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# Needs analysis for an online learning service

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## Abstract

The development of fully or partially online training, as well as the provision of digital learning materials for students, requires the development of systems that provide students with innovative services tailored to their needs. We are interested in students who perform all or part of their course in a foreign language and who face difficulties due to language understanding. Our goal is to provide them, on demand, online and in their native language, with a document similar to the one that troubles them. In this paper we present the needs analysis phase, related to the engineering process of the online service.

## Keywords

Digital educational resources, resource provision in another language, online service, needs analysis

## INTRODUCTION AND CONTEXT

International student mobility is a big challenge to deal with problems such as unemployment. While moving abroad, many “mobile” students” (ERASMUS, 2013; Endrizzi, 2010) face major difficulties such as a different style of education (more abstract, more intensive, etc.), a lack of prior knowledge and required skills, new requirements, etc. For a non-native student, *i.e.* whose first socialization and/or education language is not the one used in his/her current studies, such difficulties are enhanced by language difficulties (Coulon & Paivandi, 2003; Erlenawati, 2005).

The issue is complex and can be addressed from several viewpoints: institutional, organizational, technological, educational and methodological, among others. From the technological side, it is clear that digital teaching materials that are made available to students generally have few functional features, little interactivity and no smart support for the learning process. Thus, despite many studies and prototypes (Devedzic, 2006; Melis et al., 2009), existing e-learning systems, platforms and services rarely take advantage of modern semantic and adaptive technologies. That is the reason why it is crucial to develop services that provide students with new and innovative services tailored to solve their problems.

Our goal is to experiment with an on-demand online service, focusing on scientific, technological and management disciplines. It is developed in the framework of the Interlingua project<sup>1</sup> whose partners are research and academic institutions from Belgium, France, Germany and Luxemburg. That service aims at helping students who face difficulties studying a learning resource. It suggests them a similar resource in their native language. Notice that “similarity” does not mean “translation” and therefore has to be defined.

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<sup>1</sup> <http://www.interlingua-project.eu/>

The goal is to help the learner to become familiar with the language of the course by understanding terms and expressions used in the context of the discipline. By providing a student with a resource in his own language we expect he will be able to establish interesting connections between both. Moreover, he has the opportunity to get assessment items that are related to the keywords from the resource under examination.

So, the Interlingua service is an innovative online learning and training service that implements an integrated approach due to a substantial effort from several leading academic and research institutions. This approach mixes technological and pedagogical expertise and combines semantic linking technologies for multilingual educational materials and an automatic generation of self-assessment items.

The system manages a multilingual resource database. Once a resource, written in the language of the course, is proposed to the learner, the Interlingua service offers the opportunity to identify the main concepts (highlighted words), to select a paragraph or a slide (if the resource is a presentation). Then, the learner may ask the service to provide him with a similar resource in his mother tongue.

The original resource can be the statement of an exercise, a recommended reading, course notes, etc. The recommended resource (in the native language of the student) allows him to better understand the concepts as linguistic problems are away. In no case, the new resource is a translation of the former but a resource that is intended to deal with the same concept or the same issue. This new resource may contain other examples or illustrations, and it should improve the comprehension. So, there is no more linguistic problems and there is no more problems related to other aspects like education style, prerequisite, culture, etc. that could be implicitly solved in the proposed resource.

This paper presents the phase related to the needs collection and analysis for engineering this online service. This step is the very beginning of the service design process and does not include the human machine interface design. However the results gained through this step will document the next design phases.

## **METHODOLOGY AND DATA COLLECTION**

Supporting students who are in mobility is the main objective of the Interlingua project. So, it is crucial to understand in details the nature of the problems experienced by students in the specific context of a course, when it is given in a language different than their mother tongue. In this project we specifically focus on problems faced by students in the "Great Region"<sup>2</sup> who may study in German, French and/or English. Obviously, the problem is more general and is not limited to the Great Region case. As a first experience, the Interlingua prototype will consider courses related to basic statistics as such a course is included in many curricula, so we can collect the testimonies of many students.

An important issue regarding the needs analysis was to know who had to be questioned. Firstly we identified the international students within the project's participating institutions and also identified students who take courses abroad. These students were asked about the difficulties they faced. Secondly, we identified statistics teachers who regularly meet such students to get their feeling about the difficulties these students face. We also wanted to get the feeling of teachers from other disciplines who were in the same situation, in order to identify possible common characteristics.

We designed a questionnaire for students in mobility. The development of this questionnaire was done in two stages. We met individually 10 students who were or had been studying abroad and asked them, through informal interviews, the main

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<sup>2</sup> Saarland - Lorraine - Luxemburg - Rheinland - Palatinate - Wallonia (including the

German-speaking Community of Belgium) situated between Rhein, Moselle, Saar and Meuse

difficulties they encountered. The questionnaire was then structured according to their answers. The resulting questionnaire is made of 24 questions split into four sections. Some questions may contain several sub-questions. The first section aims at collecting data about student mobility: original language, semester during which he/she lived/lives that experience, language in which the courses were/are taught, institutional framework of this mobility and volume of courses. The second section is used to identify the problems faced by these students in relation to linguistic or cultural aspects, working habits, prerequisites, etc. The third part is related to solutions to overcome these problems, whether these solutions are offered by the hosting institution, implemented by students or simply considered useful. Among these, solutions have come out close or similar to those envisaged in the Interlingua project. The last section deals with personal information: age, sex, birth country, etc. The questionnaire was distributed widely within the project's partners, *i.e.* universities from Lorraine (France), from Liège (Belgium) and from Saarbrück and HTW (Germany).

To supplement the collected data, it also seemed appropriate to interview some students. We decided to lead semi-structured interviews in which students were brought to explain which problems they had to face and how they faced them. An interview guide was designed. It has primarily been used to verify that the students provided the expected information. The techniques used were therefore essentially reformulation, demand for details and more rarely questions to stimulate conversation. With their consent, the interviews were recorded, transcribed and qualitatively analysed. The results of the analysis have been compared with the results of the online survey.

At the same time, we collected testimonies of teachers who regularly interacted with students in a situation of mobility or teachers who were familiar with the difficulties of language proficiency. Data collection was done only in the form of semi-structured interviews. The aim was to collect information about the relevance of the Interlingua project and to get recommendations about some possible design choices. These interviews were also recorded with the agreement of teachers and transcribed before analysis.

## **MAIN RESULTS**

### **Quantitative analysis**

The questionnaire was made available online<sup>3</sup>. It was available in three strictly equivalent versions in German, English and French.

During September and October 2014, we got 460 responses but only 210 were complete. The 250 incomplete responses corresponded, most of the time, to students who just started filling in the questionnaire. The following quantitative analysis is related to the 210 complete responses provided.

### **Education profile of those who filled in the questionnaire**

The three versions (one per language) have been answered in the same proportions. Furthermore, 30% of students are native German, followed by French and Italian natives (15% each). Countries of origin and studies are mainly Germany, Italy, France, Belgium and Luxemburg. The courses taken by students are mostly taught in French and German. Their mobility experience is rather recent. For over 88% of them, it is less than one year.

### **Difficulties encountered**

In relation with the amount of additional work requested:

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<sup>3</sup> <http://enquete.univ-lorraine.fr/collegium/index.php?sid=75276&lang=en>

- 44% of students did not notice a significant increase,
- 30% did.

When questioning students about possible reasons of the difficulties faced, we noticed that the answers are equally distributed relating to the requested autonomy, difficulty in understanding course material and the number and difficulty of exams:

- 35% do not notice any difference,
- 32% noticed an increased difficulty,
- 33% noticed a decreasing difficulty.

In contrast, taking notes, understanding the explanations of teachers, reading comprehension of course materials, wording of tests and examinations are the difficulties encountered by than 52% of the students.

Additional difficulties were expressed as free text in the answers:

- lack of additional course materials,
- feeling of isolation due to language.

Some are stressed by the fact that teachers and other students discuss in their native language and not in the official language of the course.

Furthermore, the cultural references are very problematic:

- different ways of teaching,
- implicit references or attitude.

Problems with the vocabulary (understanding, oral or written production) are often mentioned.

A further study on these criteria, by pairs of languages and countries, was done. It does not show any significant differences on any pair.

### **Solutions offered by institutions or adopted by students.**

Among the solutions offered by the universities to limit these problems, we can find:

- language courses,
- special arrangements for examinations,
- additional exercises on platforms including online services.

For their part, students also adopt solutions:

- taking language courses,
- using specific support for the technical vocabulary (e.g. online dictionary),
- asking for help to their peers,
- using online resources.

About online resources that are the focus of the Interlingua service whether they are online books, online course materials, online courses in their native language or Internet research, 80% of students think it is a good approach.

### **Qualitative analysis**

A qualitative analysis of the joint interviews (students and teachers) led to identify five dimensions along which we analyse the results:

- the variety of contexts faced by the target audience,
- the nature of the language problem and consciousness of teachers,
- the reactions of teachers and students facing with innovative strategies and resources,
- the current strategies of students in response to the problem,
- the interest of teachers and students to online resources.

Interviews with students show they used to develop different strategies, whether individual or collective ones, but sometimes heavier than what might suggest the

Interlingua service. These strategies change according to the discipline, for instance in Statistics, a student noticed that:

"This is an area where the statements and questions can lead to many interpretations, the nuances of language can be more difficult to take into account than in Mathematics..."

"During exams, it is sometimes difficult, especially for multiple choice questions (MCQ), because if I do not fully understand a word I hesitate because, in my opinion, I understand the course, but I do not understand the phrase which expresses the question".

A German-speaking student taking courses in French explains that, like his classmates, when she does not understand something, she searches for other books in French but also in German:

"Looking on the Web in German helps me, that's true".

Furthermore, different cultural aspects are highlighted. In the context of offering assistance, it speaks in favour of providing an equivalent resource written in the native language, and not a translated resource. These results are online with the responses to the questionnaire.

## **CONCLUSION**

The questionnaire remains open, but the new responses do not seem to call into question the previously stated results. The students who answered the survey and/or interviews confirmed linguistic and cultural issues linked to documents understanding among other difficulties. So, we are comforted with the aim to propose and test a helpdesk to make the understanding of these documents easier. Needs analysis shows that, in order to face linguistic problems, the students implement a wide diversity of strategies. This lets us think that they use all what can help them to get a better understanding of the language of the course: taking language courses to improve their fluency in the target language, using technical vocabularies, using textbooks in their native language, asking an explanation to their peers...

Taking into account these details, the technical partners have been encouraged to develop an open solution that gives prominence to students' autonomy and vocabulary learning. Design decisions are presently taken in that sense: highlighting of concepts, glossaries, assessment items targeting vocabulary learning and text understanding, but also, choosing feedbacks that incite them to discover more (another resource, for example) rather than providing them with very formal feedbacks (like "correct answer"), using the target language to formulate assessment questions, etc.

Providing several functions and letting each student choose the best way to use them, the Interlingua service takes the diversity of strategies into account and pushes the students to show and make use of learning autonomy.

In that way, the Interlingua consortium is developing an automatic analysis device for documents and similarity calculations (Aletras, Stevenson & Clough, 2014) from semantic models of statistics area. This system develops the process described in (Sosnovsky, Hsiao & Brusilovsky, 2012). It remains to be seen what use is made of the service by students, including students of cross-countries existing courses, in the Great Region.

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## Biography



Armelle Brun is an assistant professor in Computer Science at Université de Lorraine (France). Her research focuses on artificial intelligence, user modelling, data mining, applied to e-education. She is the author of more than 50 papers in international conferences and journals.

## Biography



Monique Grandbastien is an emeritus professor in Computer Science at Université de Lorraine (France). Her research interests include e-learning, online resources and Artificial Intelligence applied to Education, as well as Informatics education. She is on the editorial boards of several journals in the field and on many conference committees

## Biography



Julie Henry is a chemist and a PhD student in Education Sciences. Her research topics are ICT didactics, didactics of informatics and ICT in education. She is lecturer at Université de Liège (Belgium).

## Biography



Étienne Vandeput is a mathematician and a computer scientist. Lecturer at Université de Liège (Belgium), he is interested in ICT in education. He is also an associate professor at Université de Genève (Suisse) where he is responsible for a research seminar in Didactics of Informatics. He is responsible for the organisation of the 6<sup>th</sup> Didapro Conference in Namur in January 2016.

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