

English as a Medium of Instruction (EMI)-oriented Web Platform for the Vocational/Higher Education

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Abstract– *Internationalization has been considered a key goal in recent decades for educational institutions around the world, mainly to favour global student citizenship, capture new sources of financial resources, and broaden the global reputation. However, the very common motor for the internationalization (student mobility) can be limited due to the reduction of funding, opening opportunities for Internationalization at Home (IaH) actions towards internationalization. In this paper, we present an ongoing research on the integration of technology together with the English as a Medium of Instruction (EMI) approach, by means of a responsive web platform for the internationalized vocational/higher education, which can be used by any teacher with his/her students before, during or after classes, for the delivery of technical content using an additional language. By the end of the research, we expect (i) encouraging students to learn more about an additional language, which can improve opportunities for student mobility, (ii) offering a new interactive pedagogical tool for technical education delivered on another language, and (iii) enabling internationalized mobile learning by means of a responsive web design. As a case study, we expose the web platform in the context of the Computer Network course for a vocational IT program, and an evaluation methodology to measure the impact of the proposal for the students.*

Keywords-- English as a Medium of Instruction, Responsive Web Platform, Internationalization at Home, Vocational/Higher Education.

I. INTRODUCTION

Internationalization is not a new concept, but there are different visions on it. One of the concepts accepted by the research community is that internationalization represents the process of international, intercultural, or global integration within the purpose, functions or delivery of postgraduate education [1]. It is clear that this concept especially reaches universities, which historically have been the main educational institutions interested in internationalization [2][3][4].

However, in order to bring the process of internationalization to fruition, it is necessary to deal with limiting internal and external factors. One of the main internal factors is the barrier associated with a low level of understanding and production in additional languages (i.e., languages other than the native one) by students. This interferes with the development of academic activities, such as lectures with foreign specialists, research into written materials in other languages, the participation of projects in conjunction with institutions from other countries, and participation in international mobility programs. The most prominent external factor which limits internationalization is the reduction of funding.

In face of these existing challenges, vocational/higher education institutions (e.g., Universities, Polytechnics etc.) has

directed their internationalization process by means of Internationalization at Home (IaH). According to Beelen and Jones [5], IaH represents the integration of the international and intercultural dimensions in the formal and informal curriculum for all the students, considering the local learning environments. By associating IaH to the institutional international relations policy, it is possible to achieve results in internationalization, making use of the technological resources that the institution already has.

The English as a Medium of Instruction (EMI) pedagogical approach fits the IaH purposes. EMI offers teaching strategies focused on the students' ability to write, read and converse in English [6]. For this, EMI includes procedures which can be applied by the teacher before, during and after classes, combining the delivery of specific content (in this case, a technical content) together with the English Language.

Given this context, our ongoing research seeks answers for the following research question: (i) how to integrate technology towards IaH in vocational/higher education institutions?; (ii) what methodologies can be applied to improve technical and additional language skills by students?. Considering these research questions, we propose two main contributions in the context of the internationalization of vocational/higher education institutions.

The contributions of this work are summarized below:

- an EMI-oriented responsive web platform for the internationalized vocational/higher education, which can be used by any teacher with his/her students before, during and/or after classes, for the delivery of technical content using the EMI approach; and
- a discussion on methodologies to instantiate the use of the web platform in an IaH-oriented approach, in the context of the Computer Network course within a vocational program.

The remainder of the paper is organized as follows. Section II describes the proposed EMI-oriented responsive web platform for vocational/higher education, which is a part of the ongoing research. Section III details an IaH-oriented case study of the web platform for the vocational/higher teaching/learning process, including the methodology to evaluate our proposal. Finally, Section IV presents the conclusions and future research directions.

II. EMI-ORIENTED RESPONSIVE WEB PLATFORM FOR THE INTERNATIONALIZED VOCATIONAL/HIGHER EDUCATION

We detail in this section the main contribution of this work, which is a prototype of an English as a Medium of Instruction

(EMI)-oriented responsive web platform for internationalized vocational/higher education. The main goal of the web platform is to integrate technology to enhance the knowledge of an additional language (English) from the student's point of view. To this end, the prototype of the web platform was conceived within the Internationalization at Home (IaH) framework, allowing its application in any vocational/higher education institution (e.g., polytechnics, colleges, universities) around the world with a low cost of investments. In a nutshell, the platform will offer opportunities for teachers and students to build technical knowledge using the English language, favour mobile learning initiatives etc., by interacting with the platform using technologies, such as smartphones, tablets, desktops etc.

A. Methodologies

In order to develop this work in an educational perspective, we first draw on the studies of José Manuel Moran, who work with the relation technology, society and school in several of his studies and presents a history of the insertion of technologies in schools since the 1990s. Moran has discovered that the use of technology was seen as an only distraction, as "[...] in the students' heads, it means rest and not a class, which modifies the posture, expectations regarding its use" [7]. Hence, it is necessary to highlight the positive expectation of the student regarding the development of classroom subjects with the support of technologies.

By making use of this technological resource (i.e., the proposed EMI-oriented web platform), we are also concerned with how the student enters into a perspective of decision making and the appropriation of the contents delivered [8]. That is, how the individual takes a position in relation to systematized knowledge and presented in the discursive formations which he/she can acquire. Hence, we think of the relation between the discursive formations, present in texts discussed in class in a traditional teacher exposition methodology, and those that can be delivered with the support of the EMI-oriented web platform.

In order to highlight the importance of the use of our digital tool for the vocational/higher vocational education, we bring from Vygotsky's theory [9]. It defences the context of corroborating, interfering in the development of the individual's learning. To that, it considers that cognition requires social interaction, mediated by instruments and signs in the internalization of the learning.

From a technical perspective, the web platform design considers a set of functional and non-functional requirements for its application in practice. In Software Engineering, functional requirements represent functionalities (i.e., operations) which a system has to perform. The non-functional requirements are characteristics which can be used to analyse the quality of a system, rather than specific functionalities.

The specification of such requirements is necessary, given that requirement specification is the definition of users' needs. In a nutshell, functional and non-functional requirements constitute the summary of the characteristics that a system must

possess [11]. In this work, we consider that the users are students and teachers which interact with the web platform.

The next subsection details the main technical requirements of the web platform.

B. Functional and Non-Functional Requirements

For the purpose of our EMI-oriented responsive web platform, the main functional requirements (FR) are specified as follows:

- **FR001- Access Home.** The user (teacher or student) will be able to view the main features of the web platform, starting from a home page. It is in this area in which the buttons to search for term/expression of technical content will be available, propose an update of term/expression already existing in the database, access to the latest contributions of other users, among other general information about the platform;
- **FR002- Search Term/Expression.** A button will be available for the user to click to query for a technical term/expression, described in the English language, in the database. If the expression exists in the database, its description (previously defined and approved by the maintainer technical team) will be displayed to the user. Otherwise, a message will be shown to the user, offering the suggestion to propose adding a new term/technical expression;
- **FR003- Add Term/Expression.** On clicking a button to add new term/technical expression, described in the English Language, the user can propose a new entry in the database. In this case, an internal procedure will query whether the proposed term exists or not in the database. If it exists, the user will be alerted and redirected to the home page of the web platform. Otherwise, a textbox will be offered for the user to enter his/her proposal for the description of the new term/expression, using the English language, also informing personal information (e.g., full name and email) for contact. After this procedure, the user will be informed that his proposal will be sent to the technical team that maintains the database, which will evaluate the proposal and give feedback (to be sent by e-mail to the proponent);
- **FR004- Contact.** A contact menu, positioned on the main page of the platform (Home), should provide the user with information so that they can contact the team of developers. In the access to this menu, the user can send suggestions for improvement, complaints, opinions, among other subjects, which will be sent by e-mail to all members of the developer team.

We also provide the main non-functional requirements (NFR) of the web platform, which are specified as follows:

- **NFR001- Being responsiveness.** This is the main non-functional requirement of the web platform proposed in this paper. By considering the aspect of responsiveness, users are allowed to access the web

platform with a common layout, either using a desktop or using a mobile device (e.g., smartphone), as the responsive layout adapts to different size screens. Hence, any teacher may adopt the platform during an EMI-oriented class, so that he/she can deliver the technical content using English in an interactive way using mobile devices in the hand of the students;

- **NFR002- Using markup language.** The web platform has to be designed using the HTML5 (HyperText Markup Language), which offers a way to structure the web pages and other web objects (e.g., buttons, text boxes etc.) to display them visually in an HTML client (e.g., web browser);
- **NFR003- Improved appearance.** The layout of the web platform has to integrate HTML5 with other tools to improve appearance for the user. In particular, CSS (Cascading Style Sheet), programming languages (JavaScript) and development frameworks (Bootstrap) should be used, which allow customization of the web platform.

III. CASE STUDY

As a case study, we describe an instance (i.e., a real application) of the EMI-oriented web platform within the context of a vocational/higher education program. The motivation of this case study came from our experience on using EMI at the Federal Institute of Education, Science and Technology of Rio Grande do Norte (IFRN). Specifically, we adopt the action research methodology within the "Computer Network" course within the curriculum of a vocational IT (Information Technology) course [11]. This study field has a strong correlation with the English language, given that the Computer Network concepts have been originally defined in English. However, we advocate that the proposed web platform can be instantiated in other institutions.

A. System development

From the technical perspective, we decided to develop the web platform by means of the prototyping model, which fits the case study. Prototyping is a Software Development Model (SDM) which consists in building prototypes of software as incomplete versions, simulating a part of its main requirements. At the end of the process, the final prototype is the version delivered for usage [12].

The template used for the development of the web platform has been downloaded from the Bootstrap Themes environment¹. To fit the needs of our proposal, we had to adapt the original version of the template. Specifically, we included client-side markup/programming languages, including HTML5, CSS and JavaScript. Hence, it was possible to implement all the functionalities (i.e., the functional requirements) of the web platform (described in the previous section) and include elements of animations which help in the

layout (front end), facilitating the simple and modern visualization so that the user can interact in a user-friendly way.

Figure 1 shows the starting page (Home) of the case study. In the Home area, the Search Query and Update buttons will be made available to the user. These are the main functionalities of the web platform, and we argue that the teacher and the students can interact, about the technical content in English.



Fig. 1. Home area of the case study.

We used the *carousel* function of the Bootstrap framework [13] to expose such buttons. If the user (i.e., the teacher and/or a student) clicks the Search button, he/she will be redirected to another page (Term/expression query page), in which the user can type and search for a specific term of interest. If the user clicks the Update button, then the user will be redirected to the Term/expression update page, so that he/she can propose a new contribution to the database, by means of new information, always using the English Language.

It is important to highlight the potential of this digital tool in the context of the teaching-learning process supported by an additional language. It is known that currently, a significant portion of the country's population has access to smartphones. Hence, the web platform can be leveraged in the context of mobile learning (M-Learning) by teachers and students before, during or after school.

Figure 2 shows the Term/expression query page. This page is displayed when the user clicks the Search button, positioned on the home page. We developed it using the HTML5 *search* form element.

The user can type the desired term/expression, using a text box at the top of the page. This functionality can be used, for example, by the teacher, during a class, when he/she has an interest in stimulating the students in reading the description, in English, of a given technical concept. It is expected in the future that, when the user types the information and clicks the "OK" button, located next to the text box, an internal code, written in the PHP programming language, will access the database (created using the Entity-Relationship model in the MySQL software), and will return the description of the information

¹ <https://themes.getbootstrap.com>

queried or, if it does not exist in the database, will return a message "Term/Expression does not exist".

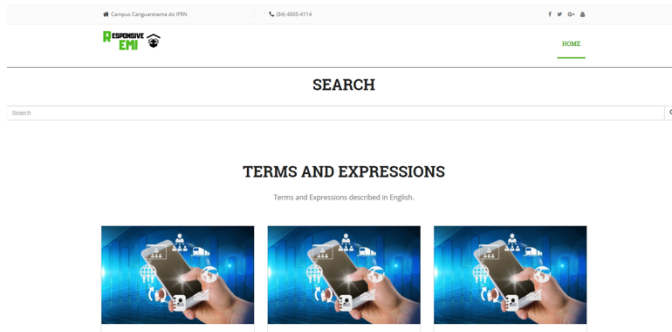


Fig. 2. Term/expression query page of the case study.

Figure 3 shows the Term/expression update page. This page is offered when the user clicks the Update button. The user may propose an update of an existing term/expression or even propose the inclusion of new information in the database. This functionality can be used, for example, by the teacher, before a mini-course/lecture/event. In the context of Computer Networks (main theme of this case study), recent concepts, such as the Internet of Things, Industry 4.0, Smart Buildings, Wearable Devices, which have not been addressed in recent literature yet may be addressed within the platform.

When the user enters the new information and clicks the "Submit" button, an internal code, written in PHP, will access the database to check if the term already exists or not. In any case, the internal code will send an automatic email to the proponent (i.e., the user) and to the technical support staff of the database (e.g., the teacher). Technical support staff will review the new information proposed by the user. Technical support staff, then, will decide whether to accept the proposal or reject it. If accepted, the database, then, will be updated. Either way, the user will be automatically informed via email, as a feedback.

We can illustrate other possible opportunities for the EMI-oriented web platform:

- Before the class, the teacher may suggest that students consult a set of terms/expressions, previously defined, in the database, also guiding students to deepen knowledge in bibliographies of the area;
- During the class, the teacher can retrieve students' knowledge by suggesting that they describe a brief summary, written in English, composing the terms/expressions previously consulted in the web platform. As an option, teachers can have students read the summaries they have built out loud, seeking to establish the technical knowledge while appropriating more knowledge of the English language; and
- At the end of a lesson, the teacher can indicate that students check if there is (or not) any

term/expression observed in the class into the database.

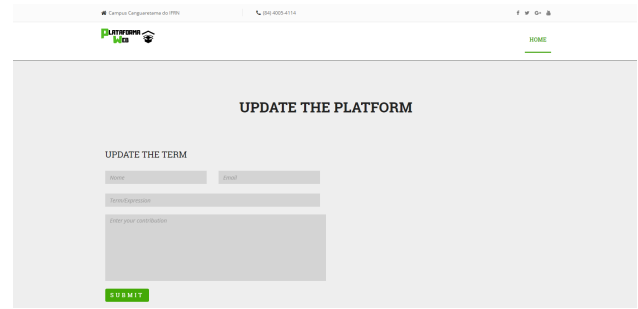


Fig. 3. Term/expression update page of the case study.

Figure 4 shows the Contributions page of the case study. It exposes information offered by the users via the Terms/Expression update page. Hence, it is possible to observe the last or the main contributions previously proposed by the users. We developed the page with the *carousel* function of the Bootstrap framework.

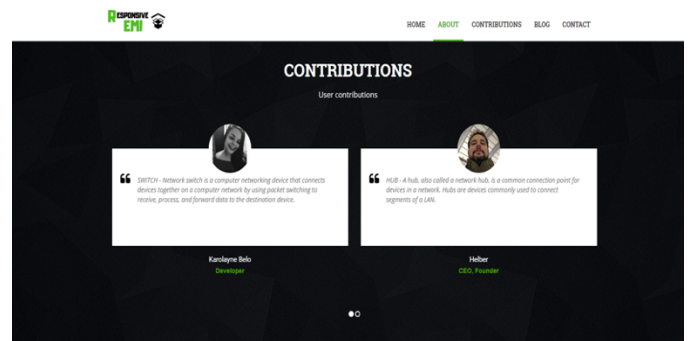


Fig. 4. Contributions page of the case study.

B. Applied methodologies

This subsection illustrates different methodologies we are planning to adopt as a follow up of this ongoing research. The teacher will combine the use of the web platform during an EMI-oriented course together with (i) active methodologies, and (ii) problem-based learning. The active methodologies bring in the use of technologies and more autonomy in the act of learning to learn, even when using more common technological supports, such as videos, movies and blogs [14]. The problem-based learning (PBL) is an instructional learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem [15].

We propose as active methodologies the use of the inverted classroom. The inverted classroom teaching strategy instigates the student to actively participate in their learning, as well as optimizing the class time that would remain for interaction with other classmates under the teacher's mediation. The integration of the classroom with virtual environments brings the reality inside the school and it opens to the opportunities presented by

the real world, important for any type of education (including the vocational/higher education).

The student would have access to the content that would be worked in class in advance, by searching terms and/or expressions in the web platform. The teacher can also provide a search itinerary for the inclusion, in the platform, whose contents would be written in English, with the option of verifying in the native language, offering illustrations, videos, images, texts in various formats and the contextualization of the concepts.

C. Evaluation of the ongoing research

We will use qualitative-quantitative research through the action-research method [16], aiming at dynamizing, sensitizing, and consolidating the contents worked in the subjects related to the Computer Network course. For this, we will consider a class with a population of 30 students, and the evaluation of our proposal will consider three different periods within one semester, as follows:

- *Before* the course, we will offer to the students a questionnaire on the interest of using the web platform for improving the English language and the technical content;
- *During* the course, we plan to verify the results of the use of the web platform in the discipline and its consequences, through debates and continuous evaluation with the students; and
- *After* the course, a semi-structured interview will be conducted with the students to identify the main strengths and drawbacks on the prototype.

IV. CONCLUSION

Internationalization has been considered a key goal for educational institutions, mainly to favour global student citizenship, capture funding, and broaden the global reputation. However, student mobility has been limited, opening opportunities for Internationalization at Home actions. In this paper, we propose an English as a Medium of Instruction (EMI)-oriented Responsive Web Platform for the internationalized vocational/higher education, which can be used by any teacher with his/her students before, during or after classes, for the delivery of technical content using an additional language. This web platform can be integrated with methodologies, such as active methodologies, problem-solving learning, among others. Moreover, mobile learning is possible, as the web platform considers responsiveness as a key requisite.

As a case study, we instantiate the web platform within the context of a technical course (Computer Networks), knowing that this study field has many concepts originally defined in the English language. By means of this EMI-oriented web platform, teachers and students are able to interact to build technical knowledge, combined with the English language. Hence, the proposed case study can be seen as an Internationalization at Home action. We highlight that the proposed platform can be instantiated to other technical

content/program closely related to the English language. More than that, the conceptual design of the web platform can be adapted to other languages (e.g., Spanish, French etc.), considering the impact of these languages to technical content. Future works include applying and evaluating the web platform from the student's perspective, considering effectiveness and usage aspects, and offering the web platform in the Internet.

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