Improving the Thesis Process:  
Analysis of Scipro Support e-mails

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Abstract. Independent learning hype has created a lot of speculation in the educational systems regarding how to develop and provide further support for the learning process. As a part of improving learning process, the Department of Computer and Systems Science (DSV) at Stockholm University has developed a communication platform, called SciPro, to support final project courses in higher education. This paper contributes by critically exploring the emerged issues during the thesis process. The content analysis is done based on the questions that are asked from the ThesisSupport group, which is SciPro support group to help the users or participants. Since a vast majority of the queries in all categories have been related to the lack of exhaustive instruction for using the existing information in the system, a general subject is brought up, named Instruction. Based on the data analysis and by considering the Instruction, five main categories of significant issues have been explored and showed in the figures. The categories that are exposed are: Thesis initiation, Info-mail, Technical issue, Exemption, Supervision, and Final seminar, which are all connected to the core issue, Instruction. Moreover, some sub-categories are explored in some categories, based on the similar issues discussed in the emails. Based on the number of queries in each category, the percentages are calculated for each category and included in the figures and tables. In conclusion, some strategies are suggested to support the categories and iron out the potential and existing problems. The suggested strategies belong to two main classifications of support, which are development of the instructions and the communications, to enhance the autonomous learning process in higher education.

Keywords: SciPro, Idea-bank, Thesis Process, Learning process, Autonomous learning, Communication platform.

1 Introduction

Education and training has always been undertaken for a purpose (Salmon, 2000). Occupations are now connected to education more than ever. Companies are looking for experts in narrower subjects to handle the tasks professionally. Hence, academic learning plays a significant role for educating and preparing people for their future careers. As discussed in several studies (including Alexander, 2001; Bates, 1997; Daniel, 1997; Duranton & Mason, 2012; Gunasekaran et al., 2002; Hansson et al., 2009), information and communication technology (ICT) improves educational access and quality by supporting
teaching and learning process. As Daniel (1997) discusses, higher education system requires technology strategies besides a coherent way of using them. A key distinction of education through use of ICT is to be very purposeful (Salmon, 2000).

Online learning, discussed by Garrison and Anderson (2003), is a facilitated process through technologies and networks, which encourages learners’ participation by providing a large range of advantages. One of the significant issues discussed in many studies (including Wu & Hiltz, 2004; Anderson & Elloumi, 2004; Sherman, 1998; Ward & Newlands, 1998) is to enable more flexibility in terms of place and time. Another issue (discussed by Collis et al., 2001; Moore, 1973) is the independency or autonomy (self-direction) for learning process, by using Computer Mediated Communication (CMC). Hence, there is increased pressure on educational system to incorporate CMC platforms or IT-based services to provide further support for learning process (Hrastinski et al., 2010).

Independent teaching and learning (Moore, 1973), is part of the educational system supported by CMC, in which the learner is autonomous. According to Wenger (1998) and Hashim and Hashim (2010), involving and actively participating in the learning process has a direct connection to the learning outcomes. In higher education, thesis work is the practical academic result of students’ efforts to elucidate their skills and abilities within a specific area of knowledge. The quality of the students’ thesis work is related to their active participations in the learning process.

Based on the annual report of the Swedish National Agency for Higher Education (HSV, 2010) in 2010, the number of full-time students entering Swedish universities is 304,200, which is an increase of almost eight percent compared with 2008. However, the throughput for the thesis courses is lower than the number of students, should graduate each year. Many students never write a thesis and among those who write, many do not manage to reach the desired outcomes within the stipulated time. At the Department of Computer and Systems Sciences (DSV) at Stockholm University, 30% of the enrolled master students during the period 2001-2006, never finished their theses.

As a part of improving autonomous learning in educational system, DSV has developed a CMC platform, called SciPro (Hansson & Moberg, 2011), to support user self-instructing during the thesis process. Furthermore, the SciPro system is connected to another IT-based service, called Idea-bank, to support thesis-project ideas. These online services aim at enhancing quality of educational learning by supporting user independency during the thesis process, in undergraduate and postgraduate levels.
1.1 Online Teaching and Learning Processes

Figure 1 illustrates the online teaching and learning process and how the CMC platforms support the process of learning. Following the model, there is a short description (according to Salmon, 2000) for each stage, from the base to the top.

![Diagram of online teaching and learning process](image)

Figure 1: Model of online teaching and learning process (adapted from Salmon, 2000)

In online learning, all participants need to progress through these stages. This process shows transparency of the system functionalities and learning process, which is important for any system, including SciPro and Idea-bank.

- **Access and motivation** is regarding the system setup and functionalities, and how to encourage participations and system usage. The essential prerequisite is the ability of participants to use the self-instructing systems. Hence, the system needs to be concise and clear to motivate participants to easily find the instructions and guidelines.

- **Online socialization** is to familiarizing participants with the system functionalities to provide connections between cultural, social and learning environments. Here participants establish their online identities and find other users to communicate; since, communications and interactions with peers and teachers positively affect the perceived learning and the quality of students’ works (Fredericksen et al., 2000 and Hiltz et al., 2000).

- **Information giving and receiving** is to facilitate tasks and the use of learning materials in a more cooperative interaction. This stage supports users to transfer information and identify the ways of giving and receiving information.
• *Knowledge construction* facilitates the teaching and learning process by supporting group-discussions and conferencing. The interactions in this stage are more collaborative and dependent on the establishment of the common understandings.

• *Development* is to provide external links for supporting and responding, which the purposes become more goal oriented. Participants look for more system benefits to achieve personal goals; i.e., exploring and reflecting on the learning process.

If any of these stages is not considered thoroughly, the users will need to refer to the accessory support systems. For instance, if the SciPro system does not fulfil requirements in any stage, the users refer to the supplementary support group, called ThesisSupport, to get the required information. Figure 4 illustrates the use of this process specifically for this study.

In the following section, the aim of the study will be clarified followed by the study background and the chosen methodology. A sample of queries, sent to the ThesisSupport, is collected and analysed. Succeeding the data analysis, some categories are explored with the number/percentage of each category. At the end, some suggestions are discussed followed by a concise conclusion.

### 1.2 Aim

The overall aim of the paper is to analyse the significant issues, which the SciPro users come up with, to develop the system and support the learning process in the thesis courses. In this study, a sample of 100 queries is collected and analysed to signify the importance of the clear instructions, determine the categories and sub-categories of the issues, and give the final proposals or strategic solutions for further system developments.

### 1.3 Background

Department of Computer and System Science (DSV), belongs to the Faculty of Social Sciences at Stockholm University (SU), is one of the oldest departments in Sweden. DSV is an international environment, carries all types of academic activities (undergraduate, postgraduate and research) in four main research units: Interaction Design and Learning (IDEAL); Information Systems (IS); Systems Analysis and Security (SAS); and ACT in Communication with Technology (DSV, 2012). DSV has approximately 200 employees and 5400 students (42% female).

DSV was earlier a joint venture between Stockholm University and the Royal Institute of Technology (KTH), under the School of Information and Communication technology (ICT School). Hence, there are still a significant number of KTH-students undertaking their thesis course and some part-time KTH supervisors from the Swedish Institute of Computer Science (SICS) and the Swedish Program for ICT in Developing Regions (SPIDER). Therefore, in this study, included in the data collection, analysis and categorization are all system users considered and counted, regardless if they are from SU or KTH.

Each year DSV has more than 300 students undertaking the thesis courses and more than 70 supervisors available. The thesis course aims at guiding students to learn how to evaluate the current researches and progress a research from start to end. The course provides a semi-formal training on the key elements of project management such as time managing, research planning and scheduling, problem analysing and problem solving, communication and presentation skills, and lifelong learning (Hashim & Hashim, 2010). Students have different
potentials and would like to experience new things during the thesis process. Hence, their expectancies of learning and the supports they get are different (Handal and Lauvås, 2008). Using unified learning platforms such as SciPro and Idea-bank supports students to experience new academic/industrial learning process by getting similar supports to fulfil the expectations.

1.3.1 SciPro system and Idea-bank

SciPro was conceptually developed in 2006 and the implementation started in 2010 to support thesis writing process. The first pilot ran in spring 2011 and the second major pilot has been run in spring 2012; however, new features has been added all the time. From the beginning, rules, regulations, and instructions has been developed and made explicit. SciPro is still a new system, which requires further developments to be motivating and stimulating for the users. There are articles, the latest one is Hansson and Moberg (2011), about the very idea behind SciPro and how the system was built and used.

A key concept in SciPro is meta-coaching, which is a comprehensive guide to provide support for autonomous (self-instructing) learning by using IT-resources. By using SciPro, the supervisors do not need to repeat the same things, concerning the basic requirements for the thesis process, several times. Moreover, SciPro supports students’ time management and knowledge constructions. For SciPro to be meaningful, it requires integration with Idea-bank, besides other existing IT systems used at DSV.

Idea-bank has been developed as a supporting system for thesis ideas, which supports students’ connections with the research and industrial needs. The purpose of the Idea-bank is to introduce new proposals by supervisors or other organizations to inspire students to find their desired topics by searching among missions. Connection between SciPro and Idea-bank supports the administrations to facilitate the matching of the project ideas with the supervisors, who have knowledge and experiences within the respective research area. The following four main insights and justifications yield to strategic development of the systems and motivations to use the systems:

• Supporting the choices of topics by connecting SciPro and Idea-bank
• Guiding students and supervisors with how to prioritize tasks, follow the deadlines and fulfill the thesis requirements
• Keeping pace and stay on the right track during the thesis process to get the desired outcome within the stipulated time
• Managing question through the ThesisSupport and SupervisorSupport

SciPro and idea-bank support students to gain a better understanding of their thesis project, and after graduation, to get relevant jobs in line with their interests. ThesisSupport is the support group to provide guidelines for the system users in any complex situation during the thesis process. In this study a sample of 100 queries from ThesisSupport e-mails is selected and analyzed by the chosen methodology, content analysis.
2 Method

Content analysis is a useful research methodology described by different researchers (including Krippendorff, 1980; Patton, 2002; Neuendorf 2002; Randolph, 2008). Content analysis is used to take a volume of qualitative material and attempt to identify core consistencies by any qualitative data reduction and sense-making effort (Patton, 2002). On one hand, as Patton (2002) states, content analysis is to compare and contrast the experimental group patterns. Moreover, Randolph (2008) mentions that qualitative content analysis is to specify the potential categories of events, why, how and in which contexts they occur. On the other hand, quantitative content analysis is to quantify the degree of the categories in a sample of population and to identify the essential variables of the phenomena (Randolph, 2008). Hence, based on Randolph (2008), quantitative data collection and content analysis is used in this study to measure the degree of the users’ reactions to a new technological innovation plus considering the percentage of each category of the total amount.

Neuendorf (2002:50-51) illustrates the process of conducting a quantitative content analysis by a nine-step flowchart. This process is to determine the most important steps to guide the process of content analysis and support determining the most relevant categories of the analysed data. As discussed by Krippendorff (1980), each category that is found by the content analysis method, refers to a descriptive level of the contents of the queries, i.e., express the manifest content of the queries belonging to that category. To show the variation of abstraction levels of the categories, each category may include one or several subcategories. Moreover, two important factors emphasized by Krippendorff (2004) are that categories must be exhaustive and mutually exclusive. Exhaustive means that categories should be determined in a way to cover all the relevant data. Explicitly, there should not be any data related to the purpose, but excluded from the categories, due to lack of a suitable category. The second, mutually exclusive, means that there should not be any related data to the purpose, which fall between two categories or fit into more than one category.

Figure 2 is a five-step model, which is a modified version of Neuendorf (2002) flowchart. This model illustrates the process of content analysis, followed in this article.

![Figure 2: The process of conducting a quantitative content analysis (adapted from Neuendorf, 2002)](image-url)
Below, there is a short description of each step and how these steps are used in this study.

- **Theory and rationale** is related to what contents are examined and why. Is there any certain theories related to the topic, or any links to other existing studies.
- **Conceptualization** is to define the study variables or contents, and how to explain those variable conceptually.
- **Operalization** (measures) is the data collection unit and defining the categories that are exhaustive or mutually exclusive. The measures should match the conceptualization (internal validity).
- **Sampling** concerns about how to collect sample data, e.g., by time, issue, page.
- **Tabulation and reporting** is the qualitative categorizing of data let to quantified information, used for comparative and correlational result by driving the discussion and drawing the conclusion for the strategic developments of the system.

The problem description and purpose in this study is determined based on the issues regarding SciPro, which are discussed in the ThesisSupport e-mails. The theoretical framework provides a general overview of the learning process, besides covering related details regarding the use of SciPro for supporting thesis course. In the discussion part, by considering both the theory (secondary data) and the result (primary data), the connection between these two parts is clarified and illustrated in Fig 4. In the second step, important parameters, such as general information of the emails, besides important issues for categorizing queries are defined. In the third step, the unit of assessment, which is the number of the queries in each category, is determined. Furthermore, for making the process easier to understand and get a general vision in a glance, the percentage is used for each category/sub-category.

In step four, a completely random sample of 100 (out of 235) queries is collected, between January 1 and March 15, 2012. The decided time interval is due to considering the functionalities of the latest pilot of SciPro, by focusing on the latest SciPro users, who are mainly involved in the thesis course in Sprint 2012. However, some questions might be asked by the old users, e.g., who are finishing their thesis, or registering for the final seminar. In the last step, the sample of the study is analyzed, quantified (illustrated in table 1) and categories in different categories, in the following section, result and discussion.

### 3 Result and Discussion

Following the discussions above and collected data analysis of the chosen sample data (100 e-mails), Table 1 shows the numbers of related emails to each category. Instruction is considered as a general issue, since all other categories are connected to it. The number of e-mails related to Instruction is 87 e-mails, calculated out of 100 (the number of emails), which is 87% of the total emails. Since this is a significant number, the Instruction is introduced as a core category in this study.

Some e-mails belong to more than one of the following categories. The total number of the queries registered related to different categories is 128, which is more than the number of the e-mails (100). In the last column the percentage of each category is calculated by the formula from Saunders et al. (2007: 440):

\[
\text{Index number for case} = \left( \frac{\text{data value for case}}{\text{base data value}} \right) \times 100
\]
This formulation will be specifically used by calculating base data value as follows and use it in the process of calculating the percentage of each category.

\[
\text{base data value} = \frac{\text{number of queries in category 1} + \text{number of queries in category 2} + \ldots + \text{number of queries in category 6}}{100}
\]

Percentage of each category = \(\frac{\text{number of queries in each category}}{\text{base data value}} \times 100\%\).

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of queries (out of a sample of 100 e-mails)</th>
<th>Percentage of the queries (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total No. of queries in the sample data</td>
<td>128 (some queries are related to more than only one category)</td>
<td>100%</td>
</tr>
<tr>
<td>1. Thesis initiation</td>
<td>33</td>
<td>26%</td>
</tr>
<tr>
<td>2. Info-mail</td>
<td>6</td>
<td>4.7%</td>
</tr>
<tr>
<td>3. Technical issue</td>
<td>22</td>
<td>17.1%</td>
</tr>
<tr>
<td>4. Exemption</td>
<td>24</td>
<td>18.7%</td>
</tr>
<tr>
<td>5. Supervision</td>
<td>22</td>
<td>17.1%</td>
</tr>
<tr>
<td>6. Final seminar</td>
<td>21</td>
<td>16.4%</td>
</tr>
</tbody>
</table>

Moreover, the number of each sub-category is calculated with considering the total number of the queries in their main categories, as seen in Table 2 on the next page.

<table>
<thead>
<tr>
<th>Category Name</th>
<th>Sub-category Name</th>
<th>Number of queries in sub-category out of the number of queries in the main category</th>
<th>Percentage of the queries in the sub-category</th>
<th>Number of remaining queries, not belonging to any sub-category out of the number of queries in the main category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Exemption</td>
<td>i. Old theses</td>
<td>7 / 24</td>
<td>29% of the Exemption</td>
<td>17 / 24</td>
</tr>
<tr>
<td>6. Final seminar</td>
<td>ii. Reviewer</td>
<td>7 / 21</td>
<td>33% of Final seminar</td>
<td>14 / 21</td>
</tr>
<tr>
<td>6. Final seminar</td>
<td>iii. Peer-review</td>
<td>12 / 21</td>
<td>57% of Final seminar</td>
<td>9 / 21</td>
</tr>
</tbody>
</table>
3.1 General Information of the queries

In this study, a sample of 100 e-mails, from January 01 to March 15, 2012, is retrieved and analysed. Most of the emails are sent by the SciPro users, but few by the support group (mainly the info-mails). This time interval is chosen due to focusing on the SciPro users for the second major pilot of SciPro, run in spring, 2012. Some general information about the emails and the senders is considered. However, this set of information is not the focus of this study and is primarily to increase the validity and to make it possible to refer back to any specific query in the future. The information considered for each query is shortly explained below.

- **Date/Time** is the actual time the e-mails are sent to unify each email and be able to refer back to any specific query later, when needed.

- **Personnel/Student (P/S) is to clarify the general group of the questions, whether the queries are from students or personnel (university staffs including the support group). This is an important issue for some specific categories, such as info-mail, to know that most of the queries in that category are from personnel (82 % students).**

- **Language (S/E)** is to define whether the e-mail is asked in Swedish or English language (S/E), which somehow determines students’ levels (bachelor or master level). This is since the bachelor programs at DSV are mainly delivered in Swedish language and there are rarely non-Swedish speakers among students. However, this might have some exception of the Swedish students in English master-programs, who send emails in Swedish language (64% Swedish language).

- **Gender (F/M)** is to define whether the senders are male or female. However, few students are considered as unrecognized, since their genders are not recognized by their names (26 % female and 3% unrecognized).

Based on the percentages for each general information item above, more than three-quarter of the queries are sent by the students; almost two-third of the total queries are in Swedish language, which refers to more bachelor students, and the number of males asking questions is almost three times more than females. Following section describes more details about the categories, cover all the sample queries.
3.2 Defining the categories

Drawing from the gathered information, theoretical framework and chosen methodology, an integrated model (Figure 3) is developed to posit the categories and sub-categories with connection to the core category, Instruction. The model shows six main categories and three sub-categories, covering all the issues discussed in the sample collected data.

![Integrated model](image.png)

**Figure 3: Categories developed based on the content analysis of the ThesisSupport’s e-mails**

The categories are defined based on the content of the queries, related to thesis processes and required technical supports. Each selected query is analyzed separately and placed into the most relevant category or categories (if more than one category). The model (Figure 3) shows that the knowledge transfer (teaching/learning process) especially through an online system is influenced by clear information and instructions, motivational factors for the users, and the chosen communicational way to support participants. The core category, Instruction, refers to the rules and regulations to guide and support users through the thesis process by motivating them to use SciPro and other connected CMC systems. Below the categories (1 to 6) and sub-categories (i to iii) are shortly explained with some given examples.

1. **Thesis initiation** covers the questions for thesis initiation, such as the course registration, choosing, changing or submitting the project ideas or thesis topics, using the system for the thesis course, or any other questions about finding the schedules and deadlines. Moreover, the industrial project ideas or clarification requirements plus the problems or errors for submitting the project ideas or changing topics are also marked as a related issue to this category.

2. **Info-mail** encompasses any kind of informative e-mails, such as For Your Information (FYI), greetings, reminders, system introduction instructions, useful thesis information (e.g., methodology lecture under process), or any general information to guide users (i.e., students, supervisors, reviewers/examiners). However, since only the first emails in each e-mail chain (i.e., not including replies) is considered, the greeting emails (e.g., appreciation e-mails) are not considered in this study.
3. **Technical issue** deals with the system functionalities and other connected CMC platforms (e.g., Daisy/FirstClass, used at DSV for getting information about the courses, registrations and grading). This category covers the problems or errors messages happens while connecting to the system, accessing the information, visiting the registration, and uploading documents (e.g., users receive error messages while submitting their project ideas, or want to connect to SciPro).

4. **Supervision** covers the supervising and supervisors’ issues; e.g., choosing, changing or commenting on the supervisors or supervision process, contacting supervisors or getting required guidelines and supervision from the supervisors. This also covers the industrial thesis supervision issues.

5. **Exemptions** encompasses specific case-dependent rules or regulations (e.g. missed the deadline but still wants to undertake the course, exemption from pairing up, and doing the thesis in pair or alone). This includes details, might be related to the industrial thesis work, sick leaves, supervisor getting retired and any other exceptional cases. Although, not all queries specifically belong to a sub-category, but some similar queries have been sub-categorised in the old theses sub-category.
   i. **Old theses** sub-category includes the thesis restarted after a short/long time, which had been paused for some reasons. In this case, users of the system need guidelines about the new rules and regulations, the information and instructions about the exception cases to come to the right track and use SciPro.

6. **Final seminar** covers the queries regarding the thesis final steps, e.g., questions about the deadlines, final thesis submission and presentation. This category includes two sub-categories, which cover most of the queries, except few general questions.
   ii. **Peer review and Active participation** sub-category covers peer-reviewing issues, choosing/changing reviews, process of registering for active participation, missing confirmation of attendance and handling the reports.
   iii. **Reviewer** sub-category covers the queries, mainly asked by the supervisors, about assigning reviewers for the thesis to finalize the final seminar, e.g., the process and delay of choosing reviewer.
3.3 Connecting categories to the theory

In this study, not all the stages in Fig 4 are entirely reflected by what is mentioned by Salmon (2000), but it is an inspiration and the original model is used as a process overview. Regarding the connection between categories and the theories, Instruction is used as a key factor in all stages, since all categories are connected to it. Fig 4 illustrates the significance of each category (1. Thesis initiation, 2. Info-mail, 3. Technical issue, 4. Exemption, 5. Supervision, and 6. Final seminar) in the teaching and learning process.

![Figure 4: Model for connection between the categories and online teaching/learning process (Inspired by Salmon, 2000)](image)

*Access & Motivation* is about enhancing the instructions for the course initiation (category 1) to spread fundamental information by increasing the info-mails (category 2) to give concise and clear guidelines for learning process. Clarifying the ground functionality of the system to understand how to work with SciPro independently and ironing out the problems (category 3) is also a significant issue for motivating the users.

*Online socialization* describes issues about familiarizing participants with the system functionalities, developing SciPro system and reducing error messages and its connection with the other CMC systems (category 3). Online socialization in SciPro system support students' communication with their supervisors (category 4) (e.g., by using checklist, which is designed to reflect students working situations) and better use of peer-review module (category 6, ii) for getting feedback to improve their thesis work. Communications and interactions have positive effects on the perceived learning outcomes and the quality of the project works (Fredericksen et al., 2000; Hiltz et al., 2000).
Clear instructions at the Information giving and receiving stage help participants to autonomously start the course (category 1) (e.g., use the Idea-bank for choosing the project idea and submitting it on Scipro); be familiar with the SciPro functionalities to reduce the system problems (category 3); receive relevant information from their supervisors (category 4) (e.g., through uploaded documents, supervisors’ guidelines); give and receive information or feedback from or to other students (category 6, ii) (e.g., through the peer-review module, which also covers active participation and opposition) and the review process (category 6, iii).

At the Knowledge construction, the SciPro system is supposed to facilitate the learning process by coherent instructions about the supervision process (category 5), rules and regulations, including the exemptions (category 5), through the entire thesis process, from initiation (category 1) to the final seminar (category 6). For constructing knowledge, participants need to get sufficient supervision (category 4), and instruction about how to get involved into the discussions (category 6) to build a general picture or mind map about the entire learning process.

Development is about supporting participants by using SciPro, to develop the learning process through sufficient supervision (category 5) and writing thesis report for the final seminar (category 6) according to the defined criteria (given in the grading part of the platform) to fulfil the course requirements. From the system development perspective, SciPro is still a developing platform with on-going developments.

### 3.4 Reflection on method

Based on the sample data and the selected methodology, the categories above are explored and defined as a result of the query-analysis. The important factors emphasized by Krippendorff (2004) regarding that categories must be exhaustive and mutually exclusive, are taken into account. The first factor is fully fulfilled. However, owing to the complicated situations and intertwined nature of human experiences, it is not always possible to fulfil the second factor. When the data analysis and categorising deals with the human experiences, creating mutually exclusive categories not always a possible solution for the questions.

In this study, some queries are assigned into more than one category, since they are related to different issues. However, they are separately counted in each category,, which led to coming up with 126 queries out of the sample of 100 e-mails (more detailed about each query could be found in the appendix). Hence, since the chosen sample is a focused group and the method is a specific analysis instrument, the outcome of the study might be different by collecting another random sample or choosing another research methodology.

### 3.5 Strategies for future development

The following strategies, which are categorised in two main categories, instructions and communications, have been suggested to iron out the problems that are discussed above. Considering these strategies will help developing communications, enhancing user autonomy and improving the thesis quality, as well as fulfilling more learning outcomes.

**Developing instructions:**

- Building scenarios with screen captures or short clips to show the navigating and using the system, for students and supervisors.
• Clarifying the thesis phases for knowledge constructions, to help guiding users through the entire course. This supports participants to have a mind map of the current and following steps and follow the process independently. This supports supervising process, since the general knowledge is transferred through the system.

• Evolving a tutorial to include the standards, general rules, guidelines and explanations about the thesis process, phases, materials, and to do list in a single file to be used as a reference for the participants. This develops the autonomous learning and reduces the need of supervisor support for general information.

• Increase the info-mail about the thesis process, besides informing participants about the changes of the system and new functions, e.g., having monthly Newsletters with latest updates. Clarifying issues and thesis phases in a step-by-step instruction encourage participations in autonomous learning through CMC platforms. Moreover, linking the information to other related details helps accessing required information in an easier way.

• Developing a “Transparent” support system in terms of support issues for the awaiting users, e.g., a “map” with different levels, so that users can see where their cases are. Separating and improving the basic supports (first level support), Grua (second level support), director of studies (third level support) help users know where and who is processing their cases. This gives feedback to users and makes the management roles clearer.

• Using index for the existing information, such as FAQs and instructions helps searching and finding specific issues and required clarifications in an easier way.

**Developing communications:**

• Supporting more synchronous interaction, through chat or Skype.
• Adding blog– open and searchable– with dialogues between students and thesis support, visible for other users with the similar problems.
• Adding a forum or public communications platform for students and supervisors or between students and their peers to enhance knowledge transferring.
• Making a weekly drop in time available for the participants to instruct and motivate them getting required information about the system and the thesis process quicker.
• Improving the connections between SciPro and other related systems (e.g., Daisy or First-Class) for automatic updating the information regarding the registration or grading. This improves system reliabilities and reduces the system errors.
• Clarify the responsibilities, roles and expectancies, for both students and supervisors lead to a better communication between students and supervisors.
4 Conclusion

Addressing the aim of the paper and analysing the collected data by the chosen methodology, a core category, Instruction, followed by six categories and three sub-categories regarding the most significant issues have been discussed. The categories are 1) Thesis initiation, 2) Info-mail, 3) Technical issue, 4) Exemption, 5) Supervision, and 6) Final seminar, and sub-categories are: i. Old theses, a part of Exemption, ii. Reviewer and iii. Peer-review, parts of the Final seminar category. Consequently, by considering these categories, some strategies are suggested for developing learning process of the thesis courses by using SciPro.

SciPro is a developing CMC platform, requires additional improvement in instruction and communication. Following the suggested strategies in this study would lead taking advantage of using a new CMC platform in educational system. The important issues are to improve the instructions and communications to clarify the guidelines and information, provide more students’ independency, and support process of autonomous learning in higher education. The concrete and straightforward instructions regarding the learning process and the use of the system besides sufficient communication support will improve achieving satisfactory outcomes with higher qualities of the thesis work.

4.1 Future studies

The findings of this study underline the importance of the instructions and system development for SciPro to motivate the users and improve the learning process. It would be of interest to see the effects of SciPro on the thesis qualities, participants’ communications, autonomous learning, and if motivating old students with drop out thesis works to get back to work on their thesis in distance. Moreover, that would be interesting to step into each categories and find out more details about various problems during the thesis process in higher education.
References


