UNIVERSITY OF HRADEC KRALOVÉ

FACULTY OF INFORMATICS AND MANAGEMENT

DESIRABILITY AND DISCOVERABILITY OF E-LEARNING STUDY PROGRAMS

BACHELOR'S THESIS

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Confirmation

I do confirm that I wrote the Bachelor's thesis myself, using only the listed bibliography.

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Abstract

The aim of this thesis is to conduct a qualitative research that investigates the general awareness and discoverability of electronic learning. Moreover, it emphasizes on measuring the cognitive load that is required by the students in order to search and find an online study program.

In the first part, evidence of the growing cost in regards to higher education is presented. Additionally, E-learning is defined and its history is introduced, showcasing its evolution over the years. Subsequently, its advantages and disadvantages are analyzed and compared to the traditional way of studying.

In the second part, the study's purpose and recruiting criteria are presented in detail. The subjects of this study were five graduate students who majored in various academic fields and undertook the formative research plan which included a pretest personal interview, a usability test, a debrief and a system usability scale survey.

In conclusion, the study reveals that the participants feel that they overpaid to receive higher education, the online search for Master's or PHD degrees is tedious, most of the websites that belong to accredited universities do not adhere to the design principles that promote discoverability and usability, the dedicated websites for searching e-learning study programs are usable, but not being used and the E-learning platforms have well designed systems. Ultimately, a student persona is created in order to provide a fictional, but very realistic description of a typical or potential user of e-learning.

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Introduction

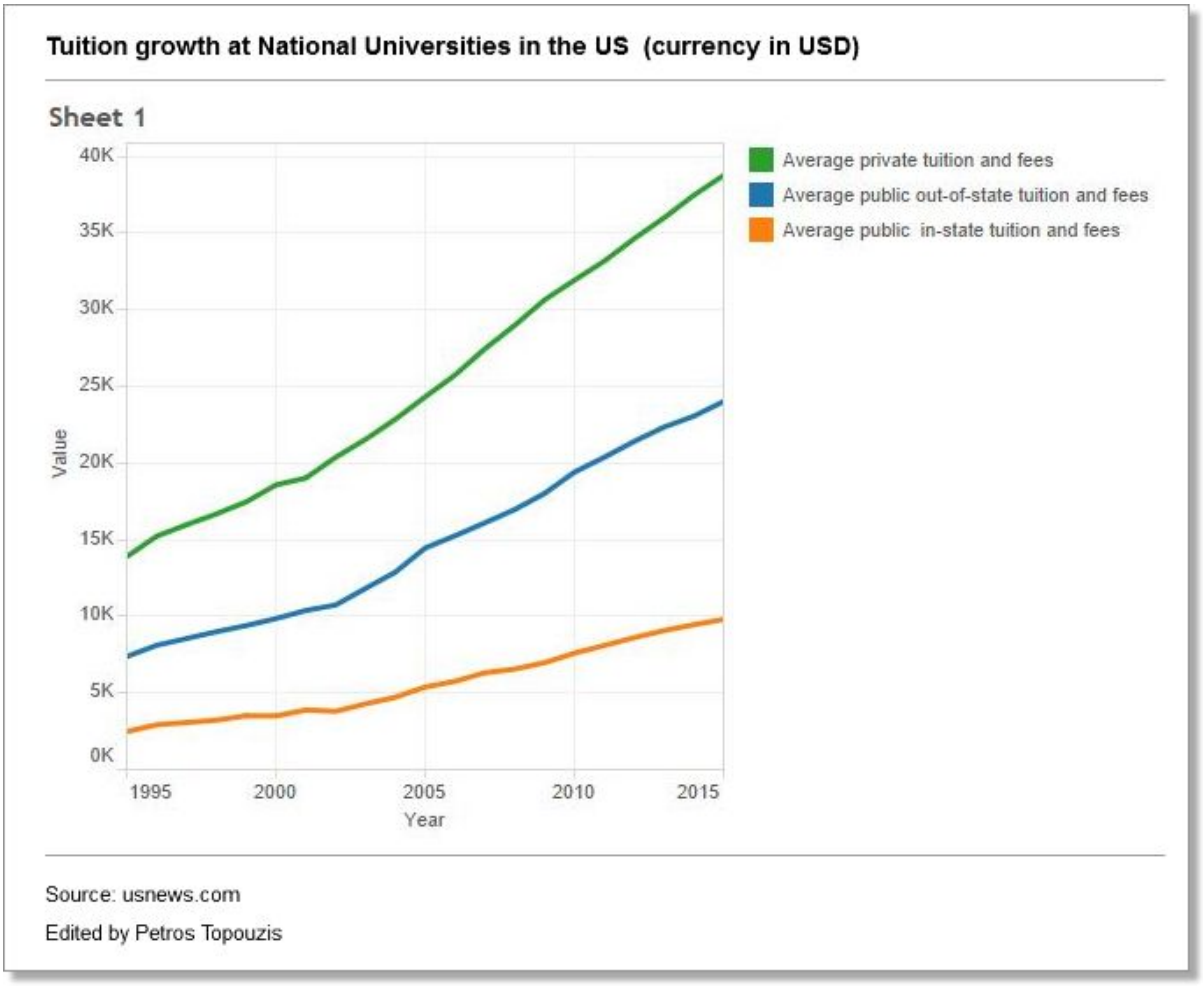
The perceived success model in the modern society consists of several levels. The first one is to secure a desirable job which will provide a stable income. This job will oftentimes determine the career path that the person will follow throughout his life and will have a direct impact on the person's personal life, as well.

The aforementioned stable income will satisfy the needs of that person; both basic, by directly spending the income (purchasing food and having secured a place to live) and psychological, indirect benefits of income (sense of achievement, determination and being able to establish relationships) (McLeod, 2017).

In order for a person to be able to acquire a job and kickstart his career the required theoretical and practical skills must be gained. As a matter of fact, the education received during high school is insufficient by itself. Thus, college education had to be invented and its intention was to specialize the students in a particular area, by providing them premium knowledge in respect to their study field.

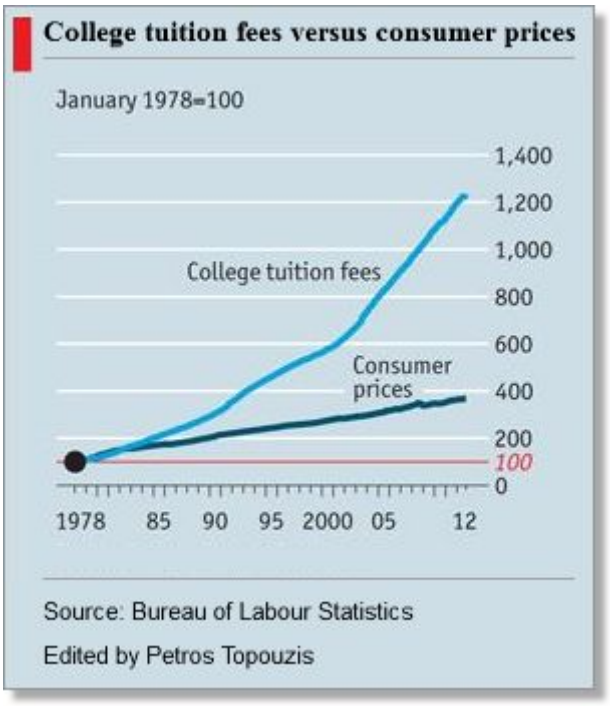
When a product or service is greatly needed, its supply rises accordingly. Qualitative supply (for instance being educated in some of the top class universities) has become very expensive and a chasm in the foundations of modern society has been created. At the same time, the mediocre and lower class universities have also increased the tuition fees, making it even more difficult for common people to study.

Let the general cost of tuition fees in the United States from 1995 until 2015 be presented and how it has exponentially increased in those years. It has to be stated that the salaries have also been increased, but in no case at this rate. In addition, even though the poverty level may have also been decreased in most of the civilized countries, the middle class has been shrinked.



Another significant factor when it comes to education is the cost of living. This corresponds to the total amount of money that the student has to pay for accommodation, transportation, food, clothing and entertainment (investopedia.com, 2017) during his studies.

Furthermore, it has to be taken into consideration that the cost of university-level education per student has risen by almost five hundred percent more than the rate of inflation since 1983. As a result, education has become less affordable and the amount of debt that the students have to be burdened with is being increased by each passing year (Heller, 2012). Taking into account all of those factors one can comprehend that studying can be quite expensive.



Technology itself, globalization and modernization meant to be the disruptors of that monopoly providing many alternatives to the students. One of these alternatives is electronic learning which allows students to study using the internet through various mediums (electronic devices) (Sener, 2015) and will be further analyzed in the next chapter.

Electronic learning is a service that people could choose in order to receive a product; Let the product be defined as formal higher education of any type. The very existence of electronic learning does not inherently impact its usefulness. A service is useful when it is simultaneously utile and usable (Nielsen, 2012).

The main purpose of this study is to investigate the general awareness and discoverability in regards to electronic learning. Moreover, it will emphasize on measuring the cognitive load that is required by its users in order to complete the first step of taking an online degree. Cognitive load can be defined as the total measurable amount of mental processing power that a user needs in order to achieve his goals, when interacting with a system. It directly correlates to the system's discoverability and ease of use (Whitenton, 2013).

A qualitative research composed of three parts will take place, using formative research methods. The first part will be a personal interview with each participant which will collect information in regards to their general knowledge and expectations of e-learning. Subsequently, the users will be asked to test the most commonly used digital system; the Internet and the e-learning platforms that are designed to function within it.

A series of tasks will be presented and required be performed by the participants, while the study administrator will be taking down notes and recording the procedure. Thereupon, a debrief based on the tasks previously performed is going to be conducted. Finally, a system usability scale survey will be presented to the participants, which will have to be completed. Therefore, the goals of this qualitative are to answer the following questions:

- ❏ How satisfied and confident are the students with their current skills and knowledge?
- ❏ What is the awareness level of e-learning?
- ❏ What impacts their awareness level and how?
- ❏ Is e-learning desirable and why?
- ❏ What are the advantages and disadvantages of e-learning?
- ❏ Are the students able to find what they are looking for when searching online?
- ❏ How quickly can they perform the aforementioned search?
- ❏ How effectively can they search?
- ❏ Do the various systems support the user's actions?

The information that was previously collected will be transformed into actionable intelligence. Actionable intelligence can be defined as refined information regarding a specific area, which can be used in a practical way by its users or other interested parties (dictionary.com, 2017).

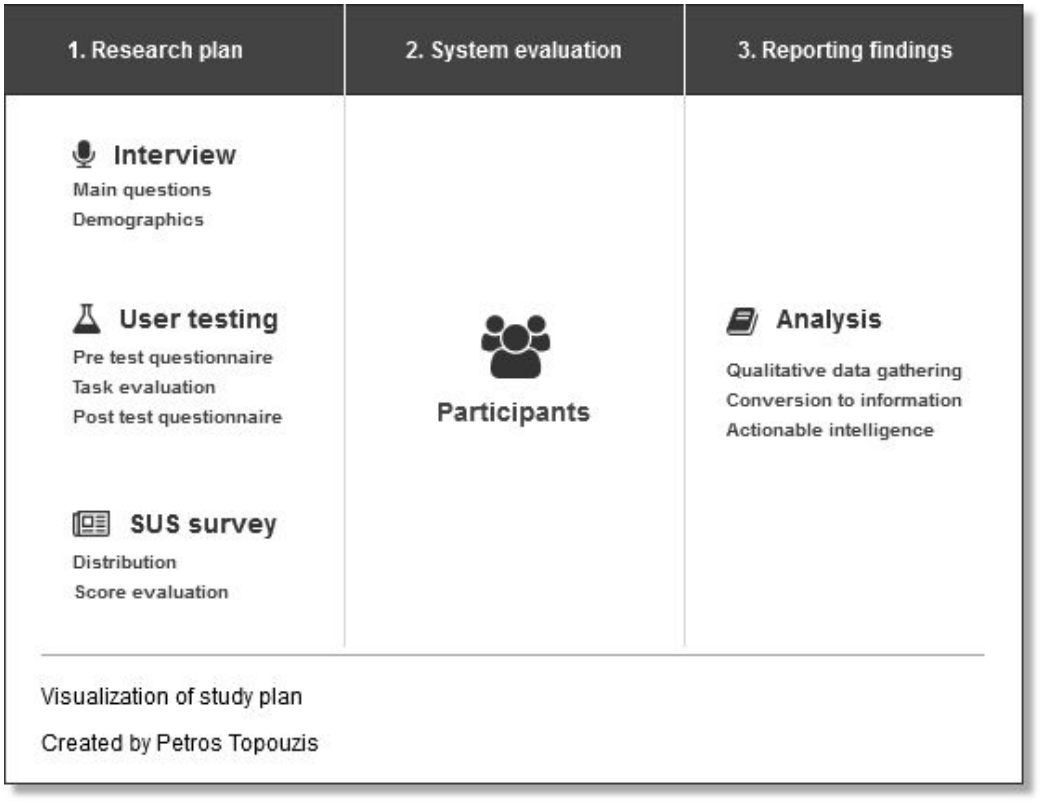
It has to be stated, that due to the nature of the research there is not sufficient amount of participants in order to generalize the results in a way to reflect to the whole population. Therefore, the main purposes are to discover potential problems and perceive the student’s conceptual model. Consequently, an overall summary will be presented, providing information that will allow to:

- ❏ Understand what students think of e-learning and if they perceive it as an opportunity.

- ❏ Identify the main issues that students they face when trying to find an online study program.
- ❏ Capitalize on those issues by providing potential solutions that could ultimately lead to an improved user experience.

Furthermore, the number of visited websites for each performed task will be measured and reported. This way, various systems (the ones that were visited during the usability testing) will be monitored and their usability is going to be measured. Additionally, a potential relation between the different kinds of websites and the overall usability crysis will be investigated, meaning that perhaps there are several design patterns that lead to a digital design catastrophe.

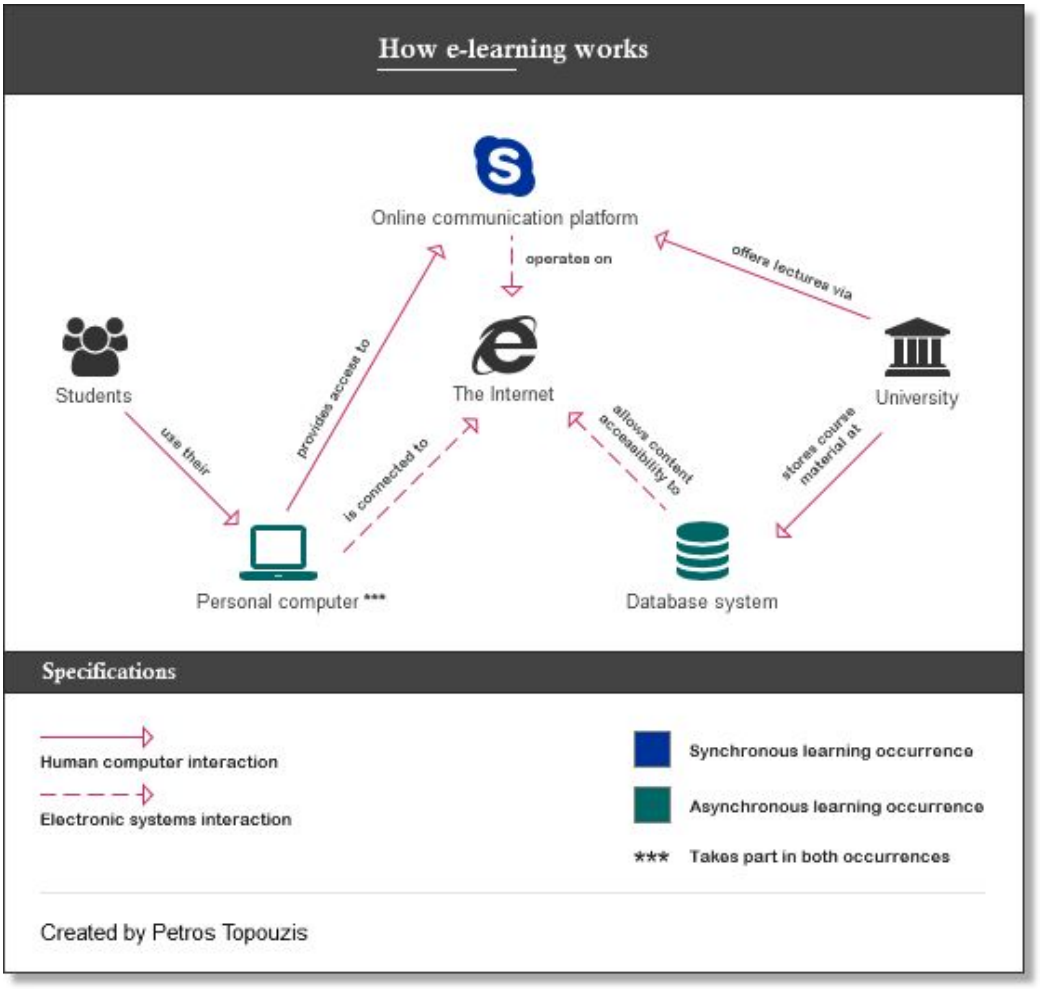
Finally, this intelligence is going to lead to user persona creation which will be used to reflect real-world users (students in this instance), highlighting their background, recording their demographics, cataloguing their behaviors and displaying their needs and expectations. More details regarding its definition, goals and development techniques will be provided during the student persona creation.



1 E-learning as a Modern Way of Studying

1.1 Definition of Electronic Learning

E-learning (electronic learning) is a computer based educational system that allows users to study from anywhere in the world at any time. In the beginning, e-learning was delivered via pre-pressed optical compact discs and digital versatile discs. However, nowadays it is being delivered via the internet through specialized e-learning platforms. (Sener, 2015)



Oftentimes, a distinction between similar 'terms' regarding the alternative types of learning seems to be ambiguous. Terms such as distance learning, virtual learning and

online learning tend to be confused and misinterpreted. Therefore, an appropriate comparison of these could be made: Distance learning is a specific teaching and learning system designed to be carried out remotely, allowing the students not being physically present with a teacher in a classroom. (The Economic Times, 2017).

Online learning is a way to study for an internationally recognized qualification without needing to be present in the university campus (The University of Edinburgh, 2016) and Virtual learning allows students to study online and form a community by interacting, sharing and learning with other students outside of their classroom (Victoria State Government, 2017).

Therefore, we can derive to the conclusion that electronic learning is a form of distance learning (by definition). In addition, it is identical to virtual learning and online learning (all of which take place on distance, using the Internet and similar if not identical digital teaching and learning systems).

1.2 History and Evolution of E-learning

The traditional model of formal education required the physical presence of the students in a classroom, where a professor or lecturer designed and executed the process of teaching. Although there were some considerations regarding alternative ways of studying, there were no modern technological advancements that could provide any alternatives.

However, computers made their way into our the global in the early years of the 21st century. Universal need lead to mass production which consequently lead to relatively cheap prices of personal computers in order to satisfy people's needs. Simultaneously, the Internet revolution occurred and unlimited possibilities were instantly available to the public.

Consequently, the way that people communicated, worked, entertained themselves, read the news and purchased products and services was radically changed over time. Naturally, following the technological trend, the way that people were going to be educated would have to change too.

A distinct name had to be assigned to this new way of learning. This happened at a Computer Based Training (CBT) systems training in 1999 in Los Angeles, California, where the term e-learning (an abbreviation for electronic learning) was introduced (Epignosis LLC January 2014).

E-learning has taken many years to mature. Probably it was not even conceived as an idea during its early stages. As it happens with every innovation, several systems and prototypes have been being created and tested over the years until the expected result is reached. Nonetheless, e-learning is still evolving and will continue to evolve as long as people are being exposed more to computers and modern technology.

The most significant technological advancements and initiatives that led to the creation of modern e-learning are:

- In 1924 the first testing machine was created by Sidney Pressey and presented to the American Psychological Association (APA) in Washington, DC. The machine posed multiple-choice questions to the students who had to assess themselves by answering them (Benjamin, 1988).
- On March of 1954 the first teaching machine was created by B. F. Skinner at the University of Pittsburgh and its purpose was to teach elementary arithmetic to the students (The National Museum of American History 2016).
- In the 1960's computer based training (CBT) was implemented by various universities and educational institutions where students learned the course materials at their own pace following specific instructions (Khan & Ally 2015).
- In 1966 computer aided instruction (CAI) was invented by the professors Richard Atkinson from Stanford University and Duncan Hansen from Florida State University. This program aimed to teach elementary mathematics and

literature to young children, respecting their individual preferences and pace (Atkinson & Hansen 1966).

- By 1976, the first "virtual college" was invented. The innovation that it brought to the world: There was no physical campus constructed. This virtual college, was called Coastline Community College (CCC) and offered a series of various of telecourses for its students (Miller,. 2014).
- In 1985, the University of Nova Southeastern offered the first accredited graduate degrees, which were being studied and completed through online courses. (Miller, 2014)

Perhaps this is considered to be the most significant initiative in the history of e-learning for two main reasons:

- Firstly, they were the first degrees that could be completed online without any physically presence, whereas a few years earlier, in 1981 at the Western Behavioral Sciences Institute's School of Management and Strategic Studies (Miller, 2014) only a single course was available to be studied online.
- Secondly, the offered degrees were accredited, which constituted the equity of online studies in comparison to the traditional model and marked the beginning of a new era for the world's educational structure.

From the mid 80s computer engineering and entrepreneurship took over and multiple inventions both in hardware and software led the global market and changed forever the way we live. Demand grew exponentially and consequently, supply had to keep up. This would continue until nowadays, where almost everyone owns a personal computer.

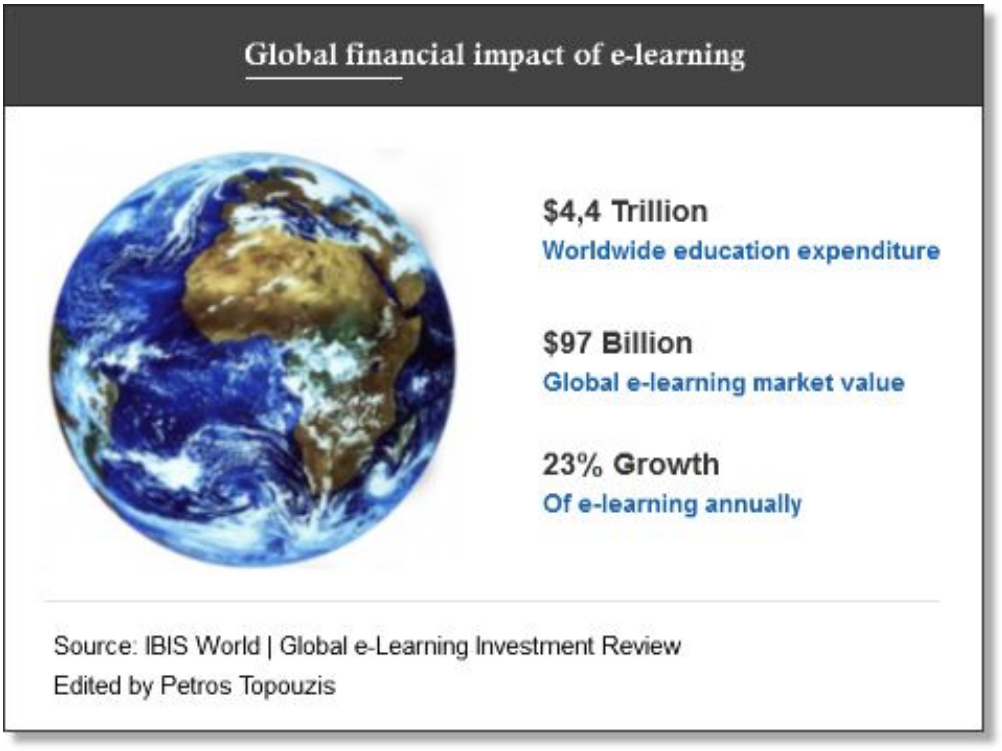
Furthermore, e-learning as a way of studying has evolved rapidly. At the present day, in corporate level it is a common phenomenon to train the employees online

rather than sending them physically to a university or a skills enhancement facility (which in most cases will be far away from the workplace).

Actually, this could be a practical technique; having their employees present at work and being educated or specialized in a particular academic field at the same time can be quite invaluable and very productive. Furthermore, the same applies to employees themselves, that can keep their job and enhance their skills simultaneously.

In addition, many universities themselves are offering fully accredited online degrees in respect to every academic level. Many private organizations such as Coursera, EdX and Udacity took advantage of that fact and begun cooperating with the Universities, providing a large amount of courses online through their digital platform.

The current worldwide financial impact of e-learning can be examined in the following figure:



1.3 Advantages and Disadvantages of E-learning

The pros and cons of electronic learning have to be taken into consideration and will determine the final decision of the individual that wishes to be educated. After all, undertaking formal education is a long-term commitment that will have a huge impact on the individual's life.

Naturally, electronic learning will be compared to the traditional way of learning in order to be able to produce some useful insight. Its advantages are (Gilbert, 2015):

- Timewise flexibility; time management is considered to be essential. Even in corporate level most of international companies have implemented flexible working schedule in order to satisfy their employees needs by giving them the opportunity of managing their time according to their needs.

  Education should not differ, because after all, the student is a client that has purchased a service and his time should be taken into consideration. Furthermore, e-learning is the best solution for students who occupy a part-time or a full-time job and encounter great issues when it comes to prioritizing their time.
- Reduced overall cost; extensive information regarding the cost of formal education has been provided in the introduction. Money is always a main determinant leading to a potential investment (in this case investing in the individual's education). All in all, e-learning is much cheaper than on campus education especially when considering the living and transportation expenses.
- Follows the technological trend; many procedures are being performed using electronic devices and the Internet. Much of the communication, ordering food and other necessities, working, entertainment, etc. are conducted online, thus supplementing or replacing the traditional way of being physically present.

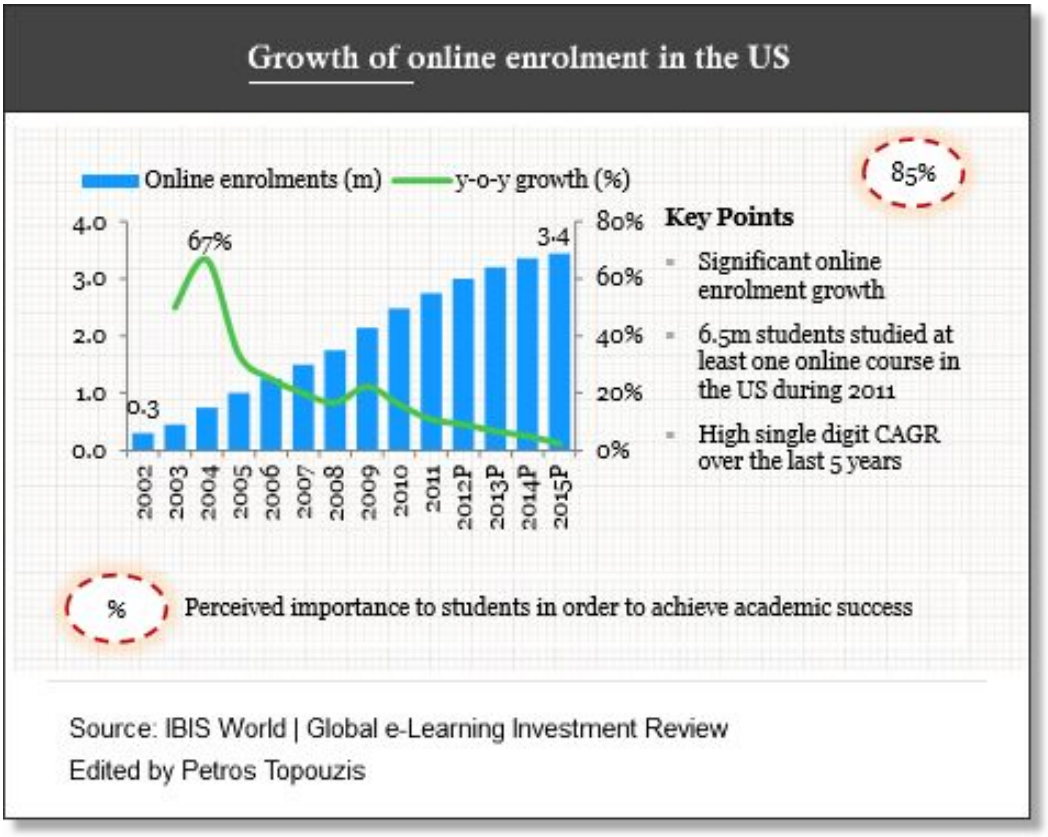
On the other hand, e-learning is not ideal for many students that consider the following disadvantages (Arkorful & Abaidoo, 2014):

- On campus life experiences; perhaps the most significant advantage of the traditional education is the experiences gained during the studying years. People tend to form communities and interact with each other since the beginning of time. In addition, college ‘connections’ (interpersonal relations formed with other people such as professors and faculty members, other students, etc.) can play a significant role in one's future career.
- A small amount of options; e-learning may be on the rise and thousands of non-accredited courses have been created from many private institutions, but only few internationally accredited degrees from higher institutions are offered online. For instance, in the UK there are currently offered seven on campus Master’s degrees in Human Computer Interaction, whereas none of them can be studied online.
- Migration tendency; applies to students from poor countries that wish to escape their current situation and migrate to a better country. The easiest way to do that is by receiving a scholarship or funding and moving to that country. This is a common phenomenon observed in the US, Canada and the UK.

Moreover, there are several differences between the two compared ways of studying that cannot be labelled neither as advantages nor as disadvantages because of the great variation in opinions and beliefs that differ from person to person such as:

- Sudden change of location; some people find it difficult to become detached from their routine, their family and their friends. Even for moving to relatively small distances (for instance 300-500 kilometers) away from home can be challenging. Yet, other people oftentimes enjoy the challenge.
- Academic performance from the student’s perspective; many students enjoy studying in traditional classrooms and tend to excel, whereas others do not feel that way.
- Additionally, many students feel more comfortable and focused studying from home whereas others find it impossible. Again, it depends on each individual’s mentality and preferences.

To conclude with, e-learning possesses advantages and disadvantages at the same time. Certainly, its usage is being increased by each passing year and predictions say that it will continue to rise.



2. Formative Research Methods

2.1. Purpose of Study and Recruiting Criteria

The following study will be based on formative research methods which will be used in order to collect qualitative information focusing on two specific target populations; recent graduate students and early career changing prospects. Qualitative data collection derives from observation and user experience analysis by understanding the users' needs and their behavior (Rohrer, 2014).

It mainly focuses on answering the following questions:

- ❏ Which are the goals of the target population?
- ❏ What is their conceptual models?
- ❏ How do they try to achieve those goals?

The recruiting criteria will be specifically tailored for the purpose of this study and will aim to recruit participants who belong to its target population. As mentioned before, its main focus will be to find out how desirable and discoverable various types of e-learning study programs are, from a single non-accredited course to a fully-accredited online PHD.

Desirability from the user's perspective, accounts for the level of desire that people possess a product or a service that serves their needs. On the other hand, from a business perspective, desirability accounts for the total value of the product and determines the market leaders (Interaction Design Foundation, 2017).

Discoverability is defined as the level of ease with which users can find and access various information within a system which they encounter for the first time. The aforementioned access will allow them to perform certain actions that are necessary to achieve their goals (Interaction Design Foundation, 2017).

It is important to note that in this study the same participants, one at a time, are going to undertake all four types of formative research methods that are included in this study: Pretest interview, usability testing, debrief on the tasks that were performed by the participants and system usability scale survey.

Each procedure will be observed and important notes will be taken by the study administrator using a notebook and an audio recording machine. The types of notes vary, depending on the type of the procedure. For instance, it makes sense to record the audio during the pretest interview and posttest debrief so that hard data could be stored and accessed in the future.

Furthermore, the usability testing procedure that each participant undertook will be video recorded. This is an important observation technique that will provide to the study administrator the opportunity of reviewing the user testing using the video recordings and observe if anything went amiss (Chisnell, 2007).

Afterwards, the results will be analyzed by providing useful insights about the digital e-learning systems based on the participants' actions, reactions and performance. It is crucial to note that the system should be evaluated; neither the participants nor the academical institutions that provide the study programs.

The study will record and thus analyze the following:

- ❏ Task completion analysis: Ability of each participant to complete the tasks during the user-testing session. Where did they fail and why?
- ❏ Individual and average required time for each task to be completed.
- ❏ Particular thoughts and feelings during the discovery of a desired course. Evaluation of searchability using the Internet.
- ❏ General desirability towards pursuing and online degree which will answer the two main questions of 'Why?' and 'How?'

Therefore, the principal audience for this study will be "undergraduate students who are: familiar with the term of e-learning, able to form an opinion and compare it to the

traditional way of learning, experienced users of the Internet and dissatisfied (meaning that they do not believe that the skills received are enough to secure them a good job) with the study program in their current university or college."

In addition, the participants should not have taken any e-learning course previously, either accredited or nonaccredited while using an online learning platform (youtube video platform is excluded). This is imperative to determining the discoverability of e-learning study programs (which is one of the focus areas of this study) because people that have already take online courses will definitely have an advantage on those who have not.

Consequently, the recruiting criteria for each participant can be defined as:

- ❑ Has not taken an e-learning course in the past.
- ❑ Knows how to use the Internet and is able to conduct extensive research in the web.
- ❑ Believes the education received during the college is not sufficient enough in order to acquire a job and become financially independent.
- ❑ Is familiar with e-learning as a service and wishes to explore it further.

Furthermore, within this population, certain diversity criteria will be taken into consideration, in order to gain insight in regards to how different types of students will think and act when searching for desired study program. The diversity criteria should provide a necessary degree of variance which will be used to categorize and report the collected information.

The recruited participants should differ along three dimensions:

- ❑ Field of studies; Students from different fields of studies have followed a different course curriculum and this could be proven vital to their online search capabilities due to the time they spent using the Internet during their studies.

- ❏ Career goals; in most cases the student's career goals, after having finished or during the last semesters of his/her studies, are not aligned with the course curriculum of the university due to the large variety (and in many cases lack of specialization) of mandatory courses.
- ❏ Location and culture; culture and location play an important role in how online studies are being perceived. Not every local employee recognizes them as a formal way of studying and oftentimes are not considered to be equal to the traditional way of studying.

The recruiting strategy that will be used for this strategy is to recruit friends and colleagues from the university. Basically, the study's administrator own social network will be used to recruit students that will participate in this study; this is a type of convenience sampling which will lead to a desirable participant pool.

Its main advantage is that this is the cheapest sampling method (however, more time may be required in order to select the participants that fulfil the recruiting criteria). Additionally, the data collection will be accomplished a lot faster than the rest of the sampling methods because the study administrator will have direct access to them ((Dudovskiy, 2017).

Naturally, incentives have to be provided to the participants because they will be asked to give up some of their valuable time and focus on their tasks, thus providing useful information. Financial compensation is always considered to be a crucial incentive and will provide a certain degree of clarity to the participants, regarding the importance of dedicating their time to this study and offer motivation.

There are three main factors that determine the type and amount of compensation: the test duration, user population and the location that the study will be conducted at (Nielsen, 2003). Therefore, digital gift certificates in the amount of one thousand Czech crowns will be given to the participants as a form of compensation.

2.2. Pre-test Interview

To begin with, a consent form will be presented to the participants and asked to be signed by them prior to the study. It will provide the purpose of the study and request their agreement to participate. Moreover, it will ask their consent to record and collect the data derived from it and state that it will only be used for this research (for academic purposes).

Furthermore, the participation will be voluntary and the participant will agree to immediately raise any questions regarding concerns or areas of potential discomfort during the session with the study administrator; naturally, the participants are free to pause or stop whenever an issue of this nature arises.

A signed consent form from each participant is mandatory and oftentimes requested by the regional law. Yet, it is seen as an ethical obligation by researchers all over the world and must be presented to the study participants prior to the beginning of the study

The signed consent form will provide overall information regarding the rights and responsibilities of both the participants and the study administrator. Additionally, it will state the purpose of the study and inform the participants about how the data collected will be used. All in all, it will assist the study administrator to build rapport with the participants and formalize the procedure (Travis, 2016).

Afterwards, the pre-test interview will take place and the study administrator will ask several questions to the participants regarding their study and work expectations, future plans, personal characteristics, conceptual models and unique mental patterns/behaviors.

The personal interview will be used as a research tool instead of a pre-test questionnaire for several reasons and its advantages are:

- ❏ Collect qualitative data by asking open-ended questions.
- ❏ Quantifiable questions (if needed) can be asked verbally and act as chain responses to other linked questions. They can also be used to characterize the participants in a numerical form.
- ❏ It will help the users feel at ease and connected to the study administrator.

However, there are some disadvantages to be take into consideration such as the time consumption (since interviews take much longer than questionnaires) and the peculiar feelings that follow when asking personal questions (for instance regarding the age of the participant). All in all, the pretest interview should be kept short because of two reasons: the time limitation of the study and the fact that users should spend most of their energy during the following user test where most of the insights will derive from ((Interaction Design Foundation, 2017).

The questions that will be asked to each participant are supposed to last between eight to ten minutes, depending on the answers; seldom more questions are going to follow. However, due to the nature of an interview, open-ended questions will be formed by the study administrator. Open-ended are usually preferred to close-ended because they engender people to provide answers using full sentences by listing their ideas and provide concrete stories (Farrell, 2016).

The main questions to be asked are:

- ❏ What is your highest educational attainment?
    - ❏ Do you believe that based on what you learned during your studies a good job could be secured?
- ❏ How is e-learning perceived in your society?
    - ❏ Which are considered to be the success factors regarding a person's education?
- ❏ In your opinion, what are the advantages and disadvantages of e-learning?
    - ❏ Would you ever consider studying online?
- ❏ How familiar are you with the quality and quantity of e-learning studies?
    - ❏ Have you ever searched for a particular online course?

2.3. Usability Testing

Subsequently, the usability testing (or user testing) procedure will follow. This is the most crucial part of the study because the users will be asked to achieve certain goals using the Internet by completing several tasks given to them by the study administrator. This will provide useful insights regarding the user behavior, feelings and how the system helps them to achieve those goals (usability.gov, 2017).

The users will conduct the usability testing one by one and special consideration has to be given while moderating the tests. Firstly, rapport has to be gained; in other words, the study administrator should establish a relationship where the participants feel comfortable sharing information and performing naturally while undertaking the tasks.

In addition, the different aspects of the user test protocol that are going to described have to be clear and understandable. Many participants feel stressed when they test a system because the feel like they are being tested themselves. The study administrator has the responsibility of handling the situation in order to clearly set the expectations and take the pressure off of them. As a result, the role of the participant as well as the role of the study administrator have to be clearly defined.

The role of the study administrator (usability.gov, 2017):

- ❏ He/she is the one that facilitates the procedure
- ❏ Observes the test and records anything of interest
- ❏ Hopes to gain an honest assessment by expecting natural behavior from the participants.

The role of the participant (Dumas & Loring, 2008):

- ❏ Helps the study administrator to evaluate the system
- ❏ His/her abilities or skills are not being tested

- His/her participation is voluntary and therefore has the right not to answer any questions or perform any tasks that he/she does not feel comfortable with .

In addition, it is important to allow the participants to declare if they believe that they have completed a task rather than having the study administrator guessing in regards to the outcome. This can happen by explicitly stating the instructions regarding the usability testing during the test protocol (Rubin & Chisnell, 2008).

Thereupon, the participants are going to attempt to complete the tasks presented to them, one by one, while their actions and specific behaviors will be observed. User tasks can be defined as written instructions consisting of the goals that need to be accomplished by the participants of the study using a predefined system.

These tasks will be presented to the participants as predefined user scenarios. User scenarios can be defined as series of actions that users perform when interacting with a system. Moreover, they explain to the participants why they need to perform those actions in the first place. In other words, a user scenario looks like a realistic, short story of a real person with specific need, who would perform some certain actions in order to satisfy that need (Idler, 2011).

Well-designed user scenarios that reflect reality and provide a convincing background stories will alleviate the stress of the participants and motivate them to do their best, while performing the tasks. Nevertheless, during the task creation those are not the only factors that should be considered.

The tasks that exist in the scenarios must respect the three fundamental rules of engaging users with task scenarios (Nielsen Norman Group, 2014):

- The tasks should always be realistic; if a participant is asked to perform actions that are not realistic (do not correspond to sets of actions that a real user would have performed) he/she is not going to act naturally, and in most cases will not care about the quality of the results, interacting poorly with the

interface. Participants should feel special, owning the task by understanding that is is something that could have occurred naturally.

- ❏ The tasks must contain multiple interactions; tasks are meant to test a system used by its targeted audience. This happens when the participants test the system rather than expressing their opinions in regards to its ease of use. In other words, the participants should be asked to perform actions and their interactions with the system should be carefully observed.
- ❏ The tasks should not be leading; clues, descriptions leading to a potential solution and instructions as to how the task could be solved must never be given to the participant. One of the core metrics of this study will be the task completion rate and by leading the user the results would be compromised and thus untrustworthy.

Additionally, the tasks should be verifiable. This means that it should be clear what the success criteria are for each performed task. These success criteria will eventually be the main determinant towards defining the task phraseology by explicitly stating what is expected to be searched.

Finally, the task difficulty level should vary and must be carefully designed to be ascending. This means that the usability testing session should begin with relatively easy tasks leading to more difficult ones. Consequently, the participants are going to feel more interested in completing the tasks presented to them if their confidence has already been boosted.

Taking these factors into consideration the participants will be asked to perform six tasks, that account from 35 to 45 minutes of procedure and will be implemented into the following user scenarios:

- ❏ **Task 1**: You have just heard from a colleague of yours that she found some very interesting IT courses online. Naturally, this news intrigued you and you wish to investigate further. You task is to find two websites (or web platforms) that offer certified online courses.

Success criteria: The participant has successfully found two e-learning websites; There is a large variety of them in the web.

- **Task 2**: You are recently graduating from a Computer Science Bachelor's study program. During you studies you have taken an interest towards Cloud Computing and you think that your future career lies in this field. However, during your studies you had only one course which was introductory to that field and did not emphasize as much as you would like to. Your task is to enroll to a free online course specializing in Cloud Computing.

  Success criteria: The participant has successfully found a free online course with the title 'Cloud Computing'. There are many websites and higher institutions that offer this course such as: Cloud Computing from the University of Illinois at Urbana-Champaign, offered by coursera.

- **Task 3:** You have changed your mind realizing that you do not like Cloud Computing as much as you thought. Now you wish to receive official training and become a frontend developer. Your task is to find an online course specializing either in CSS or HTML (programming languages required for frontend development). The course should be taught in English, offered by an online educational organization (not from a recognized University) and cost less than $100.

  Success criteria: The participant has successfully found either a CSS or HTML online course that meets the criteria mentioned above. There is a variety of options such as the courses offered by W3 Schools via the EdX learning platform.

- **Task 4:** You are very excited about the new opportunities in field of IT. Recently, you have been reading the latest news about one of the most promising future disciplines; virtual reality. Therefore, you are determined to become a VR Developer. Your task is to find a specialization (series of

courses) that will provide you with the necessary skills. This study program should cost less than $1,300, received very good reviews (more than 4 stars) from previous students, recommended from many professionals and can be completed in less than 10 months.

Success criteria: The participant has successfully discovered either the nanodegree program offered by udacity or the Virtual Reality Developer Training program offered by the VR Dev school.

- **Task 5:** You currently hold a respectable position in an international IT organization. It has been explicitly stated by the CTO of your company that you have to earn a Master's degree in Computer Science in order to receive a promotion during the next few years. At no time should you abandon your job in order to study. Your task is to find and online Master's degree offered by a top rated American university (one that belongs in the QS 100 list), study part-time for no more than 3 years, and the total cost should be less than $8,000.

  Success criteria: The participant has successfully discovered the online masters in Computer Science offered by Georgia Tech. Information about the study program can be found either by directly accessing the university's website or by an intermediary such as distancelearningportal.com.

- **Task 6:** You have been a successful employee and you wish to take your career a step further; perhaps even to teach in order to pass your knowledge. In the meantime, your are not willing to give up your job yet. Your task is to find an online PHD in Education offered by a University from the United Kingdom. You wish to study full-time for no more than four years and total cost should not exceed the amount of 20,000 euros. In addition, because of the fact that it is a long-term commitment you wish to have a flexible structure of studies (to be able to slow down the course requirements and rhythm by extending the study period).

Success criteria: The participant has successfully found an online PHD which respects the aforementioned criteria. One example is the online PHD in Education offered by the University of Leicester. There are various pathways that lead to receiving information about the course.

A pilot test should take place before these user scenario tasks are presented to the participants. Pilot testing is defined as an initial or experimental run of a study for the single purpose of verifying that the test itself is valid. Valid means that the overall script is clear, the tasks are well articulated and thus understandable by the participants, their difficulty level is appropriate and that the collected data is going to be meaningful (Wright, 2017).

Furthermore, some practical challenges may occur during the usability testing sessions and have to be accounted for in advance. One is regarding to the system's variability; System variability correlates to the different ways that a system can vary and thus alter the user's experience in comparison to a previous user (for instance, if a new course will be added during the test).

Additionally, most of modern websites and web browsers provide personalized experience to their users. Individual personalization can be achieved by adjusting the appropriate settings and this can lead to a different user experience for each participant. Therefore, the website's or browser's settings must be kept as defaults.

Moreover, the history of prior actions can significantly influence the user experience of the participants. The presentation of previously used links is automatically changed by the browsers (for instance, a link can initially be presented with blue color and after being clicked on it would change to purple). This unexpected effect can indirectly lead the participants in successful completion of their tasks.

Finally, it has to be stated that many of the user tasks include purchasing a course, a series of courses or even a Master's degree. This is not feasible in this study, thus the

tasks would be evaluated as successfully completed if the participants reach to the point that the system requests a payment to be made.

Considering the aforementioned factors the following actions will be conducted by the study administrator before the beginning of each usability testing:

- ❏ The system's cache will be cleared
- ❏ The browser's history will be wiped clean
- ❏ Every data or shortcut created by former participants will be deleted

2.4. Debrief and System Usability Scale Questionnaire

After the usability testing, a set of debrief questions is going to follow. Debrief questions are the ones that follow up the tasks that were performed and derived through that observation. The study administrator directly asks questions (according to his notes) to the participants in regards to actions that they previously performed on a specific task (Hodgson, 2013).

They usually focus on the errors that were made (even in occasions that users did not understand that errors occurred) and try to receive feedback as to why they performed the 'incorrect' actions. In addition, they identify the specific places in the interface that lead the participants into committing those errors.

Debriefing the participants is considered to be a very valuable formative research method. It is important to notice and record if the participants would try to achieve their goals differently (after the study administrator asks the reasons why they performed a specific action the way they did).

Additionally, in some occasions, the right solution or appropriate series of actions can be presented to them by explaining how the designers of the system could have anticipated their actions. This way, they can explain what they anticipated from the

system and a comparison can be made. Therefore, the main pain points of the system can be identified.

Furthermore, there are some general questions that need to be asked regarding the participants' feelings and their overall experience while using the system. These questions should not consume much of their time (total duration between 5 to 7 minutes) and have to be designed as preparatory questions for the System Usability Scale questionnaire that is going to follow.

These general questions are:

- What do you think the system does well?
    - Did it help you to find the information that you were searching for?
- Do you think that some improvements should be implemented to the system?
    - Please explain why
- For which people do you believe this system would be most beneficial for?
- If you had another chance, would you have searched for the desired courses using other systems or pathways?

Lastly, a SUS (System Usability Scale) questionnaire will sked to be filled out by the participants. The SUS questionnaire is globally considered to be one of the most reliable tools in order to measure a system's usability. Its creator is John Brooke (1986) and it has been used by tenths of thousands of researches during the past thirty years (Sauro, 2011).

The SUS questionnaire consists of ten concrete statements and obliges the participants to score these statements in a Likert scale (ranging from one to five), were 1 equals to the response 'Strongly disagree' and 5 to 'Strongly' agree. The structure of the questionnaire verifies that the received answers were considered before being answered by presenting a positive statement after a negative one, repeatedly until the end.

SUS template

		Strongly Disagree				Strongly Agree
1.	I think that I would like to use this website frequently.	☐	☐	☐	☐	☐
2.	I found this website unnecessarily complex.	☐	☐	☐	☐	☐
3.	I thought this website was easy to use.	☐	☐	☐	☐	☐
4.	I think that I would need assistance to be able to use this website.	☐	☐	☐	☐	☐
5.	I found the various functions in this website were well integrated.	☐	☐	☐	☐	☐
6.	I thought there was too much inconsistency in this website.	☐	☐	☐	☐	☐
7.	I would imagine that most people would learn to use this website very quickly.	☐	☐	☐	☐	☐
8.	I found this website very cumbersome/awkward to use.	☐	☐	☐	☐	☐
9.	I felt very confident using this website.	☐	☐	☐	☐	☐
10.	I needed to learn a lot of things before I could get going with this website.	☐	☐	☐	☐	☐

Source: Digital Equipment Corporation, 1986

After the participants complete the SUS questionnaire its scoring results must be evaluated by the study administrator. The scoring results provide a genuine insight to the usability of the evaluated system based on the performance and posttest feelings of its users.

The scoring system itself is complex and requires prior knowledge and exercise by the evaluator. The reported scores are on a scale of 0-100 and it is important to note that they do not represent percentages. However, they can be normalized and interpreted as percentiles, thus producing a comparative ranking (Brooke, 2013). Finally, the scores themselves do not reflect the places in the interface that the issues occurred at, but rather provide a general idea of the system' usability.

The reason that the SUS questionnaire will be used in this study is because it provides many advantages such as (usability.gov, 2017):

- It provides measurable results that are crucial to defining the usability of any digital system
- It measures the learnability of a system too, and learnability is closely connected to discoverability
- It is consistent and reliable, providing qualitative data (which is the main focus of this study)

3. Finding and Recommendations

3.1. Study Overview

To begin with, respecting the recruiting and diversity criteria, five participants were selected to undertake the interviews, usability testing, debrief and SUS questionnaire. They signed the consent form and were genuinely interested in completing their tasks and explore various study opportunities.

It has to be noted that there was a general confusion over e-learning with many participants being misinformed. Therefore, an explanation had to be provided in order to clarify the meaning of e-learning by providing its definition and several real-life examples. Thus the average duration of the whole study per person was one hour and fifteen minutes.

Overview of participants					
Participant number	1st	2nd	3rd	4th	5th
Educational level	Bachelor's	Undergrad.	Bachelor's	Bachelor's	Undergrad.
Internet search skills	High	High	Mediocre	High	Mediocre
Field of studies	IT	DS	ENG	CS	FIN
Specialization area	Manag.	C. Systems	Mechanical	General	Accounting
Studies satisfaction	Poor	Poor	Average	Poor	Average
Future career goals	Specialize	Specialize	Advance	Specialize	Shift
E-learning interest	High	N/A	N/A	High	Very High
E-learning bias level	Low	Low	Medium	None	Medium
Cultural heritage	China	Middle East	C. Europe	S. Europe	C. Europe

The educational level refers to the highest educational attainment of the participants. Three of them possess a Bachelor's degree and two are in their final year of studies. Furthermore, the e-learning bias level refers to the conceptual model that the participants have shaped regarding a potential online education. It derived from the questions asked to them during the pretest interview and highlight their beliefs regarding to its validity and equity to the traditional educational model.

The abbreviations that were presented in the table as the fields of studies of each participant and their specializations (majoring at) are: Informatics (management), Data Science (computational systems), Engineering (aero turbines), Computer Science (general curriculum) and Finance (financial accounting).

Moreover, the future career goals differ along three dimensions:

- ❑ 'Specialize' means that the participant believes that he/she needs to receive further knowledge in a particular discipline in order to be able to acquire a desired job in the future.
- ❑ 'Advance' means that the participant wishes to receive more advanced education regarding his/her original field of studies, and feels that it will recompense in the future.
- ❑ 'Shift' means that the participant is not satisfied at all with the knowledge received during his/her study years and wishes to swiftly change to a high-demand field of studies in order to be able to secure a desirable job in the future.

Additionally, the Internet search skill refers to the ability of the participant to conduct advanced search online. High ability means that the participant has conducted a lot of research and feels very confident finding any kind of information on the web. Mediocre ability means that the participant has conducted a fair amount of research during his/her studies, but is feels not very confident performing advanced search on the web. This field was self-evaluated by the participants.

The participants' e-learning interest and studies satisfaction are also important factors

that have to be taken into consideration. The first one refers to the genuine interest of each individual to explore new ways of studying. On the other hand, the latter one refers to the general satisfaction level of the participants, in regards to the knowledge they received during their college studies (always compared to the financial cost plus the time consumption).

Lastly, the cultural heritage is according to the place of birth and living until the age of eighteen; not the country that the participants received their formal education at. This is an important distinction that will determine the recognition and acceptance level of e-learning depending on the culture.

Due to the number of participants, the results cannot be regarded as quantitative data. In other words, they are not statistically significant. However, it is visible and logical that the more 'practical' experience a student gets with a personal computer the more 'natural' the activities performed via it seem to be. This phenomenon does not only occur in education, but in every activity that can be performed both physically and digitally (for instance shopping, socializing, etc.).

Therefore, the students who have undertaken studies relevant to computer technology (such as computer science, information systems, etc.) possess much more experience using the Internet than the ones who undertake a more 'traditional' study program (such as history, mathematics, etc.). Thus, they tend to be more open to online solutions as they have received more exposure in the digital world.

3.2. Limitations

Before analyzing further the qualitative data that was collected, the participants' biases have to be presented as a major limitation of this study. Bias in user research can be defined as any kind of proclivity that prevents impartial consideration, and answer of a question or a user scenario during the usability testing (Pannucci & Wilkins, 2011).

Participant (subject) bias is defined as the tendency of the study's participants (subjects) during the experimental procedure or the interview/questionnaire to act in a way that they believe that the researcher/study administrator wants them to act. This phenomenon usually occurs when the participants have a deep knowledge about the purpose of the study (Gonzalez, 2017).

Another type of bias is demand characteristics and it refers to the tendency of the study's participants to provide the answers that they think that the researcher either wants or needs. Therefore, they believe that it is expected of them to like the system that is being tested. This phenomenon usually takes place when the participants presume that the researcher/study administrator is somehow invested in the study's results (Cherry, 2017).

Furthermore, the acquiescence bias has to be considered. Acquiescence bias refers to the tendency of answering positively when the answer is unknown or the participant does not really care about it. Few people are able to answer all questions asked to them and in general, it is considered to be socially easier to respond positively than negatively. Consequently, the participants are going to seem more positive throughout the study than they really are (Vannette, 2015).

Ultimately, confirmation bias which tends to affects the researchers can perhaps be the most threatening bias to the study's validity. In general, researchers prefer 'hard' evidence that confirm their beliefs or hypotheses either consciously or unconsciously. Thus, it is a common phenomenon to selectively ignore evidence that disconfirms the researcher's beliefs (Lee, 2010).

The aforementioned biases have been addressed to a great extend when the study administrator, before and during the study, clearly stated to the participants the following:

- ❏ He is not financially invested in the outcome of this study; It has been conducted purely for educational purposes.
- ❏ Honest feedback is required at all points.

- ❏ Whenever an answer cannot derive it must not be forced; It is better to answer by saying 'I do not know'.

Moreover, a few techniques were deployed during and after the usability testing:

- ❏ Clear design of tasks and questions; Ambiguity could be the enemy of truth.
- ❏ Read the body language of the participants in order to identify if some of the answers were 'forced'.
- ❏ Lasly, the study has to be aware of the biases and look out for their symptoms.

It has to be noted that there could be a huge amount of individual differences between any group of selected participants during a usability study and this is called variability in user performance (Nielsen, 2006). These differences can occur due to various factors, one of which has already been defined as the amount of total exposure to the Internet and digital products/services.

Finally, the findings of this study should not be accounted as definitive but rather as indicative, and due to the nature of a qualitative survey they cannot be generalized for the whole student population. A usability study of a larger scale (including more participants and having diversified the recruiting criteria) should take place in order to generalize the results by providing statistical significance to the findings, especially the quantitative measurements of time consumption and error rate.

3.3. Key Findings

To begin with, this section will present the information which was collected from the last two stages of the study (usability testing and debrief plus the post-test SUS questionnaire). The data which was collected during the pre-test interview has already been used in order to create the table used in section 3.1 'Overview of participants'.

Based on this data, crucial information regarding the findings of the study will be displayed, highlighting the importance of those findings and explaining in detail their

meaning. These findings are derivations of qualitative data analysis and their purpose is to diagnose and reports critical issues that exist within a system. Furthermore, they act as socio-behavioral analytics by investigating the aforementioned issues from the in-person quantitative tests that were undertaken by the target population.

Subsequently, two tables containing quantitative data which was collected during the usability testing will be presented. The first table is going to display information regarding the required time for task completion from each participant. Note that the required time corresponds to both the achieved and failed tasks, as well. Moreover, the failed tasks will be marked with red color.

Individual task completion time						
TNH* PNV**	#1	#2	#3	#4	#5	#6
1st	2m 37s	4m 11s	7m 26s	4m 20s	7m 51s	6m 39s
2nd	2m 19s	3m 55s	5m 2s	3m 58s	10m 15s	7m 10s
3rd	1m 51s	3m 46s	7m 17s	6m	9m 17s	5m 45s
4th	1m 44s	4m 2s	5m 20s	3m 56s	8m 59s	6m 52s
5th	2m 20s	4m 58s	5m 25s	4m 24s	8m 21s	8m 50s

*TNH = Task number is displayed horizontally
**PNV = Participant number is displayed vertically

For each task eight minutes were allowed because of the study's predefined testing criteria; 30-35 minutes allowed in total for each usability testing per participant. Additionally, it has to be taken into consideration that the first two tasks were relatively 'easy' (were diagnosed during the pilot run). Some of the participants requested an extension of the allowed time in order to complete the task at hand.

It is noticeable that every student committed at least two mistakes that led to task failures. Especially in the two last tasks (regarding the Masters and PHD degree) the

students displayed frustration and disappointment. Only ⅛ or 20% of them were able to achieve their goal successfully and find the desired study program. Yet, it is almost certain that if more time were given, most of the participants would have completed it successfully.

The second table will showcase the 'jumps' (changes of websites) that were performed by the participants during the usability testing. Either upon successful or unsuccessful (where it will be highlighted with red color as before) completion, the 'jumps' were recorded and can be used in order to provide useful insights regarding the participants' activity.

This activity is crucial to be analyzed because it is directly related to the total amount of the participants' cognitive load and general effort. Additionally, extreme fatigue deriving from these 'jumps' during the search procedure is considered to be the main cause of task abandonment.

Total number of visited websites until the task was completed						
TNH PNV	#1	#2	#3	#4	#5	#6
1st	3	2	5	2	2	8
2nd	3	2	3	2	7	7
3rd	3	2	6	5	6	4
4th	3	2	2	2	6	8
5th	3	4	3	2	7	8

The first task that was successfully completed by everyone actually required at least three websites to be visited (Google or a search engine in the beginning plus the two websites that had to be identified as learning platforms). Therefore, the repeating number 3 is not misleading; just an expected and natural occurrence.

Moreover, the table clearly indicates that there is a relationship between the number of visited websites and the successful outcome. This relationship defines that the more websites visited by the participant in order to achieve a certain set of goals, the less successful his efforts will be. Actually, in many cases where an unsuccessful effort took place, the percentage of visited websites was increased by 200% or even 300% (in comparison to a successful one which was performed by another participant).

Certainly, if both of the tables were to be observed simultaneously, a direct relation between the number of visited websites and the required time to completion would be visible. This relation indicates that the more websites visited while performing a certain set of tasks, the more time will be consumed by a user. As a matter of fact, it is logical for a user to spend more total time on the Internet when visiting many websites rather than when he visits just a few of them (always considering the factor of discoverability).

Furthermore, the last two tasks were the ones that were considered to be the most difficult to be accomplished, leading the participants to extreme frustration. The main cause to that phenomenon was the fact that the tasks required from them to conduct research using websites that belonged to individual universities rather than online e-learning platforms (like they did in the first four).

Another repetitive occurrence that was very unhelpful for the users was the lack of perhaps the most significant information; the total cost. Maybe it is a good marketing technique not to discourage your potential customers by displaying the total cost upfront and 'feed' them with secondary information such as customer reviews or 'what other students say about this course'. Nonetheless, these kinds of techniques discourage users from quickly finding the required information and hurt the overall user experience of the website.

Interestingly, even the e-learning platforms such as Lynda.com (subsidiary of LinkedIn) and Udacity which are considered to be in the top 5 e-learning platforms do not clarify the total cost. Instead, they are trying to force the user to begin the study

program for free (perhaps by offering 1-2 weeks or even the whole first course) and the real price is placed somewhere in the user interface; usually in one of the 'hidden' places (places that do not draw the user's attention).

Additionally, the decentralized and misplaced crucial information in the Graphical User Interface (GUI) is obvious. All the important information which will constitute the main constraints and goals of the potential customers (which are the future students in this case) should be placed together, creating a cohesive, usable and aesthetic GUI. This phenomenon was observed in both the universities' websites and the online e-learning platforms.

All in all, taking into consideration the usability testing and the debrief session that followed, several findings will be reported:

- ❏ All of the participants admitted they feel as overpaying for their higher education (the financial and time costs in comparison to the receiving knowledge and practical skills).
- ❏ The online search for Master's or PHD online study programs is tedious due to the total effort that has to be made by the students.
- ❏ Most of the students believe that receiving e-learning education is equivalent to the traditional way of learning.
- ❏ The dedicated websites for this particular search (specialized in higher education) such as mastersportal.eu and distancelearningportal.com are not being used.
- ❏ As a matter of fact, the aforementioned higher education-wise dedicated websites are very usable and provide a decent user experience.
- ❏ Most of the websites that belong to accredited and well-respected universities do not adhere to the design principles that promote discoverability and usability, making it difficult for students to find desired information.
- ❏ Most of the US colleges have a complex mechanism of displaying the total cost of the study program. Many calculations over several pages are needed to be performed by the user.

- E-learning platforms have designed their systems a lot better; However, the total price and other crucial information should be clearly presented.
- Single accredited courses which are either part of specializations or just represent a particular topic do not interest the students (especially when they are not being offered for free).
- On the other hand, entire specializations tend to attract the students' attention because the majority of them do not feel confident with the skills that were acquired during their studies.
- Most of the students believe e-learning to be a very practical way of receiving further studies in order to advance their career.
- However, they feel that some of their best years were in college, and if it were up to them they would not substitute them with e-learning.
- All of the participants stated that they did not possess enough information regarding e-learning in order to appropriately compare it (especially the way of teaching and taking exams) to the traditional way of studying.

Finally, a table containing the SUS questionnaire answers (that followed after the debrief) will be presented. The scoring was calculated in a way that produces meaningful information in regards to the system's usability. It has to be noted that some of the participants may have used different systems and websites in order to complete their tasks.

Report of System Usability Scale questionnaire					
Participant	1st	2nd	3rd	4th	5th
Total score	37.5	47.5	25	55	27.5
Interpretation	Failing	Failing	Failing	Below avg	Failing

None of the scores actually showcased a usable system. Even if the results were converted in a rating scale (for instance A-F where A is the best grade possible whereas F the worst), still the systems would have failed (Sauro, 2011). Thus, ⅘ or

80% of the participants believed that the systems failed them by not supporting their actions.

The following derivations from the individual answers of the questionnaire (the ten statements that have to be evaluated) have been identified as findings:

- The students thought that the universities' websites were unnecessary complex and that guided them to endless online search procedures.
- In addition, they believed that the various systems were very inconsistent between themselves (even the ones belonging to e-learning platforms)
- None of the participants felt comfortable using the system. The admitted being anxious about the final result.
- Furthermore, they thought that they would need to spend some time experimenting with the various e-learning systems in order to learn how to use them.
- Finally, they felt confused by stating the obvious fact that these systems alienate the potential customers and imagined that they force them (the potential customers) to abandon their search tasks.

3.4. Persona Creation

A persona is a defined as a fictional, but very realistic description of a typical or potential user/customer of the product and is being used by many organizations in order to define their target audience (the end-users or customers of their products/services) (Bernstein, 2015).

Many characteristics of a user persona are solid derivations from its definition. Nevertheless, a user persona possesses more characteristics such as (Ilama, 2015):

- The persona's data has to be collected via conducting formal research such as interviews, surveys, longitudinal studies, etc.
- Therefore, realistic information is contained in it; It is very important to state that the persona represents real users not fictional ones.

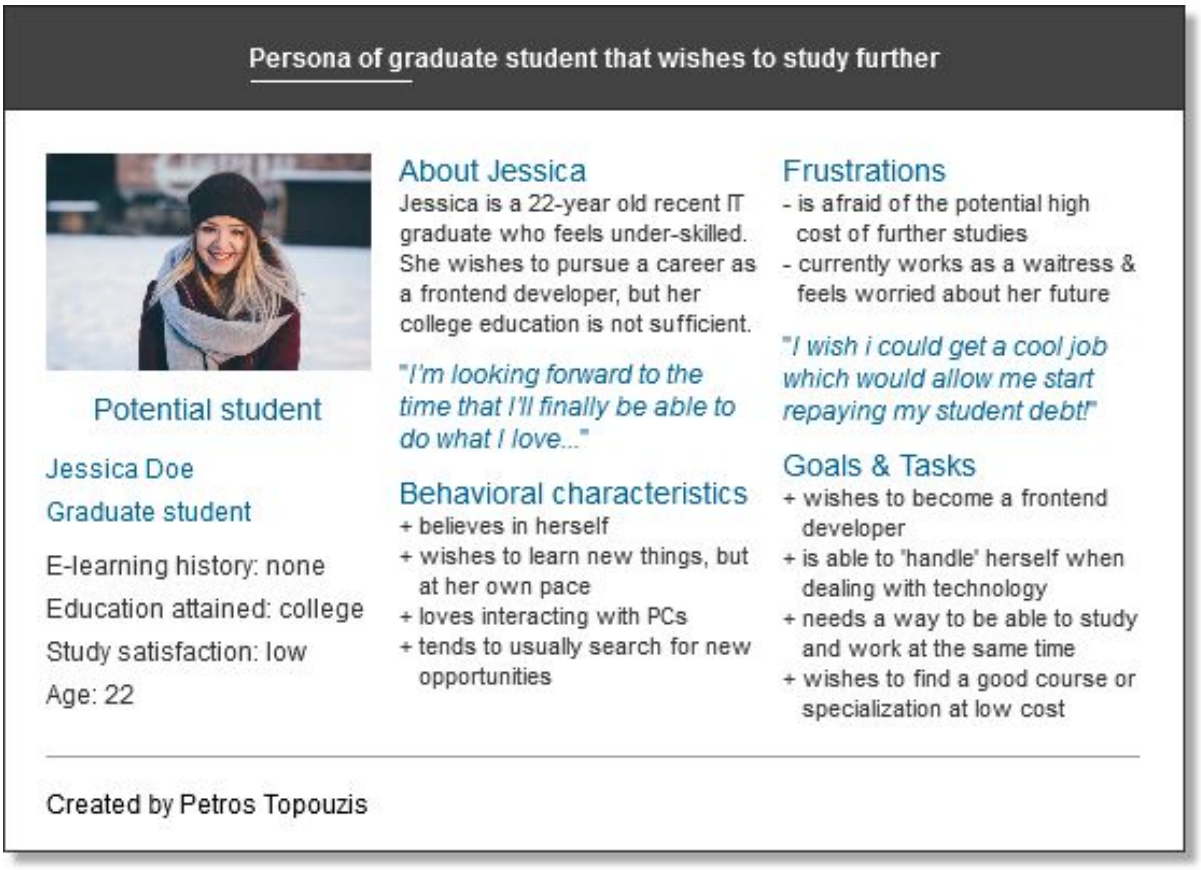
- ❏ The displayed information refers to the current state of the target population and cannot be used as a model that is able to predict future states.
- ❏ There is a variety of information included in a user persona such as user behavior and characteristics, needs and requirements, goals that derive from everyday challenges and conceptual models

Furthermore, personas should be created as early as possible during the design (or redesign; depends on the product) and development process because they act as representatives of the future users. Therefore, they provide a clear representation of the requirements that must be met and act as guides for the project's complete life cycle (Harley, 2015).

The creation of user personas serves various purposes (Goltz, 2014) such as:

- ❏ Constitutes an easy form of communication by providing an understandable model and various comprehensive information in regards to the user's needs. Therefore, the use of a persona makes it easier for interdisciplinary groups to work together.
- ❏ Provides a clear, predefined set of design and development goals which can be used as very effectively by the product management. As a matter of fact, the product manager can keep his/her team focused on taking care of the user's needs. In addition to that, the user persona provides the means to dissolving any kind of misunderstanding between the interdisciplinary groups (a phenomenon that occurs frequently during the production of a new product).
- ❏ By providing the needs and requirements of real users it can directly assist measuring the effectiveness of the product during its early stages. This is a significant benefit for any development team because the quick diagnosis of the product's issues can save lots time, money and energy.

Consequently, this study is going to include a persona creation whose data derived by conducting the two interviews (prior to and after the usability testing).



The data used for the creation of the displayed information in the persona, was collected during the interview, based on the participants' responses to the main and supplementary questions. Furthermore, the participants' selection respected the recruiting and diversity criteria, which means that the participants were already recruited based on the demographics required by the study..

In order for a persona to be valid (to properly represent a group of users that belong to the target population), the persona should consist of the following elements (Harley, 2015):

- ❏ An image of the fictional user; It has to be stated that the image does not belong to a recruited participant.
- ❏ Demographics; displayed under the photograph.
- ❏ Background information; it is a short introduction of the user with the purpose of making the persona realistic.
- ❏ Quotes; offer humane characteristics to the persona.

- ❏ Behavioral Characteristics; can be used to create empathy between the designers and the target population.
- ❏ Frustrations; showcase the fears and anxieties of the represented group. Alongside the behavioral characteristics, they provide the user's conceptual models.
- ❏ Goals & Tasks; they provide insights as to the user's motivations and constraints (regarding the goals that have been set).

Summary

To summarize, the purpose of this thesis was to conduct a qualitative research in order to investigate the general awareness and discoverability of electronic learning. Its main emphasis was to emphasize on measuring and reporting the cognitive load that is required by the students in order to search and find an online study program.

In the introduction, the issue regarding the exponential rise in cost of higher education, both in tuition fees and living expenses was presented. Evidence was presented in regards to the tuition growth at national universities in the US from 1995 until 2015 and the college tuition fees versus consumer prices in the US from 1978 until 2012. Furthermore, the concept of e-learning was introduced and thus analyzed as an alternative way of learning. Lastly, a brief introduction into the used research methods was made.

The first chapter, E-learning as a Modern way of studying consisted of three subparts; Defining e-learning in the modern era, History and evolution of e-learning and Advantages and Disadvantages of E-learning. The first subpart defined the term of learning and compared it to other similar terms such as virtual learning, online learning and distance learning. The second subpart contained information about the history of e-learning providing the most significant chronological events that led to the way that it is perceived nowadays. The third part presented the pros and cons of e-learning and compared it to the traditional way of studying.

The second chapter, Formative Research Methods was divided into four subchapters; Purpose of Study and Recruiting Criteria, Pre-test Interview, Usability Testing and Debrief and System Usability Scale Questionnaire. Firstly, the thesis delved deeper into explaining its purpose and provided the recruiting and diversity criteria that were used in order to find and enlist appropriate participants. Afterwards, the thesis' qualitative research methods were defined and explained, beginning with the roles of the study administrator and the participants and moving on to the user scenarios that contained a set of tasks which had to be performed by the participants. Moreover, the debrief (posttest interview) questions were

formed, clearly indicating their goals. Finally, the System Usability Scale questionnaire was used in order to measure the usability of the systems that were previously used by the participants during the usability testing.

The third chapter, Findings and Recommendations consisted of four subchapters; Study Overview, Limitations, Key Findings and Persona Creation. To begin with, an overview of the five participants that undertook the study was presented. This overview contained qualitative information (demographics, beliefs and behaviors) regarding the participants' educational level, Internet search skills, field of studies, specialization areas, overall satisfaction regarding their previous studies, future career goals, e-learning interest, e-learning bias level and cultural heritage. Subsequently, the thesis limitations were introduced, providing a list of biases that should be handled in order for the findings not to be compromised. Additionally, it is stated, that due to the nature of the research there is not sufficient amount of participants in order to generalize the results in a way to reflect to the whole population. Furthermore, the results of the usability testing are used in order to create two tables; the first reports the measured individual task completion time and the second the total number of visited websites until the task was completed. Their data combination alongside to the SUS survey data analysis provide a list with actionable intelligence, which contains the identification of issues that occurred and how they damage the user experience of e-learning. Finally, a student persona is created in order to provide a fictional, but very realistic description of a typical or potential user of e-learning.

It has to be stated that the findings of this study should not be accounted as definitive, but rather as indicative and usability study of a larger scale (including more participants and having diversified the recruiting criteria) should take place in order to generalize the results, by providing statistical significance to the findings, especially the quantitative measurements of time consumption and error rate.

However, the identified issues exist and make it difficult for an interested party to search and select an appropriate e-learning study program. This leads to a poor user experience which consequently impacts both sides; On the one hand, the educational institutions do not have as many students as they could, and consequently they suffer losses in respect to their financial

gains and a larger, more vibrant academical society. On the other hand, the students have to encounter cumbersome systems which force them either to not pursue further their search or compromise to an alternative, which under other circumstances would not have been their first choice.

The main reasons of these issues is the presence of unusable digital systems and the level of awareness in regards to e-learning. Therefore, the first recommendation to the academical institutions is to hire professionals in order to maximize the user's experience by iteratively improving both of their digital learning platforms and simplify the studying procedure by providing clear information beforehand. In addition to that, e-learning has to be advertised more with marketing campaigns in order to inform the target population about the potential opportunities and consequently increase its general awareness level.

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Study Programme: Systems Engineering and Informatics
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Document for registration BACHELOR STUDENT'S THESIS

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TOPIC IN CZECH:

DESIRABILITY AND DISCOVERABILITY OF E-LEARNING STUDY PROGRAMS

TOPIC IN ENGLISH:

DESIRABILITY AND DISCOVERABILITY OF E-LEARNING STUDY PROGRAMS

SUPERVISOR:

Ing. Pavel Čech, Ph.D. - KIT

RESEARCH PLAN:

The aim of this thesis is to conduct a qualitative research that investigates the general awareness and discoverability of electronic learning. Moreover, it emphasizes on measuring the cognitive load that is required by the students in order to search and find an online study program.
It mainly focuses on answering the following questions:
-Which are the goals of the target population?
-What is their conceptual models?
-How do they try to achieve those goals?

In the first part, evidence of the growing cost in regards to higher education is presented. Additionally, E-learning is defined and its history is introduced, showcasing its evolution over the years. Subsequently, its advantages and disadvantages are analyzed and compared to the traditional way of studying.

In the second part, the study's purpose and recruiting criteria are presented in detail. The subjects of this study were five graduate students who majored in various academic fields and undertook the formative research plan which included a pretest personal interview, a usability test, a debrief and a system usability scale survey.

In conclusion, the study reveals that the participants feel that they overpaid to receive higher education, the online search for Master's or PHD degrees is tedious, most of the websites that belong to accredited universities do not adhere to the design principles that promote discoverability and usability, the dedicated websites for searching e-learning study programs are usable, but not being used and the E-learning platforms have well designed systems. Ultimately, a student persona is created in order to provide a fictional, but very realistic description of a typical or potential user of e-learning.

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