6 Technology-enhanced curriculum development in the ESP tertiary context

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Abstract

Teaching English for Specific Purposes (ESP) in Higher Education (HE) has a long-standing tradition in the language centres of the Cypriot academic world, much like in other European contexts. Even though Cypriot universities are advancing in educational technology, students enter bearing coursebook-led and teacher-centred learning experiences offered in secondary education. The present chapter focusses on a pilot study involving 20 ESP first year students of the Department of Chemical Engineering, and a curriculum that was developed to tailor their academic and professional needs with the aid of a technology-enhanced environment. The aim of the personalised curriculum was to stress the fusion of interactive tools and make use of applications that would deliver opportunities for: (1) autonomy, (2) resource and content management, and (3) communal and individual content production, presentation, and sharing. The impact of the design of the curriculum was investigated through (1) online surveys completed by the students and (2) students' reflection journals. Data reports on the transformational period, the progress made, and the impact the technology-enhanced curriculum had on their learning. Additionally, the investigation revealed insights on the level of intensity of cognitive and instrumental interactivity.

Keywords: technology-enhanced curriculum, pilot study, interactivity, autonomy, transformational learning period.

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1.   Introduction

Teaching ESP in HE has a long-standing tradition in academic contexts where language instructors are expected to adjust their curriculum to the needs of students of various departments and faculties. More specifically, in the Cypriot HE context, language centres operate separately from other departments and focus on teaching English and communicative skills in a specific field. Students, however, enter university bearing coursebook-led and teacher-centred learning experiences (Tsagari & Giannikas, 2018), having not used their familiarity of technology for educational purposes in secondary education (Papadima-Sophocleous, Kakoulli-Constantinou, & Giannikas, 2014). This creates barriers for university students, and challenges for language instructors.

The present pilot study focusses on 20 ESP first year students of the Department of Chemical Engineering, and a curriculum that was developed to tailor their academic and professional needs with the aid of a technology-enhanced environment. The students were encouraged to use electronic means instead of paper. The aim of the specific personalised curriculum was to stress the fusion of the interactive tools provided from a constructivist or socio-constructivist approach, a scientific position that knowledge arises via interaction and active construction (Mascolo & Fischer, 2005), and makes use of applications that would deliver opportunities for:

- autonomy;

- resource and content management; and

- communal and individual content production, presentation, and sharing (Hall & Conboy, 2009).

The data of the present pilot study reports on the students' transformational period, the progress they made and the students' perception of the impact the specific technology-enhanced curriculum had on their language learning and attitude towards the process. Additionally, the investigation revealed insights

on the level of intensity of cognitive (between participants) and instrumental (between participants and technology) interactivity. Through the outcomes of the study, the researcher aspires to share a complete curriculum overview, present how technology-enhanced environments can pedagogically benefit ESP courses, and prompt the re-evaluation of curriculum design and delivery in HE ESP by embracing students' academic needs.

1.1.   A background review

There is a growing global demand for the teaching of ESP, and the purpose of its courses is to provide students with in-context language and authentic tasks that are related to the learners' professional needs. Ideally, students would be motivated to develop competencies necessary to develop the L2 and achieve their language learning goals (Živković, 2016). What distinguishes ESP and keeps it in demand is its approach and decisions related to content and teaching methods are based on the students' motives for learning the foreign language (Dudley-Evans & St John, 1998). For this reason, there is a call for highly specific ESP courses to be implemented in the experimental needs-based syllabus as part of a renewal process (Richards, 2001). Needs can involve what learners know, do not know, or want to know, and can be collected and analysed in a number of ways (Hyland, 2006). The integration of technology can help assist these needs (Higgins & Spitulnik, 2008).

Integrating technology in the ESP learning environment provides potential for an innovative teaching and learning approach based on elements of communication, interaction, and cooperation, which relates to earlier Vygotskian (1962) research on cognitive development and social learning. Therefore, expecting ESP learners to develop into successful, autonomous students is not feasible in a traditional teacher-centred classroom where the instructor dominates the learning process (Hedge, 2000). Hedge's (2000) observation supports Lekatompessy's (2010) statement that in order to improve learning, the students' needs must be considered. In other words, the development of an effective curriculum should include as much information as possible about the needs of the learners. Skehan (1998) goes as far as arguing that using coursebooks is against all notions of learner-

centredness. ESP students require materials and learning scenarios outside the limitations of traditional teaching (Gimeno-Sanz, 2014). More specifically, the ongoing development of ESP and curriculum design have verified Bojovic's (2006) conclusion that resources should be authentic, up-to-date, and relevant for the students' specialisations. Integrating a technology-enhanced ESP curriculum can provide university students with a variety of learning opportunities and advantages ranging from interactive and communicative activities related to their field of interest, to tools for giving feedback and self-awareness (Butler-Pascoe & Wilburg, 2003). This would mean that developing a successful curriculum prioritises and looks into the appropriate learning needs and interests of the learner, rather than focussing exclusively on the content they would be learning. For this reason, design practices have also been enhanced by skillful uses of technology. New technologies have offered new ways of visualising and capturing curriculum designs, bringing authenticity and collaboration to what has been a risk-averse process (Giannikas, 2019). Bringing these processes and practices into sharper focus as students look for a wider range of benefits from their courses can be an ongoing challenge. Nonetheless, using technology to enhance an ESP curriculum can assist universities, and those studying or working with them, to gain an advantage. However, the time sensitive nature of most ESP HE courses, needs analysis, and curriculum development have limited investigations of processes and contexts of technology-enhanced ESP curriculum design. The present chapter aims to contribute to the literature by disseminating the outcomes of the pilot study.

1.2.   The curriculum

The present ESP curriculum consisted of two dimensions: (1) L2 delivery and (2) employment awareness. Therefore, the design of the curriculum aimed to enhance the students' ability required in order to successfully communicate in the L2 within their occupational and academic context. The module was not supported by any coursebooks, due to the limited material for this specific science in ESP and because students' needs were taken into consideration. All material used was prepared by the instructor and the course outline was communicated and shared with the students before the semester commenced. To equip the students with appropriate and tailor-made material, the instructor took the students' L1 and L2

background into consideration, as well as the content they would come across in their other modules. The following list displays the main areas of the curriculum:

- academic journals (analysis and comprehension);
- academic writing;
- communication skills expected in academic contexts;
- presentations and responding to questions;
- lab communication; and
- research skills (conducted online)

The fusion of interactive tools was supported by Social Media, Google Scholar, Google Drive/Docs/Forms/Slides, YouTube, Canvas, and Prezi. This 13-week course took place in a Multimedia Language Classroom (MLC) for three hours a week, and all students had access to an individual computer. The MLC had a projector, and students were also encouraged to use their mobile phones for a number of tasks. Paper was not used at all during the semester and students worked on their activities or assignments exclusively on online tools. The use of the online interactive tools are displayed in Table 1.

Table 1.   The application of online interactive tools

Interactive Tools	Use Of Tools
Social Media	As a Course Management System (CMC), discussion platform, for the submission of activities
Google Scholar	Online search for academic journals
Google Drive	Management and organisation of material, sharing of folders, reflection keeping
Google Docs	Collaborate on assignments, articles, projects, instant sharing with instructor and peers, journal paper break down, review and analysis, reflection writing
Google Forms	Creation of questionnaires for research projects
Google Slides	Presentations and the use of single slides for covers/ posters, presentations for mock conference participations
YouTube	Listening tasks, vocabulary/terminology activities, note-taking tasks, sharing clips to exchange information, creation of a clip playlist for conference presentation inspiration
Canvas	Creation of lab posters, safety posters, professional bio posters
Press	Interactive presentations between students and instructor

2. Method

2.1. Data collection

The current pilot study was conducted in order to trial a new ESP curriculum. The research, as mentioned earlier, focussed on 20 first year undergraduate students and the effect their ESP curriculum had on their autonomy, resource/content management, and communal and individual content production, presentation, and sharing. For the needs of the pilot study, data was gathered through students' reflective journals and questionnaires.

The students were encouraged to create folders on Google Drive and save all their reflections in the folders. They were not requested to answer specific questions. The students were expected to complete their reflection entries weekly and share their thoughts regarding the development of the course, their language learning, and how they progressed through the semester. These thoughts were only shared with their instructor. The reason the students were given this freedom was to (1) include their needs and thoughts in any potential changes made to the curriculum, (2) encourage them to share their opinions and input freely, and (3) identify what the students found most useful and intriguing during their lessons. This approach was applied in order to avoid guided and biased reflections.

The data that derived from the reflections were analysed and coded on Atlas.ti 7[2] (Scientific Software Development GmbH, Berlin), and themes emerged as a result of the coding on the software. The questionnaires, which were distributed at the end of the semester, aimed to provide insights on students' thoughts about technology-enhanced learning and their demographic information. The questionnaires were created on Google Forms and included multiple choice and open-ended questions. The questionnaires were analysed on the response spreadsheet.

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2. https://atlasti.com/2012/08/15/atlas-ti-7-qualitative-data-analysis-software-gets-work-done-efficiently-smoothly-enjoyably/

2.2.   The context and the participants

The English language courses at Cyprus University of Technology (CUT) are mandatory for students of all university faculties, i.e. English for Geotechnical Sciences and Environmental Management, English for Management and Economics, English for Applied Arts and Communication, English for Health Sciences (Athanasiou et al., 2016) and, since September 2017, English for Chemical Engineering.

All ESP courses take place in MLCs, where students have access to an individual computer. All students and instructors have access to Moodle, which is CUT's CMC.

Based on the demographic data, 15 of the students were female and five were male. The students were all Cypriot and shared the same native language (Standard Modern Greek) and dialect (Greek Cypriot Dialect). The male students were 20 years of age and their female peers were 18. This is due to the fact that Cypriot male students must complete their two-year military service immediately after they graduate from secondary school. Furthermore, 56.9% of the students had been learning English for nine to 12 years and 43.1% for six to eight years.

According to the questionnaire responses, 64.3% of the students did not use technology in their language lessons at school, however, 50% of the students sometimes used technology in their general education in secondary school. A high percentage, 92.9%, of the students stated that the majority of their English lessons were based on coursebooks. Nonetheless, 57.1% stated that they would have preferred that their language lessons at school included the use of technology. Some indicative responses are as follows:

> "Technology can be more vivid and interesting, but it is trickier to use" (Student 4).

> "You can access more information" (Student 1).

"I prefer technology because it is easy to use, and you can find more things which can help you in your subjects" (Student 11).

"I cannot concentrate on a screen for long" (Student 19).

"Books can be really interesting sometimes, but working on the internet can be fun and entertaining" (Student 15).

3.   Results and discussion

3.1.   Questionnaire outcomes

The ESP curriculum was based on activities and projects that could be carried out on a computer, which was the main equipment used for the needs of the course. According to the outcomes of the questionnaire, the curriculum embraced and encouraged autonomy in language learning, as stated by all the participants. More specifically, students believed that certain activities seemed more appealing as seen in the following sample statements:

"I enjoy using technology in my English classes because I use critical thinking rather than just accepting everything I see or hear" (Student 2).

"I can use the internet and answer my own questions. I don't need to ask my professor for answers all the time" (Student 7).

"This kind of learning and using technology in my lessons helps me become more mature as a student" (Student 20).

The majority of the students (64.3%) understood their progress and became more independent from one semester to the next. The questionnaire, used for the needs of the study, focussed on the main tools applied to deliver content, and prompted the respondents' impression of them.

3.1.1. Facebook Group: English for Chemical Engineering

The Facebook closed group was used throughout the course for students to post their activities, get involved in class discussions, and stay informed concerning class/university announcements their instructor posted. According to the data, none of the students had experience in using any kind of social media for educational purposes, and 71.4% of the respondents stated that it was very practical and preferred sharing/posting their work with their instructor and peers via Facebook, rather than handing in a hard copy of their assignment or uploading it on Moodle. They also found Facebook convenient because they received notifications on their mobile phones whenever there was activity on the Facebook group. It is important to add that none of the students had anything negative to state regarding the use of Facebook for the needs of their ESP course.

The use of social media can be controversial in a number of learning contexts. In this case, students were not aware of how they could use Facebook in a pedagogical way, which meant there was a form of 'training' in the fall semester. Students were given time limits on Facebook (i.e. a task would need to be completed in 10, 15 minutes, etc.), and were expected to post their work in a timely manner. Their post was deleted if there was any form of plagiarism (which was detected via Turnitin) and students were asked to re-work the task so that it met codes of academic integrity. This is an interesting shift for students who have spent their entire schooling working in a teacher-centred, coursebook-led learning environment.

3.1.2. YouTube

According to findings, the participating students had never used YouTube for pedagogical purposes in the past, and it was the tool that brought about the most positive responses, with only one respondent stating that they believed it to be distracting. Over half of the respondents (57.1%) stated that they enjoyed using YouTube due to the fact that their listening tasks had a visual, and 71.4% enjoyed using subtitles, which worked as a safety-net during some of the more challenging

activities, and gave the students the incentive of becoming more autonomous. For example, students were asked not to use subtitles throughout the clips, but were encouraged to use them when they had difficulty making sense of what they were watching. The subtitles used were in English, which helped students with their phonological as well as lexical understanding. A smaller percentage (21.4%) of the students stated that they enjoyed using YouTube because there was more variety in the activities, and there was fruitful information regarding the topic at hand. During the course, students viewed TED Talks, university lectures, conference presentations, and lab guidelines in the field of chemical engineering in the L2. According to the multiple choice questions of the questionnaire, 100% of the students believed that their exposure to the YouTube tasks helped them in their other modules as well as in ESP, and prompted them to use YouTube as a resource for the rest of their studies. With the specific YouTube activities students were presented with, they were encouraged to develop their note-taking skills and enhance the ability to analyse and focus on important points of what they heard and saw in the clips. Finally, YouTube was used as a virtual library to support the ESP content by providing students with access to videos, allowing them to better illustrate complex concepts, procedures, and ideas.

3.1.3. Google Docs/Drive

The findings have shown that none of the students were familiar, or had even heard of, Google Docs and Google Drive before. The initial reason the students were introduced to the two tools was to help them organise their work on the Drive, go back when they needed to study, and reflect on their learning by creating a 'My Reflections' folder. Google Docs was used exclusively throughout the semester, due to the instructor's 'no paper' policy. This approach is aligned with Green Office Practices, designed to save paper and meet several environmental objectives in HE (Zen et al., 2016). The students were familiar with the concept of sustainable development and waste deduction given that they studied solid waste management. Students were encouraged to 'go green' during their ESP classes as well, which was communicated to them from the beginning of the semester, to which no one brought any objections. More specifically, 100% of the respondents found the sharing feature very useful and practical, and 64.3% of the students

appreciated the fact that they did not need to save their work constantly. A smaller percentage, 28.6% stated that it was easier to use than Microsoft Word. After becoming more familiar with Google Drive and Google Docs, none of the students wanted to use Moodle to upload their assignments any more.

3.1.4. Google Slides and PowerPoint

Students were encouraged to use the information they received from YouTube university lectures and conference abstracts found online, to prepare presentations on various topics in the field of chemical engineering. They were given the option to use Google Slides or PowerPoint. The vast majority (82%) of the participants preferred using Google Slides. All students stated that they enjoyed the creative element of preparing their slides and finding information and data to display. Nonetheless, the majority of the students had negative feelings towards presentations. Half of the students did not feel comfortable using English to deliver presentations in front of their peers, and 14.1% stated that the entire process made them very nervous. A small percentage (28.6%) enjoyed giving presentations and stated they learned from the process. None of the students had ever given a presentation before, and they had not been assigned such tasks in their other modules either. Although this is a basic skill and task in HE, the students in Cypriot universities bear very little experience presenting in their native language, which justifies that half of the students felt uneasy presenting in a foreign language.

The combination of the use of various tools and the very different learning environment helped students develop various skills and become more autonomous. According to the questionnaire data, 64.3% stated they asked their instructor less questions in the second semester than in the first, and all the participants felt they had a better understanding of the course. From the responses gathered, one could interpret that students enjoyed working together, collaborating, and interacting via technology. A percentage of 64.3% stated they found working on group projects effective (e.g. preparing a group presentation, analysing an academic paper, or comparing notes of a lecture viewed on YouTube). Based on the data, none of the students wanted to work alone on

coursebooks after following a curriculum that embraced technology and collaborative learning and eliminated paper and teacher-centred coursebook-led approaches. The present ESP experience prompted 72% of the students to state that they were more confident English users than they ever were in their past schooling. This was mostly due to the fact that students felt they were exposed to more authentic and realistic language and situations. They were using tools that they would apply in their everyday life and work with material adjusted to their academic and linguistic needs.

3.2. Students' reflections

As mentioned in the Methods section, the students participating in the study kept a reflective journal in Google Drive, which they only shared with the instructor. Here they were encouraged to reflect on the course weekly, explaining how they saw themselves develop as university students. The reflections helped the instructor understand students' needs, and how the curriculum affected their learning. It also gave students a better understanding of their own foreign language development, and gave them the incentive to look at the process of language learning critically.

The reflections' outcomes added value to the course of the study as they offered students a voice. Furthermore, the students' insights added to the outcomes of the questionnaire. The two approaches of data collection strengthened, validated, and complemented each other due to the fact that the reflections provided a better understanding and explanation of the figures that derived from the analysis of the questionnaires. The reflections were coded for analysis and, as a result, the following themes emerged:

- intrigued by technology;
- increased confidence;
- autonomy;
- student interaction;
- rich resources; and
- learned more about their field via the ESP course.

Here, a sample and interpretations of final reflections of the course are displayed below:

"Looking back at the beginning of the first semester, and the beginning of the ESP lessons, I have concluded that it was going to be an **awesome course** throughout the whole semester **due to the expansion of the usage of technology** during classes. Now that we are nearly at the end of the second semester I **feel more confident** about myself speaking English in front of other people. Moreover, using technology helped me to emphasise more on researching the web and finding the answers for questions that nobody could give me answers to. Also, I've also learned **how to cooperate** with other people in the making of a project or a presentation. I found this very interesting because during the preparation we all shared our thoughts about a specific subject and exchanged different ideas. In conclusion, this second semester of English taught me how to be more independent and more competitive in my life" (Student 15).

"During the second semester, we have learned a lot of things in our English course that helped us, not only with our studies, but also with other courses. **We watched videos, lectures from chemical engineers talking about their experiments, the solution of their experiments and their plans for the future about chemical engineering.** We had so **many resources** because we were working online. I learned more than I had ever expected from an English class. It was all very helpful" (Student 4).

"In the lesson of English during the second semester, we learned many new things. To begin with, the lesson was more specific and had to do with chemical engineering, not with academic skills in general. Therefore, we enhanced our knowledge with issues connected to chemical engineering, and even how **to approach a scientific paper correctly**. In addition, we used YouTube for listening, PowerPoint, Canvas (to create posters) and other useful technological tools that made the lesson **more appealing.** Furthermore, we **interacted** with

> our fellow students and **collaborated** through presentations and this is something that **we are going to need later on in life,** not to mention that we got an idea of how a lecture is but in an easier way, as we were able to put subtitles and stop it, or go back and hear something again. Overall, in my opinion the course was easier to understand and closer to the subject of our studies because of the material we used" (Student 18).

When combining questionnaire figures and reoccurring reflection statements, results show that the majority of the students viewed the technology-enhanced curriculum as a positive feature of the course. In reflections, students mentioned the use of YouTube and presentations extensively, as these had an impact and would help students develop skills they would need in their academic and professional path. The analysis of student responses suggests that students valued and profited from the opportunity to take up a more autonomous, student-centred, constructivist approach to learning. Their reflections indicate that they perceived improvement in their ability to work with each other, work online, and increase their knowledge of English for Chemical Engineering.

4.   Conclusions

The study discussed in this chapter offers a comprehensive up-to-date overview of the findings generated from a pilot study of technology-enhanced curriculum development in ESP. Research findings indicate the transformational process and development of the participants as digital learners and users. The present study, however, is not without limitations. Although this was a pilot study, the sample size was considerably small. A larger sample size would ensure a representative distribution of the population of ESP students. Furthermore, the study would have benefitted from an additional semester of data collection, and although this was not possible in the current context, it can be tackled in other future research projects.

The findings in this line of inquiry elicited some enriched and complementary findings which revealed insights on the level of intensity of cognitive and instrumental interactivity. This leads to an important outcome of the study, which

was that a coursebook, teacher-centred context can be overcome with ease when students are encouraged to apply mechanisms and tools they are accustomed to and use in their own daily lives. A technology-enhanced curriculum can encourage students to develop as autonomous learners and embrace a wider variety of content and resources in a student-centred environment. The pilot study has provided a humble attempt to show that the Cypriot, and similar contexts, are ready to leave their traditional coursebook-heavy approaches behind, and embrace a constructivist approach in a digitally rich ESP curriculum.

Acknowledgements

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