ARTICLES

UDC 37.013.2

BUILDING ON LANGUAGE AND DIGITAL PROFICIENCY: SMART RECOMMENDER SYSTEM PROJECT

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The paper presents a vision for non-linguist master-level English for Specific Purposes course, which housed the Smart Recommender System project with involvement of significant amplifying the basic specialized content. Our goal was to move classroom learning away from memorizing fragments of information and trivial exercises toward dynamic learning environments where students simultaneously develop disciplinary core ideas and practices to design solutions to problems and refine on their digital competences. Initiated by the University library this inter-disciplinary project was embedded into "English for Specific Purposes" and "Big Data Management" academic courses. The content-collaborative recommender system exploited in an academic situation helps University teachers and students receive suggestions about the materials they could be interested in. Maintaining a focus on practical use in the University library the project has the advantage of equipping aspiring specialists with a broad set of both general professional and narrow professional skills. The net result derived during the reflective discussion, is that while focusing on technical specifics rather than on language nuances, this project work positively impacted students' understanding of generally valid issues, strengthening of functional language in the meaningful context, and increasing self-efficacy in leveraging larger-scale practices for real-world application.

Keywords: knowledge-in-use, project-based learning, university library, personalization, interdisciplinary collaboration

A paradigm shift in tertiary educational goals and standards caused new trends in electronic literacy, interdisciplinary collaboration, and deeper learning perspectives. Nowadays, students need to develop usable knowledge – the capacity to apply knowledge to make decisions and evaluate how to get more information when necessary. Knowledge-in-use amounts to exposure to authentic disciplinary experiences with problems that enable students to develop a deeper, more connected level of knowledge [1]. When completing high-impact practices for an authentic purpose rather than memorizing fragments of information that suggest superficial comprehension, students are compelled to engage in higher-order cognitive activities that require them to use a broader spectrum of thinking methods and manipulate information and ideas in ways that transform their meaning and implications [2, p.9]. When translating the theory into practice, we need more scenarios and guidelines for adapting usable knowledge perspectives and shaping the new quality of students' performance.

As in many other disciplines, in teaching English for Specific Purposes {ESP), there is high demand in the subject area for courses with a practical orientation to provide students with sophisticated practice of enacting knowledge oriented toward educational, economic, or political opportunity. From this perspective, language learning becomes a by-product of a focus on meaning, acquiring specific topical content [3, p.3], or making decision practices. However, by crossing traditional disciplinary boundaries, we push the students to develop new ways of thinking and push ourselves to make ESP classes more dynamic. Dynamic classrooms have more creative freedom and are instantiated by:

- Incorporating real-life situations;
- Integrating skills authentically;
- Having a real purpose;
- They are motivating;
- They are fostering learner autonomy and using experiential learning;
- They apply project-based learning.

To explore the teaching moments in such an educational environment, we put forward and discuss the following questions – how should we design a learning environment to provide students with the opportunity of developing knowledge-in-use based on the deeper application of disciplinary core ideas and practices, crosscutting concepts (that occur within and across disciplinary boundaries) to design solutions to problems?

In this paper we share insights gained from our experience and hope that other ESP professionals might benefit from them.

Materials and methods of research

Internet proliferation and technology advancement bring forward new services in the public infrastructure that combined with curriculum reform, support new forms of education and novel approaches to teaching and learning, course, and program planning. In pursuit of enhancing education to new heights, some universities upgrade their facilities and provide software-based approaches and technological environment developments such as

maker space, context-aware technology, digitalization of contents, and cloud computing. Remaining on the cutting edge, ESP teaching faces the challenge of delivering language as "the basic human technology" [3, p.6], where information and communication technologies play an important role and hold promise and excitement for students.

The implementation of this project idea started in 2020, with welcoming innovative, or interesting courses that have a practical orientation. The question and the outcome have an authentic connection with the academic community. This project work embedded into the ESP academic course was initiated by the Far Eastern Federal University (FEFU) library within the benefits of *Design Technologies for Students and Staff Wellbeing Initiative.*

All over the world, libraries have begun the paramount task of making faithful digital copies of the books, images, and recordings that preserve the intellectual efforts of humankind. The benefits of going digital are seen (1) into preserving the wealth of information; (2) lending their virtual collections to those unable to visit in person; (3) turning into inclusive public spaces and exhibition concourse, a place for discourse, self-directed and interest-based learning. Along with the increasing integration of digital processes, libraries are aggravated by the tremendous rise of digitally available information and its relevance. In a torrent of data amounting to 40 zettabytes (studies conducted by International Data Corporation), libraries have to think about new ways of mediation; up-to-date services have to be created to meet the needs of the current education and science. However, for the time being, in work-a-day circumstances, education and students' lives often go beyond the library.

As university libraries are repositories of research in virtually all fields, improving libraries would positively impact the university's competitiveness and really advance the university in general. Aligning with the new digitalization trends in education systems, FEFU institutions of information supply started to convert library collections into active mode as Web 2.0 onward with a long-range goal to be developed into Web 3.0 for the interests of teachers and students. Library 2.0 is defined as a subset of library services designed to meet user needs precipitated by the direct and peripheral effects of Web 2.0. Web 3.0 combines the semantic web, Web 2.0 applications, and artificial intelligence. Moreover, it gives the opportunities and possibilities to use semantic tagging and annotation for the social web [4]. Creating this kind of scheme is not an easy way to do.

Intra-university engagement between librarians and academics to strengthen learning capacity, STEM programming, and independent research is well-established and often takes the form of collaborative teaching of information research and academic skills for undergraduates and graduate students [5]. Such a perspective of scholarly collaboration practice provides broad benefits for the ESP course, too in the sense of emphasizing a more experiential approach to learning. Taking into account a positive effect generated by the synergy from team-teaching, the interdisciplinary project featuring intra-university engagement between librarians and academics from different fields of education (a subject expert and an English language teacher) was expected to become a platform to promote students' deeper learning and a diverse set of skills acquisition with the evident connection to authentic purposes. Engaging students in active roles stimulates purposeful learning, and learners can make the most of this integration.

The research was conducted as part of "English for Specific Purposes" course and "Big Data Management" course with 14 students in their first year of study in the "Corporative Management Systems" Master program (spring term). The students were assigned to complete a project work worth 60% of the final grade. The project was focused on the real-world subject matter and employed the use of cognitive tools to integrate into the University's information space and design solutions to the following problem.

The search for the content of interest from an infinite number of possible alternatives is increasingly becoming a labor-intensive, multi-step, and time-consuming process. On the other hand, it is getting increasingly crucial to get easy and effective access to information content with each passing day. Users need strong support in sifting through a large amount of retrieved information. On the other side, the release of new platforms can make digital libraries more powerful.

The main objective relied on the approach for the exploitation of digital libraries for personalization goal. A technology-enhanced module called "Smart Library" added supplementary online components to a traditional ESP course without changing the amount of time students spend face-to-face with instructors. The following are the different stages involved in the project process:

• The *Initial stage* introduced the general problem of information filtering, the application of techniques coming from it and included a discussion of the main areas where the principles and techniques of information filtering are applied. The discussion reinforced by visuals involved the language skills of reading, speaking, and listening.

• The *Project Objective* stage involved the skills of speaking (negotiating or suggesting) and listening. Nowadays, many websites embody recommender systems (RS) to personalize their content for users. RS are becoming indispensable in helping users discover content in a large body of items. The students were tasked to design a recommendation service that can catch the university user preferences. As a thought-starter, the participants analyzed the problem statement and visualized the problem, identifying the issues that need to be addressed. It was important to construct qualitative representations (a sketch, diagram, or graph of the situation). From these qualitative representations, they identified the basic points that constitute an overview picture and attended to certain details to settle on what will go into the project.

• *Collecting the Information stage*. Next, the participants worked in groups exploring the key concepts. Among different recommender techniques that have already been put forward, the content-based and collaborative filtering approaches are the most widely adopted to date [6]. Content-based recommendation approaches analyze textual descriptions of the items previously rated by an individual user and build a model or profile of their interest based on the features of the objects rated by that user. There static content associated with items (the description) is usually exploited. Collaborative recommender systems differ from content-based ones in that user opinions are used instead of content. The classical trend in collaborative filtering is represented by memory-based algorithms. In this scenario, the group decided to use a combination of content and collaborative recommendation techniques, described in some researches [7, 8].

In *Collecting the Information* stage, the point of departure was learning the users' preferences during the interaction. Considering the discipline aspect (ESP), the focus groups mainly included students in the International Baccalaureate and Advanced Placement programs and native-English speaking instructors. The participants split into three workgroups that surveyed subject-related information, scanned the materials revealing details not normally apparent to the naked eye, attempted to make sense of that information, matched users' ratings, approximated representations of the users' interest in the corresponding domain, and shared the data via the local network (Reading, Speaking, and Listening skills).

• In *Collating stage*, the participants made a systematic analysis, explained their findings, created their own ideas about topical collations, and synthesized their ideas with those of other students.

The challenge in this line of work was the system being subjected to exposure biases. Little exposure to a vast majority of the contents available on the platform. That's the disadvantage which may cause irrelevant recommendations. The trouble required a certain system exploration to find efficient techniques to estimate the uncertainty and propose the choice crucial for attaining user satisfaction.

• In *Organizing and Displaying stage*, working individually and in groups, the students were creating the end-product. They constructed profiles of the users that could be later exploited in selecting relevant items. In this section when packaging the end-product accurate English was especially needed. The particular about the created neural network is that it can catch the real user personal preferences obtained from the data about the university books.

The result was envisioned as the application of collaborative filtering and content-based recommendation algorithm in the recommendation of university books, which involves reader classification, the establishment of a user-item scoring matrix, the construction of a vector space model, and the calculation of similarity among users.

Results of the research and discussions

After all hard work, the students were ready to present the final outcome of the project – SLA (Smart Library Assistant) information system with individual recommendations that will make it easier for the user to find the content of interest while reducing the time for content selection.

It is also worthy of note that under the scope of this project two students taking the advantage of engaging environment exercised initiative and suggested creating Science & Technology News (S&TN) database that includes the content about the latest events both within and beyond the University walls. The implementation is in searching a piece of news in tune with personal needs. You choose a target field of science (e.g. Chemistry / Physics / World Ocean etc.) and move on to the two columns with descriptive information.

	Id	Field_of_science	Scientific_field_topic	Source_link
1	1	chemistry	Chemists make tough plastics recyclable	https://www.lifescience.net/news/3303/chemists-ma...
2	2	biology	Method offers inexpensive imaging at the scale of virus particles	https://www.lifescience.net/news/3743/method-offer...
3	3	physics	Ultrasound has potential to damage coronaviruses	https://www.lifescience.net/news/3718/ultrasound-h...
4	4	physics	New type of atomic clock keeps time even more precisely	https://www.lifescience.net/news/3591/new-type-of-...
5	5	biology	Chemists gain new insights into the behavior of water in an influenza virus channel	https://www.lifescience.net/news/3731/chemists-gai...
6	6	biology	A comprehensive map of the SARS-CoV-2 genome	https://www.lifescience.net/news/3795/a-comprehe...
7	7	chemistry	How metals work together to weaken hardy nitrogen-nitrogen bonds	https://www.lifescience.net/news/3811/how-metals-...

Source link columns on the top panel

The first one provides a brief summary of each news item. If you are interested in any piece of news, you can get further details in the next column (Figure). What's interesting is the students' decision to present the follow-up information to the effect of exciting the curiosity of the reader rather than reveal granularity bits of the news story.

S&TN database as an instance of creative product was a notable supplement, since news stories activities constitute an essential part of many English-language classes.

The Reflection stage engaged the students in a dialogue about what they have learned by completing the modulethe . The students gave basically positive feedback to the term project. The revealed effects include:

-"…The results are real";

- "A sense-making environment";

- "It is a bit steep to provide benefits for the University";

- "Real language in real situations";

-"There was not much fun but rather a great deal of relevance"

- "Though the idea of the project was imposed by the teacher, doing the project work was super dope."

-" We were captured with the input to keep university people currently informed"

Special complexities and apparent difficulties for students involved combining and weighing the preferences of user neighbors.

In the research, we implemented a transition from conceptual content-oriented activities to the to the uttermost professional practice-like student work. It was an institution-wide collaboration that emphasized the intertwined disciplinary content of several academic courses. All partners combined an interdisciplinary effort with an equal sense of responsibility, the action coordination for the successful completion of the project for relevant work significant to the FEFU community.

Though focusing on technical details rather than on specific language targets, the project work made learning more effective as in completing the larger-scale task. Students were compelled to engage in higher-order cognitive activities that required them to go beyond the level of content knowledge and reflect on information. The mix of complex cognitive skills relied on ones' integration of competencies in information processing. The methods of thinking included the following: mind mapping in preparation for the task; searching for information; scanning for information; using references; summarizing; constructing definitions; keeping records; arranging data; conducting a review; reflecting; practicing language skills.

Conclusion

In this way, the graduate students carried out the task and showed that the designed SLA recommender system could be exploited for personalization goal in an academic situation scenario, helping teachers and students receive suggestions about the materials they could be interested in and tailor well-defined portions of academic affairs and scientific research activities on their tastes.

The completed authentic intellectual work encouraged student autonomy and awareness of self-efficacy related to the student's belief in their ability to develop usable knowledge, reach goals, and complete socially meaningful tasks that prepare for high-quality results. We believe that our experiences have led to tangible professional growth for us, too.

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