of study. It may sound like a long time, but now he has a permanent job and is going to pay tax for the next 40 years. The alternative was probably living on public support," says Bjarklev. "If students with disabilities and illnesses just get the peace of mind, they can easily complete the study and become great candidates for the benefit of society."

Niels-Henrik Møller Hansen, Associate Professor at the Department of Learning and Philosophy at Aarhus University who has researched young people with disabilities, agrees with this. He points out that the bureaucracy that students with disabilities have to go through for a prolongation of their studies has become significantly heavier after the progress reform. "In addition to their education and a possible course of treatment, they must, throughout their study, relate to a pending dispensation case. They must repeatedly seek to extend their exemption and document their suffering," says Niels-Henrik Møller Hansen. It pushes the disabled students mentally, and it requires energy that many of them do not have. "For example, if you are blind or schizophrenic, it makes no sense that you should continuously pursue a case to get the extra study time you obviously need," he assesses.

"It is a central part of the progress reform that the individual universities must have a clear financial incentive to push the students faster through the studies. If the students succeed in reducing the average completion time of their studies, the grant by the University increases. If they do not succeed, the grant is cut down. As it is now, students who have been granted exemption are also counted in the overall study statements, including students with disabilities or other documented and recognized needs for extra study time. And it is grotesque that the universities are penalized financially for taking students with special challenges into account", says Anders Bjarklev. "At DTU, we counted on it, and we are

losing up to DKK 170 million in funding due to long study periods. This is mainly due to a very small group of students with some very real needs," he explains, pointing out that students' maternity leave is already being deducted.

The universities risk having to close entire departments because they meet the students' obvious need for increased time, he explains. "We want enormous space for students with disabilities and special needs at the universities. But the knife is nearing our throat. We are punished with tremendous amounts for helping these students through the programs. If we were able to take students with documented diagnoses out of the study time calculations, the problem would be solved. Completely gone."

All educational institutions should formulate a strategy for inclusion of students with disabilities, assesses Mette Wittorff Schmidt. She is the head of the Advisory and Support Centre at Aarhus University, which helps students with special challenges. The educational institutions should systematize the support opportunities for students with special needs and have an effective and clear dispensation system, she believes.

Like Anders Bjarklev, she finds it problematic that students with special needs are counted in the general study time reports. "The universities, in principle, have an incentive not to give students with recognized needs the extra time they need." Schmidt emphasizes that there are measures to help disabled students who work really well. She stresses the Special Educational Support Scheme, which offers individual students an opportunity to get individual organized guidance throughout most of their study time.

Danish politician Carolina Magdalene Maier says that she regularly receives inquiries from students with disabilities who experience the dispensation system as heavy and suspicious. "When students so massively report on rigidity, bureaucracy and suspicion, we have to act on it," she says. She supports Danske University's proposal to exclude students with disabilities from the total study

time calculations. It would hopefully make the universities 'soften the tight practice' of exemptions, says Carolina Magdalene Maier.

Social Democrat Education Inspector Mette Reissmann finds it worrying that such a high proportion of disabled students experience stress and dissatisfaction. DH's study does not show whether students with disabilities have developed a certain well-being or dropped out over time. One cannot therefore simply point to the progress reform and the SU reforms to explain the worrying figures, Mette Reissmann points out. "We have tightened the requirements. They apply to everyone. To disabled students as well. But I would like to emphasize that there is the possibility of obtaining an exemption," says Mette Reissmann and refers to the universities if the students find that the bureaucracy surrounding the exemption search has become heavier. "Of course, it should not happen that students with disabilities drop out because they have a poor education course; but we have no concrete measures on the drawing board right now," says Mette Reissmann.

The former Minister of Education and Research, Søren Pind (Liberals) declined to comment DH's study, as well as the general criticism of the grant system that Danish universities are experiencing. He refers to answers he has previously given in the Education and Research Committee. In the replies, the Minister states, "the universities after the Progress Reform can reduce study activity for disabled students as compensation for their special conditions. The intention is *equality between the disabled and the other students*". Nevertheless, Søren Pind believes that, within the current framework, it is possible to give disabled students the special conditions "necessary for them to complete their higher education".

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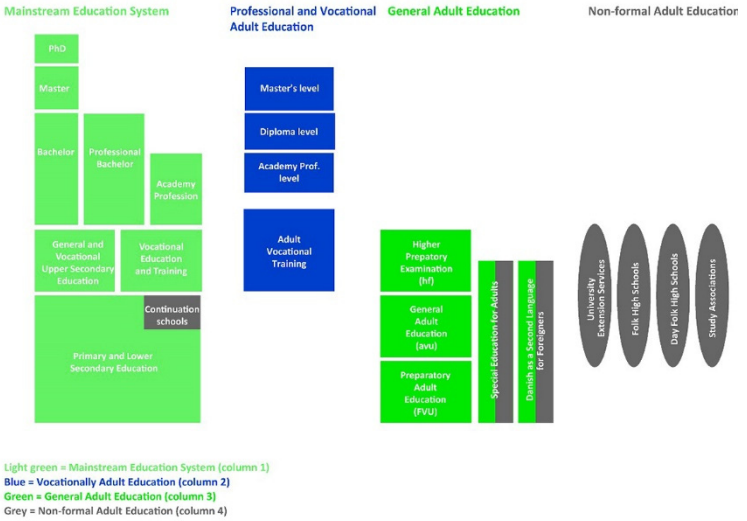
2.1 THE HIGHER EDUCATION SYSTEM IN DENMARK



Public higher education institutions in Denmark are regulated by national legislation concerning degree structures, teacher qualifications and examinations. Accreditation in higher education is undergoing transition from programme-based accreditation to institutional accreditation. Programmes and institutions are accredited by national, independent accreditation agencies and the Accreditation Council.

Higher education institutions

Higher education is offered by five types of higher education institutions:

1. Business academies (*Erhvervsakademi*) offering professionally oriented short cycle and first cycle degree programmes.
2. University Colleges (*Professionshøjskole*) offering professionally oriented first cycle degree programmes.

3. Maritime Education and Training Institutions offering professionally oriented short cycle and first cycle degree programmes.
4. General and specialised research universities (*Universitet*) offering first, second and third cycle degree programmes in academic disciplines.
5. University level institutions offering first, second and third cycle degree programmes in subject fields such as architecture, design, music, and fine and performing arts.

Most higher education institutions are regulated by the Ministry of Higher Education and Science (type 1-5). The Ministry of Culture regulates a number of higher education institutions offering programmes within fine and performing arts (type 5).

Degrees in the Danish Higher Education System

Danish qualifications levels	Ordinary higher education degrees	Adult/continuing higher education degrees	Qualifications Framework for the European Higher Education Area – Bologna Framework	European/National Qualifications Framework for Lifelong Learning – EQF/NQF
Academy Profession level	Academy Profession (AP) degree (90-150 ECTS)	Academy Profession (AP) degree (60 ECTS) (also known as Further Adult Education (VVU) degree)	Short cycle	Level 5
Bachelor's level	Professional Bachelor's degree (180-270 ECTS)*	Diploma degree (60 ECTS)	First cycle	Level 6
	Bachelor's degree (within the arts) (180 ECTS)			
	Bachelor's degree (180 ECTS)			
Master's level	Master's degree (within the arts) (120-180 ECTS)	Master degree (60-90 ECTS)	Second cycle	Level 7
	Master's degree (120 ECTS)**			
PhD level	PhD degree (180 ECTS)		Third cycle	Level 8

* Can be obtained through a full regular bachelor's programme (180-270 ECTS) or a top up bachelor's programme following an Academy Profession degree.
** A few Master's programmes are up to 180 ECTS.

Higher education institutions measure study activities in ECTS credits. 60 ECTS correspond to one year of full-time study.

Qualifications framework

The qualification levels form the basis for the Danish National Qualifications Framework for Higher Education, which is certified in accordance with the overarching Bologna Framework according to the principles adopted by the European Ministers of Higher Education. Danish higher education qualifications at levels 5-8 of

the Danish Qualifications Framework for Lifelong Learning (NQF) correspond with levels 5-8 of the European Qualifications Framework (EQF).

Admission and progression

General access to higher education in Denmark requires an Upper Secondary School Leaving Certificate or comparable qualifications. Admission to some particular programmes requires entrance examination or submission of a portfolio of artistic work. Holders of an Academy Profession degree can obtain a Professional Bachelor's degree within the same field of study through a top-up programme. Completion of a first cycle degree qualifies students for admission to the second cycle.

Ordinary Higher Education degrees

The Academy Profession degree is awarded after 90-150 ECTS and includes a period of work placement of at least 15 ECTS. The programmes are development-based and combine theoretical studies with a practical approach. Programmes are, among others, offered within Marketing Management, Computer Science and Chemical and Biotechnical Science. The Danish title is field of study followed by the abbreviation *AK* and the English title is *AP Graduate* in [field of study].

The Professional Bachelor's degree is awarded after 180-270 ECTS and includes a period of work placement of at least 30 ECTS. The programmes are applied programmes. They are development-based and combine theoretical studies with a practical approach. Examples of professional bachelor's degree holders are nurses, primary and lower secondary school teachers and certain types of engineers. The Danish title is Professions *bachelor i* [field of study] and the English title is *Bachelor of* [field of study].

The Bachelor's degree from a university is awarded after 180 ECTS. The programmes are research-based and are offered in all scientific

fields. The Danish title is *Bachelor (BA) i* [field of study] or *Bachelor (BSc) i* [field of study] and the English title is *Bachelor of Arts (BA) in* [field of study] or *Bachelor (BSc) of Science in* [field of study].

The Bachelor's degree (within the arts) is awarded after 180 ECTS. The programmes are based on research and artistic research. Programmes are offered within the fine arts. The Danish title *is Bachelor (BA) i* [field of study], *Bachelor i music (BMus)* [field of study] or *Bachelor i billedkunst (BFA)* [field of study] and the English title is *Bachelor of Arts (BA) in* [field of study], *Bachelor of Music* (BMus) [field of study] or *Bachelor of Fine Arts (BFA) in* [field of study]. A higher education degree within theatre or filmmaking is awarded after 3-4 years of study (180-240 ECTS).

The Master's degree is awarded after 120 ECTS. The programmes are research-based and are offered in all scientific fields. The Danish title is abbreviated to *Cand. [Latin abbreviation of academic area] i* [field of study]. The English title is *Master of Arts (MA) in* [field of study] or *Master of Science (MSc) in* [field of study].

The Master's degree (within the arts) is awarded after 120-180 ECTS. The programmes are based on research and artistic research. The Danish title is abbreviated to *Cand. [Latin abbreviation of academic area]* [field of study]. The English title is *Master of Arts (MA) in* [field of study], *Master of Music (MMus)* [field of study] or *Master of Fine Arts (MFA) in* [field of study]. Music Academies offer a specialist degree of 2 to 4 years following the master's degree.

The PhD degree is awarded after 180 ECTS. PhD programmes are offered by the universities and some university level institutions offering degrees in the artistic and cultural field.

Detailed descriptions of degree levels can be found in the Danish Qualifications Framework at www.nqf.dk. A relevant Diploma Supplement can be consulted for information about the learning outcome of any specific degree.

Adult and continuing higher education

The programmes normally consist of 2 years of part-time study, equivalent to 1 year of full-time study (60 ECTS credits). Certain master programmes require 1½ years of full-time study (90 ECTS credits). Admission requirements are a relevant educational qualification and at least 2 years of relevant work experience.

Adult and continuing education is available at levels corresponding to qualifications of the ordinary higher education system.

The Further Adult Education degree (*videregående voksenuddannelse/akademiuddannelse*) is awarded after studies at short cycle level and gives access to diploma programmes.

The Diploma degree (*diplomuddannelse*) is awarded after studies at first cycle level and gives access to master programmes.

The Master degree (*masteruddannelse*) is awarded after studies at second cycle level.

Higher education in Denmark is free for students from the EU/EEA and Switzerland and for students participating in an exchange programme. For other students annual tuition range from 6,000 to 16,000 euro. A number of scholarships and grants are available from the institutions and from public funded schemes.

The Erasmus+ programme offers students from the EU/EEA and Switzerland the possibility to study abroad as part of their higher education in their home countries. Exchanges last between 2 and 12 months. For further information, please contact your home university or the national educational agency of your country. To learn more about the Erasmus-programme and find out if you are eligible to apply, please visit the website of the European Commission.

The Danish State Educational Support (SU) is generally only awarded to Danish residents. As an international student you may, however, apply for equal status as far as the state educational

support is concerned. You may be granted equal status according to Danish rules or EU law. For details on how to apply, visit the website of the *Danish Education Support Agency*.[4]

Number of Students in HEI

In 2019, 53,403 people have applied for higher education; this is 2% fewer than in 2018. Here are the numbers over a five-year period:

						Ændring 2018-2019	
	2013	2015	2017	2018	2019	Antal	Pct.
Erhvervsakademiuddannelse	6.600	8.807	8.378	7.620	7.826	206	3
Professionsbacheloruddannelse	22.751	25.192	24.843	23.847	23.049	-798	-3
Bacheloruddannelse	20.578	21.416	22.821	22.984	22.528	-456	-2
I alt	**49.929**	**55.415**	**56.042**	**54.451**	**53.403**	**-1.048**	**-2**

The total number of students in HEI in Denmark is 262.186. 61% of the class of 2015 achieves a higher education, while 27% obtains education at masters level.

3. "WE ARE NOT A PART OF UNIVERSITY CONSCIOUSNESS": A STUDY OF BARRIERS FOR STUDENTS WITH DISABILITIES IN LONG-TERM EDUCATION

The Danish Students Common Council published a report[5] containing an overall picture of the challenges that students with disabilities meet in their daily lives at the universities and in Danish higher education in general. What follows is a detailed account of the various problems that students with disabilities experience concerning their situation as students.

It is important to understand that students with disabilities are a complex group, struggling with quite diverse forms of disability.

[4] http://www.su.dk/english/su-as-a-foreign-citizen/

[5] https://www.dr.dk/nyheder/htm/baggrund/generel/handicap-rapport

The label can pertain to wheelchair users, blind or visually impaired, young people with different mental disabilities, young people who suffer from chronic diseases such as arthritis or dyslexia; this means that, although there are problems the group has in common, in many cases different things are perceived as problematic.

It is also important to emphasize that students with disabilities are not a group of young people that give the image of being "sad", or even "victims". On the contrary, the qualitative interviews with students with different disabilities give a picture of young students that find great pleasure in their studies. It is important for them to get an education. As a group, they appear to be disciplined and strong people, who manage to complete education and, at the same time, handle functional impairments that in many ways complicate this.

The report helped summarise 14 concrete recommendations to be implemented. By nature, recommendations focus on problems, so it must be highlighted that there are also areas where students with disabilities are mostly satisfied with current conditions.

Increased awareness of the group of students with disabilities among teachers and students

In the study, 13% of the students have a primary disability associated with senses and communication (e.g. deafness, blindness *vel sim.*), 22% suffer from reduced mobility (wheelchair users *vel sim.*), 31% have a mental impairment (mania, personality disorders, OCD *vel sim.*), 15% suffer from other diseases (chronic joint pain, arthritis *vel sim.*) and 18 suffer from dyslexia. This means that the vast majority of students have a disability that is not immediately visible.

A characteristic statement from the group of students with disabilities is that "[we] are not part of the university's consciousness". At the same time, it is clear that the group is afraid of stigmatization as "the sick students"; there is widespread frustration

that both teachers and fellow students lack understanding of what it means to study with a disability. This is especially true among the group of students with non-visible disabilities; between 30 and 40% of the students with a "non-visible" disability have weekly or monthly contacts with teachers who lack knowledge and understanding of their needs. For example, this may include teachers who do not understand that students who suffer from chronic pain may not always be able to meet the hours. Concerning students with mobility problems, one finds that problems with access to teaching rooms, or with the distance between teaching rooms, are rarely taken into account.

More than 60% of students with disabilities find that their disability has a negative impact on their capacity to complete education on equal footing with other students. Among students with a "non-visible" disability, 70% experience this as a negative influence. It is characteristic of the students with a "non-visible" disability that they more often feel lonely than students with a visible disability, that they more often consider leaving the studies and infrequently participate in professional events. The less understanding their particular needs they experience from teachers and studies, the more often students with disabilities considering dropping out. More than half of the students believe that a greater awareness by the teachers about having a disability could alleviate some of the problems they face during their studies.

There is a need for the educational institutions to initiate a systematic informational exchange primarily with the teachers, but also with the students. It should aim to make clear that "students with disabilities" are a group comprising several thousand students, including many whose disabilities are not immediately visible, and how this, in different ways, makes these students face particular problems in connection with teaching or exams. At the same time, it is crucial that this exchange does not seem stigmatizing towards this group of students; it should be clear that they are by no means "weak", but on the contrary, strong young people

who, in spite of their disabilities, are able to do finish their higher education.

Furthermore, developing a formulated institutional policy towards all students with disabilities should become a focus area, in line with the focus on gender equality, which exists in all higher education institutions. Similarly, local student councils should focus more on this area, as they are the organizations that protect students' interests and must take care of all their interests.

Need for starting guidance

Students with disabilities seek primarily an education based on their academic interest. Thinking about future job opportunities is the second most important motivation. In this sense, it probably separates students with disabilities from other groups of students. It is first and foremost students with different kinds of physical functional impairments in terms of mobility or senses and communication, who have compensated for what opportunities there are to handle the job one is likely to get after the studies.

The vast majority, approx. 90% have not received guidance in connection with the start of studies about what impact the disability may have on the implementation of the education they are setting on. On the other hand, the minority who had received guidance were mostly satisfied with this. As there are major challenges associated with completing higher education when one also has a disability, it is problematic that the vast majority of students with disabilities have not received the necessary guidance. The large majority, approx. 65%, of the students who had not received guidance indicated that they were unaware that this possibility existed.

Universities and other long-term higher education institutions should therefore inform the freshmen about the possibilities for guidance and offer it to newly starting students with disabilities. This ought to be done in the written information material as well

as in the general introduction on the start of studies, as not everyone is open about their disability.

Conditions for students with disabilities should be included in intro days

A vast majority of students with disabilities (~80 per cent) participate in the intro days. The educational institutions and the individual subjects are responsible for ensuring that these are held; but since the local student councils, specialist councils and the like in practice carry out a large part of the introduction to the studies, both educational institutions and student councils should in future consider the conditions for students with disabilities, not least the fact that the majority of them may have "non-visible" impairments.

This means that everyone is informed about the possibilities for guidance and support and, furthermore, that the introduction is organised in a way that makes room for students who cannot instantly enter traditional housewarming parties with emphasis on partying, alcohol and large crowds. The aim of the introduction is, in part, to make students with disabilities aware of support opportunities, and in part to make other students aware that students in the longer higher education programs present a diverse group that includes young people with disabilities. If there are older students with functional impairments, this may present an opportunity to involve these in the planning and conduct of the introduction.

Again, it is crucial that the process does not become stigmatizing. It should be kept in mind that the group of young people who have a disability that causes them problems usually appear to be very strong and disciplined at the same time.

Need for greater flexibility within the existing support systems

The vast majority of students with disabilities (~75%) receive SU and 20% also receive disability allowances, 15% are in rehabilitation

and less than 5% are on pension; other than that, they receive a 25% practical support in the form of Special Education Support (SPS).

Many of the students with disabilities have had experiences with the state support system that are negative or have left them frustrated. One common complaint is that they are facing rigid systems, where young people with very different needs consistently experience standardized solutions. They emphasize that there is a need for greater flexibility within the administration of the system of support, be it the SU Agency, the SPS supervisors or others. For example, a disabled student can only be equipped with one model of a particular laptop, which is too heavy, as smaller models are not on the list. The students face a lack the understanding of the support system on how it is to study when you have a disability.

To a certain extent the students lack further financial support (~30%); many request guidance (~50%), exemptions (~40%), practical aids (~20%) or secretarial assistance (~15%). Only ~20% do not seek additional support.

Better information on the possibility of support and guidance at educational institutions

The study points out that there are problems with the way SPS guidance and other guidance is organized at the educational institutions. There are periods in the students are unable to receive guidance because of a widespread lack of assignments during holiday periods.

The organization of the guidance itself is also criticized. The students who need guidance must, in vast majority of cases, reach out themselves, but they lack the information that there are actually support opportunities and guidance for students with a disability. Information efforts on existing support and guidance opportunities must be offered in a much better and more comprehensive manner by the educational institutions. About half of the students

with disabilities in the study lack guidance. This is especially a problem for students with mental disorders or developmental disorders.

Over two-thirds of the students with disabilities have thus not received guidance on funding opportunities. This is most pronounced among young people with mental impairment or with chronic diseases, where 77% and 84% respectively did not receive guidance on support options. It is also characteristic that among the minority who have received guidance, only about 30% have received it from the educational institutions' SPS counsellors. A rather large group has received guidance from student counsellors, while a plurality of 45 % has received it from other sources.

There is a need for a more thoughtful, more comprehensive and more informative effort from universities who provide opportunities for support and guidance, and not only in connection with the start of the studies, since for some students it is only during the study period that the disability arises or is recognized. The present information effort must be characterized as highly lacking in quality. However, it must be said that after the students receive guidance for the first time, over 80% are satisfied with it.

Faster application processing by SPS supervisors and special educational support

It is especially students with reading or sensory problems who receive Special Education Support (SPS). One continuing experience of applications for the SPS support system is that the processing is too slow. The students apply for different forms of support (aids, instructors, interpreters) at the beginning of the semester, but are sometimes assigned one when the semester is largely finished. The SU Board has an objective that 80 per cent of all applications must be processed within one month after receiving the electronic application from the educational institution. The students, on the

other hand, experience the wait as far longer: 29% had been waiting for two months and 50% had been waiting for 3 months or more. Students with disabilities clearly believe that longer waiting times adversely affect their ability to follow classes on an equal footing with other students, and students who have been waiting for 3 months or more are strongly negative about the application procedure for the SPS. The is especially a problem in periods around the exam / medical exam, where a quick response is crucial. When the students experience such long waiting times, this causes problems elsewhere in the system. The students experience waiting time while an SPS supervisor makes a recommendation, for example before aids and materials are ordered, and also waiting time with the suppliers. There is, therefore, a need for stricter efforts at the educational institutions to speed up handling by the SPS counsellors and to set them stricter requirements for a correspondingly faster expedition from the suppliers.

One solution is that the process of application and guidance starts at the educational institutions before the start of the studies or the start of the semester. However, this requires getting in touch with SPS supervisors at the educational institutions during the summer holidays. The HEIs should ensure that this is an option in their holiday planning; quite the opposite, today the administration is largely closed through much of the summer period.

The SU board points out that another problem is that applications often lack the necessary documentation from specialist doctors, hospitals etc. There is a need for better guidance and greater knowledge about the application forms by the SPS supervisors at the institutions: a relationship that the educational institutions should take care of.

More SPS guides and more time would make SPS guidance more effective. Most SPS supervisors we have talked to during the investigation are well aware of the problems, but do not seem to have resources to address the problems.

Faster turnaround time and better guidance when applying for disability allowance

Applying for a disability allowance is experienced as a very difficult and slow process for students with disabilities. At the same time, students find that it requires great persistence to get support at all. First of all, the waiting is a problem for many. About 40% were granted disability allowance after less than 2 months, while slightly more than 40% had to wait 4 months or more. Waiting time is perceived as a major problem, because it creates uncertainty in relation to whether the young people can cope with the study and rely on the support of parents and others who are willing to support them financially. Not surprisingly, the students who have been waiting for 4 months or more are most dissatisfied with the application procedure for handicap allowance.

The SU Board's assessment is that the waiting time could be reduced through better applications, as many submit applications with defective appendices in the form of – for example – old or inadequate statements from doctors, the hospital service etc. This presupposes, however, that the student, possibly in cooperation with a supervisor, spends time and resources on preparing a more complete application. There is therefore a need for better guidance during the preparation of applications for handicap allowance, as well as in the process of allocating resources for this by the educational institutions.

In relation to the SU Board's treatment, it is a particular problem that there is a processing time of at least three months in the National Board of Industrial Injuries. This might indicate that there is a need for the state government to investigate alternative methods, sites or pages that could carry out the task of assessing the degree of reduced working capacity of the applicants.

Improving physical availability at educational institutions

There is a very big difference between the physical accessibility of various educational institutions, how much space there is for the necessary aids in the premises, and the possibilities for students with functional impairments to get around the premises within the given period. For example. If it is simply too cold in the otherwise accessible premises, students with arthritis will have difficulty following the classes.

If we look at the space for aids in the premises, ~40% are dissatisfied with the space in rooms for aids. An effort is primarily needed at the University of Copenhagen, Copenhagen Business School and RU, where between 55 and 75% are dissatisfied or highly dissatisfied. Compared to the other higher education programs, it is very clear that there are special problems at these three universities. It may be that there is no possibility to bring your own ergonomic tables and chairs, trouble getting space for computers, or other things. A particular problem is the lack of flexibility and understanding by the administration. Looking at access to auxiliary equipment in the premises, there are even bigger problems; about half of the students are dissatisfied. Again, it is the University of Copenhagen and the CBS where problems peak, but there is also great dissatisfaction at Aarhus University. Particularly, teachers are requested to use a microphone and to install a telescopic loop system.

In general, there are good opportunities for having a helper or interpreter anywhere during the studies. Again, however, it is the University of Copenhagen, where there are the greatest problems, as almost 30% are dissatisfied with the existing possibilities. It would be a clear improvement for students with disabilities if access to lectures via the internet were made more widespread. Here, however, there is a particular problem, as many of the educational institutions' websites and intranet forums are not made to be accessible to students with disabilities. For example, the students do

not have the opportunity to use their reading programs or other compensating equipment. It is a problem that educational institutions should relate to.

The HEIs must make an effort to ensure that students with disabilities participate more in academic events

About half of the students with disabilities rarely or never participate in professional events besides the compulsory teaching during their studies. It is particularly the students with mental disabilities, illnesses or mobility problems that do not participate. In large part, they think that they would participate more often in professional events if it were not for their disability. At the same time, there is a clear correlation between participation in the academic events and whether the students feel they are a part of a larger community during their studies.

In addition to the purely academic input, this suggests that participation has a significant impact on the general well-being of the students. Therefore, individual studies should look at ways to get a larger share of students with disabilities to participate in the local academic events.

Effort must be made to get students with disabilities to join reading groups

A factor that is related to the participation in professional events is whether the students are included in a reading group daily or not. Participation in a reading group has a great importance in the context of whether the student with disabilities feels lonely within the degree programs. More than twice as many of the students who are not part of a reading group on a daily basis feel more lonely during their studies.

However, only about one-third of the students with disabilities participate in a reading group daily. Students with mental disor-

ders, developmental disorders and illnesses typically do not participate in reading groups. More than half are included in reading groups during examination periods, but again, almost 60% of students with mental disabilities remain without a reading group.

The proportion of students who are not part of a reading group must be compared to about 45% of those who do note take part in a reading group on a daily basis, but actually wish to do so. Three quarters of these reading groups are formed by students themselves; less than a quarter are formed following an initiative of the institution. The figures emphasize that one should make a bigger effort to advertise reading groups among the students and get the students with disabilities to join them.

Better information on providing opportunities

The vast majority of students (over 90%) have not applied for exemption from daily classes. A somewhat larger part (~30%) has applied for exemptions concerning the exam. Generally, the students who have been granted exemption are satisfied with the possibilities for exemption from teaching and examinations; but this should be seen in relation to the fact that few students take advantage of these opportunities. More than three quarters of students with disabilities have received no guidance on the possibilities for exemption from examinations or classes; this applies primarily to students with mental disabilities or chronic diseases. More than 70% of the students who have not received guidance on exemption options have not been aware of the possibilities for guidance. It is also characteristic that the students who have received guidance have mostly sought out this themselves. These striking figures must be seen in relation to the fact that 40% of students with disabilities feel they lack the possibility of exemption.

Continuing the general trend of lack of information for students with disabilities, this underlines once again that there is a need for

a much larger information effort from the educational institutions overall on dispensation possibilities for students with disabilities.

Problems with getting teaching material in time

Overall, students with disabilities are happy to study, but 60% of them experience problems in getting the fullest benefit from teaching due to their disability. There are a number of different problems that cause this.

It is particularly clear that students with disabilities have problems with getting teaching material on e.g. digital media, audio tapes etc. in time. It is a problem that particularly affects students with functional impairments within senses and communication or dyslexia, where 60% either experience this problem weekly or several times a month. It is thus a specific and widespread problem that educational institutions should take care of.

Problems with the social accessibility of the studies

The vast majority of students with disabilities experience that their disability has a negative impact on their participation in social life during their studies. Students with disabilities feel lonely more often than other students. At the same time, students with disabilities describe social life among fellow students as something that takes much time, space and resources. In particular, students with mental disabilities, reduced mobility or illness express feeling lonely during their studies the most.

About half of the students with disabilities very rarely or never attend parties or café events, especially students with mental disabilities and reduced mobility. For the majority of these students, their disability is the main cause for this. One problem is that most of the social events are linked to larger crowds or much alcohol, and they rarely participate in such events. One solution could be that the active students make several smaller café-like events and

professional days. Since it is the students who organize most social activities on the individual subjects, this is of course something that should be taken care of by the local student councils.

Dissemination of study jobs and better guidance on opportunities for internships

Within many higher education programs, a relevant student job is an essential prerequisite for getting a job in his field, as it provides practical experience that crucially complements the formal teaching from the program. Thirteen students with disabilities also point out that it is important to have done study-relevant work beside the program; but just over half of students with disabilities have had a student job during their education, and about half of that them had a job relevant to their studies (just under 30% of all respondents). The students who did no work whatsoever pointed out that they simply did not have time to have a student job and carry out their education while having a disability (almost 80%), or that they did not have the opportunity to have a job because of their disability (about 60%).

These figures highlight that a special effort is needed to convey study-relevant vocational work for students with disabilities, as well as to educate this group on the possibilities of paid and unpaid internships during their studies, so that they become equal to their fellow students in this area.

The conditions for students with disabilities are a responsibility of the educational institutions, the teachers and the student organisations

About 60% of the students with disabilities find that their disability has adversely affected their ability to complete their education on equal footing with other students. About 40% of the students with disabilities do not feel as a part of a greater community. It is

especially the students with mental impairment, illnesses or disabilities related to mobility that do not feel a part of a larger community. It is quite clear that the less these students feel like a part of a larger community, the more often they consider dropping out.

It is a joint responsibility of the educational institutions, the teachers and the student movement to strive to ensure that all students have good conditions for completing their education. This has been the basic premise of both this report and the 14 recommendations outlined above. The educational institutions' management and administration, the teachers and the student organisations should tackle the problems and challenges in creating educational environments where equality for students with disabilities becomes reality.

3 Learning Management Systems: the Desktop Research

There is no agreement on how the categories 'e-learning' or 'blended learning' should be understood. Literature reviews and case studies demonstrate a variety of concepts and applications in vocational education and teacher training. Various institutions and organizations use many different definitions of e-learning and blended learning. Some of these are, so to say, "technical", stressing the anticipated potential by a specific technology; other definitions underline knowledge delivery, and thereby the communicational aspect; yet many others understand e-learning primarily as a form of teacher-student communication during core teaching. This may be the reason that many training providers follow their own (not always pedagogically justified) notions of e-learning, while in only a few institutions where one can see pedagogical expertise driving application and implementation of e-learning. Thus, the educational, learning-oriented notions of the e-learning concept are frequently found in the heart of discussion on good and bad pedagogy; different views of what e-learning really represents place researchers on different sides in relation to specific educational practices.[1]

[1] For instance, there is a lot of scepticism on the use of the term 'e-learning' by Norwegian online schools, which several of our Norwegian colleagues defined as 'giving access to teaching aids, without the possibility of interaction with a teacher'. This perception of the e-learning concept (a 'first-generation' e-learning concept, in a way) is still widespread in Denmark, especially among executives in small and medium-sized companies (Krog, 2011). The Norwegian government has tried to avoid the problem in two ways: firstly, by insisting that the concept of e-learning is 'fluid', and then

Previous studies on the use and effect of e-learning in vocational education have uncovered the same lack of consensus on the use of these concepts. However, Sangra, Vlachopoulos and Cabreras (2012) draw four main notions of e-learning that help us understand the process in broad terms: namely, that it is *technology-driven* (in that it focuses on the potential of specific educational technologies); *dissemination-oriented* (as it focuses on the ways specific technologies can be used to convey educational content to students); *communication-oriented* (as communication and information technology can be used for communication and interaction between students and teachers); and finaly, that it is e*ducational paradigm-oriented* (in that it embraces a holistic approach on how digital technologies can improve the learning process).

1. HISTORICAL AND CURRENT TRENDS IN LMS USE

An older survey showed, among other things, that **Danish universities** had generally been more reluctant to develop virtual teaching methods than universities in most other European countries.[2] However, LMS use in Denmark is widespread at all educational levels, has been such for many years, and is still developing.

In the conceptual framework for Denmark, e-learning must not be understood only in relation to "use of e-learning; e-learning is understood as something that has an improvement potential in relation to learning and education. All HEIs have included LMS as part of their online information and education, with Moodle as the most common, followed by Blackboard. Accessing the LMSs is

by chosing the label "online schools" and "online courses" for the kind of flexible education that other countries describe as e-learning courses.

[2] https://ufm.dk/publikationer/2005/filer-2005/effekter-af-e-laering-fem-business-cases.pdf

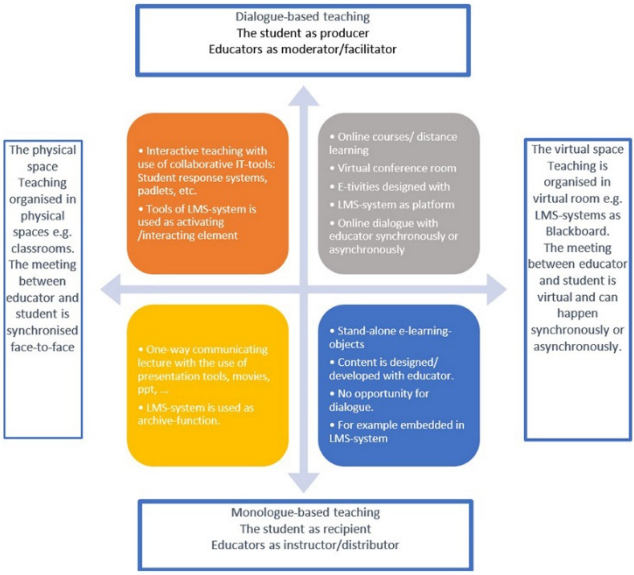
possible at the institution or through 'WAYF'[3]. They make it possible to use digital identities (i.e. logins, user accounts) from research and educational institutions outside the institutions themselves - e.g. by cloud services. However, only at a small number of Danish universities is the strategic focus placed on e-learning; this applies to both normal full-time and graduate studies and the open part-time studies, including master's programs.

E-learning is often singled-out as part of a modernization agenda, where it can both involve using digital technologies to enhance the attractiveness of education in relation to young people, giving them the opportunities to develop technological literacy or, more generally, symbolically. These programmes are often presented as "modern". However, in some instances, this turns out to be not entirely adequate or not entirely beneficial. For instance, the South Danish University Library has since 2015 experimented with embedding a 100% stand-alone e-learning course in their courses on Responsible Conduct of Research (RCR). The e-learning course has been developed using SDU's LMS system, Blackboard. The motivation for this development was that the teachers in this e-module wanted to save time for both themselves and the students, and that it should therefore be accessible without further personal introduction or follow up. The e-learning course was originally intended as a separate e-module, developed by two teachers, who did not meet personally with the students. The first evaluations showed that the students were satisfied with the e-course, but that both they and the remaining teachers lacked space and opportunity for dialogue about the module up to or after. In its latest version, the e-module's teachers still do not meet the students, but the module is discussed by other teachers, who do presentations and a short follow-up, so that questions can be answered. The students are now generally satisfied with the e-module; nevertheless, from a pedagogical point of view, developing a pure e-course

[3] '*Where Are You From*' is Denmark's *R&HE* identity federation.

that reaches deeper levels of learning while saving time (no interaction, no tasks to be rectified or given feedback to) proved to be a real challenge.

Students with disabilities are expected to use such courses exactly like all other students. The question of accessibility is dealt with by other services.



The IT-didactic reflection model (Remvig, 2017)

Several other challenges remain. For example, **e-learning in Denmark** is mostly understood as "planned learning that is entirely or partly digitally mediated with the aim of creating a qualitative and / or quantitative educational improvement". This concept indicates that e-learning may be pushed forward with different intentions: for instance, there may be a presumption that participants would learn "better", with a greater benefit in relation to effort; it can mean that more people would gain access to formal education or that there would be an optimization of resource

utilization. It is often the case that several of these justifications inspire a certain commitment to e-learning, but at the same time, they can hardly be reconciled among themselves. In the worst case, there may be contradictions between justifications and intentions.

This definition is in line with the political objective of the *VET* in an EU context, which places the concept of e-learning within a broader educational context, stating that *ICT* should be utilized to increase access to education as much as possible, while promoting active learning and developing new methods within work- and school-based *VET*. (Brugges Communication, 2010). But the challenge it presents is that the concept of e-learning is a so-called "*floating denominator*", a concept without a real conceptual core, regularly included as a starting point for discussions on its meaning, content and limitations (Conolly, 2011). We often find such floating denominators in various documents pertaining to educational policies and concepts, such as 'competence', 'innovation' or 'inclusion'. In the context of documentation and analysis, a more specific definition is needed, while in the context of educational development there is a need for discussions, validations and decisions as to what the aim and context are at different organizational levels.

◈

The first learning management systems were introduced into **Lithuanian education** in the very beginning of the 21st century. The primary body for governing distance learning in Lithuania – the Lithuanian Association of Distance and e-Learning (LieDM) – was established in 2010; however, projects and programmes dedicated to implementation and facilitation of introducing and maintaining e-Learning services in Lithuania started as early as 1998.

The first governmental programme, *Development of Distance Learning in Lithuania*, later followed by *Development and Dissemination*

of Distance Learning (1999-2000) were mostly concerned with introducing distance learning to Lithuanian education, focusing on tertiary education. These were followed by *ITMis* (Programme of IT for Science and Studies) from 2001 to 2006 and the EU-funded project *Development of IT-based Distance Learning Network in Lithuania (2005-2007)* (LieDM Konsorciumas [LieDM consortium], 2019). The Education and Science ministry-approved programme *Lithuanian Virtual University*, implemented from 2007 to 2012, was explicitly stated to continue the implementation of *ITMis*. The *Lithuanian Virtual University* was aimed towards expanding the IT structure in Lithuanian science and studies, understandably focusing on tertiary education again (Lietuvos virtualus universitetas [Lithuanian Virtual University], 2019). The Lithuanian Association of Distance and e-Learning (LieDM) is now a voluntary association of willing institutions, currently comprised of 49 members (LieDM Association, 2019).

As the first steps were directed towards tertiary education, the use of LMS in primary and secondary education has been less frequent and slower to implement, at least partially due to poor technical situation at schools (lack of computers) as well as low IT competences of teachers. The first methodological guidebook for implementing LMS in secondary education was published in 2005 (Virtuali mokymosi aplinka mokyklai [Learning Management System for Schools], 2005). While the development has been slower than in the case of higher education institutions, the recent data shows that learning management systems are gaining popularity in secondary and primary education as well: there are now 246 institutions in Lithuania that are using Moodle as the most popular LMS; out of 69 publicly available usage sites, 32 are providers of primary and/or secondary education (Moodle.net, 2019). Moreover, the overall number of sites in the last year has increased by 101: from 145 in 2018 (Mažeikienė, 2018) to 246 in 2019. The pioneering schools that provide distance education most commonly use Moodle management and certain tasks or discussions with the

teacher are carried out using Skype (Vaičiūnaitė, 2012). There have been mentions of business enterprises using learning management systems (mostly Moodle) or providing services in its implementation (Dagienė et al., 2018), however, elaborate statistics on LMS use in business are not available in Lithuania.

There is a general increase in the popularity of LMS (Dagienė, et al., 2018). Since higher education institutions have been using LMS for a significant amount of time and secondary schools have joined the initiative later, current trends are somewhat different for different education levels. The primary and secondary schools for most part seem to be enthusiastic in terms of quantity and there is research on ways to motivate teachers to use LMS and encourage them to use LMSs in their schools (Kondratavičienė, 2016).

Furthermore, the prevailing belief in the introductory stages that online materials provided by LMS can only be used as a supplement (Virtuali mokymosi aplinka mokyklai [Learning Management System for Schools], 2005) is giving way to the acceptance of full time distance learning. There are now 6 institutions providing distance primary and/or secondary education (Renkuosi Lietuvą/ Nuotolinis mokymasis [Choosing Lithuania/Distance Education], 2019).

Higher education institutions, however, are now more concerned with the quality of their online courses. LMSs (most commonly Moodle) are widely used in higher education (Dagienė, et al., 2018) and the majority of universities encourage the use of LMS in all university-level courses. In a representative survey of students of Lithuanian HEIs about the 72% of respondents claimed to have used LMS in their previous or current studies. On the other hand, while there is no data separately for LMS, only 48 % claimed to have been satisfied with the way e-study tools had been used in their study process (Kinderis, Gaižiūnas, Lisauskas, & Zinkevičiūtė, 2018).

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For many years **the education system in Portugal** was essentially supported by a traditional and unidirectional teacher-based transfer of knowledge, in which students/learners tended to have a passive role in the learning process (Halim, 2018). However, along with the new technological developments and the changes in the educational system, new approaches to the educational process become imperative (Lencastre, Vieira, & Ribeiro, 2007). The use of information and communication technologies in the educational context was inevitable, culminating in a student-teacher interaction deeply marked by the adopting new teaching and learning methods, namely, the e-learning methodology (Lencastre et al., 2007). One should keep in mind, however, that in its strict definition, e-learning corresponds to a learning process that develops mainly (or almost exclusively) at distance, through Internet as well as through other information and communication technologies, thus offering scarce opportunities for teacher-student contact.

The first experiences with e-learning came at the end of the 60s in the military industry and the university context (Aparicio, Bacao, & Oliveira, 2014; Cação & Dias, 2003). During the nextt decades, in parallel with technological innovation, specialized platforms to support the e-learning process emerged and become known as Learning Management Systems (LMSs). Nowadays in Portugal LMSs are understood as web-technology/software based tools that allow presential or distance teaching/learning through sharing of content and activities, asynchronously and/ or synchronously, offering spaces of communication and collaboration for greater ease of teacher-student interaction, as well as other administrative functions (Carvalho, 2018; Cruz, 2014; Such, Ritzhaupt, & Thompson, 2017).

The potential of using technological developments in favor of education has been recognized at European level: construction of bases

for technological modernization were included in the *e-Europe Action Plan* (year 2000, revised in 2002), covering, among others, the areas of Public Administration, e-commerce and telecommunications (Comissão das Comunidades Europeias, 2000, 2002); in addition, a specific e-learning program for education systems was launched (Commission of the European Communities, 2001). In 2002, the *e-Europe Action Plan* established as an objective that Member States should ensure that, by the end of 2005, all universities provide online access to students and researchers in order to maximize quality and efficiency of teaching processes and activities. Many Higher Education (HE) institutions implemented LMSs as a supplemental teaching/learning tool (Rodrigues, Rocha, & Abreu, 2018; Sang, Valcke, Braak, & Tondeur, 2010; Such et al., 2017).

In Portugal, a decisive commitment for new forms of learning was made in 2003 with the *e-U Virtual Campus Program*.[4] This governmental national program involved the development of services, content, applications, and mobile communications network for students, professors and researchers of HEI, with the purpose of encouraging and facilitating the production, access and sharing of knowledge. This initiative culminated in 2017 with 87% of the HEI having access to the e-U wireless network and a set of online virtual campus services and content (Agência para a Sociedade do Conhecimento [UMIC], n.d.). Thus, LMSs platforms become common in the Portuguese HE context. This allowed improving the teaching/learning process not only at distance (through collaborative virtual learning environments), but also as a supplemental teaching tool (that can support traditional classrooms). That is, LMSs brought the means to plan, host, organize and manage materials that can support both traditional classroom learning and e-learning methods in a complementary approach, corresponding to a hybrid blended learning model (*b-learning*) (Brandão, 2004;

[4] 'e-U' stands for 'Electronic University'.

Davis, Chen, Hauff, & Houben, 2018; Linawati, Sukadarmika, & Sasmita, 2012; Such et al., 2017).

In the beginning, Web Course Tools (WebCT) was pointed out to be the most widely used LMS by universities around the world (Cação & Dias, 2003). In this LMS, the entire process is based on the Web, eliminating the need to create special software versions for different platforms. The software is run from a central server (fast internet connection is recommended) and may require that the web browsers be configured to work with it. Nowadays, the Modular Object Oriented Dynamic Learning Environment ("Moodle") open source software (under the GNU license) is largely adopted by many HE institutions, Portugal being no exception (Barge & Londhe, 2014; Linawati et al., 2012; Rodrigues et al., 2018). Although there are alternative platforms developed by Portuguese companies, this software is the mostly used in all applicable context, namely the educational system (including HE), in government/public administration, business, etc. This software is compatible with various operating systems, as long as they support MySQL, Apache, HTML, PHP or Java (Lencastre et al., 2007).

However, even though LMS software supports tools that facilitate the creation of integrated virtual learning environments, recent studies conducted in Portugal show that LMSs are preferably used by teachers as a repository and an easy and immediate way of disseminating material and information, while other facilities that support activities in the classroom context have limited use (Rodrigues et al., 2018; Torres, Pimenta, & Kerbauy, 2018). In fact, historically teachers have faced challenges to effectively integrate the new technologies into educational seating (Baldwin, 1998; Dvorak & Araújo, 2018; Ertmer & Ottenbreit-Leftwich, 2010; Knezek & Christensen, 2002; Labbo et al., 2003; Sang et al., 2010; Such et al., 2017).

While initially the main challenges for the use of technology in teaching were obsolete hardware and software, lack of adequate

equipment and infrastructure, as well as lack of adequate training for a *brand new* technology (Baldwin, 1998; Mercado, 1998), today's limitations are related to requirement of constant knowledge update regarding the exponential technology evolution, as well as confidence, perceptions and beliefs about the utility and impact of these tools on the role of the teacher (Dvorak & Araújo, 2018; Such et al., 2017; Torres et al., 2018). The overvaluation of the technological aspects in detriment of the pedagogical element is mentioned as a negative point, pointing at a need for reconciliation between teachers and computer (Dvorak & Araújo, 2018; Sang et al., 2010; Such et al., 2017). This factor may be due to the predominant selection of LMSs based on criteria oriented to economic factors, usability and supplier design, to the detriment of other factors affecting teaching and learning (Such et al., 2017). *Task-technology* fit, as well as an intuitive and easy-to-use interface, has a strong influence on users' attitudes and perceptions about the usability of LMSs. The concept of *form follows function* can consistently describe the most effective design and use of a LMS, having positive impact on the perception of LMSs users and particularly on student performance (Such et al., 2017). Furthermore, LMSs adoption should go beyond the mere technological aspects of the adopted system, taking into consideration its functional influence in the overall learning process (Dvorak & Araújo, 2018; Such et al., 2017).

2. BENEFITS FROM USING A LMS

Danish universities have used the Moodle LMS in daily teaching for many years. As more functions and processes were being introduced in the system over the years, more resources were needed for development and process-supported functionality, as well as continuous operation and adaptation to the needs of both state agencies, state administration and private businesses.

The benefits from using a LMS can be generally divided into three levels, where HEIs and others would be able to achieve effects using e-learning:

– *streamlining of training activities*, where the immediate goal is streamlining and optimizing the educational activity in itself, *e.g.* savings on travel, accommodation and other course logistics, volume and time-to-market optimization.

– *strengthened productivity*, where e-learning contributes to developing and improving productivity through competence development. The effects of competence development are reflected in the primary activities, for instance, through quality improvements.

– *innovative development*, where e-learning is part of a broader-oriented competence strategy. This strategy focuses, among other things, on effective knowledge sharing across the study, but also through the involvement of external players which has a long-term strategic perspective in e-learning initiatives. The strategic goals include development of brand new areas and strengthening the student's readiness for change.

In general, Danish educators and students find that e-learning allows for innovative learning processes that form the core of knowledge-based global dynamics, including the ability to both cooperate and work independently, communication skills, analytical skills, problem identification and formulation abilities, as well as information search.

In a similar mood, a research conducted among primary school teachers who are using an LMS **in Lithuania**, an overwhelming majority (92%) found it to be beneficial, since it made the education process more interactive and interesting to the students, improving their results at the same time. Teachers claimed that the LMS helps students who have to miss classes due to health issues catch up with materials discussed in class, also being suitable for exceptionally talented students, if they want to study additionally

in order to participate in competitions. According to the participants of the research, use of LMS also helps give students more interesting and less standard tasks, allows individualization and differentiation of tasks, facilitates project-based activities and improves students' abilities to plan their learning process. Courses in a LMS can also be used as a supplementary means for studying at home (both in the case of less or more motivated students and those that have temporarily emigrated from the country and wish not to fall behind on their studies) and improving communication and cooperation competences (Kondratavičienė, 2016).

Among the benefits observed in higher education are these: students have become more independent in their studies, they have better opportunities to both study and apply their knowledge in work experiences. LMS use also at least partially solves the issue of access to study materials – the essential data can be uploaded to the LMS and it can be easily updated or edited. If LMS is used for assessment, it saves time for the instructor as simple tasks of multiple students can be evaluated automatically by the LMS; it also allows to observe how different students are interacting with the course, see their individual errors or lack of motivation and act accordingly (Virtuali mokymosi aplinka mokyklai [Learning Management System for Schools], 2005). Additionally, LMS use allows both students and teachers to be more flexible in their teaching/studying as it provides them with the opportunity to both teach and learn irrespectively of time and place, also increasing the student's responsibility for his/her studies (Kinderis, Gaižiūnas, Lisauskas, & Zinkevičiūtė, 2018).

A large-scale survey of Lithuanian students showed that they believe Moodle or other types of LMS are the most suitable tool for providing: study materials (76%), information about the study process (course description, assessment strategy, course outline, dates of tests and exams, etc.) (71%), homework collection and evaluation (70%), study results assessment (exams or tests carried

out in LMS, uploading research papers, etc.) (60%), tasks for self-check and self-reflection (58%). A significant amount of students (78%) agreed that it is important to use one main tool supplemented with other (if necessary) that would not carry out the same functions (Kinderis, Gaižiūnas, Lisauskas, & Zinkevičiūtė, 2018). In a qualitative research, students claimed that the use of LMS as well as other newest technology is essential in higher education (Baziukė, Girdzijauskienė, & Šliuzinskė, 2014).

In Portugal, LMSs are also seen as tools that bring teaching/learning advantages in terms of simplicity of use, speed and ease of access, mobility and efficiency of teaching, which seem to have an impact on students' performance and improve their results (Linawati et al., 2012). It should be noted that with LMSs the learning contents are available anywhere, 24 hours a day, allowing students to learn autonomously and at their own rhythm, aligned with the demands of the new educational paradigms underlying the Bologna process (Rodrigues et al., 2018; Wang, Woo, Quek, Yang, & Liu, 2012). Additionally, despite the LMS privileging the context of distance learning, students are not alone in their study tasks, since LMSs provide several tools that facilitate interaction with teachers and/or other students in a virtual cooperative learning environment (Cação & Dias, 2003; Cacheiro-Gonzalez, Medina-Rivilla, Dominguez-Garrido, & Medina-Dominguez, 2019).

The support for knowledge management allowed by LMSs is also a positive point to emphasize from two perspectives. First, LMSs allow an easy way to update content, tendentially in small units, which allows students to adapt the time they dedicate to that task according to their needs (Cação & Dias, 2003). Second, the educational institution has the opportunity to reinforce its own intellectual capital (often dispersed or disorganized), which can be strengthened as a competitive advantage (Cação & Dias, 2003).

3. CHALLLENGES IN USING A LMS

Primary school teachers who do not use LMS in their classes believe that using LMS would make the learning process more attractive and interactive. While they understand the benefits, they lack information on how to use it, do not feel that it is an absolute necessity or lack the appropriate IT skills. The majority of participants in the research **in Lithuania** claim they would like to use LMS if they had the proper training to do so and, so, appropriate methodological courses and materials are essential to successful LMS introduction and development in primary education (Kondratavičienė, 2016).

Such seems to have been the case in the introductory stages of LMS in higher education as well, and in some cases it remains such. At the beginning, the teacher would encounter more workload than usual as s/he has to plan the course outline, prepare the tasks, upload materials. However, such work is not only necessary to do only once a new course is introduced (the course can be edited and developed but the majority of the work is done only the first time) (Virtuali mokymosi aplinka mokyklai [Learning Management System for Schools], 2005). On the other hand, time constraints remain among the reasons for not adopting LMS in University teachers' research (Baziukė, Girdzijauskienė, & Šliuzinskė, 2014). At least several of the biggest higher education institutions in Lithuania have their own online resources available for teachers who are interested in creating online courses for the subjects they teach (Kinderis, Gaižiūnas, Lisauskas, & Zinkevičiūtė, 2018). Vilnius University provides teachers with an online course which presents the capabilities of Moodle (the LMS used by Vilnius University), various frequently asked questions, has visual examples on how to perform certain functions in the system. The responsible University body also organizes trainings for teachers and provide consultations. They have recently introduced a Microsoft Teams group for teachers working and willing to learn more

about Moodle from their colleagues' good experiences, active members of this group are the programmers working with Moodle at the University, therefore, they can provide their expert knowledge in real time.

In a research conducted at Klaipedos university, the 4th year undergraduate level students participating in the research claimed to have only used a learning management system (called *virtual learning environment* in the article, which is a direct translation of the Lithuanian term *virtuali mokymo aplinka*) once throughout their studies and the lecturers cited poor infrastructure and lack of expertise in information and communication technologies as primary reasons for their reluctance to use LMS in their courses (Baziukė, Girdzijauskienė, & Šliuzinskė, 2014). The representatives of higher education institutions participating in a recent research noted that as more parts of study process are moved to the digital area, the most common challenge encountered is the diminishing of human contact between students and their teachers and peers as well as the retention of students' attention to their studies (Kinderis, Gaižiūnas, Lisauskas, & Zinkevičiūtė, 2018). We should add here that such attitudes were expressed in regards not particularly to LMS but in regards to all virtual tools of study process management (e-mail, study information and administration databases, library services, etc.).

Another challenge that the use of LMS in particular encounters is observed when multiple means are used for the same goal: study materials are uploaded onto the LMS and simultaneously sent out to students via e-mail or a similar combination of several e-communication methods is used. This confuses the students as to which information is the correct one, and forces them to search multiple digital tools to find the course materials (Kinderis, Gaižiūnas, Lisauskas, & Zinkevičiūtė, 2018).

In addition, surveys **in Portugal** have shown that there are many technical challenges pertaining to security that are associated with

the use of the Internet in general, and therefore with LMSs as well. Some authors point out that the risk of invasion of privacy is potentially increased with the use of internet, added by the risk of identity theft when its use entails the association of personal data (Cação & Dias, 2003). However, encryption and authentication techniques are generally used in the LMSs access, which can contribute to reducing this risk.

Lastly, interviews conducted in **Danish HEIs** pointed to several factors that do not directly stem from LMS use, but strongly testify that all LMS and distance learning solutions have to be carefully planned, always keeping in mind the broader context. Namely, a research of possible factors that weaken the competitiveness of Danish universities compared to foreign ones have shown that the research-oriented incentives remove the strategic focus far away from teaching; that cooperation with other state- or privatelly owned organizations is weak and random, making all investments in elaborate learning methods and systems seem futile; that the universities have insufficiently established internal systems and structures for marketing the continuing and distance education on both national and international markets; and finally, that existing legislation and regulations limit in different ways the HEI's power to explore the business opportunities in the supply of qualifying continuing and distance education in the form of flexible, online-based studies. On this basis, improving the strategic delivery for all students, and especially for students with disabilities in Denmark – with regard to improved use of LMS and e-learning – is still a huge challenge.

4. LEARNING CONTENT, UPLOADS AND COURSES

As we saw on the diagram presented above, use of e-learning and technology in teaching can be perceived from two viewpoints: *the form of teaching* (dialog-or monologue-based) and the *location of the*

teaching (physical or virtual space). Its didactic reflection modelis, in fact, a didactic reflection on how the teacher wants IT to be included in his teaching. The model is a classic four-field model built around two axes: classrooms and teaching form. On the horizontal axis, a distinction is made between the physical and the virtual space: does the teaching follow a traditional, face to face model, or is it virtual and online? On the vertical axis, a distinction is made between dialogue and monologue-based teaching form: does the teaching primarily follow a one-way communication model, or is it primarily interactive? Thus we get *four different models of teaching*, all of which – in one form or another – seek to integrate information technology by uploading and using online LMS content. These fields should not be understood as restricting, and there is no field that is better than another: this depends on what the goal of the teaching process is. Every single model can have pros and cons, and more importantly, teaching can – and hopefully does – move within *several or all four fields*, thus requesting *updated, additional or even entirely different (or differently structured) course content*.

Another thing that the type of content uploaded in the LMS greatly depends on, is *the ICT competence* that the teachers have. While teachers understand the necessity of interactive content, research shows that virtual conferences, video lectures or virtual forums – at least in Lithuania – are used only occasionally throughout the study process. While creating the course units in the LMS, teachers tend to use tasks, tests and topic discussions as the former tools require a higher level of ICT competence as well as more active and continuous involvement in the online course (Baziukė, Girdzijauskienė, & Šliuzinskė, 2014). Local research also recommends that the online course should not employ lecture-based classrooms and focus more on active learning methods. The mere act of uploading PowerPoint presentations is criticised as neither giving opportunity for students to actively construct their knowledge and regulate their learning nor ensuring interactivity of the learning process. Online courses should be constructed in a way

that *supplements face-to-face learning*, *promotes self-improvement and life-long learning*. Since generation Z requires constant and instant feedback, in order to avoid making them feel alienated in the online course, a more active engagement of teachers in virtual communication is necessary (Jaleniauskienė & Jucevičienė, 2015).

The form of learning content provided in the LMS differs from course to course, however, more visual data (pictures, diagrams, video excerpts) is preferred to textual information as the current students mostly belong to Generation Z which is considered to be comprised of visual learners (Jaleniauskienė & Jucevičienė, 2015).

New technologies play a similarly essential role in the operation and interface of the University of Aveiro as well. The institution makes several online resources available to the entire academic community, providing an *integrated and comprehensive service*. In UA, users can "consult everything that goes on in the university, have online access to image files, publications, articles, sound and video or create their work environment through the development of their own personal page" (Universidade de Aveiro [UA], 2019e). UA's online projects includes a LMSs (Moodle) platform, a tool essentially oriented to support the curricular units; it contains all the information, material and activities for every course the student is enrolled in. Still, these are primarily used to support activities in the classroom context. The platform by itself also serves as an access point to other services, such as the virtual secretary *Academic Portal* (*Portal Académico*, PACO), forum, events calendar, etc.

Additionally, UA's online projects provide a set of learning tools that go beyond e-learning, namely the online digital library (with access to several research databases, as well as to articles, images, magazines, audio and multimedia) and *My UA* (a personalized portal for each user), as well as a wide range of other services and tools, such as the provision of licensed software (e.g. CADFLOW, Autodesk, IBM SPSS, MATLAB, SolidWorks) (UA, 2019e), research

support (e.g. implementation of online questionnaires using LimeSurvey) and other specialized support services. Furthermore, all UA services and tools are available remotely through a teleworking service through a VPN access.

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Currently, there are no courses at Vilnius University that would be entirely taught as *strictly online courses* (*distance education*). Starting from September, 2018 all courses (subjects) that are taught in any study programme are automatically entered into the LMS and the teacher has the possibility to either use it by uploading materials and interacting with the students – or not. Previously to this, online courses in the LMS were created upon request by the teacher and now the LMS (Moodle) is integrated with Vilnius University study database and all online courses are already in the LMS once they are entered into the study plan of the upcoming semester. The teachers are strongly encouraged to use it and this has led to an increase in teacher and student activity in the system.

The online courses currently available to students of Vilnius University vary in their use and it depends on the particular academic teaching the course: some teachers only upload the materials they present in class, other also upload necessary readings for in-class seminars, others try to employ all the possibilities of Moodle by having students discuss on seminar topics in the course forum, upload their papers or other homework and get feedback or take short tests that are immediately evaluated in order to check whether they have understood the materials provided. There are a few courses that have video recordings of lectures read by the coordinating teacher, however, these are rare as not many staff members feel comfortable recording their lectures and there is a lack of technical tools and staff to record and edit the lectures.

On the other hand, the University of Aveiro offers one of its graduation programs in distance learning – namely, the Accounting program at the Polytechnic School of Accounting and Administration (*Instituto Superior de Contabilidade e Administração da Universidade de Aveiro,* ISCA-UA).

At this point in time, the use of LMS at both HEIs obviously falls into the category of *blended learning* – a term that covers courses that alternate between the physical and the virtual, a combination of presence education and web-based activities. The rareness or absence of purely virtual courses, however, must not be perceived as a failure, as blended courses have proved to be more than adequate. While teaching and learning had been traditionally considered as direct communication between a student and a teacher who are both in the same environment, the use of LMS helped make this process more varied and effective. Since time and distance is not an obstacle to education anymore, it becomes significantly easier to access studies; the students can choose the time that is the most suitable to their personal circumstances and search for data/materials, check what tasks need to be done and when. They can also easily and quickly access teacher's feedback on their homework. Moreover, if some students are absent from the class physically, they can join the class via virtual means and ask their questions in the forum or a chat room.

Embracing blended learning allows more flexibility for students and encourages teachers to work in a more systematic manner which helps them to improve their daily academic life (Motekaitytė, et al., 2010). Lithuanian students studying social sciences suggest that blended learning (part of their studies is conducted in classroom and part, using e-learning technologies, such as LMS) is a necessary aspect of their studies (Vilkonis, Turskienė, & Burškaitienė, 2012). Positive attitudes were also expressed by those studying humanities – out of 398 students of English as a foreign language, more than a half (67%) answered that they would either choose the model of blended learning applied in their course (80%

in class, 20% using LMS) or one where there was more e-learning (70% in class, 30% using LMS), 34% and 33% respectively (Pundziuvienė, 2012).

Things are very similar in Portugal, as well. The student-teacher interface is accomplished through the e-learning platform, from which information, support materials, curricular contents and activities are available for every curricular unit of the course. There are periods of real time contact between teachers and students, called *synchronous hours* (weekly and throughout the semester, by electronic means), in which content is explained and clarifications are provided. The discussion and sharing of activities among students are also promoted through the platform forum (UA, 2019a). Additionally, the UA also offers Wordpress blogs, Content and Community Management Platforms (CMS) (Drupal) and wikis (Mediawiki).

The e-learning platform, the library service and the specific work tools available are the central resources can – and do – support both virtual and traditional classrooms. It should be noted that 99% of the courses in the UA are taught in a traditional classroom or using a mixed model, enabling independent and self-regulated learning all the same. This approach helps the student convert from passive to active learning (Wang et al., 2012), also contributing to learning practices and competence development (Moreira & Vieira, 2017). However, understanding the contextual constrains and their influence on the design, usage and management of information, communication and learning systems seems to be an ongoing challenge – but also an important predictor of its successful implementation (Such et al., 2017; Zhang, 2007).

5. LMS ACCESSIBILITY AND FUTURE CHALLENGES

LMS is considered to be one of the main infrastructural requirements that could improve the accessibility of higher education to persons with special needs, as using an LMS allows them to study from home, communicate online, express their opinion that they would otherwise feel uncomfortable doing due to physical or psychological issues. They can maintain their familiar social networks, keep working or volunteering in local communities and study at the same time (Spiriajevienė & Spiriajevas, 2015).

Methodical guidelines on how an LMS[5] should be made accessible to students with disabilities were published in 2005 (and updated in 2010). The general requirements stated are these:

1) use tools that increase the accessibility of the operational system without decreasing the functionality of the LMS;
2) ensure the compatibility with supplementary tools that increase accessibility;
3) all functions have to be available using only the keyboard (without using the mouse);
4) all information needs to be available to people with sight or hearing disability;
5) flashing objects with a frequency higher than 2 Hz cannot be used;
6) documentation, user manuals and help guides need to be provided in a form that is accessible for people with disabilities;
7) use simple, easily understandable language in documentation, user manuals, help guides, provide illustrations next to the descriptions, if necessary;
8) provide exhaustive descriptions and explanations of all tools dedicated to increasing accessibility;

[5] Called "informational environment" in Lithuanian – however, the object is that of what we currently call an LMS.

9) provide logical order of passage between control commands, input fields and other objects;
10) introducing the technical personnel to the capabilities of a new informational environment to be made accessible to people with disabilities and to specific functions that are adapted to the needs of students with disabilities;
11) ensure the support for the informational environment and necessary help to solve possible accessibility issues (Government of the Republic of Lithuania, 2005).

Based on research conducted in Lithuania, the biggest issue that people with disabilities have overall is access to necessary study materials – some books are still unavailable in audio format or Braille, scientific databases are not accessible to people with certain disabilities, therefore, students encounter a lot of issues when they need to find alternative study materials to those that are provided by the teacher or the University library (MOSTA, 2014).

Persons with different disabilities have different special education needs. Those with physical disabilities are most concerned with the accessibility of education areas and possibilities of distant education (those with severe physical disabilities), those with sight or hearing disabilities will need accessibility to information systems (including LMS), special materials and might have different assessment requirements, those with somatic or psychological disabilities will benefit most from flexible organization of the study process. As to what regards study materials, people with sight disability need their materials to be provided in a suitable format or have the materials (in word or pdf) void of tables and images, diagrams and so on because the software dedicated to converting text to speech is not capable to read visual information (Ruolytė-Verschoore & Ruškus, 2012).

There is no specific research that tackles LMS use for people with disabilities and there might be several reasons for this. First, the number of students with disabilities is not particularly high in

higher education in Lithuania, partly, because Universities do not have suitable physical environment and blended learning approach is favored instead of fully distant education of entire undergraduate or graduate study programmes. Also, the prevalent LMS used in Lithuania, Moodle, is somewhat compatible with supplementary tools used by students with disabilities, therefore, the issue of accessibility arises more with materials than the system itself.

At the University of Aveiro, the UA Library, specifically the User Support Service of Special Needs, provides support and guidance to students with disabilities (blind, low-vision, deaf and with reduced mobility in various aspects), by making available equipment adapted to their specific needs, producing and distributing content in accessible formats, as well as by providing other specialized services required (Serviços de Biblioteca Informação Documental e Museologia - Universidade de Aveiro, 2017). The recognition that *accessibility is an added value by itself* ensures that conditions are created in order to assure that the content is available to all users, thus guaranteeing universal and uniform access to information and academic knowledge.

It should also be noted that, when applied to the educational context, accessibility does not only include students with specific disabilities (e.g. blind, low-vision, deaf and with reduced mobility in various aspects), but should be framed in a more comprehensive perspective i.e. international students or students with learning disabilities (LDs, e.g. dyslexia, dysgraphia, dyscalculia, etc.) (Cortiella & Horowitz, 2014; WAI, 2018). For the international students, LMSs platforms should at least include the option of multilingual translation. Furthermore, according to Zhang (2007), in the educational context there is a tendency to select and integrate new technologies "that fit the existing pedagogical culture, designing them in familiar patterns, and adapting them in line with the features of the local educational system". It should then be assumed that environments where different cultures meet must be constructed taking that into consideration (Zhang, 2007). In the

case of LDs, students tendentially have difficulties to cope with the existing LMSs (Pirani & Sasikumar, 2012). Moodle (adopted by UA) already includes some accessibility functions, including the possibility to hide some items, which decreases the reading difficulty of the dyslexics (caused by a high number of items displayed on the screen). It also allow users to personalize other layout settings to their specific needs, including some that prove to be very relevant: "background color, font faces, font colors, font sizes, or line spacing on course materials such as lecture notes and electronic reading assignments"(Pirani & Sasikumar, 2012).

Finally, in Denmark, accessibility issues related to LMS and students with disabilities are individualized to the students themselves, by utilizing one of many open source tools available. In addition, through the Special Pedagogical Service, the students can get assistance by a number of external services such as the *Copenhagen School for Dyslexia*, the *Student Counselling Service* (for psychological problems), *Nota* (the Danish Library and Expertise Center), *Vitec* (IT aids), *IBOS* (the Institute for the Blind and Partially Sighted), the *Interpreters Center for Rehabilitation of Brain Injury*, as well as the *Danish Autism Centre*.

◈

LMSs offer learning support without geographical or time limitations, allowing for more comprehensiveness, availability and accessibility when compared to the traditional classroom model. However, overcoming the merely instrumental use of LMSs, as well as the emerging need to prepare students for the challenges of the Digital Age, seem to be the current top challenges (Aparicio et al., 2014; Dvorak & Araújo, 2018; Moreira, 2018; Such et al., 2017). The fight against 'digital illiteracy' is a priority of the European Union; there is an evident need for innovative pedagogical strategies and development of more comprehensive and inclusive digital learning ecosystems (Moreira, 2018). Based on this, in 2013,

the European Commission proposed an approach that does not limit itself to the technological aspects of web-based learning, but embraces an ecological, integrated and holistic approach, focused on the establishment of a knowledge network in the scope of an *Open Education* strategy (European Commission [EC], 2013; Inamorato dos Santos, Punie, & Castaño-Muñoz, 2016; Moreira, 2018). Ubiquitous learning, supported by smartphones and other emergent technologies, may bring new approaches to digital learning and LMSs; furthermore, with the exponential development of technologies and constant innovation, overcoming challenges will always be an ongoing work.

Nevertheless, we think that inclusive higher education is the only path towards fully protecting the educational rights of students with disabilities. Teachers' attitudes toward students with disabilities and toward their inclusion in universities are a key factor that will affect the development of inclusive higher education. Finally, *effective implementation of inclusive higher education must also be supported by effective services* – a support network of professionals and an administrative support system for teachers and students. Learning Management Systems are an integral part of these measures which ought to be amplified, improved and implemented.

4 Results from the semi-structured interviews with students with disabilities

> "As a student with disabilities, you have the right to the adaptation needed to enable you to complete your education on an equal footing with other students." (*UN Convention on the Rights of Persons with Disabilities, November 13th, 2006*).

In the scope of the *Fostering International Accessible Learning Technologies* (*FAST*) project, whose main objective is to create a Learning Management System accessible to students with specific needs (students with impaired vision, students with impaired hearing, students with specific learning difficulties such as dyslexia, students with Asperger syndrome and students with physical disabilities), interviews were conducted with students with the specific needs identified to better understand the changing needs of how smart technology and learning management systems work and how to make them more accessible.

In this direction, information was collected through interviews with students with specific needs in order to collect information about habits of use of smart technology (e.g. computers, mobile phones, tablets), Web activity (eg. use of email, social networks, school platforms to support learning), as well as the main problems / barriers of accessibility found in these same activities.

DEMOGRAPHIC SAMPLE ANALYSIS

A total of 34 semi-structured interviews were conducted. The sample comprised of 18 females (53%) and 16 males (47%), aged between 19 to 29 (Figure 1).

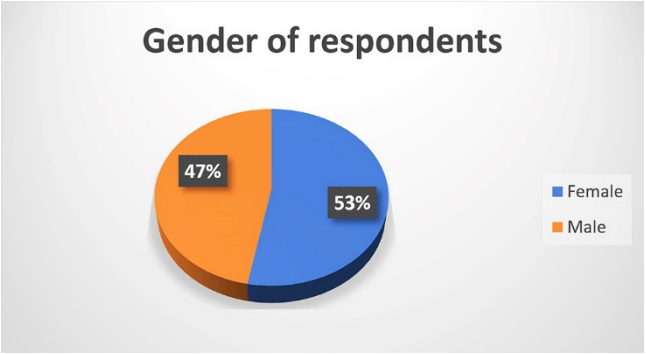

Fig. 1. Gender of respondents participating in the semi-structured interview

The sample disabilities types and number of participants are presented in Figure 2. Twelve students participated from Macedonia, 9 students participated from Portugal as well as from Lithuania and 4 students came from Denmark.

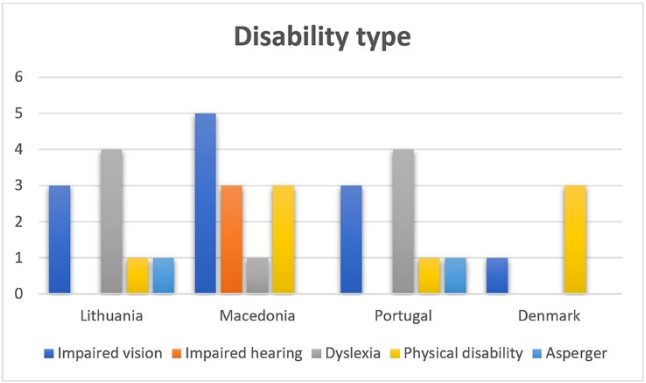

Fig. 2. Respondents disability type across countries

Figure 3 gives information regarding the percentage of respondents with different types of disability. The most prevalent group of students were students with impaired vision (35%), the dyslexic student consisted 26% of the sample, 24% of the students were

students with physical disability, 9% had impaired hearing and 6% were students with Asperger syndrome.

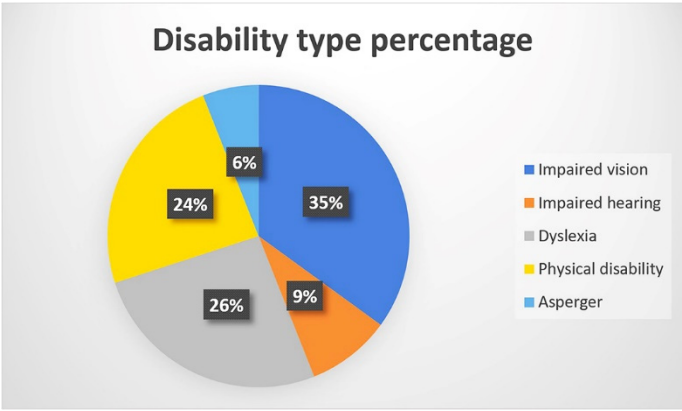

Figure 3. Percentage of different types of disabilities in the research

ANALYSIS OF STUDENT RESPONSES

The student responses were categorised and subcategorised. The categories and subcategories came from the bulk of information from the interviews. Each theme that emerged from the interviews was thoroughly analysed, which gave in-depth information regarding the investigated phenomenon. The data from the semi-structured interviews is shown integrally within every category (and subcategory subsequently). Excerpts from the interviews are shown below.

1. DAILY USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

A. Devices

Focus groups excerpts:

Lithuania

Student2 (blindness): "I use them often. Computer for me is work and studies, and free time, basically. Ninety percent of my time, probably. I spend a lot of time on the computer."

Student4 (visual disability): "I usually make phone calls. To the teachers, to the head of the study department. We frequently also write to each other using Outlook, but it is even more comfortable for me to communicate by phone. If it is stil working hours, I call because it is faster, if the time is not suitable for calling, then I write [e-mails] using Outlook".

Macedonia

Student1 (physical dysability): "I use smart technology [...] I use a laptop and a mobile phone and I have my own computer which I use for everyday e-mail communication."

Student9 (hearing impairment): "I use a mobile phone and a computer daily."

Portugal

Student4 (dyslexia): "Yes, smartphone, computer, tablet."

Denmark

Student3 (physical disability): "I had, for example, a ballpoint pen that functioned as a voice recorder and scanned the sound into the computer."

B. Calendars

Focus groups excerpts:

Lithuania

Student1(blindness): "As for calendars, then no, not really. And a planner, no. If I need to mark something, I just write it down myself. All those internet planners, no, I don't use them."

Macedonia

Student1 (physical disability): "I don't use a calendar".

Portugal

Student9 (Asperger): "No."

C. Library resources

Focus groups excerpts:

Lithuania

Student1 (blindness): "In the library itself, to use a library computer, no, I haven't [used it], because, like, really, I am not sure if they are accessible. Maybe, I think, there is one but I am not sure because I need a talking programme in the computer and I am not sure if it is there."

Student2 (blindness): "I take the literature I need from the library. I can scan it and… that's how I use it. It would happen so that you have to take a book, I have a scanner, so I would scan it myself. That is also difficult, because there are pencil markings, someone marked something and didn't erase it. My scanner is very sensitive to this, then the text is distorted and I start to not understand, I cannot understand what I am reading. It means I have to erase everything that is written in pencil."

Macedonia

Student2 (physical disability): "I sometimes use library online tools for research papers, when I need them for a course."

Student11 (impaired hearing): "I use it extremely rarely, almost not at all."

Portugal

Student6 (physical disability): "Yes, and usually Google Scholar."

Denmark

Student1 (physical disability): "I can only read through e-books, which resulted in me still missing 3 out of 5 books."

D. Website

Focus groups excerpts:

Lithuania

Student1 (blindness): "It can be [so that I use it] once a week, can be less, can be more. Depends on what I need. [...] It is accessible enough, I manage to find information. It is inaccessible when there are a lot of graphic things, graphic information, that is just in the picture or somewhere, because the programmes then wouldn't read the information off of those pictures and if everything is provided in a written form, normally, with links, then that is easier. And there are no pop-up windows, because then you have to rush to click on them and you can miss them or something until you find them. So, it is rather simple, without these complicated things."

Student2 (blindness): "I needed to look some time ago. To check something about the requirements for papers, how what paper has to look like. I think it was accessible, I forgot now. I think everything was ok there [...] You download it [timetable] and, say, it is spring semester of the fourth year. And it would be so that it is a table and it is, for example, archaeology, one column is the time and the other, the subject. For me personally, I don't know, maybe there is somebody else who navigates better, but for me personally and I heard that for others who are blind, it is not very comfortable to navigate that table. Maybe, for example, it is possible to upload separate documents, of, say, culture history. Well, so that there is a separate document for each subject."

Macedonia

Student1 (physical disability): "I visit the web-page of the Faculty once a month. I receive the information through the professors posts. The biggest problem I face is that the web page doesn't have all the options on the cell phone."

Student4 (impaired vision): "Honestly, rarely. I usually call my colleagues and get info. From the website I usually learn about

exams or administrative info. I encounter many problems while trying to access the website-the website is not at all accessible and it is impossible to connect it with the screen reader I use, the pictures do not have alternative texts and explanations which would simplify things for me as a person with impaired vision."

Student8 (dyslexia): "The webpage of the Faculty is not regularly updated and also the materials are not accessible for dyslexics."

Student9 (impaired hearing): "I visited the website always just because of one reason – to check the study program."

Portugal

Student2 (impaired vision): "On the web page I would like to see lessons recorded on video/audio and more info about workshops."

Student7 (Asperger): "Lots of information, few highlights of what's most important."

Student8 (dyslexia): "Many informations like calendars, curricular plans, information for written works, projects, study materials for the curricular units."

2. COMMUNICATION

A. Social Media

Focus groups excerpts:

Lithuania

Student6 (physical disability): "I communicate with other students on Facebook, discuss tasks and so on. When I cannot come to lectures, say, because of a surgery or my health getting worse, then we write to one another [with other students] on Facebook, that is how I know what is happening in class."

Student7 (blindness): "I use Facebook both for personal needs and we also talk and discuss with coursemates there. We have a Facebook group, so we share tasks there, talk about teachers, how to do the tasks that we've been given. Of course, I also write personal

messages sometimes for my coursemates because it is sometimes complicated to get something, so then I ask them to send me, share or scan some book, if they can, and so on. We use it for all kinds of communication."

Macedonia

Student1 (physical disability): "We use a Facebook group to communicate with other students and professors."

Student10 (impaired hearing): "I use Facebook and Instagram daily. I also use Facebook messenger to communicate with other students."

Portugal

Student4 (dyslexia): "I use Instagram and Facebook, but also Moodle to communicate with professors."

B. E-mail

Focus groups excerpts:

Lithuania

Student1 (blindness): "With teachers it's mostly e-mail. If there is a question, I have to write to them [...] so then I have to write via Moodle, but mostly it's e-mail. [...] we don't have some unified system, but somehow we share [materials among students]. Most often it is a common e-mail sent to all the students by the group leader."

Student6 (physical disability): "With teachers it's mostly via e-mails [communication] or meeting in person during their office hours. There are issues with this. Once it got really bad for me, my legs were swollen, I couldn't sit. And it was the exam period, during the winter. I informed all the teachers that I wouldn't be able to attend, sent the doctor's note. But not all teachers check the e-mail that is publicly available [on the website], so some of them failed me. I was very surprised at first, started finding out what happened. I even sent my dad to the University to ask what that

was. But finally, finally, I found the contact information of the coordinator for people with disabilities, I wrote to her and she gladly agreed to mediate between me and the teachers. So she wrote to them, found out how I can pass the exams individually and organised everything".

Student7 (blindness): "I have the University e-mail but it is not very much used, it's mostly general information that goes there. I have my Gmail that I use for everything. I got my e-mails from the university e-mail to be transferred, because Gmail is more comfortable to use, there I already know how to do everything in there. That other e-mail system can also be used, but maybe this is more of a habit. [...] Gmail is always on your computer, you're just used to checking it. And the university e-mail appeared only when I started studying, so, sometimes, it would be so that you forget to check it. So when I missed information about some test, then I went to the assistant in our institute and asked to do the transfer for me. [...] Most often, the group leader either sends the information by e-mail or upload it to the Facebook group. [...] I am consulting the supervisor of my final thesis via e-mail. We have only met in person once to discuss everything. Now everything is in e-mail. Then I'll have to upload it to some system, bet I don't know, I'll ask help from those in my group, so that it is all right."

Macedonia

Student1 (physical disability): "Professors should be more involved, to find more creative methods for information transfer, and also help the students find the most effective methods for content comprehension with the purpose to achieve higher levels of interaction between students while working in groups or during workshops."

Student10 (hearing impairment): "I use e-mail communication with the professors exclusively, I do not use social media to contact them."

3. INFORMATION AND COMMUNICATION SYSTEMS USED BY THE UNIVERSITY

A. Learning management system (Moodle)

Focus groups excerpts:

Lithuania

Student1 (blindness): "Everyone uses it, it's just that not necessarilly everyone renews or adds to the information that is there, and maybe just doesn't go there very often. [...] I think it's a useful thing, because there is sometimes certain information there, e-books or some lecture notes, slides or something. [...] So that we can read it, if it is from a book, so it is properly scanned. So that it is bright and there are no drawings or markings or anything. [...] Teacher just has to provide certain tasks in the Moodle system, give that clear information, what are the tasks and such. And upload exactly the kind of information that is required by the university regulations."

Student3 (hearing disability): "I ask others, my friends, for lecture notes and copy them [...] It would be easier for me. For example, when the teacher is showing something on Youtube, I ask to turn on the captions so that I can understand the words better. [...] Now there are no forums, not enough information, lecture notes are very brief. If there were more, I would understand better."

Student5 (physical disability): "If there was no Moodle or other e-learning resources, I think I would have to take an academic leave. At least at this time and in these studies. Because it is very hard to get in contact with teachers by e-mail. In my case, sometimes I cannot move. And then you have to wait a long time for an answer and you don't know whether you can do something or not. We also used to use a forum where the teacher discussed tasks. If we sent papers, then she would do an overview of all of them, what went well, what did not, so that we can correct our papers based on her remarks. It really made it easier and we didn't need to meet

additionally. She would also discuss evaluations in the forum if there very any midterm exams."

Student7 (blindness): "Overall, that learning environment, Moodle, is a very good thing. I just wouldn't want everything to be online. I think that communication in person with teachers and coursemates is also very important. It would be boring to be studying only online. Moodle is more of a supplement than the main thing here, I think. You can hear everything live, so to speak, but if you miss something, you can find it on Moodle. That would be very good."

Macedonia

Student6 (impaired vision): "I am not familiar with such systems. But a good platform is essential for the success of such a system as well as the professors themselves… they will have to adapt their teaching styles, their methods and techniques and incorporate them within this system."

Portugal

Student 5 (impaired vision): "More balance and systematization of the shared contents to have more balance between shared material; some teachers share YouTube videos, but lessons recorded on video / audio."

B. Other systems

Focus groups excerpts:

Lithuania

Student5 (physical disability): "Sometimes it could be a possibility to have online consultations, even using Skype. Now it is not so, I think you could communicate like that. […] And if there are various questions that you cannot explain not in person (because data is one thing but how you interpret it, is another), then that would make it much easier if you can register for a consultation not only

in person and then meet but you could also have some kind of conversation on Skype or using some other software."

Macedonia

Student1 (physical disability): "I believe we should use technology from a positive aspect for something useful, in this case to ease the access to information and tools for learning and research, for all students, especially students with dsabilities."

Student3 (physical disability): "For successful online teaching courses we need fast internet and everyday communication with the teachers."

Denmark

Student2 (impaired vision): "This means that I sometimes have been exposed and extended time on many tasks. In addition, I have a secretary system where another student can be employed to help with practical complications, such as figure descriptions, correction of task layout, etc."

C. Online learning

Focus groups excerpts:

Macedonia

Student4 (impaired vision): "Availability of materials in electronic form would simplify online learning. I am a part of this society, and I have the same rights as all others."

Student6 (impaired vision): "I believe that this is a great solution for humanistic and social sciences. It will simplify data research, there will be more online data, in that manner we could attend lectures from anywhere and not lose time in transportation to the facility. For persons like me, with impaired vision, if the platform is good, the access to lectures will be easier."

Student9 (hearing impairment): "For successful online courses for the deaf, we would need materials compehensible to deaf students and also videos in sign language right next to the text."

Portugal

Student7 (Asperger): "In the virtual school the explanation is succinct, given slowly, has images on the subject, and can be seen as many times as you want."

4. OTHER ISSUES

A. Physical environment

Focus groups excerpts:

Lithuania

Student1 (blindness): "In what concerns rooms, you learn them little by little. Maybe it would be easier if the number of the room was written also in Braille".

Macedonia

Student4 (impaired vision): "Unfortunately we face many problems: we don't have course materials in electronic form or in Braille, the Faculty is not accessible, even the city is not accessible, so I have problems the minute I step out of the house. Also one of the problems is the lack of professor-student one-on-one time."

Student12 (impaired vision): "There are many problems. There is a lack of materials in electronic form, lack of literature in general, problems of accessibility of public transportation... all the info from the professor is put out on one piece of paper in front of their offices, we need these things to be put online. Even the Faculty's web-page and the iKnow system are not fully integrated with the screen readers, so I literally have to beg people to to do things for me on these two platforms."

Portugal

Student2 (dyslexia): "No difficulties were found on the platform. Already the app considers that this could have more specific functionalities."

B. Reaction of university teachers

Focus groups excerpts:

Lithuania

Student3 (hearing disability): "Teachers maybe know. I remember the teacher during a test, she first said everything in words and numbers. Everyone wrote it down and I was the only one who didn't because I didn't understand anything. And then she came to me and gave me a sheet of paper with the tasks that I could copy. [...] Other things, there are no issues there, I just need to work more on my own and that is all. I find it easier to work alone than with a group. When one person is talking, then everything is clear, but if we need to discuss or do something together, it is complicated to hear several people at the same time. Then they write for me."

Student5 (physical disability): "I am very happy that people with disabilities get attention in this university. And that means a lot as I spoke with my coursemate who also has a disability. There is a human connection here, which is very important. It is very important to maintain that, that they speak with everyone individually and it's not just cold information sent out by e-mails."

Macedonia

Student1 (physical disability): "Professors have a crucial role. It is very important to compile the material, in what for it is being presented, how understandable and interesting for learning the material is, what are the assesment methods for the students etc."

Student3 (physical disability): "I think that these systems will improve the cohesion between professors and students and also there is a possibility for one-on-one mentorship."

Student6 (impaired vision): "The university professors should foremost be mentors and not lecturers. In the 21st century there shouldn't be professors that mechanically repeat/quote/paraphrase

their own or other scientific papers which are avaliable to all of us."

Portugal

Student2 (dyslexia): "eLearning is basically a teacher-student communication and sharing tool."

Student7 (Asperger): "There should be a script of procedures for teachers with a view to standardization as they make a multivariate use of the platform. There should be very small spots."

Student9 (dyslexia): "E-learning functions is basically an aggregator and facilitator of the interaction but it would be necessary to have a network like messenger."

The respondent's responses were divided into categories. Several categories were defined during the analysis phase:

1. Daily use of information and communication technologies;
2. Communication;
3. Information and communication systems used by the university;
4. Other issues.

Within the first category (*Daily use of information and communication technologies*) several subcategories were discussed among the respondents:

- Devices;
- Calendars;
- Library resources;
- Website.

Regarding the subcategory *Devices*, the respondents from all countries reported that they mostly use computers and mobile phones for their everyday communication. Some of them use additional

assistive technology (especially the students with impaired vision) which enables better communication with their peers of professors. Within the subcategory Calendars, all the responses pointed to the lack of use of calendars. Students prefer to use more traditional methods of planning rather than calendars. The use of Library resources subcategory showed a discrepancy in the responses. Students with impaired hearing and physical disability as well as students with dyslexia used library resources as well as online library tools. Unfortunately, students with impaired vision had problems with accessing library materials (written and online). Regarding the last subcategory within this category – Use of Faculty or University web-sites, the respondents mainly had negative experiences. The largest problem is for the students with impaired vision, especially if there is graphic information on the web-site and their screen reader does not read such information. The materials on the web-site are never accessible for dyslexics (example: specialized font for dyslexics, use of colored background and so on). All the problems students with disabilities encounter while visiting the Faculty's official web-site lead to less frequent attempts for accessing the respective web-sites.

The second category *Communication* is organized through the following two subcategories:

- Social media; and
- E-mail.

Students with disabilities most often use Facebook as a mean to get information regarding classes, lectures or tasks. Some of them even use Facebook to communicate with their respective professors. In the countries such as Portugal, Lithuania and Denmark, students use Moodle as a platform for communication with professors. Nevertheless, the most prevalent medium for communication between students and professors is via e-mail correspondence. The only issue that arises is the possibility professors not checking their e-mails regularly.

The third category *Information and communication systems used by the University* was the most delicate part of the research having in mind that Macedonia is the only country where students do not have access to platforms such as Moodle. Hence the following subcategories were defined:

- Learning Management System (Moodle);
- Other systems;
- Online learning.

Regarding the first subcategory the students in general asked for more balance and systematization of the shared content and agreed that the professors are essential for the success of such a platform and they have to adapt their teaching styles, methods and techniques and incorporate them in the Learning Management System. Students that use Moodle frequently believe that if it wasn't for Moodle they would have to take academic leaves. Sometimes Skype consultations are preferred rather than e-mail correspondence. Students from Macedonia believe that Online learning is a great solution for students with disabilities in humanistic and social sciences. In this manner students with disabilities could attend lectures from any geographical point. In the virtual school the explanation is succinct, given slowly, has images on the subject, and it can be seen multiple times.

The last category Other incorporates responses that could not be categorized under any of the other categories or subcategories. This category is consisted by the following subcategories:

- Physical environment;
- Reaction of University teachers.

The students with disabilities discussed the physical accessibility barriers they face. The students with impaired vision could benefit if the classroom number was written in Braille. The physical accessibility of materials as well as their online editions are also barriers for learning for students with disabilities. For the students

in Macedonia (in particular the students with impaired vision) the accessibility of public transportation as well as the physical accessibility of the University are a big barrier for their education process. The students believe that the role of the University professors is changing from mechanically repeating / quoting / paraphrasing their own or other research to mentorships and one-on-one communication and work. They also have a large role in making materials accessible before they upload them on the e-learning platform. This Universal Design of Learning (UDL) is crucial for the e-learning process and the effective Learning Management System operations.

5 Statistical analysis of the survey among high school students with disabilities

In the conducted survey, a suitable sample was assembled consisting of 65 examinees, aged 14-18. Table 1 and figure no. 1 show that 48% of the respondents or 31 were male, while the majority or 52% were female. Table number 2 shows the age distribution of the respondents: 13.9% are 14 years old, 5 examinees or 7.7% are aged 15, 16.9% are 16, while the biggest part, or 61.5% ,are 17 to 18 years old.

Table 1. Gender distribution of the respondents

Gender	N	%
Male	31	48
Female	34	52
Total	65	100

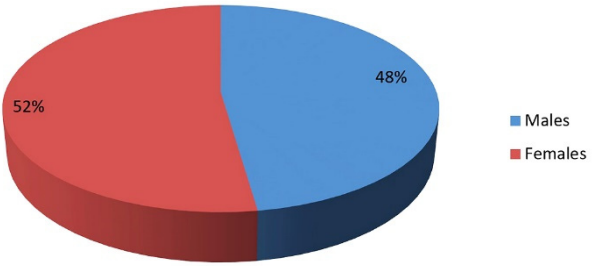

Figure 1. Gender distribution of the respondents

Table 2. Age distribution of the respondents

Age	Males		Females		Total	
	N	%	N	%	N	%
14 years	4	12.9	5	14.7	9	13.9
15 years	2	6.5	3	8.8	5	7.7
16 years	5	16.13	6	17.6	11	16.9
17 (18) years	20	64.5	20	58.9	40	61.5

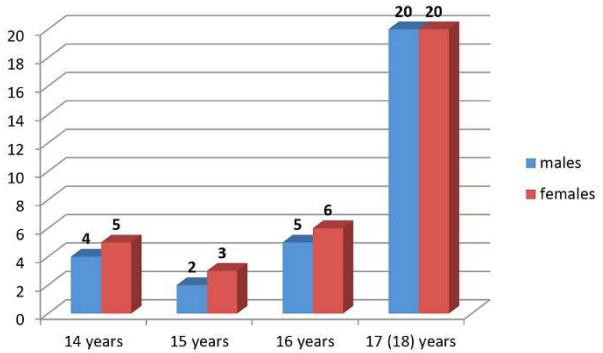

Figure. 2 Age distribution of the respondents

All 65 respondents answered the first question regarding use of smart technology. Table no. 3 shows a statistically significant difference in the gender responses; we notice greater use of smart technology in female examinees (91.2%, opposed to 61.3% in male respondents). In each category affirmative answers prevail; in the age group of 14 year olds, all examinees have answered they use smart technology, same with the examinees in the age group of 15 year olds. In the group of 16 year olds, 3 male respondents (10%) and 1 female respondent (3%) have answered that they do not use smart technology, while in the age group of 17 and 18 year olds, nine male and 2 female respondents do not use smart technology. The estimated correlation coefficient between groups indicates the existence of a weak connection r=0.9302.

Table 3. Distribution of the answers of the question "Do you use smart technology?"

Do you use smart technology?	Males		Females		df	Fisher exact Test
	N	%	N	%		
yes / age 14	3	10	3	9		
yes / age 15	3	10	1	3		
yes / age 16	1	2	4	12		0.007
yes / age 17	12	39	23	67		
Total yes	**19**	**61.3**	**31**	**91.2**	3	
no / age 14	/	/	/	/		
no / age 15	/	/	/	/		
no / age 16	3	10	1	3		
no / age 17	9	29	2	6		
Total no	**12**	**38.7**	**3**	**8.8**		

* r=0.9302

On the second question, concerning the most commonly used smart technology, there is no statistically significant difference regarding the gender or age of the examinees (Fig. 3 and 4). In both male and female groups of respondents, the most commonly used smart technology is the smartphone, 38% of the males and 40% of the females, next most used device is the laptop, 23% of males and 19% of females. The tablet is the least used device in the male group from the list that we have suggested, while in the female group there is equal use of tablets and standard PCs.

On the question on the frequency of using smart technology, we notice a proportionate increase of the usage frequency with the

increase of age, while there is no statistically significant difference between genders (Fig. 5).

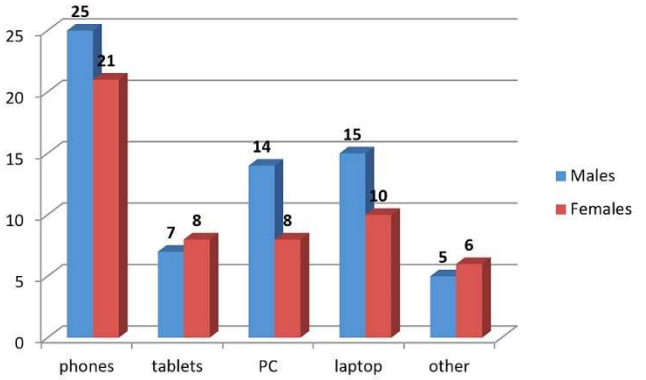

Figure 3. Most commonly used technology according to gender

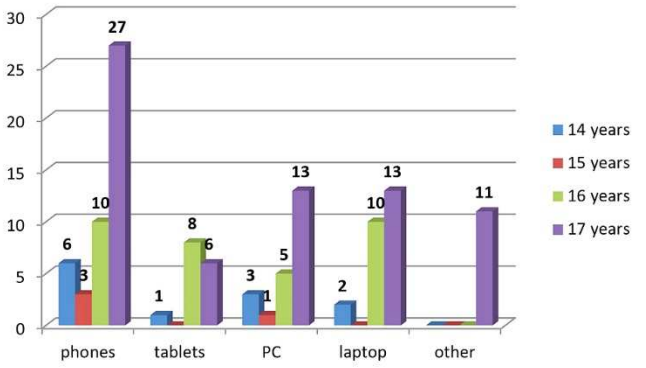

Figure 4. Most commonly used technology according to age

Regarding age, smart technology is most often used by the oldest category of examinees, 62% use it more than 4 hours per day and in the groups of 14 and 16 year-olds there is a noticeable increase in usage, but not in an interval longer than 4 hours per day (Tab. 4).

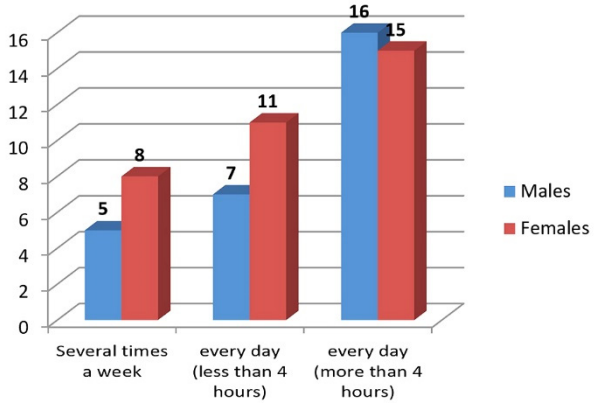

Figure 5. Frequency of using smart technology according to gender

Table 4. Frequency of using smart technology according to age

How often do you use smart technology?	14 years		15 years		16 years		17 years		df	p	χ^2
	N	%	N	%	N	%	N	%			
Several times a week	2	33.3	1	33.4	4	36.4	6	14.3			10.098
Every day (less than 4 hours)	3	50	0	0	5	45.4	10	23.8	6	0.0912	
Every day (more than 4 hours)	1	16.7	2	66.6	2	18.2	26	61.9			

On the question "Do you have your own computer", 17 males (54.8%) and 14 females (41.17%) answered affirmatively (Fig. 6), with no statistically significant difference where p is .270 and χ^2 is 1.2133. The answers between male and female groups show negative correlation among groups or r= -1 (Pearson coefficient of correlation). The analysis of the answers between different age groups does not indicate any statistically significant difference with p .639 and χ^2 1.689, but also there is no significant correlation among groups. The biggest percentage or 67% that have their own computer belongs to the age of 16 years, in other groups dominates the number of respondents that do not own a personal computer (Fig. 7).

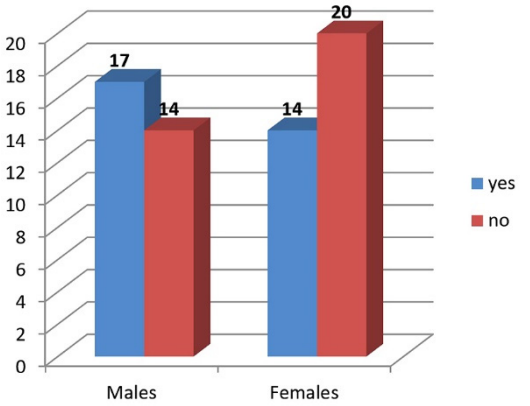

Figure 6. Owning a personal computer

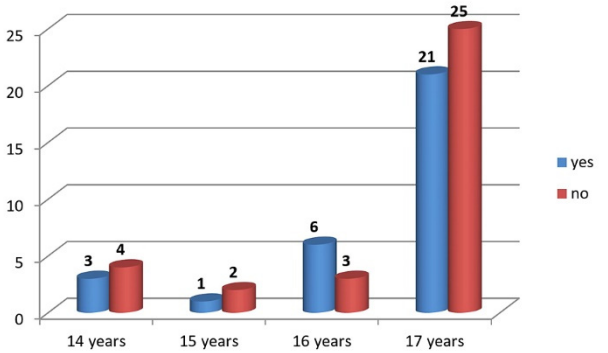

Figure 7. Possessing a personal computer, differences according to age

Regarding the use of e-mail, a statistically significant difference by gender of the examinees can be noticed (Tab. 5) 61.3% of the male respondents gave a positive response, compared to 32.4% of female respondents. There is no statistically significant difference regarding the age of the examinees; only among the 15 years olds all respondents use e-mail without negative responses. Other age groups show predominantly negative answers, with the biggest percentage of negative answers (72.7%) belonging to the 16 year old respondents (Fig. 8). Analyzing the frequency of use, most of the

males (64.5%) use their e-mail accounts several times a week, 29% use them every day but no longer than 4 hours, while 55.9% of the females use e-mail several times a week and 38.2% use them every day in a time frame of 4 hours.

Only in the oldest group there are examinees using e-mail more than 4 hours per day, 8.33% or four respondents (Fig. 9).

Table 5. Differences in using E-mail according to gender

Do you use e-mail?	Males		Females		df	p	χ^2
	N	%	N	%			
Yes	19	61.3	11	32.4			
No	12	38.7	23	67.6	1	0.0194	5.464

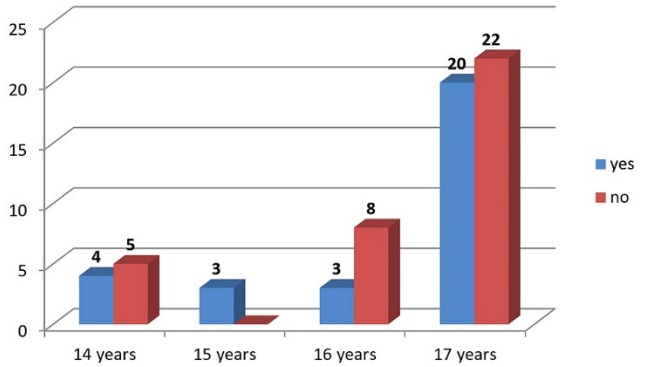

Figure 8. Differences in using E-mail according to age

The analysis of the answers on the question whether they practice online scheduling or calendaring reveals no difference between sexes; in both groups the majority answered negatively (71% in males and 67.7% in females, Fig. 10). There is a big statistically significant difference regarding the age, with p .0001, where in the

older categories of 16 and 17 year olds a presence of more negative answers is noted.

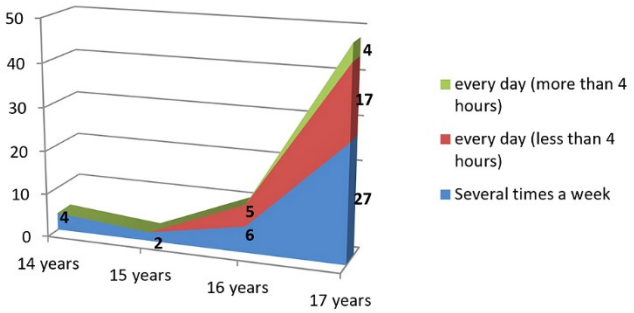

Figure 9. Frequency of using e-mail in relation to age

In the group of 16 year old examinees, all respondents gave negative responses, while in the 17 year old group, 77.8% gave negative answers. In the groups of 14 and 15 year olds, only one respondent answered negatively in each group, which may indicate promotion of education with greater availability of online materials (Tab. 6).

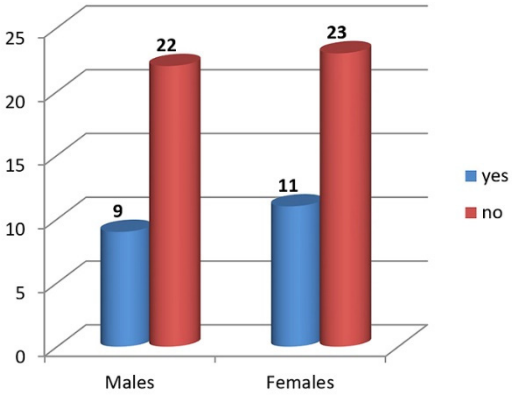

Figure 10. Do you practice online scheduling and calendaring; gender based distribution

Table 6. Do you practice online scheduling and calendaring?

	age 14		age 15		age 16		age 17		df	p	χ^2
	N	%	N	%	N	%	N	%			
Yes	5	83.3	5	83.3	0	0	10	22.2			20.664
No	1	16.7	1	16.7	8	100	35	77.8	3	0.0001	

Regarding the use of sites and social networks for peer communication, there are no statistically significant differences by gender: 64.5% of males and 79.4% of females use the sites and social networks (Fig. 11). According to the age of the examinees, there is a big statistically significant difference in the answers with p .000 and χ^2 22.742.

This question has completely opposite representation of answers compared to the previous one: the respondents aged 14 and 15 years were those who use online scheduling more, while the respondents aged 16 and 17 years show bigger tendency for use of social networks – 62.5% in the group of 16 year olds and 86.7% in the group of 17 year olds. There is one positive answer in the groups of 14 and 15 year olds (Tab. 7).

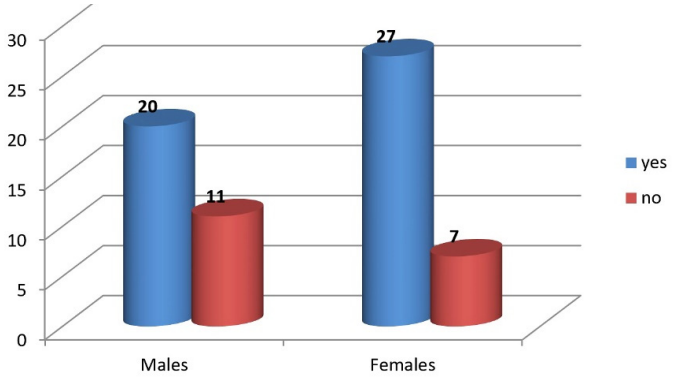

Figure 11. Gender distribution of the answers on the use of peer-networking websites

Table 7. Distribution of the answers
on the use of peer-networking websites

Do you use peer networking websites?	age 14		age 15		age 16		age 17		df	p	χ^2
	N	%	N	%	N	%	N	%			
Yes	1	16.7	1	16.7	5	62.5	39	86.7	3	0.0000	22.742
No	5	83.3	5	83.3	3	37.5	6	13.3			

There is no statistically significant difference regarding the type of most commonly used social networks; most commonly used are Facebook and Instagram, while LinkedIn is not used at all (Fig. 12). The oldest group – the 17 year olds – most often use Facebook (45% of the examinees), while in the other categories most commonly used is Instagram (Fig. 13).

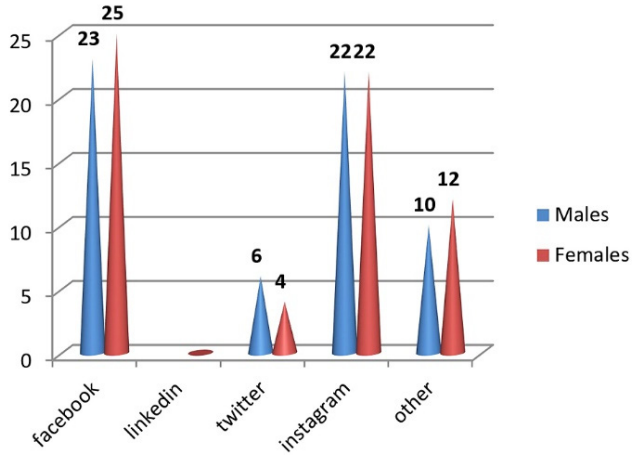

Figure 12. Gender distribution of most commonly used social networks

During the analysis of the use of Library online search tools for research projects / papers, we did not encounter a statistically significant difference regarding the gender or age of the respondents. Only 35.3% of females gave positive answers, while in males there were 32.3% of positive answers. In reviewing the responses by age, we notice that positive answers prevail only in the youngest

category: 56% or 5 respondents confirmed using Library online search tools, which is one more than the negative answers. The highest percentage of negative answers is in the group of 16 year olds, 78% (Tab. 8).

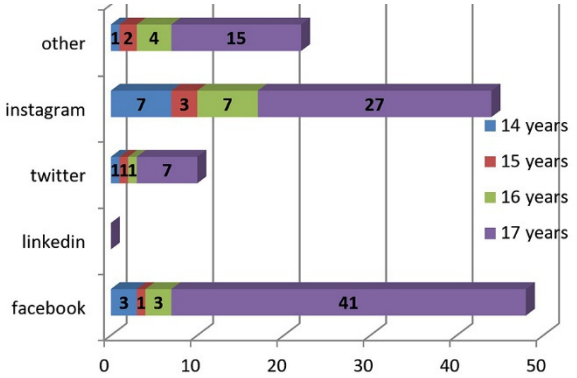

Figure 13. Age distribution of the most commonly used social networks

Table 8. Use of the Library online search tools for research projects / papers

	Males		Females		age 14		age 15		age 16		age 17	
	N	%	N	%	N	%	N	%	N	%	N	%
Yes	10	32.3	12	35.3	5	56	2	40	2	22	13	25
No	21	67.7	32	64.7	4	44	3	60	7	78	39	75

Regarding the way of internet communication among the peers, the majority of them (60%) communicate through social networks, 24.6% communicate by using Skype or a similar application, 15.4% use other type of communication, and no examine stated using a LMS as way of communication (Fig. 14). The distribution of the answers did not present a statistically significant difference by gender or by age. The results of the frequency analyses show that 63% or 41 respondents never communicate with peers, 26% or 17 respondents communicate several times a week, 8% communicate

every day in a time interval longer than 4 hours and 3% communicate every day, but no longer than 4 hours (Fig. 15).

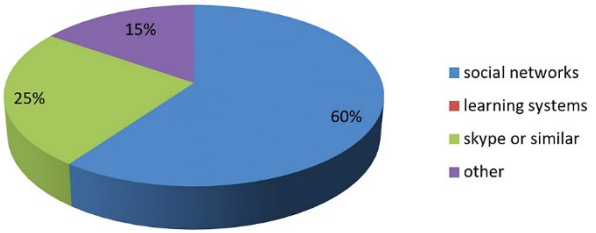

Figure 14. Ways of communication with peers

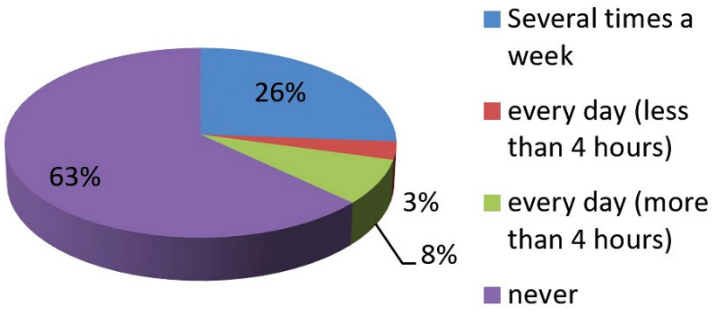

Figure 15. Frequency of online communication with peers

Posting documents or other materials online is very rare practice for all examinees: 71% of males and 56% of females have never posted a document online, while 19.3% of males and 32.4% of females post documents several times a week (Fig. 16). Regarding gender and age there is no statistically significant difference in all groups except in the group of 15 year olds, where the difference is one respondent; the majority of the examinees answered negatively, which means that they have never posted materials online to a group of their classmates.

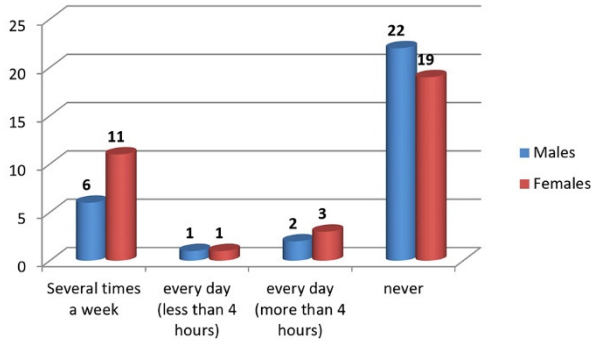

Figure 16. Gender based frequency of online document posting

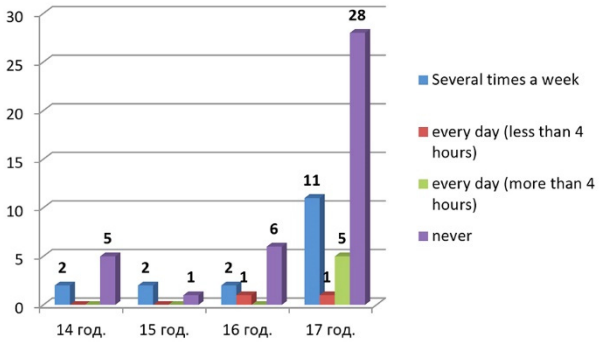

Figure 17. Frequency of online document posting

A gender-based statistically significant difference can be noticed in the answers to the question "How often do you receive or have access to documents or other materials online that other group members have posted?" with p .0006 and χ^2 17.145. The majority of the male examinees (71%) never practice reading or accessing materials posted online in the group, 13% do that every day for no longer than 4 hours, while 10% practice this several times a week. In the group of female respondents, the highest percentage (38%) do this several times a week, 29% access online materials every day for no longer than 4 hours, while 21% do not access online posted material at all (Tab. 9).

Table 9. Frequency of use of online posted materials.

	Males		Females		df	p	χ^2
	N	%	N	%			
Several times a week	3	10	13	38	3	0.0006	17.145
every day (< than 4 hrs)	4	13	10	29			
every day (> than 4 hrs)	2	6	4	12			
never	22	71	7	21			

A statistically significant difference can be noticed regarding the age of the examinees. In the youngest as in the oldest category, the majority of respondents answered that they have never accessed online-attached materials or documents. In the age group of 15 year olds, only one respondent stated accessing them several times a week, while in the group of 16 year olds, 56% answered that they work with online materials every day, but for less than 4 hours (Tab. 10).

Table 10. Frequency of using online posted materials, differences by age.

	age 14		age 15		age 16		age 17		df	p	χ^2
	N	%	N	%	N	%	N	%			
Several times a week	2	22	1	100	1	5	12	32	9	0.0051	23.501
every day (< than 4 hrs)	2	22	0	/	10	56	2	5			
every day (> than 4 hrs)	1	11	0	/	0	/	5	14			
never	4	45	0	/	7	39	18	49			

Regarding the frequency of visiting the school / institution web page, the majority of the examinees (67.7% of males and 50% of females) answered that they have never visited the web page, while 22.5% of males and 32.3% of females wrote that they visit the web

page several times a week (Fig. 18). By age, 67% in the youngest group answered that they visit the web page several times a week, while 2 respondents never visit the web page. In the age group of 15 year olds, three examinees have never visited the web page, two visit several times a week, while in the age group of 16 year old, an equal number visit the web page several times a week or have never visited the page – 4 respondents in each category. In the oldest group, 63% of examinees have never visited the web page (Fig. 19). Seven respondents answered the question "what kind of information do you usually find on the web page?" by mentioning info on different events, excursions, celebrations, 3 respondents answered that they are informed about their activities, the timetable, and the contact details of the professors, while one respondent answered that the information is usually school news (Fig. 20).

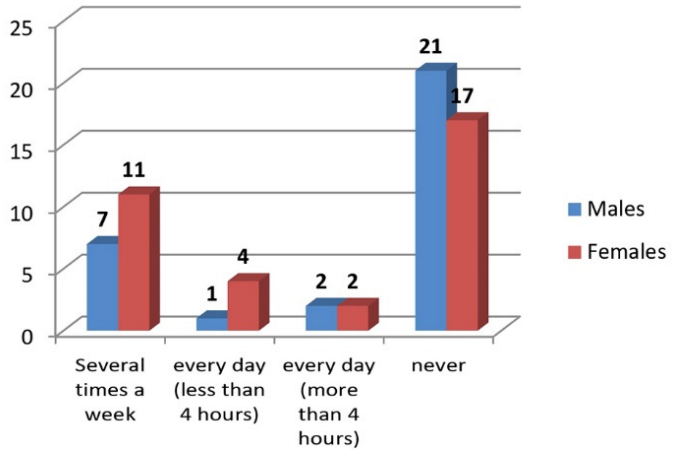

Figure 18. Frequency of webpage visits

The question "what kind of problems do you encounter when visiting the webpage?" was answered in different ways. 5 examinees answered that they cannot find any relevant or updated information, 4 examinees pointed out that they have a problem with the

design of the web page, while one respondent answered that he has problems finding any information that he needs.

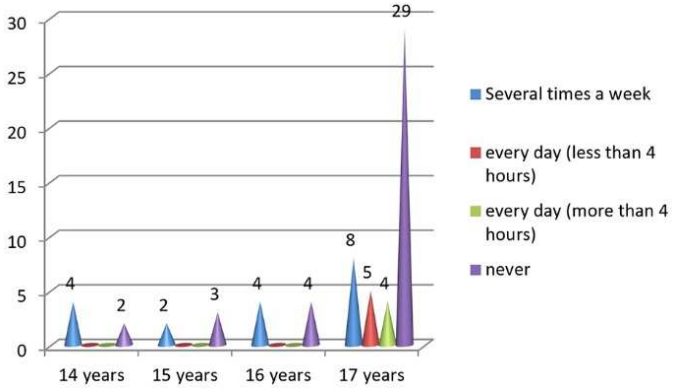

Figure 19. Frequency of webpage visits according to age

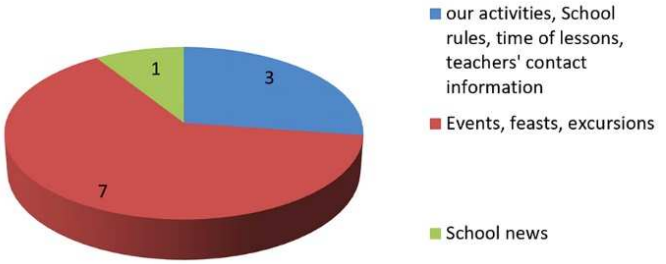

Figure 20. What kind of information do you usually find on the webpage?

As to what kind of info they would like to find on the web page, 2 respondents asked for more school news, 4 respondents asked for info on events and excursions, while 4 requested more frequent updating of the info (Fig. 21).

70.8% of examinees answered that online learning is effective; negative answers were given by 18.5% of the examinees. Regarding

this question, there is no statistically significant difference and variations in the responses by gender or by age (Fig. 22 and 23).

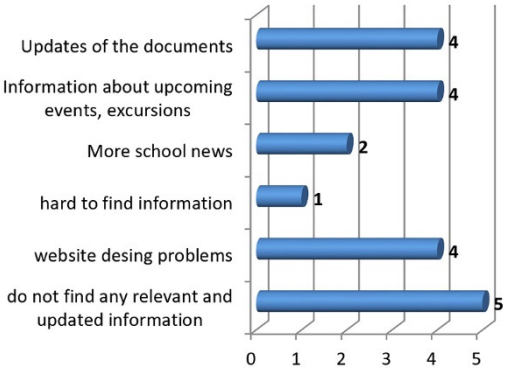

Figure 21. Contents the web page should contain and problems faced when visiting the web page

The majority of the responses is affirmative in all categories. For more effective learning, 4 examinees stressed the need of sign language interpreters and school platforms for online learning, one respondent asked for help and support by the professors, while 6 respondents needed updated information on the learning system platform.

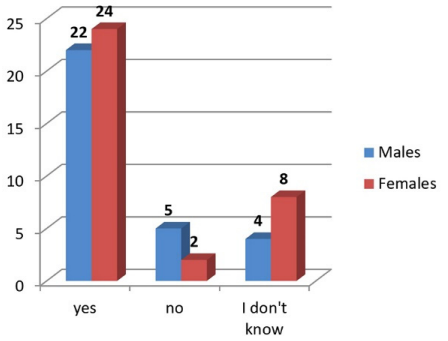

Figure 22. 18. Do you think online learning is effective? (answers by gender)

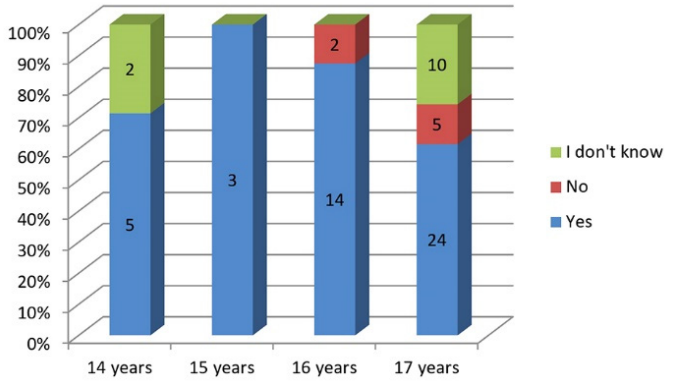

Figure 23. Do you think online learning is effective? (answers by age)

The majority of examinees (69.2%) consider that an online learning system will have a positive impact on the professor-student interaction, while 27.7% think it would not have any impact. Regarding gender and age, positive answers prevail. This kind of distribution does not indicate a statistically significant difference in different categories of examinees (Fig. 24 and 25).

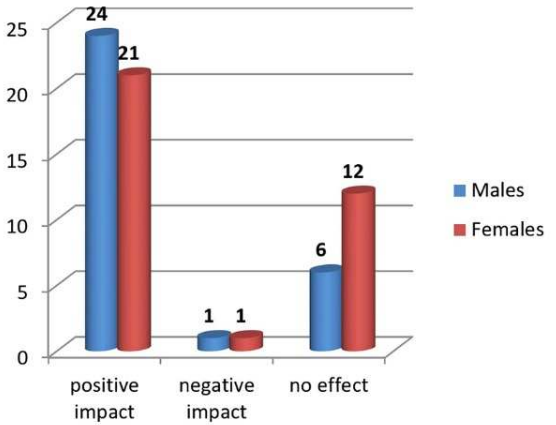

Figure 24. The impact of the online learning system on professor-student interaction

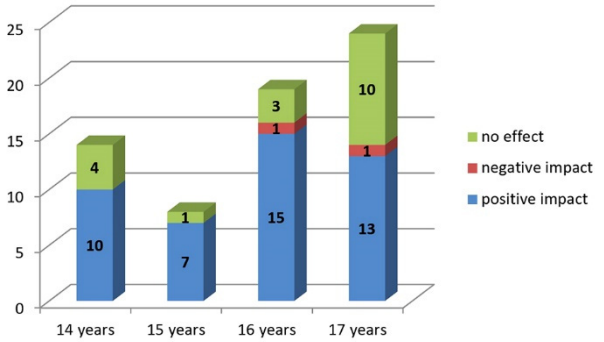

Figure 25. The impact of the online learning system on professor-student interaction, answers by age

Regarding the impact that an online learning system would have on the learning process of the students, the highest percentage, or 45%, consider that it will have moderate impact, 25% consider that it would not have any impact, 21% consider that the system will affect their learning process very little and 6 respondents or 9% consider that the system will have big impact on their learning process (Fig. 26). Gender analysis indicated that the opinion about moderate impact prevails in both sexe; it is also the dominant category in almost all age groups; only in the group of 15 year olds, two examinees answered that it would not have any impact, and one respondent pointed weak impact.

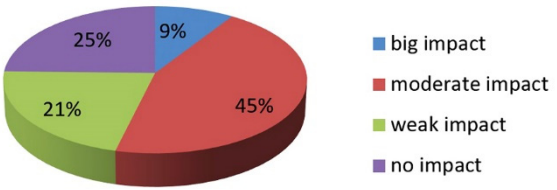

Figure 26. Degree of impact of the online learning management system on the learning process of students

When talking about the problems they face during studying or learning, 8% stressed the inaccessibility of lecture rooms, while 21% mentioned consultations with the professors; accessibility of learning materials is a problem for 31% of examinees, and 40% answered that they cope with other problems (Fig. 27). Regarding age, all categories except the oldest one, the 17 year olds, stress inaccessibility of material as a main problem they face, the oldest group opting for other problems.

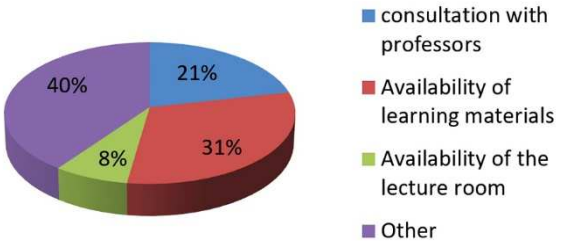

Figure 27. Problems they face during their study

6 Analysis of the IT expert focus groups and recommendations for LMS creation

It should be noted that the difficulties associated with different types of disabilities are individual (each case is a case of its own), and the deficiencies are not static (they are evolutionary and may have positive or negative evolution). In general, the solutions that are placed are always tailor-made, and the system should be sufficiently intelligent or flexible enough to adapt to the user, not the other way around. The idea of the tools dynamically adapting to the user profile is something that has been pursued for many years, that is, have a solution that reads the user profile and return an entire adapted interface.

However, given the difficulty of finding Universal solutions, relying on tools where the learning curve for its full utilization (including its personalization) is low, seems more realistic. So, the alternative is to create a solution that allows to respond in a global way, but it must also be adaptable to each case specific needs, not something typified, static and immutable in time. It would be interesting to develop solutions that could simplify the use of the tools, through the design option that allows simplified customization according to needs (including funds, colors, font, menus and their order of presentation), and / or contextual needs (It should be noted that Moodle already has some of these accessibility solutions available, however, often the way of personalisation is not simple).

Furthermore, in the broader sense of inclusive education, cultural and temporal adaptation is also evident. It should be noted that adaptation to the set of symbols and meanings of the target population and generation is essential.

In sum, it should consider the characteristics of the user broadly, going beyond the instrumental accessibility of the tool.

On the other hand, support tools that only work in an integrated way with another (LMS), also limit their use in terms of extended learning (e.g. it does not allow its use in learning contents made available by other means, such as email). Thus, it seems always preferable to adopt / think of broader solutions / tools, which function offline or from the browser and not only on the platform, because this is also a limiting form of the deficiency.

Four focus groups with 10 IT experts were conducted in the four respective countries – Macedonia, Portugal, Lithuania and Denmark (40 participants in total). The participants had experience in the area of Learning Management Systems, Moodle, accessibility issues and so on. The data of the focus groups is given integrally for all four focus groups mainly because the answers overlapped in all research areas.

1. APPROACHES FOR ADAPTING TEACHING MATERIAL ACCORDING TO THE TYPE OF DISABILITY

A. Visual

(text readers, description of visual material in text, black text, suitable font, contrast, audio recordings)

Focus groups excerpts:

"I had the most encounters with visual [impairment]. So there are either simple tools, which read the text from the screen, or, if there is a picture, it should be described as precisely as possible, in order to know what's there. Other [visually impaired people] apply very high contrasts. [...] visual [materials] are not [adapted]."

"Windows has a standard Speech reader. And it reads."

"Windows has a screen reader, but sometimes it does a lousy job. It's not good for any language. And sometimes it happens that the screen readers read everything, including the website code; that makes them unusable."

"[...] an additional plugin, using which you can make an examination in such a form that when the student records his answer, maybe after listening to a question that is also recorded. Then he can push 'record' in his own Moodle system and enter his answer and give it to the teacher."

"Smart technologies show suitability for people with reduced vision, given the ease of using extra support software, namely screen magnification or screen readers."

"So far, we mainly improvise and use what's available on the internet, preferably for free."

B. Hearing

(subtitles, providing material not in audio but in visual format)

Focus groups excerpts:

"So for those [with hearing disability] audio information is not given, something that they may not hear."

"Because of the hearing – again, subtitle the lectures. If the lectures are subtitled, one can successfully learn. [...] I would consider this kind of course ideal – students want to see lecture slides, know them and later they understand from the teacher's lips, what he is talking about."

"However, for students with auditory deficit, this communication pathway is more difficult, since they tend not to be bilingual. Thus, the task of communicating in writing is more difficult."

C. Mobility

(video conferences, distance learning, video recordings, audio recordings)

Focus groups excerpts:

"Since everyone was working with their own computers, so… delivery of the material was basically more or less standard. I do not remember that something would have been very special in this case."

"If it's a physical disability, having all the tools that we can provide now, that is, video conferences, and the Moodle LMS, then the student really can study without leaving home […] I would like to have a video recording after each lecture […] Say, one student had to miss the class, and then there's at least something."

"An additional plugin, using which you can make an examination in such a form that when the student records his answer, maybe after listening to a question that is also recorded as an audio. Then he can push 'record' in his own Moodle system and enter his answer and give it to the teacher."

"In case of motor deficiency, the main problem is solved outside the LMS. Tools such as Trackball, Magiceye (used in the case of people who do not have control of the movements of the head) and / or Magickey (to users who have more difficulties in controlling the mouse) can prove essential to the use of the new technologies by these students (Magickey Lda, 2016)."

2. ADAPTATION

A. Projects

Focus groups excerpts:

"I had to make a training course about computer literacy for people with disabilities but there were none with visual disability. In that case, there were more those with mobility, kinetic issues".

"Several of the participants exercised functions to support the accessibility or management of Moodle platforms in their respective

schools. The work carried out by a participant in the development of the Musicbraille project stands out. This software is designed to create favourable conditions for the musical learning of people with visual impairment that are equivalent to those of the normal vision colleagues, through a tool of transcription of musical scores for braille".

"Another tool is not specifically related to educational software for persons with disabilities, but rather to the adaptation to the Portuguese language of an international tool that allows to evaluate and train the level of digital literacy, which includes the specific competencies of digital accessibility literacy."

B. Usage

Focus groups excerpts:

"You can change the template, apply contrasting colours, so this then shouldn't be [an issue], but then, all other issues are as they are [not being solved] [...] teachers would complain that the system is very complicated to use. So, we wanted to make it simpler, it wouldn't be much different from the older [version] [...] it turned out that the older [version] is more contrasting and can be adapted [to those with visual disabilities]."

C. Differentiation

Focus groups excerpts:

"I still think that we should make distinctions between different disabilities."

"If you provide the same content in video and text and you don't want to show a certain part to [people with] a certain disability, then that is a problem that you cannot differentiate without knowing what to show to whom".

D. Opportunities

Focus groups excerpts:

"If the teachers were having their lectures recorded in video [...], Braille script, if those lectures are recorded and subtitled in Braille or, say, there was an interpreter in the corner [of the screen] to interpret, then that material would definitely be useful [...] as for hearing, again, subtitle the lectures. If the lectures are subtitled, they can easily learn."

"Video materials, I would say, is the most important thing. It is important that it would somehow [be] portioned, not in videos that are an hour or two long. Really, students don't watch those videos, there is no point to them. Short records and that's it."

"There is evidence of the need to raise awareness of the production of accessible content, following the principle of recent "Design for All" guidelines, as well as Web Accessibility Initiative.[1]"

3. SYSTEMS

A. Current situation

Focus groups excerpts:

"In Lithuania the main one is Moodle, because all the universities and colleges use it, it is also widespread abroad [...] it is a very wide community, it is an open source software package [...] Starting this year we started using Office365, Microsoft Teams, so now we have video conferences, and communication, and lecture recording, Moodle has really become the place where there directions to certain sources [...] for example, in the Faculty of Medicine precisely, they are communicating and all lectures and consultations happen via video conferences".

"It's not only the LMS itself, most often Moodle, that can be resolved with various additional tools and plugins [...] We [administrators]

[1] https://www.w3.org/WAI/fundamentals/accessibility-principles/

do it when, say, teachers ask for something or we decide and look for something that could be beneficial for students with disabilities. Then we install that plugin into the testing version, we check if it works well, then we put it into the real Moodle app and then we give information to the teachers that there is a particular tool that can help, say, make audio records. And then the students [...] [for example] can provide their answers without writing, but, say, by recording their voice. [...] We put this information on our website about Moodle possibilities, [students] can ask us, they can ask teachers, teachers can then communicate the possibilities to them."

"First, it is necessary for developers, programmers to become aware of and program and develop things well from the point of view of the code, so that the fundamental characteristics needed (for example, a screen reader to be compatible).[2]

The need to work on support tools is also considered. Particularly for Moodle, the suggestion was to have a tool that analyses the upload documents and help content producers, as well as alert the, to the situations in which the accessibility parameters were being violated for the contents that are loaded (similar to how word has check assessment). That is, the tool itself should be able to give the user feedback on the quality of the content that is being placed on the platform.

Second, there is evidence of the need to raise awareness of the production of accessible content, following the principle of recent "Design for All" guidelines, as well as Web Accessibility Initiative.[3]"

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[2] https://www.w3.org/TR/2017/WD-wai-aria-practices-1.1-20170628/

[3] https://www.w3.org/WAI/fundamentals/accessibility-principles/

B. Other opportunities

Focus groups excerpts:

"There is e-Tutor, commercial ones – Blackboard (which is noteworthy, but very expensive, it's widespread in the US), Microsoft have LMS365."

"There is one, LMS SAKAI. As far as I know, a lot of institutions in Europe are now switching from Moodle to this SAKAI."

"SAKAI may be an alternative, as it's open source. Moodle is free, too. Blackboard and other commercial solutions – as offered by Microsoft or Adobe, for example – would be all but impossible in Macedonia, mainly because of their steep pricing."

4. STIMULUS TO ADAPT

A. Teachers

Focus groups excerpts:

"If the teacher wants to, they can make good courses with lots of students engaged. Again, if the process is active and inclusive, with lots of surveys and discussions, and quizzes, video conferences – I consider such courses successful. [...] I would like to have a communicative teacher. If I write a question, I do not want to wait and answer for a week. [...] It is important to submit suitable material. [...] Moodle is just a tool where all the materials are uploaded. But it all depends on how the [teaching and learning] process is organized, depends on the teacher. In my opinion, the tacher is more important that the platform itself. Everything else can be organised, can be done."

"The most important thing is that the teacher knows what tools we have in Moodle, how to use them, that is exactly what we must emphasize when [creating] some kind of scenarios. [...] Probably teachers have very few students of this kind, so maybe they discuss

exams and other tasks individually, even without using Moodle or any other LMS."

"The development of digital literacy is essential, being recommended the European framework for the Digital Competence of Educators.[4]

This work is the basis of which the (above-mentioned) tool that allows to evaluate and train the level of digital literacy, which includes the specific competencies of digital accessibility literacy.[5]"

"In practical terms, it is suggested that teachers use multiple means of representation for the same content, for example by image, text and audio simultaneously.

Have sensitivity to the accessibility of communication in general, through the development and availability of accessible content (e.g. provide caption for images, graphics and / or tables), upload content in PDF format in order to facilitate compatibility with Optical Character Recognition (OCR)."

B. Quality

Focus groups excerpts:

"Students should receive materials of the same quality in both distance and on-site learning."

"LMS gives nothing [doesn't do anything], we have to talk about the preparation of study material."

"It depends on the digital literacy they have, the knowledge about support tools, as well as the barriers that the tools themselves impose. In general, it is considered that it is easy for people with disabilities to acquire skills in terms of basic information to work with e-learning tools."

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[4] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/european-framework-digital-competence-educators-digcompedu

[5] https://ec.europa.eu/eusurvey/runner/DigCompEdu-S-PT

C. Consulting

Focus groups excerpts:

"There is the default Moodle version that we download. [...] if we have a good consultant who tells us what needs to be done, then yes [we can adapt it]."

"I had [...] a consultant who instructed me on how the webpage should look like. What are the requirements, contrasts, font size, changes and so on... then it was very simple for me."

"We have practically no consulting. Noone offers any. Only a handful of faculties use anything resembling a LMS, and with no dedicated support team, professors and students are left to themselves. Hence the negative attitudes and slow acceptance."

"From the teachers' point of view, the main difficulties relate to adequate digital literacy. Adequate training emerges as a fundamental need; however, the high number of functions and lack of time often makes it difficult to acquire these specific skills and / or their usefulness in a timely manner. On the other hand, also the necessary adaptation to specific needs often acts as a limiting factor for other students, so that a duality of needs is often found.

With regard to the students, the difficulties encountered vary according to their own deficiency, and are in symbiosis between the web page basic concept that and the content.

Students with visual impairment often encounter compatibility problems with the platform itself and / or content with the specific support tools (magnifiers or screen readers). There are also problems related to the tones (background) and contrasts adopted, since they may make accessibility to people with reduced vision difficult.

In the case of the deaf, it is evident that there is a need for compatibilisation of the tools with the specific need of auditory deficits (since these students are typically not bilingual, there is an added

difficulty in having accessibility). Already in the case of neuro diversities, the problems found are not so much in the LMS, but in their contents. In case of motor deficiency, the main problem is in the access to the computer and therefore, outside the LMS.

Finally, in general, if the content made available is not accessible, all other difficulties are increased."

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