



# The Advising Dimension of Information Literacy:

Helping Students Decide on a Thesis Topic

Evgenia Sisamaki

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## **ABSTRACT**

Tampereen ammattikorkeakoulu

Tampere University of Applied Sciences  
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SISAMAKI EVGENIA:

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This project aimed to design and launch a new library service. This service was developed as an addition to the already existing Information Literacy workshops offered by the Central Library of the National Technical University of Athens. An advising dimension of Information Literacy was investigated and the new addition to the workshops came in the form of advising sessions between the researcher / library employee and each student. The goal of the sessions was to help the students decide on a thesis topic.

Qualitative data collection methods were chosen for this project. During the implementation stage of this research project semi structured in-depth interviews were conducted as part of the search process aimed to help students decide on a thesis topic. For the evaluation of the design and implementation of the new service, focus groups were conducted. For the analysis of the primary data collected from the focus groups, a SWOT Analysis was done.

The data collected from the evaluation of the service revealed that this is a useful and helpful new library service to the students. The process followed throughout the sessions was understandable, easily applicable and time efficient. It was a simple approach which helped students gain necessary information not only for the search process needed in order to decide on a thesis topic, but information needed for the overall thesis writing process. The help they received relieved them from stress and anxiety towards the thesis writing process and offered them a better understanding towards what was expected of them. Thus, the initial evidence shows that this new service is a promising addition to the library pre - existing Information Literacy workshops. It is adding value to the Library and it shows promising potential for future improvements and additions.

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Keywords: Information Literacy, Thesis topic, ISP model, Repository

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**GLOSSARY**

ACRL	Association of College and Research Libraries
ALA	American Library Association
CAS	Council for the Advancement of Standards
IL	Information Literacy
ISP	Information Search Process
NACADA	National Academic Advising Association
NTUA	National Technical University of Athens
SCONUL	Society of College, National and University Libraries

## **1 INTRODUCTION**

### **1.1 Research Topic**

The topic of this research was selected due to the researcher's own interest and professional involvement with Academic Libraries, and specifically Information Literacy as an essential component of an Academic Library. The researcher works at the Central Library of the National Technical University of Athens "NTUA" where Information Literacy "IL" workshops are being offered to the library users. The ambition and desire of the researcher to enrich and improve these workshops has inspired the thesis topic.

The thesis will concentrate on concepts like Information Literacy, specifically Information Search "ISP" Models as well as the advising role of librarians and the Institutional Repository as an information source in a higher education institution.

### **1.2 Research questions**

Purpose of this project is to explore the idea that if library employees help students identify their interests; it can hugely assist in aiding them to choose the right topic for their thesis. The first step will be to provide students who cannot decide on their thesis topic with the opportunity to explore their academic interests and skills. The information gained regarding each student's interests and competences will be utilized following the Information Literacy principles and guidelines to provide users with the necessary knowledge to examine thoroughly their options before reaching a decision. This research project will be a case study of constructive research and it will use both theoretical (secondary data) and qualitative (primary data) research methods.

**The strategic question that guides the project:**

How can three different models of Information Literacy be combined and incorporated in the Information Literacy workshops along with the use of the Institutional Repository as a source of information in order to provide a library service which guides its patrons when choosing their ideal thesis topic?

**The objectives of the project:**

- To enrich the current steps of the Information Literacy Workshops with the addition of steps number 2 and 3 of Kuhlthau's ISP model.
- To apply stage 2 and 3 of Kuhlthau's ISP model with the use of depth interviews with the sample of library users.
- To decide on keywords deriving from the interests, skills and competences of the users in order to search for the appropriate thesis topic with the use of the Institutional Repository.
- To test whether or not such a service is useful to the patrons
- To investigate if this project can create an added value service for the library.

**1.3 Research approach**

This research project is conducted of 3 research stages. The first one is the preparation phase, where an extensive theoretical and literature review took place to examine how three different models of Information Literacy can be combined in order to add a feature (two additional steps) to the already existing Information Literacy workshops at the Central Library of the National Technical University of Athens. The second phase of the project included two case studies of implementation of the new IL model with the additional steps to NTUA students. The first case study involved three undergraduates and the second case study involved three postgraduate students. The third and final phase of the

project was the evaluation of this pilot service in order to examine whether this attempt could provide an added value service for the NTUA Central Library.

## **2 THEORETICAL FRAMEWORK**

The theoretical framework of this thesis project revolves around the concept of Information Literacy and the various models that represent this concept. The purpose of this literature review was to create a clear picture of what Information Literacy is, to introduce the most established IL models of Information Search Process, to describe how Information Literacy workshops have been formed thus far at the central Library of NTUA and how they can be enriched by the combination of these IL models.

### **2.1 Literature Review: The process of designing a new service**

#### **2.1.1 Academic Libraries trends**

Libraries are essential for an educational institution because they add value to the entire educational community by introducing the importance of information (Neal, 2006). Nevertheless, even now in the era of information, libraries must keep up with the latest trends and developments in order to enhance their importance and contribution to institutional aims and outcomes. As Bruce states in Somerville & Collins article, the goal of a modern library should be to provide an educational experience that is compelling, useful, important, and meaningful in the real world (Somerville & Collins, 2008). In order to achieve that goal, academic libraries realized that they should effectively re-adjust their services to answer the needs of a continuously changing user population, and the provision of innovative services is the key to remaining meaningful during the learning experience (Dugan, Bergstrom, & Doan, 2009).

Terms like “Linked Data”, “Semantic Web”, “Repositories”, “Information Literacy” and ‘e-resources’ are the core of a modern library and every library that wants to provide useful and desirable services to its users should be able to identify and apply such terms. New trends indicate an emphasis on user services to



support learning in terms of inquiry and research, making academic libraries a place to enable student exploration of the learning process. Therefore, libraries should align their services with objectives larger than them (Dugan, Bergstrom, & Doan, 2009), as they work in partnership with wider sources in the academic community.

Information literacy has been evolving rapidly over the last decade, and has gained a crucial role among library services. This evolution is caused by the increased use of e-resources and by the shift in user behaviour when it comes to searching and using information for learning, research and work (Chia, 2012). Information has become a vital part of every function in peoples' lives, thus the competency of proper search and use of information is nowadays more important than ever. "Information literacy is the ability to think critically and make balanced judgments about any information we find and use. It empowers us as citizens to reach and express informed views and to engage fully with society." (CILIP, 2019). "Information literate people will demonstrate an awareness of how they gather, use, manage, synthesize and create information and data in an ethical manner and will have the information skills to do so effectively." (SCONUL, 2019). It is evident from both definitions that information literacy includes aspects of evaluating information and looking for credibility, while learning how to use it effectively rather than just accessing it. It contains elements of critical reflection, critical evaluation, and it involves problem-solving and decision-making dimensions (Belshaw, 2012).

It was Robert Taylor in the 70's who linked the libraries with Information literacy, referred to the importance of information resources and their appropriate use (Behrens, 1994). Since then, libraries have played a crucial role in the learning process. The proper acquisition, evaluation and use of information are essential, integrating libraries in the learning process. As W. B. Lukenbill explained in Behren's article: "When applied to library use, information literacy involves going well beyond location skills and correct answer responses, into educating users in abilities which build insight and promote the development of strategies which help structure successful approaches to solving information needs" (Behrens, 1994).

### 2.1.2 The Information Literacy Workshops

The expanded role libraries have adopted has also affected the Central Library of the National Technical University of Athens. Therefore, three years ago motivated by the need to provide proper training and supply of necessary competences to its users, the library decided to provide Information Literacy “IL” workshops to its users. The aim of the workshops/classes was to teach both the undergraduate and post-graduate students how to prepare an individual or group paper within a particular class, and how to work on their final thesis or dissertation (NTUA Central Library, 2019).

The content and structure of the workshop is a product of the two most popular IL models. The first model is the seven pillars of Information Literacy which are basically seven steps, acting as a guide to understand what IL is and how it is used. The steps are determined by the SCONUL Working Group on Information Literacy who introduced the Seven Pillars of Information Skills model. This model has been adopted by librarians and teachers globally in order to assist them deliver information skills to their students (Bent &Stubbings, 2011). The model was revised in 2011, and then again reviewed in 2015 (Sconul, 2019), in order to ensure it remains relevant. The seven pillars, as are also demonstrated in Figure 1 (Bent &Stubbings, 2011), according to SCONUL are:

1. Identify: Identify a need for information
2. Scope: Evaluate existing knowledge and identify gaps
3. Plan: Create strategies for locating information
4. Gather: Locate and access the information
5. Evaluate: Review the process and compare and evaluate information
6. Manage: Classify information professionally and ethically
7. Present: Use the knowledge gained: present the results of research, synthesize new with old information to create new knowledge and disseminate it in a variety of ways

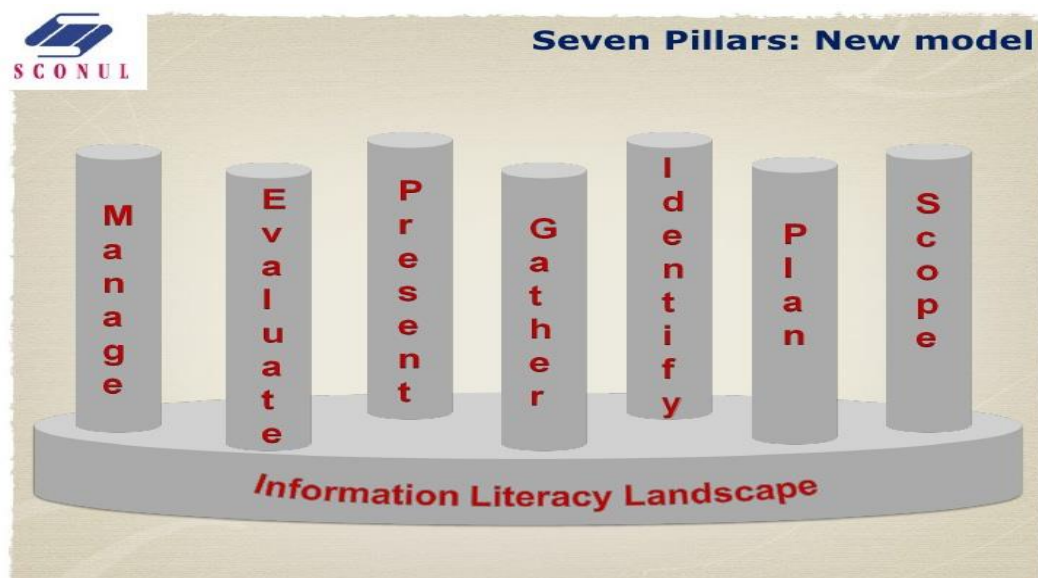


Figure 1: The seven pillars of IL (Bent & Stubbings, 2011).

The core model describes a set of skills, which are the components of the IL Landscape (figure 1); nevertheless, each component of the model can be highlighted, according to individual needs in order to best support diverse learners. Thus, the model is flexible and adaptable (Sconul, 2019).

The second model that influenced the content of the workshop as well as its actual delivery pattern is the ALA Guidelines for Instruction Programs in Academic Libraries (American Library Association, 2011). In this model the steps are reduced to five as shown below:

#### ACRL Info Literacy Competency Standards for Higher Education

1. Determine the information need
2. Access information effectively and efficiently
3. Evaluate information and its sources critically
4. Use information effectively to accomplish a specific purpose
5. Understand issues surrounding the use of information, and access/use information ethically

There is a clear sequence in the steps of the model, which are connected to each other (American Library Association, 2011), like the pieces of a puzzle (figure 2), coming together to present the best possible learning outcome.

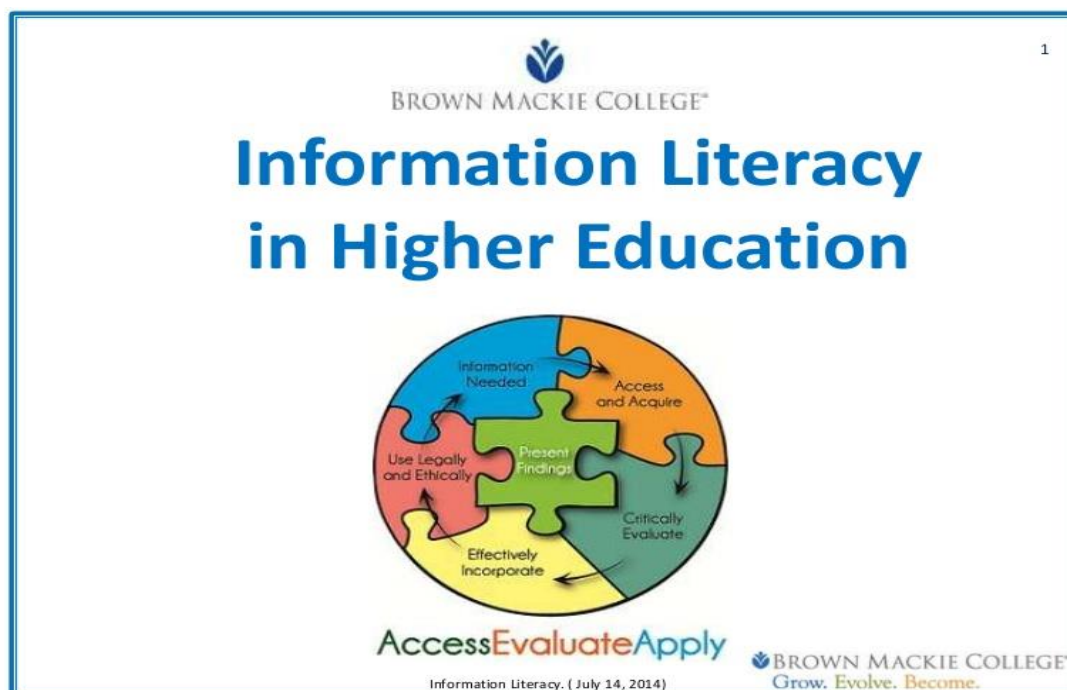


Figure 2: IL steps in Higher Education (LinkedIn Corporation, 2015)

The delivery of the workshop was also inspired from the ALA Guidelines. The workshop is hosted in an IL platform which is designed in a way that it can solely act as an e-class, but it can also become a useful tool when the class is provided onsite by the instructors. The onsite workshops are delivered in cooperation with schools and departments of NTUA. The idea for the web tutorial and the web-based instruction came from the ALA guidelines. The same guidelines also inspired the group instruction in library or campus classrooms and the combination of the two modes of instruction that lead to a hybrid arrangement of these methods.

Additionally, the guidelines inspired the evaluation and assessment of the workshops, which is meant to monitor the student learning outcomes and the overall program goals to reassure that the workshops are producing the desirable results (American Library Association, 2011). The workshops are distinguished into three different levels:

1. Introductory workshops to the undergraduate students regarding how a scientific report should be written.
2. Advanced workshops on how to write a thesis addressing students closer to graduation.
3. Workshops addressed to postgraduate students.

The class is designed in such a way trying to integrate technology into learning, trying to narrow the gap between theory and practice (Mishra & Koehler, 2006). The aim is for the students to identify the extent and the kind of information they need, identify information sources available to them, know how to access this information, evaluate it and use it legally and ethically (Euθυμίου et al, 2015).

In order to achieve this, a practical guide of five steps towards writing a report or a thesis has been created, following the logic suggested by the SCONUL's and ALA's models. This guide provides advice addressed to library users who need guidance in order to write a scientific report. The steps are:

1. Determine the extent and the kind of information you need in order to develop your assignment.
2. Discover where to look for information related to your topic.
3. Learn how to evaluate information using critical thinking.
4. Document the new knowledge attained in a way that allows you to demonstrate your personal judgment.
5. Learn the fundamentals of plagiarism.

The content of the workshops covers the needs of the undergraduate and postgraduate students for introductory information, while crucial additions are to be made to enrich the content of the workshops addressed to students closer to graduation (both undergraduates and postgraduates), who are about to write their thesis. A thesis or dissertation is a more complex task than just rhetorical structure and writing guidelines, as many factors influence each step of the process (Paltridge, 2002). Thus, the university should establish additional supports.

Combining global trends of providing innovative user-centred library services, while integrating the library with other aspects of the educational community, the library can facilitate properly the advanced needs of users who are about to start their thesis writing process. Library users should be given the opportunity to explore their academic interests, while they will learn how to fully utilize the outcome of this exploration in combination with the variety of resources and services their academic institution has to offer (Noaman & Ahmed, 2015, p.359) in order to ease their way towards the choice of an appropriate thesis topic.

### **2.1.3 The advising dimension of Information Literacy**

There is a recent interest in the parallels between academic librarian training and academic advising. This resemblance proved inspiring and indicated new possibilities for the Central Library of NTUA and the IL workshops for the students who are about to start their thesis. One possibility is to combine academic advising with academic librarianship in order to better leverage the alignment between these two services. Specifically, the academic advising guidelines for higher education recommended from the National Academic Advising Association “NACADA” Council for the Advancement of Standards “CAS” resemble those of the Association of College and Research Libraries “ACRL” “Information Literacy Competency Standards for Higher Education”. These standards recognize that both the advisor and the librarian have a role in the students’ development and success. In both cases, students are supported in their decision making according to their goals explored in collaboration with the advisor or librarian (Young, 2008, p.139).

The librarian can resemble an academic advisor in the aspect of providing strategies and guidelines for assembling, exploring, and interpreting information related to the students' educational purposes. Additionally, a librarian, much like an advisor, is invested in student achievement of goals resulting in an information-literate person (Young, 2008, p. 143). Separately, academic advisors teach students about different study options and offer guidance for selecting an appropriate major or educational path, while academic librarians illuminate stu-

dents on how to identify, access, and evaluate information and research sources. These functions could be combined to create an added value service. Beyond just helping students with their academic responsibilities, such a service could educate students on research opportunities that may even lead to future career opportunities (UNC Wilmington, 2019), since the selection of a right research topic can direct to a promising career (Useem, 1997, p. 215). All the information skills acquired from such a service could be valuable for the process of decision making towards the development of knowledge and success.

Until now the IL workshops at NTUA have assisted students who are about to write their thesis in relation to information search, source evaluation and proper use and referencing so as to avoid plagiarism. Nevertheless, the connection between advising and library work has generated the idea for an addition to the IL workshops. It would be very useful to exploit all the possibilities this similarity between library employees and advisors provide in order to help students explore thesis topics that are suitable for them. Choosing a thesis topic is an important decision in a student's life since it will consume a significant portion of their studies (Schlechter, 2006) and it can often be linked to a postgraduate specialization or even a future career (Tanner, 2002). The right topic can be a strong future asset, while the wrong topic can cost months of unnecessary fatigue and danger of incompleteness, derailing promising future possibilities (Useem, 1997, p. 2016).

The National technical University of Athens doesn't provide such a service, not even within the advising services of its career office. Students are responsible for exploring their options and choosing a thesis topic on their own. Teaching staff is usually available for guidance, but there is the trap to be proselytized for a specific topic that is within the professor's academic interests or research funding, without taking into account about the students' interests. Therefore, such advising for a thesis topic is a better fit for the academic librarian (Flatley, Weber, Czerny & Pham, 2013, p. 583). Additionally, librarians who have experience with the needs and stages of the information research process may thrive as advisors to undecided students (Wiley & Williams, 2015).

Advising entails the instruction of the student in several ways and this resembles many of the duties of a library employee. Much like reference work, advising requires time and dedication to student, since listening and asking the appropriate questions are essential (Kelleher & Laidlaw, 2009). The librarian - advisor will approach the session bearing in mind that the student's potentialities and interests are yet to be discovered and that the decision on the thesis topic should be derived from the student rather than be imposed by the library employee – advisor (Crookston, 2009, p. 79-80). The whole point of this effort will be to dismiss the confusion and indecision of the student and produce positive personal development (Wiley & Williams, 2015).

The advising aspect of the service will involve the help provided to students in order to investigate their values and goals, explore their educational options, and assist students in selecting a thesis topic consistent with their interests and skills (Kelleher & Laidlaw, 2009). The goal of the whole advising session will be to reduce anxiety from the information overload and rather focus on how to excite and guide students with multiple interests; the ambition is to select only targeted paths to explore rather than feeling confused about the starting point.

Usually students are limited in their exposure to scholarly content and are influenced only by the courses they have undertaken and the textbooks they have studied during these courses, while they are oblivious to the wide range of research that occurs within each discipline (Head, 2008, p. 429-430). The library expert will explore with the student all the courses, disciplines, and types of research assignments the student has undertaken. Such experiences help develop confidence in students' capabilities to make decisions about their own personal research abilities and choice of topic (Wiley & Williams, 2015). Nevertheless, research options can expand far beyond the students' experiences and follow the latest trends in the academic world. Since research is deeply relied on previous research and based on what has already been done, new knowledge is developed (Daland & Hidle, 2016), the role of the library employee is to help students explore this wide range of previous research and use it as a foundation for their own research project.



Student advising usually includes a decision-making process. In order to reach a decision, with the help of an advisor, it is important to build trust between the advisor and the student and for the advisor to become aware of the students' interests, motives and competences. Information Literacy doesn't focus on decision-making processes, but rather on information-seeking behaviours. While decision making and information seeking do not service the same goals, the process remains similar, and both contribute to a student's general growth (Wiley & Williams, 2015). Additionally, Information Literacy and all its variations (media/web/digital literacy) do have a critical thinking dimension (Kellner, & Share, 2007) and critical thinking is the kind of thinking involved in solving problems, reaching conclusions, calculating probabilities, and decision making (Halpern, 1999). As Skovira states in Oili Kokkonen's article, an information literate person besides being able to locate information, determining relevance and adequacy of the information, should also apply information in problem solving and decision making (Kokkonen, 1997, p.1).

The problem-solving and sense-making dimensions of the knowledge generated from information use, can even be linked to essential skills for survival in today's information/knowledge societies (Ibenne, Simeonova, Harrison & Hepworth, 2017). Information Literacy is offering to assist with the development of the skill of critical thinking. Information Literacy it is more than a set of skills in the sense of the simple following of a few steps to write an assignment. These skills, when understood and valued appropriately can create a habit of thinking in which the thinker is disposed to use them and to accept the results of using them whenever necessary (Anderson & Johnston, 2016).

#### **2.1.4 The Information Search Process**

There are several models of Information Search in the Information Literacy sector. One of them is the information search process (ISP) which was introduced by Carol Kuhlthau in 1991. It describes the Information Search process as a six-stage process of information seeking behaviour, and it is often used to describe

students' behaviours when in quest for information (Bawden & Robinson, 2015). This model resembles all the other models used in Information Literacy in the aspect of identifying the need for information and the process of information search, collection and presentation/use. The main differentiation of the model, which is the points of interest for the case of the Central Library of NTUA are the second and third stages/steps of the model. At these stages the focus is on the research topic selection, a part of the process that is often overlooked or taken for granted.

Kuhlthau's ISP model is based on the principle that the individual gathers data from various sources and this information is incorporated with pre-existent knowledge, allowing the information seeker to formulate a critical understanding (Wiley & Williams, 2015). The model describes the typical thoughts, feelings, tasks, and actions associated with six stages of research: Task Initiation, Topic Selection, Pre-focus Exploration, Focus Formulation, Information Collection, and Search Closure or presentation (Kracker, 2002). Each stage relates to a task in which the researcher exhibits different characteristics as summarized in table 1 (Wiley & Williams, 2015) below. While the other two IL models presented (figure 1, figure 2), also consist of stages/steps with a clear structure, much like Kuhlthau's ISP model, the latter offers an interesting variation. Each stage of the model is associated to a human feeling (Kracker, 2002) or state of mind (table 1).

Table 1: The 6 stages of Kuhlthau's ISP model

Stage	Description
<b>Initiation</b>	A lack of knowledge or understanding leads to feelings of uncertainty and apprehension.
<b>Selection</b>	A general area, topic, or problem is identified and initial uncertainty gives way to optimism and readiness to begin the search.
<b>Exploration</b>	Inconsistent, incompatible information is encountered, and uncertainty, confusion and doubt frequently increase such that confidence wanes
<b>Formulation</b>	As a focused perspective is formed, uncertainty diminishes and confidence increases
<b>Collection</b>	Pertinent information is gathered and uncertainty subsides as interest and involvement deepen.
<b>Presentation</b>	The process is completed and a new understanding can be demonstrated through explanations and applications of knowledge acquired in the process.

For each indecisive person the information he or she needs in order to get to the stage of deciding may differ, but the process of meeting the needs is similar. The important clue in the information search process is to realize that people don't just look for information, but they also want to construct meaning from that information (Kuhlthau, 2005). This meaning or sense-making is what will hopefully lead their decision making process.

### 2.1.5 Incorporating Stages 2 & 3 of Kuhlthau's ISP model into the IL Workshops

While all the information search models start at stage 1 with the realization of the need for information (figure 1, figure 2, table 1), usually during library instruction the latest stages of the Information Search Process are mostly addressed and focused on. Nevertheless, much of the effort and creativity of research exists in the early stages of the process (Kracker, 2002).

Following that norm, the IL workshops in NTUA have been focusing on the stages after exploration (stage 3 of table 1), based on SCOUNL's and ALA's models (figure 1, figure 2). The aim for the enrichment and improvement of the workshops is to focus equally on the second and third stages of Kuhlthau's ISP model for the indecisive and confused students. Once these steps are taken, they can lead into selecting a thesis topic. To that end, the potential of a library employee to act as a student advisor will be examined in order to explore students' interests, motives, skills and academic strengths with the objective to decide on a suitable topic. The customized approach of the model according to the personal styles of information search of every individual in combination with its focus on emotions (Kracker, 2002) is compatible with the personalized character of the advising process.

Starting at the very beginning of the search process, the goal is to help students in their decision-making course, and provide what they need to advance to the next step in order to assure them that a positive and rewarding result is probable (Wiley & Williams, 2015). To summarize, the two stages/steps to be added to the workshop which will be addressed to the indecisive students who are about to start their thesis are:

**Stage 2: Topic Selection.** During this stage the students work towards choosing a general topic. The process of this primary orientation towards a topic involves weighing possible options and comparing them to the assignment guidelines, existing knowledge, personal interests, information availability, and time constraints. This initial exploration of options may be the result of discussing

and browsing available collections with the help of the library employee (Kracker, 2002).

Practically, this step of the Information Search Process will be added just after the initial step of the realization of the need for information in order to start the thesis task. The process will begin by a semi-structured in depth interview in a form of an informal discussion between the library employee and the indecisive student. During this interview/discussion the students' interests, level of knowledge, skills and competences will be explored. Then, the information gathered will be translated into several key-words which will play a significant role at the next step of the information search process.

**Stage 3: Pre-focus Exploration.** After a general topic is selected, the focus during Stage 3 is to gather further background information on the topic in order to make it more specific. Background information act as a guide on what questions should be asked in order to formulate the aim and objectives of the thesis. The decision on a specific topic may be the outcome of finding general information, realizing how the pieces fit together, while looking for a workable focus. Information search, reading, interviewing, and taking notes are needed at this stage (Kracker, 2002).

At this step, the key-words provided in step 2 will be used to conduct a search in the Institutional Repository. The student will be introduced to this very useful library tool, where a significant collection of theses, dissertations and other research papers are stored. The desired outcome of this step is to provide specific ideas on thesis topics.

After the topic has been decided, the rest of the workshop's steps will follow. Specifically, the new enriched guide to the Information Search Process, with the addition of the new two steps will be:

1. Determine the extent and the kind of information you need in order to develop your assignment.
2. **Explore your interests, skills and competences to initiate the topic selection process**
3. **Conduct a primary search in the Institutional Repository to explore thesis topics.**
4. Discover where to look for information related to your topic.
5. Learn how to evaluate information using critical thinking.
6. Document the new knowledge attained in a way that allows you to demonstrate your personal judgment.
7. Learn the fundamentals of plagiarism.

These two additional steps are optional and will not be used in every IL workshop. They will only be part of the Information Search Process in the cases that the topic is not pre-determined and the student is indecisive.

### **2.1.6 Institutional Repositories**

Institutional repositories are storage places of digital collections where the intellectual output of educational communities is accumulated and preserved (Crow, 2002). Their service is to manage and disseminate the digital materials created by educational institutions and their members (Lynch, 2003). They are essentially web-based databases of scholarly materials which can be prepared in a wide variety of formats (Bailey, 2005) and they provide free and open access to research. In higher education, they can serve as agents of a university's quality by demonstrating the scientific, societal, and economic benefits of its research activities, thus increasing the institution's visibility, status, and public value (Crow, 2002).

An institutional repository might contain any work generated by the institution's students, faculty, non-faculty researchers, and staff. This material can include student electronic portfolios, classroom teaching materials, monographs, the institution's annual reports, video recordings, computer programs, conference papers, data sets and other ancillary research material, photographs, art works, peer reviewed articles, electronic theses and dissertations, and gray literature. It can pretty much include any scholarly content in a digital form that the institution wishes to preserve. This content may include even pre-prints and other works-in-progress (Crow, 2002). It is a commitment from the Educational Institutions towards all these types of digital materials, providing long-term preservation so that intellectual and scientific property is not lost (Lynch, 2003).

NTUA's Central Library has chosen to use DSpace as software for its Institutional Repository, and in DSpace the research work of the members of its academic community in digital form is collected, stored, indexed, maintained and distributed. It is an Institutional Repository for dissertations, postgraduate theses and doctoral dissertations, as well as journal publications and conference presentations and proceedings of the faculty members. Specifically thus far DSpace contains 29.000 research publications, 9.000 dissertations and digitalized books and magazines from the 18th and 19th century of NTUA's Historical Library (NTUA Central Library, 2019). Additionally, the users of NTUA Library have access to the largest portal of scientific digital content of 750.226 items from 59 Institutions, called "Open Archives" (EKT, 2019), which provides a wide variety of dissertations and research publications and access to their full text. These repositories will be the source of material where the Information Search Process will take place for the purposes of this thesis.

### 3 METHODOLOGY

This project focuses on the pilot phase of the enrichment of the IL workshops the Central Library of NTUA is offering to its users. This pilot phase of the enriched workshops is divided in three distinct stages. The first stage is the preparation phase, where the use of secondary data obtained via the literature review generated the combination of three different models of Information Literacy and has added two steps in the Information Search process aiming to guide students in their thesis topic selection. After the new sequence of steps is established, the second phase of the project is about the implementation of this new IL model. The third and final phase of the project is the evaluation of this pilot service in order to examine whether this attempt could provide an added value service for the NTUA Central Library.

While the first phase of the project has been completed solely with the use of secondary data and extensive search identification and utilization of previous relevant research in the field of Information Literacy, the second and third phases of the project require practical application and testing of the newly designed service. Subsequently, the second and third parts of this thesis will generate primary data, which will be analyzed and used in order to create a spherical understanding of the functionality and value of this new service. In order to acquire and use this primary data, it is important to choose the appropriate research method to address this project's needs. Research methods are necessary to determine, discover, interpret, and develop facts. The word research means, "to investigate thoroughly", thus, research methods are used when the aim is to produce "new knowledge" (Research Info, 2013).

Because this thesis is a very practical and applied project, the methodological approach derives from constructivism and post positivism. Constructivism perceives reality as a construct of human mind; therefore the generation of meaning is subjective (Lee, 2012). Within a similar mindset, post positivism perceives reality as a socially constructed outcome rather than objectively determined truth and it appreciates the different constructions and meanings people give to their personal experiences (Noor, 2008). Specifically, the constructive research method has been selected. Constructive Research is one of the main branches



of research methods. This type of research encompasses the area of theory, is specifically related to theories, hypotheses, and case studies. It is used to test theories (Research Info, 2013) and it is mostly appropriate for producing innovative constructions, while it has problem solving dimensions (Lucka, 2003, p.83).

Constructive Research was considered to be the most appropriate method for this project, because in applied science it is essential to discover theoretically grounded solutions for practical cases (Mattessich, 1995). Cases from the management and accounting field show that the constructive research approach is used for the improvement of existing practices, since this approach can be defined as a research procedure for producing novel entities (e.g. models, diagrams, plans) that solve emerging problems in organizations (Kasanen, Lukka & Siitonen, 1993). Furthermore, this research approach has been applied in educational sciences in addition to many other scientific fields like IT, medicine and business administration (Lukka, 2003, p.83).

Since a need has been identified in an educational organization, such as the National Technical University of Athens, in order to cover this need is to come up with a real life solution by providing the library users with an enhanced service. When dealing with real life problems, using real life data and implementing the solutions in the workplace, constructive research becomes the natural choice that doesn't need much justification (Labro & Tuomela, 2003).

### **3.1 Case studies**

As mentioned above, constructive research can be based upon case studies. The implementation and evaluation of this pilot service provided by the Central Library of NTUA constituted a case study divided in two separate parts. The first part of the case study involved four (4) undergraduates while the second part involved four (4) postgraduate students. The case study can be the appropriate research method especially if an in-depth investigation is required, as it enables the researcher to closely examine the data within a specific context. It is popular

in many social science studies and it is a well established research method in the field of education. Usually, a case study selects a limited number of individuals as the sample for the study and it explores real-life phenomena (Zainal, 2007). A case study research can be constituted of one or more case studies, relies on multiple sources of evidence and benefits from the prior development of theoretical proposals (PressAcademia, 2018).

In more detail, exploratory case studies answer to the questions of 'what' or 'who' and their primary data collection derives from methods such as interviews, questionnaires, experiments etc. The data collection and analysis take place within the context of each case and can integrate qualitative and quantitative data. Case studies have the ability to capture complexities of real-life situations so that the phenomenon can be studied in depth. Nevertheless, case studies also have disadvantages such as the lack of thoroughness and the difficulty for generalizations of findings and conclusions (Dudovskiy, 2019). In this case study, the data collection methods included in-depth interviews and focus groups.

### **3.1.1 In-depth Interviews**

The aim of the study was to incorporate two additional steps (steps 2 & 3) into the existing steps of the workshops and then investigate whether these steps have improved the workshops. As mentioned, the steps added were:

2. Explore your interests, skills and competences to initiate the topic selection process
3. Conduct a primary search in the Institutional Repository to explore thesis topics.

During step number two (2) the personal interests, competences and skills of the students were explored. The necessary information required from step number two (2) of Kuhlthau's ISP model was produced from the in-depth inter-

views. Even though the interviews were serving as a tool to acquire necessary information from the library users and were a component of the service (step number 2), the in-depth interviews were approached as a research method for this study. Thus the interviews were given the appropriate attention and were conducted with the professionalism necessary to achieve objective results.

Conducting qualitative research interviews is not a simple undertaking. It requires the use of various skills, such as excellent listening skills at the same time as note taking, thorough planning and sufficient preparation (Qu & Dumay, 2011, p. 239). Because the aim in this case was to collect interview data useful for research purposes (in addition to serving as a step of the IL model), the interview phase of the IL model was approached as a proper research method. The focus during this step of Kuhlthau's ISP model is on the individual, making the interview the most appropriate data acquisition method. Interviews provide the individual the opportunity to bring up matters he/she is interested in as freely as possible. The interview's loose structure allows those interviewed to be participants in meaning making and aims to contribute to the generation of knowledge that is conceptual and is based on life experiences of the interviewees (DiCicco-Bloom & Crabtree, 2006). The purpose of interviews can be to clarify matters or gain a deeper understanding, in this case exploring the students' academic areas of interest.

The in-depth interviews in this case were semi-structured, making sure that all the basics were covered, yet left enough space and opportunities for exploration. The semi-structured interviews had some indicative questions in order to explore the students' interests and skills, while they were flexible enough to allow the interviewer to modify the style, pace and ordering of questions to evoke the fullest responses from the interviewees, who were free to provide responses in their own terms and in their own language (Qu & Dumay, 2011, p. 246). This was the reason why the interviews took place in the interviewees' mother tongue, which is Greek. More specifically, the questions were among the following lines as they were inspired by guidelines on exploration of interests and skills from Tufts University (Tufts University, 2019):

**Interests:**

- How do you like spending your free time?
- What academic, cultural or social activities do you prefer?
- What have been your favourite courses during your studies?
- What is the most satisfying thing you have achieved?
- Which world issues interest you?
- If you could choose 3 jobs, what would they be and why?
- What would you try to do if you knew you would not fail?

**Skills / Competences:**

Writing skills: Can you easily express yourself in written forms of communication?

Talking skills: Do you relate effortlessly to people in a conversation?

Numerical skills: Are you good with quantitative data?

Computer skills: Do you have knowledge of programming, etc?

Scientific skills: Are you keen on learning about scientific phenomena?

Research skills: Do you like accumulating information regarding a specific field of knowledge to understand facts or principles?

Technical skills: Can you work easily with practical, mechanical or industrial aspects of a particular science?

Mechanical skills: Do you understand the way that machinery?

Spatial perception skills: Can you understand the relationship of objects in space?

Artistic skills: Are you fascinated by aesthetics; able to create works of art?

Imaginative skills: Can you create new ideas, forms, and programs through conceptualization?

Organizational / planning skills: Are you interested in developing a program, or a project through methodical groundwork and organising tasks, managing the people and resources necessary to activate the plan?

In order to produce valuable outcomes from this project, it was important to collect the appropriate sample of patrons and conduct the in-depth interviews. The user sample for the research came from the users of the Central Library of the National Technical University of Athens.

Step number three (3) of Kuhlthau's model gathers further background information on the topic in order to make it more specific. The aim was to incorporate the insights from the interviews in the form of "keywords" and "subject categories" into the workshops in order to navigate the search in the Institutional and "Open Archive" Repositories and produce the appropriate results. The wanted outcome in this case was for the search in the Repositories to produce enough results in order to inspire the students towards a specific thesis topic.

### **3.1.2 Focus Groups**

The final part of the project was to determine whether this is a useful and desirable service for the library. This part of evaluating the usefulness of the enriched IL workshops was done with the use of a qualitative research method. In this final part, the research conducted concerned the research project as such and the conclusions drawn from it had a direct impact on the proper design and implementation of the added features in the IL workshops. The selected qualitative tool for the evaluation of the service was focus groups. Two (2) focus groups, one for each user category were conducted where the views of the users were recorded and then analysed to produce the research outcome.

A focus group is a group of individuals selected and composed by researchers to discuss a topic of interest for the research project (Powell & Single, 1996, p. 499), aiming to analyse it in detail in order to gain an understanding from their personal experiences, beliefs, perceptions and attitudes via a moderated interaction (O. Nyumba, Wilson, Derrick & Mukherjee, 2018, p. 21). The use of focus groups was selected because of the importance of the opinion of the participants rather than the opinion of the researcher and the ability of the method to

maximise the collection of high-quality information in a short period of time (Acocella, 2012, p. 1126). Focus groups are commonly used not only to gather peoples' beliefs and perceptions, but also to evaluate an educational program (Powell & Single, 1996, p. 500), which was the case in this research project.

Focus group sessions include four main steps: Research design, data collection, data analysis and reporting of results (O. Nyumba, Wilson, Derrick & Mukherjee, 2018, p. 21-22).

Research design: The initial step is to decide the aim and research objectives the researcher wants to derive from the focus groups. These research objectives, will act as a guide for each focus group discussion session. In focus groups it is important to have successful group dynamics and good collaboration among participants to generate valuable data. Consequently, participants should share similar characteristics (O. Nyumba, Wilson, Derrick & Mukherjee, 2018, p. 22), such as their level of expertise related to the research topic (Krueger & Casey, 2014). This is the reason why in the case of this thesis the researcher decided to conduct two separate focus groups instead of one. This way, the homogeneity of each focus group can be increased, since the main characteristic that connected the participants was the level of their studies (undergraduates / postgraduates).

As far as the number of participants is concerned, Krueger & Casey mention that between six and eight participants are sufficient (Krueger & Casey, 2014). Other studies mentioned in O. Nyumba et al paper (e.g. Fern, 1982; Mendes de Almeida, 1980) have reported as few as four and as many as fifteen participants (O. Nyumba, Wilson, Derrick & Mukherjee, 2018, p. 23), increasing the options for a sufficient number of participants. Given that this was an initial evaluation of a pilot service and that there were time restraints on the study, the minimum number of participants sufficed. If the initial results appear to be promising and the service becomes well established and widely used in the Central Library of NTUA, it is possible to continue with a future research of a broader scale.

Ideally focus group sessions should continue until saturation is reached, that is a clear pattern of answers is evident and additional groups don't produce new information (Krueger & Casey, 2014). Unfortunately in this case, time limitations make such an approach impossible, therefore only two focus groups of two different user categories (undergraduates / postgraduates) took place, producing only initial indicative research results.

**Data collection:** The facilitator or moderator plays a critical role in the focus group. He or she must guide the discussion, and also manage the participants' relationships while creating a relaxed and comfortable environment. (O. Nyumba, Wilson, Derrick & Mukherjee, 2018, p. 23). In this case the facilitator will be the researcher who has previous experience with focus groups from work in a qualitative market research agency. As Stewart, Shamdasani, & Rook (2007) mention in O. Nyumba, Wilson, Derrick & Mukherjee article, methods of data collection during a focus group discussion include audio and tape recording, note-taking and participant observation (O. Nyumba, Wilson, Derrick & Mukherjee, 2018, p.23). For the purposes of this thesis, data collection was conducted via note-taking in order to create a more relaxed atmosphere and reduce any stress a recorder might create.

**Data analysis:** The extent of analysis is determined by the aim of the research, the complexity of the research design, and the ability to reach to conclusions. Most commonly, the analyses of focus group results include the transcript of the focus group discussion followed by the summary of the conclusions drawn from this discussion. Nevertheless, in some cases the transcript part of the analysis can be unnecessary. These are the cases when decisions have to be reached quickly or/and when the conclusions of the research are apparent and straightforward, a brief summary may be all that is necessary. In other cases, time or budget constraints might prevent a more thorough analysis. Finally, there are cases when all interested parties and decision makers observe or participate in the focus group, so there isn't much need for a detailed analysis or report. In every case, an analysis report is helpful, even if it serves archiving purposes (Stewart, Shamdasani & Rook, 2007). In the case of this thesis, there was one decision maker who moderated the focus group discussions, the research design was simple and clear and the conclusions drawn were apparent and

straight forward. Thus, a transcript for analysis was an unnecessary use of the limited time and budget for this research.

Reporting of results: After the data analysis is completed, results are presented in the format of a report. In that report, information such as gender, age and education level are usually included as well as key quotes from participants to emphasise points or support a conclusion (O. Nyumba, Wilson, Derrick & Mukherjee, 2018, p. 24).



## **4 IMPLEMENTATION**

### **4.1 In-depth Interviews**

Semi - structured in depth interviews were conducted in order to implement the topic selection steps of the IL model. As such, the interviews were not a research method for the purposes of this thesis, nevertheless, they were essential for the enriched IL model to function and produce the desired outcome; therefore are treated as a research method in order to be approached with the gravity they require.

#### **4.1.1 Undergraduate Students**

##### **Interview Number 1**

The first student who was selected to come for an interview in order to decide on a thesis topic was a 30 year old male undergraduate student of the School of Electrical Engineering of the National Technical University of Athens. When he was initially admitted to the school, he found the lack of structure of the University, something that unfortunately applies to all Greek Universities, frustrating and confusing, while the strictly technical thematic of the school did not really appeal to him. This resulted in suspending his studies for several years, deciding to start again the last five years. The School of Electrical Engineering has four (4) different directions, which are:

- IT
- Telecoms
- Energy
- Electronics and Systems

This student's direction of choice was Energy. Nevertheless, as the conversation started it was obvious that this student had no interest in a purely technical topic restricted by the strict scientific nature of the School of Electrical Engineering. As the conversation was progressing, via the questions concerning his interests, favourite modules, etc, it became clear that he favoured a more managerial direction. The keywords that resulted from the interview were:

- Management
- Organizing
- Decision making
- Environmental Policy
- Sustainability
- PEST Analysis
- SWOT Analysis
- Energy saving

The search process in the Repositories initiated using the keywords produced from the interview. At first the information source was the Repository of all the academic institutions called "Open Archives". Since this Repository contains publications from all the academic institutions, the variety of topics is wider. The search indeed produced many desirable outcomes. Published theses were retrieved where the field of management with the field of energy and renewable energy were combined, providing adequate inspiration to the student.

The second step of the search process was to conduct a search using the same keywords in "DSpace", the Institutional repository of NTUA. The purpose of this search was mostly to identify the professors of the university who were involved in the managerial aspect of the renewable energy sector. This search also produced satisfying results, providing enough options to the student to work with.

The process ended with the student having enough information to explore and come up with the appropriate thesis topic. He explicitly stated his satisfaction with the process and was excited to proceed with the topic selection relieved from the unnecessary stress and confusion.

## Interview Number 2

The second student who needed guidance towards finding the appropriate thesis topic was a 26 year old male who had to postpone his studies for three years due to work obligations. Therefore, he was now conducting his ninth (9<sup>th</sup>) year of studies, even though the required years for the completion of studies are five (5). This student was also a student at the School of Electrical Engineering of the National Technical University of Athens. The School of Electrical Engineering, as already mentioned, has four (4) different directions, which are:

- IT
- Telecoms
- Energy
- Electronics and Systems

This student's desirable direction was IT. From the IT directions there are several specializations to choose. More explicitly, these specializations are:

- Software
- Computer Systems
- Mathematics
- Biomedicine

The student in this case was interested in software and mathematics, mostly influenced by the modules he attended during his studies. Thus, he would prefer a thesis topic that could combine these two specializations. His interests were programming and mathematics and he demonstrated technical, numerical as well as theoretical/academic skills. As the conversation progressed it was apparent that this student would prefer a topic that could combine not only his two specializations of choice, but also could provide the possibility to combine a theoretical approach with a more technical / practical one. From the questions asked during the interview, the appropriate keywords for the search at the Repositories were:

- Programming
- Programming language
- Type Systems
- Application
- Blockchain
- Smart contracts
- Soundness
- Compilers
- Correctness
- Deadlocks

Using these keywords the search in the “Open Archives” Repository initiated. This Repository provides results from all the Academic Institutions, thus more outcomes. Previous academic research was retrieved from this Repository combining programming, blockchains and their applications in various fields, providing a variety of ideas to the student.

The second step of the search process was to conduct a search using the same keywords in “DSpace”, the Institutional Repository of NTUA. The purpose of this search was to identify which professors of the University were involved in the student’s area of interest. This search provided useful results for the student to work with.

The process ended with the student having a large volume of information to take into account and come up with the appropriate topic for him. He claimed that his confidence was boosted, he was inspired by the process and he was motivated to proceed with the topic selection.

### **Interview Number 3**

The third library user whom the in-depth interview was conducted with was a 24 year old female student at the School of Chemical Engineering in her sixth (6<sup>th</sup>) year of studies. The School of Chemical Engineering of the National Technical

University of Athens has four (4) different directions students can choose from the fourth (4<sup>th</sup>) year of their studies forward. The directions are:

- Environment / Energy
- Food / Biotechnology
- Materials
- Mechanics of Procedures

This student expressed interest in the direction of Environment and the Energy sector, renewable energy sources in particular. She also expressed interest in Management, mostly influenced by related modules during the course of her studies. Therefore, as the interview was proceeding it was decided to adapt an approach that would combine the Energy and Environmental sector with a Managerial element. The keywords decided for the search in the Repositories were:

- Renewable Energy
- Green Energy
- Management
- Market Research
- Competitor Analysis
- Greek Market

The search in the “Open Archives” repository produced several results, which proved very useful to the student, who decided on adapting a more managerial approach to her topic with scientific elements, rather than focus on the pure scientific aspect of the energy sector. The multidiscipline results produced because of the great variety of materials in the “Open Archives” repositories were extremely helpful in this case. Then, the search in “DSpace”, helped to find the appropriate professors who were involved in similar disciplines for the student to contact. Overall, the process seemed very useful, easy and understandable to the student, who stated that she felt satisfied with the experience.

## Interview Number 4

The fourth and final undergraduate student who was interviewed for the purposes of this thesis project was a 23 year old male, currently in his sixth (6<sup>th</sup>) year of studies in the School of Electrical Engineering of NTUA. The directions available for this school are:

- IT
- Telecoms
- Energy
- Electronics and Systems

This student has chosen the direction of Electronics and Systems. He was interested in circuits, hardware design and device development and materials. His interests and skills were towards a more applied topic, while he also expressed interest in physical chemistry, which is the theoretical background of hardware design and its related applications.

More specifically, the student was intrigued with the design and development of electronic devices used in the medical profession. The keywords derived from our conversation were the following:

- Medical Equipment
- Equipment maintenance
- Bioengineering
- Biophysics
- Clinical Engineering

Firstly the search was conducted in the “Open Archives” Repository, where many search results were retrieved from various academic backgrounds. Unfortunately, this search didn’t produce very compatible results regarding the student’s academic background and orientation. Nevertheless, the search provided two additional keywords, which derived from topics that upon further exploration inspired interest to the student. The additional keywords were:

- Medical Instruments
- Bioethics

Bioethics was a new concept to the student, concerning a more philosophical approach, questioning the ethical concerns raised from technological achievements in the health industry. The student seemed fascinated with this concept, and expressed a strong desire to investigate it further.

At this point, a search took place in the Institutional Repository of NTUA, “DSpace”. This search produced a plethora of relevant and applicable results. As in the previous cases, this search helped us identify the professors of the Institution who were involved in relevant research projects, for the student to approach. Furthermore, some of the examined topics seemed to allow room for the concept of “Bioethics” to be involved. This prospect created an additional interest for the student.

The session ended with the student having new ideas and stimuli for further investigation, and the knowhow to conduct research independently. He was very satisfied and assisted by the process, as he stated.

#### **4.1.2 Postgraduate Students**

##### **Interview Number 1**

The first postgraduate student who needed help with his choice of thesis topic was a 27 year old male, student of the integrated postgraduate programme of NTUA “Naval and Marine Technology and Science”. This programme is the product of collaboration between the Schools of the National Technical University of Athens, the National and Kapodistrian University of Athens, and the Hellenic Centre of Marine Research.

As the conversation started, soon the student revealed that during his internship in a shipping company he developed an interest in the possible use of liquefied natural gas in ship engines. The keywords derived from the quick interview were:

- LNG (liquefied natural gas)
- Marine Engineering
- Marine fuel
- Engine adjustment

The original search in the “Open Archives” repository didn’t produced many relevant results, due to the high specialization of the scientific area of interest. Similar were the results from the search in the Institutional Repository “DSpace”. Nevertheless, the results indicated that a more appropriate key word for the search instead of “Engine adjustment” was “Engine moderation”. The replacement of the keyword produced a few more relevant results, but the outcome of the search was still insufficient.

The level of specialization combined with the advanced requirements of a post-graduate thesis, were the most probable cause of the limited results produced from the search in the Repositories. Therefore, the same keywords were used to conduct a search in Google Scholar and in the University’s meta-search platform, where results are produced from the sum of the University’s databases and e-journals. This new search produced several very relevant results, useful to the student. The process ended with a satisfying final outcome and the student stated his gratification for the help he received.

## **Interview Number 2**

The second postgraduate student was a 42 year old male student of the MBA postgraduate integrated programme. This programme derived from the collaboration of the School of Mechanical Engineering, the School of Electrical Engineering and the School of Chemical Engineering of NTUA with Athens Universi-



ty of Economics and Business, and it is considered to be the most prestigious MBA among Greek Academic Institutions.

The student had a twenty year working experience as an employee of the National Technical University of Athens and a first degree in European Civilization from the Hellenic Open University.

The interview started, with the interviewer asking considerably more questions than all the previous interviews due to the biggest variety of options provided by an integrated MBA, which is a less specified field of studies, thus providing a variety of options. Considerable attention was given not only to the interests of the student and professional plans, but also to his talking and organizational skills and his interests that revolved around communication, human resources and organization themes. The keywords derived from this interview were:

- Human Resources
- Communication
- Organization
- Educational Institutions

The initial search in “Open Archives” produced limited relevant results, because of the key word “Educational Institutions”. Therefore, this keyword was replaced with the word “Education” and the search produced several relevant results. From the first screening of the search results the keyword “Evaluation” was detected, which really inspired the interviewee. A firmer idea and direction towards a thesis topic started forming. Following the initial search in the “Open Archives” Repository, a search in the Institutional Repository “DSpace” followed. From this search, besides more relevant and interesting theses topics, the appropriate professors for the student to contact were also identified. The interview ended with the student expressing his satisfaction for the assistance in the thesis selection process.

### Interview number 3

The third interview with this postgraduate student was conducted via Skype, due to the coronavirus pandemic, which caused a lockdown in the country. As a result, Universities were closed and social contact and social distancing was required. Under these extreme measures, it was impossible for a face to face in-depth interview to be conducted; therefore Skype was used as a communication tool.

The third interviewee was a 29 year old female who was attending the postgraduate program “Environment and Development” of NTUA. This is an integrated postgraduate program organized and implemented by all the faculties of the National Technical University of Athens, where applicants can be graduates from equivalent Technical Universities, or other equivalent Universities in the country, with a high preference in engineers and positive science graduates.

This interviewee was a female graduate of the Department of Chemical Engineering of the University of Patras. The student was very clear about her areas of interest, with a strong preference in environmental pollution, energy sustainability and ecology. Therefore, the interview was short, and focused. The keywords derived were:

- Environment
- Sustainability
- Ecology
- Renewable energy

After the initial search with the use of the above keywords in the “Open Archives” Repository, and the initial screening of the search results, the area of interest of the student became narrower and more specialized. Consequently, the keywords were slightly adjusted as follows:

- Environmental Education
- Sustainable Development

The new adjusted search produced fruitful results, helping the student to acquire a firm idea of her thesis topic. The next step was to conduct the search in “DSpace”, which produced the names of the most appropriate professors for the student’s area of specialization.

#### **Interview number 4**

This last interview was also conducted using Skype because of the coronavirus epidemic and the strict restrictions this had resulted in. This student was a 33 year old male, attending the postgraduate program “Environment and Development” of NTUA. His first degree was in Environmental Engineering from Democritus University of Thrace.

From the interview it became soon apparent that this student’s interests were focused on Environmental Management and Waste Management. The student was very clear about the specialization of his thesis. Therefore, the keywords derived from the interview were:

- Environmental Management
- Waste Management
- Higher Education

The search in “Open Archives” Repository produced limited results, so an estimation of which keyword was limiting the search results was made. Therefore, the keyword “Higher Education” converted into “Education”. This time the search results were more fruitful, making the search more efficient and helpful. A short search was then conducted in the Institutional Repository “DSpace” for the appropriate professor to be found. The process was completed with success, with the student clearly stating his satisfaction with the help he received.

## 5 EVALUATION

### 5.1 Focus groups

Focus groups are commonly the selected method for evaluation purposes of a program's success (Nagle & Williams, 2013), and in this case of the IL model that was created and the process followed to help students with their thesis topic selection. This method of evaluation was chosen in order to obtain insights from a selected group of individuals rather than from a statistically large sample of a broader population (O. Nyumba, Wilson, Derrick & Mukherjee, 2018, p.20).

The research technique of a focus group involves a guided, interactional discussion aiming to acquire the experiences and the reasoning behind the participants' actions, beliefs, perceptions and attitudes (Powell & Single, 1996). In this case study the required information deriving from each focus group were the participants' opinions, perceptions and experience with the Information Literacy model and the search process applied during its implementation. Since the participants of each focus group should share similar characteristics (O. Nyumba, Wilson, Derrick & Mukherjee, 2018, p.22) in order to achieve the appropriate dynamics in the discussion, in this case study the focus groups were formed based upon the participants' level of education. The homogeneity of each group was determined based on education level. Consequently, two focus groups were conducted, one compiled with the undergraduate students and one accumulated with the postgraduate students.

The main benefits of the focus groups were expected to be group interaction and non-verbal communication, which would encourage participants to make connections to various concepts through the discussions (Nagle & Williams, 2013). A beneficial factor for the implementation of the focus groups was the previous experience of the researcher, due to her postgraduate degree in marketing management and her working experience in a qualitative research agency.

The focus groups had to be conducted online, using tools like messenger and Skype due to the coronavirus pandemic, which made it impossible to implement face to face focus groups. Online focus groups are becoming more popular with the increase of internet use and quality. They are easy to implement, since the requirements are access to a web camera and a set of earphones and a microphone on the participants' behalf (GroupQuality, 2020).

The purpose of the focus groups was to gather the insights and opinions of all the participants in the process in order to evaluate whether this new service was designed properly and its outcome was useful to the students. For a successful focus group session it is important to narrow down the discussion to a couple of key points (GroupQuality, 2020). Therefore, the main investigation was the evaluation of the search process followed.

### **5.1.1 Focus group of undergraduate students**

Undergraduate students preferred to use the “Messenger” online communication app for the implementation of their focus group. The session lasted 75 minutes, which is within the recommended time margin of 60 to 90 minutes for such purposes (GroupQuality, 2020).

It is essential to the success of any focus group to achieve active and open participation in order to acquire valuable insights and perceptions (Vaughn, Schumm & Sinagub, 1996). Towards this desirable participation and the establishment of a relaxed and friendly atmosphere in order for the participants to speak freely - known as the “loosening effect” - (Vaughn, Schumm & Sinagub, 1996), the conversation in a focus group always initiates with an icebreaker, in the form of a general relaxed conversation, which gradually becomes more targeted to the issues under examination.

Therefore, the conversation started with the introduction of each member of the group and then moved to a general conversation about the National Technical

University of Athens and the study experience it provides. Gradually the conversation became more focused to the studies of each member of the group, their subjects of interest and future plans. It is interesting that the words *confusing* and *lack of structure* were frequently used, while the word *chaotic* was mentioned by one participant, in order to describe their study experience in the National Technical University of Athens.

The conversation gradually started involving the thesis topic selection. Words such as *insecurity*, *uncertainty*, *uninformed* and *lost* used by the participants expressed their level of stress and lack of direction from the University. The absence of a guide or instructions for the thesis process was discussed and the consequent stress and uncertainty this was causing to the students.

The aim of this focus group, as well as the postgraduates' focus group, session was to evaluate the new advising service created with the addition of two steps to the IL model, regarding the selection of a thesis topic. To achieve such an evaluation the following questions were answered during each focus group session:

1. Are you satisfied with the help you received?
2. What is your opinion on the search process as it was demonstrated to you during your advising session with the library professional?
3. How would you characterize this service?
4. What are the main benefits of this service?

When describing the information produced during focus groups it is useful for organizational purposes a table to be used, where all the important information and the main statements from the participants can be gathered. Such tables facilitate the researcher to group the information, make patterns more obvious, and reveal trends, and relationships (De Negri & Thomas, 2003, p. 51). Consequently, tables were used to organize and demonstrate the core information from both the undergraduate (table 2) and postgraduate (table 3) focus groups.

Table 2: Undergraduates' responses in the focus group

<b>Questions</b>	<b>Participant #1 Answers</b>	<b>Participant #2 Answers</b>	<b>Participant #3 Answers</b>	<b>Participant4 #1 Answers</b>
<b>Are you satisfied with the help you received?</b>	Yes	Yes	Yes	Yes
<b>What is your opinion on the search process as it was demonstrated to you during your advising session with the library professional?</b>	Useful, advantages of keywords and Repositories	Helpful, usefulness of Repositories, preference of "Open Archives" Repository	Understandable, useful, preference of "Open Archives" Repository	Good for ideas for thesis topics. Preference of "Open Archives" Repository
<b>How would you characterize this service?</b>	Easy, not time consuming	Helpful	Helpful, easy	Well structured
<b>What are the main benefits of this service?</b>	Less stress, research proposal guide	Less insecurity, less stress	More confidence, gained knowledge, more information	Better Understanding of the thesis writing process

Table 2 provides a useful tool to acquire a general view of the students' evaluation. In more detail, concerning the two additional steps added to the IL model and their implementation as form of an advising session the students were posi-

tive and encouraging in their comments. All students stated their satisfaction with the help they received, as well as with the process itself. They characterized the service as a whole as *helpful, easy, not time consuming* and *well structured*. They all stated that they obtained a good understanding of the search process, the usefulness of “keywords” and the concept of an Institutional Repository. Nevertheless, all participants were preferable to the search layout and search results from the “Open Archives” Repository, rather than the Institutional Repository “DSpace”. DSpace was characterized as not having a user friendly interface, its search results as *limited* and the search process as *problematic*. On the other hand, “Open Archives” Repository was characterized as *user-friendly, useful, indicative* and *helpful*, while the search process was described as *easy, understandable* and *quick*.

The main benefits of the service provided were the reduction of the stress levels concerning the thesis process and the increase of confidence levels, gained by the better understanding of the requirements of a thesis. The research proposal guide that was given to the students after the advising session gained excellent comments, as it was considered a very desirable assistance tool. Finally, all participants confirmed that this service improved their perception of the library, and they considered such a service as an asset.

### **5.1.2 Focus group of postgraduate students**

The postgraduate students chose to conduct the online focus group via Skype. This session lasted only 40 minutes, which is less than the recommended time margin of 60 to 90 minutes for these sessions (GroupQuality, 2020). Nevertheless, the changing priorities due to the coronavirus pandemic, can justify the decrease of importance of such an evaluation at this time.

The focus group started with a general approach, moving quickly to the specifics of the topic selection process and the enriched IL model. It was obvious from the beginning of the discussion that the students wanted to move quickly to the main questions of the evaluation, reducing the initial conversation time to the minimum.



Table 3: Postgraduates' responses in the focus group

Questions	Participant #1 Answers	Participant #2 Answers	Participant #3 Answers	Participant #4 Answers
<b>Are you satisfied with the help you received?</b>	Yes	Yes	Yes	Yes
<b>What is your opinion on the search process as it was demonstrated to you during your advising session with the library professional?</b>	Useful in total, not impressed with Repositories	Very useful. First time information of the concepts of Keywords, search process and use of Repositories	Useful, impressed with the importance of keywords, not impressed with DSpace	Easy, quick, informative. First time information on the use of keywords in search process.
<b>How would you characterize this service?</b>	Good	Useful	Useful	Well organized, impressed that this is a library service
<b>What are the main benefits of this service?</b>	Better understanding of the search process	Gain time because of targeted search and better search results	Information on how to conduct search, time efficient	Good Understanding of search process, and information sources

As it is apparent from table 3, all postgraduate students were content with the help they received. Nevertheless, comparing to the enthusiasm the undergraduate students showed with the help they received, postgraduates were somewhat more restrained in their reactions. All of the postgraduate participants were pleased with the demonstration of the proper use of keywords in the search process, as this was the main benefit they got from the service. Most of them were not actually impressed with the Repositories as a main source of information and ideas. Finally, they were mostly dissatisfied with the search engine and search results of the Institutional Repository “DSpace”.

Overall these participants were satisfied with the service and they characterized it as *useful* and *well organized*, while the main benefit for them was the ability to save time on their search with the advice and insights they received during the search process.

## 6 CONCLUSIONS AND DISCUSSION

This research project aimed to build on and enrich the existing steps of the Information Literacy workshops offered at the National Technical University of Athens. The existing steps of the IL workshop are five (5) in number and they derived from the two most popular IL models:

- The seven pillars of Information Literacy determined by the SCONUL Working Group and
- The ALA Guidelines for Instruction Programs in Academic Libraries.

The aim of these steps and their implementation was to teach the undergraduate and postgraduate students how to prepare assignments or/and their thesis.

This research project identified the need for further support to the students who are about to start their theses. The starting point of the thesis writing process is the topic selection. The appropriate topic can be a crucial success factor of the entire thesis. To help students with their topic selection, an advising session was added to the Information Literacy workshops.

The research project was structured in three parts. The first part is the design and the enrichment of the workshops. The second part is the implementation of the new service and the third part is the evaluation of the new service developed.

### **Part 1: Design**

The initial part of the research project, through a thorough literature review managed to enrich the existing steps of the IL workshop, with the addition of two optional steps as were described above and were based on the information search process (ISP) introduced by Carol Kuhlthau. The additional steps to the IL workshop are the second and third stages/steps of the ISP model. At these steps the focus is on the research topic selection. In more detail, the two additional steps are presented below:

Stage 2: Topic Selection. During this stage the aim is to choose a general topic, by weighing possible options and comparing them to the assignment guidelines, existing knowledge, personal interests, information availability, and time constraints.

Stage 3: Pre-focus Exploration. The main goal of this step was to come up with a more precise information search and narrow down the topics.

## **Part 2: Implementation**

The aim of the second part of the research project was to launch the pilot version of the new enriched IL workshops. In this part, the focus was on the implementation of new service to a sample of undergraduate and postgraduate students. The minimum requirement for a sample of interviewees found in the bibliography for qualitative methods such as in-depth interviews was four (4), so due to time restrictions, four (4) students of each of the two (2) categories (undergraduates & postgraduates) were used for the pilot implementation of the service.

For a better structure and outcome of the in-depth interviews, a guide of questions was prepared covering the students' interests and skills. This guide was for the researcher to study before the interview for preparation reasons, but was also available during each interview, in case additional help was needed. This guide in practice was proven useful as a preparation tool, but was never needed in interview at the pilot phase. During the interviews it was observed that not all the questions from this guide were fully used in each case.

During the interview sessions with the students it appeared that initially it was crucial to create a relaxed and friendly atmosphere. This was essential particularly with the undergraduate students, who seemed to be shyer and more reluctant in comparison to the postgraduates who were more relaxed from the beginning. Once the atmosphere became more relaxed, the conversation was flowing easier and the students tended to speak openly about their interests and skills. The significance of the prepared questions for the semi-structured inter-

views was apparent especially at the point of the interview were the students' interests were translated into keywords. At that point it was essential to pay attention to detail and be very explicit towards the appropriate keywords in order to achieve the most relevant and useful search outcome. Asking the right question at the right time proved that it could clarify blurry lines between disciplines and scientific terms.

### **Part 3: Evaluation**

The goal of this part of the thesis was to evaluate the new library service that was designed. The evaluation requires the production of primary data to identify strengths and weaknesses in order to decide if this is an added value service for the library and identify where improvement actions were needed.

Focus groups were chosen as a qualitative research method. Initially the focus groups were planned to take place inside the premises of the library. Nevertheless, the coronavirus pandemic altered these plans and the focus groups took place remotely, using online communication tools such as "Messenger" and "Skype".

Focus groups can be more efficient when conducted on site, since a basic success factor is the relationship formed between the participants and the moderator, with all the non-verbal cues contributing to a better interaction between them, which is enhanced when the conversation takes place face to face, while the virtual environment cannot fully capture the richness of people together in a room (InterQ, 2020). On the other hand, online focus groups provide easy access to the participants and especially when the participants are millennials whose natural habitat is online, mobile and digital, the online version can even be a better option (Datadecisions group, 2020). Nevertheless, the focus groups were successful, even though they were conducted remotely. A relaxed and friendly environment was created, the conversation was fluent and vibrant and all the necessary primary data were collected.

A noticeable difference between the two focus groups was that the undergraduates were more enthusiastic and more active than the postgraduates in their participation in the focus group. They were more willing to elaborate, more explicit in their opinions and overall they seemed to be more dedicated to the evaluation process. On the contrary, although the postgraduate students were very polite and did offer their opinions clearly and willingly, they seemed to be hastier and less invested in the process. It was clear that this evaluation process was less important to them and they were more occupied talking about the pandemic than focusing on the IL model under investigation. This is understandable since students experienced high levels of stress and anxiety because of the closing of the academic institutions because of the coronavirus and the impact this has on their academic progress (Wang et al, 2020, p. 21). A possible explanation could be that older students are more motivated by their desire to learn and their quest for knowledge (Wolfgang & Dowling, 1981, p. 645), making them more preoccupied with any possible delays on their academic development. Nevertheless, all the necessary data were gathered for the evaluation to be useful and meaningful.

The data gathered from the focus groups concerned the added IL steps of the workshops and the process followed during the session between the student and the library employee / researcher. This concerned the internal environment within the library concerning the library's students and the library's employee. For the evaluation purposes, this process investigated the positive and negative opinions of the students. In other words, the Strengths and Weaknesses of the new service were investigated, as were experienced by the participants in the focus groups.

On the other hand, unavoidably this internal process was influenced by external factors, such as the Institution's policy on the thesis selection process, or the Institution's funding on expert staff for the upgrade and maintenance of the Institutional Repository. These external factors that influence the outcome of the evaluation can be considered as Opportunities and Threats.

Combining these internal and external factors that influenced the evaluation of the service, a SWOT analysis can be used to properly evaluate and analyze this

new service. A SWOT analysis is a useful evaluation tool, both as a data collection option to gather and retrieve monitoring information and as an analysis approach, to describe a program (or a service in this case), to assess a problem in depth or to evaluate a new project (BetterEvaluation, 2020). A SWOT Analysis increases its credibility when it is based on the customer's perspective, and reliable SWOT factors can derive from customers' feedback (Phadermrod, Crowder & Wills, 2019, p. 1-2) which is the case in this project, since this SWOT Analysis is solely based on the students' opinions and feedback.

Overall, all the participants were satisfied with the service, which makes this attempt promising. Summarizing the main points of the two focus groups, the main Strength of the service was the introduction of the "keywords" concept to the students. Even the postgraduate students, who were familiar with the search process, and were more aware of the scientific resources available at the library, were satisfied with the explanation of how keywords were formed, their proper use during a search in a Repository or in any other information resource and their significance in the search results.

The undergraduate students were generally more impressed with the service and according to their statements they were the ones who were introduced to the newest concepts, other than keywords, such as the concept of a "Repository", "Research Proposal", "Plagiarism" and "Referencing". This is expected since the postgraduate students have already been exposed to a thesis writing process at least once before, during their undergraduate studies. The first time contact with a thesis writing process and the break-down of that process into steps, explaining the process and clarifying the requirements of every step is probably the reason why undergraduate students were more enthusiastic towards this service. This also explains the responses of the undergraduates when asked about the main benefits of this service. The reduction of stress, the increase of confidence and the understanding of the thesis writing process proves that they received essential information they needed in order to proceed with their thesis.

On the other hand, postgraduates, who have already been through this process in the past, focused on the time saved with the proper use of keywords and to

some extent the role of “Repositories” in their topic search. In the case of the postgraduate students the importance of a “Research Proposal” was not even mentioned, probably because their previous experience reduced its necessity to them.

The advanced studying experience postgraduates have was probably the reason why they were less impressed and more judgmental towards ‘Repositories’. The knowledge these students have on scientific resources and the search engines of well-established publishers created higher satisfaction demands for these users. Additionally, the increased specialization of a postgraduate degree, thus the higher specialization of a postgraduate thesis project, could be the reason for the low number of desirable outcomes produced by the Repository “Open Archives”, because of its wide variety of subjects and titles. Contrarily, the NTUA’s Institutional Repository “DSpace” could provide the specialized results required in every case, due to its highly specialized content. Nevertheless, funding cuts all State Academic Institutions had to endure, led to staffing cuts, which in turn led to the creation of gaps to the Institutions’ human capital.

The Central Library of the National Technical University of Athens has been operating without an IT employee since 2016, when a group of highly specialized employees were let go due to funding cuts. Requests for the re-employment of these experts by the Library are being made every year since then, without a positive outcome to this day. Therefore, this Academic Library, of the most prestigious Academic Institution in Greece, is being forced to operate and support its services without the necessary expert personnel. This lack of the necessary IT personnel is the cause of problems in the maintenance, upgrade and proper operation of the Institutional Repository “DSpace”. This is the reason behind the problematic search engine of “DSpace”, which produces insufficient search results. Consequently, this was the main reason behind the low satisfaction all students had of the Institutional Repository of NTUA.

Thus, “DSpace” had to be used only as a tool for the discovery of the suitable professors of NTUA for the scientific fields deriving from each thesis topic. It is important to state that the capabilities behind the software and the programming of “DSpace”, had it gotten the appropriate support, would allow it to produce a



plethora of search results, making all the important scientific work produced in NTUA easily accessible, thus available to the scientific community.

A SWOT analysis can reveal obstacles that need to be overcome in a project, while at the same time and in the same way, a SWOT Analysis can identify positive elements that may not be clearly evident at first site (BetterEvaluation, 2020). Under that logic, even though the lack of IT personnel in the Library is an undeniable Weakness, and the general underfunding towards Academic Institutions in the country is a clear Threat for the progress of Libraries, this issue could be looked from another angle. This new IL service, and the outcomes of this research project, could act as yet another argument and proof towards the next demand for IT personnel from the Library, therefore the Weakness and Threat element of this SWOT Analysis, could also be utilized as a future Opportunity to Strengthen the Library's human capital.

A successful interpretation of a SWOT analysis requires the creation of connections between internal and external factors influencing the outcomes of the Analysis. That is, to look for instances where internal Strengths are connected to external Opportunities, or instances where internal Weaknesses are connected to external Threats (BetterEvaluation, 2020). Therefore, in this research project, connections between the internal and external factors influencing the SWOT Analysis were attempted in order to acquire a spherical understanding of all the parameters which influenced the outcomes of the Analysis. Table 4 assembles all the main points from the SWOT Analysis:

Table 4: SWOT Analysis

<b>Strengths</b>	<b>Weaknesses</b>
<p>Easy, understandable process</p> <p>Explanation of thesis writing process: Stress reduction, confidence increase</p> <p>Keywords: Time efficiency, quality search results</p> <p>Repositories: Source of topic ideas</p>	<p>Repositories: Problem with 'DSpace' search engine / poor search results.</p> <p>Insufficient IT personnel for the support of this search tool.</p> <p>'Open Archives' insufficient for highly specialized scientific topics.</p>
<b>Opportunities</b>	<b>Threats</b>
<p>Need for technical support in "DSpace": Argument for IT personnel hires.</p> <p>The increased needs for online/distant learning: opportunity to further enrich the service with the online version of this advising aspect of IL</p> <p>Enhance the Library's contribution to the academia &amp; improve the perception and capabilities of the Library</p>	<p>Underfunding of Academic Institutions: Staff insufficiencies, Technical problems</p> <p>General perception of Library role and Library employees: The culture in the country is still strangling to accept the broader role of Libraries</p>

A closer look at the outcomes of the focus groups and the conclusions that can be drawn from the evaluation of this research project, useful Opportunities could arise from such a service, if the Threats identified were to be overcome (table 4). The evaluation of the service is yet another proof that it is imperative that the Library's human capital needs to be enhanced and that the digital capabilities of a modern Library should be valued and enhanced.

Another factor advocating towards the importance of the digital progress for this Library (and any other Library), is the recent restrictions imposed by the coronavirus pandemic and the consequent social distancing it imposed. In particular, these new circumstances have created yet another Opportunity for this service. As distant and online learning are becoming the new trend and maybe the new normal even, this service is given the Opportunity to become digital and function completely online. Utilizing the Strength provided by the structure and infrastructure of the existing IL workshop platform, the two additional steps for the advising dimension of the workshop, can also be developed in their digital version. This will create the Opportunity for the service to be more flexible, to meet the new social distancing requirements and satisfy the students' needs even under these extreme circumstances. A digital version of the advising aspect of the workshops can also further enhance the arguments for the need of an IT employee to support the Library's services.

The positive evaluation this service received from the students creates an excellent Opportunity for the Library to establish a new connection with the students and Strengthen its relationship with them. The success and importance of the Library derives deeply from the acceptance from the students. Therefore any Opportunity to increase this acceptance and enhance the Library's usefulness to the University's students is empowering the Library's role within the Institution.

This new added value service, can only improve the Library's image and validity within the Academic Institution. It can create the Opportunity for library employees to contribute to the learning experience of students in various ways and establish the Library's importance in an integrated teaching environment. Such an empowerment of the Library's role within the Institution, could contribute to create a culture within the Academic world which is more respectful, more receptive and more inclusive of Libraries, increasing their status and significance in the learning experience.

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