ONLINE COLLABORATIVE PROJECTS TO ENHANCE SOFT SKILLS

Iwona Mokwa-Tarnowska
Gdańsk University of Technology
Gabriela Narutowicza 11/12, 80-233 Gdańsk, imtarn@pg.edu.pl

Magdalena Roszak
Poznan University of Medical Sciences, Rokietnicka7, 60-806 Poznań, Poland, mmr@ump.edu.pl

Barbara Kołodziejczak
Poznan University of Medical Sciences, Rokietnicka7, 60-806 Poznań, Poland, bkolodziejczak@ump.edu.pl

Abstract: *Students working in a web-enhanced environment have the chance to develop hard and soft skills. With web-enhanced components, a university course offers more versatile learning opportunities than face-to-face classes, which may result in undergraduates becoming more competent and competitive workers in the years to come than those who lack the experience. By using online tools to collect data and information, they learn in a new active way that is appealing to future engineers. These ideas are supported by students' opinions and attitudes expressed in the surveys conducted at Gdansk University of Technology in June 2018.*

Keywords: web-enhanced learning, online tools, soft skills, e-learning, academic education, collaborative project

INTRODUCTION

Blending face-to-face methods with e-learning technologies, i.e. Web 2.0 tools, can lead to a successful outcome if the blend is aimed to produce high-quality educational programmes engaging students in various interactions, resulting in them developing both hard and soft skills. University courses are more likely to arouse interest, stimulate to work and lead to satisfactory progress both from the students' and the teachers' viewpoints when they are run in environments structured around pedagogical methodologies based on active learning and collaborative achievements (Kołodziejczak, Roszak, Ren-Kurc, Kowalewski, Półjanowicz 2015). When the focus in education shifts from

distribution of a vast amount of information and rote learning to problem-based learning and complex skill development, new web tools can help to create an educational environment responsive to new challenges. With the capacity for versatile interactions, such programmes can better satisfy the needs, expectations, and learning styles of the new generation of students, i.e. Generation Z (Beall 2016). Not only do they enable them to access a substantial number of up-to-date resources, but they also provide functionalities that give plenty of opportunities to increase learning experiences inside and outside the classroom. This may allow university course participants to study in an engaging way based on more genuine interactions than those available in a traditional, face-to-face approach (Kołodziejczak, Mokwa-Tarnowska, Roszak 2017; Kemp, Grieve 2014).

The paper aims to show how to enhance English for Specific Purposes classes with web-based learning, how to create a project-based environment that can raise students' interest and increase their satisfaction, and how to engage them in an active and collaborative development of various competences needed also in other courses and in the work context. Moreover, it attempts to investigate how undergraduates perceive the inclusion of e-learning tasks in the curriculum and whether they can work collaboratively to develop soft skills through research and learning online. The presented hypotheses are supported by survey results and the observation of students' behaviour in class and during online activities.

1. WEB 2.0 TOOLS TO SUPPORT PROJECT-BASED LEARNING AND SOFT SKILLS DEVELOPMENT

There is a variety of Web 2.0 tools to enhance classes for university students attending regular courses (Mokwa-Tarnowska. 2017b). The ones that support collaboration, particularly communication, productivity and creativity, e.g., text based tools, image based tools and multimodal production tools can increase learning experiences. With their various functionalities, they offer more opportunities for teachers who can engage their students in interactions that are not available in a typical, traditional, instructivist classroom setting (Kołodziejczak, Mokwa-Tarnowska, Roszak 2017; Mokwa-Tarnowska, Kołodziejczak, Roszak 2018). They can stimulate learning by doing and help students develop both hard and soft skills. The latter are numerous, ranging from collaborative, communicative, reflexive, and critical ones to time management and work-life balance (Doyle 2017). They seem to be more difficult to target, and employers across the world constantly complain that university graduates are not equipped well enough with them (Callaghan 2017, Sander 2016). Poor soft skills have been reported to be the reason why young workers have difficulty adapting to a new work environment. Thus, to prepare students for future challenges in the labour market, universities should change their course curricula to also

accommodate for the needs of employers seeking soft competencies (Mathur 2017; Rima, Syeda, Lubna 2017).

1.1 Traditional ESP Classes Enhanced with Web Technology at GUT

Over the last six academic years different short online components have been designed to enhance learning opportunities for students attending courses in English offered by the Language Centre at Gdansk University of Technology. First they aimed to introduce novelty into teaching and learning English for specific purposes and to prepare students for blended programmes and self-directed learning. Then another goal emerged, namely to teach undergraduates professional English in the context of their interest.

The last few years have seen the emergence of different Web 2.0 tools, which has resulted in a growing interest in using them in university education (Noskova, Pavlova, Yakovleva, Gutiérrez-Esteban, Martin-Espada, Cubo-Delgado, Arias-Masa, Delicado-Puerto, Alonso-Dias and Yuste-Tosina 2017). The tools that have been chosen to deliver a web-enhanced study programme, due to their functionalities, support the development of different soft competencies. First of all collaborative, analytical, critical-thinking and reflective skills have been targeted. To create a new environment in the academic year 2016/2017 and the first semester of 2017/2018, website creation and data publishing technologies such as the *Moodle wiki* tool and *Thinglink* were selected to support short project-based tasks. Then in the second semester of the academic year 2017/2018 other free online tools were suggested to students working collaboratively on their 3-week projects, namely *mural, quip and easel.ly*.

1.2 Design and Implementation

Since October 2016 around 160 students have been developing online materials using different Web 2.0 tools. In the first semester of the academic year 2016/2017, for the first time, two groups of Civil Engineering students attended web-enhanced classes structured around a curriculum that included collaborative projects. The first project involved preparing an interactional poster using Thinglink (fig.1). The students were asked to find information on accidental discoveries or inventions and choose a specific topic to examine. Then, they produced a multimedia poster, presented it in class, and hosted a discussion based on it. The second project was considerably more creative than the first one and involved compiling specifications of an apparatus or equipment invented by the students themselves in the form of a wiki in Moodle (fig. 2). All the participants knew how to move around the LMS, as the university requires the first-year students to pass a test on how to use it, but they had not authored material before. The second stage of the task was to advertise the product in class. It ended with a competition designed to increase student engagement. The task helped to move control over the learning process to the participants, as well as to create a positive atmosphere and the sense of community. All the projects lasted one week.

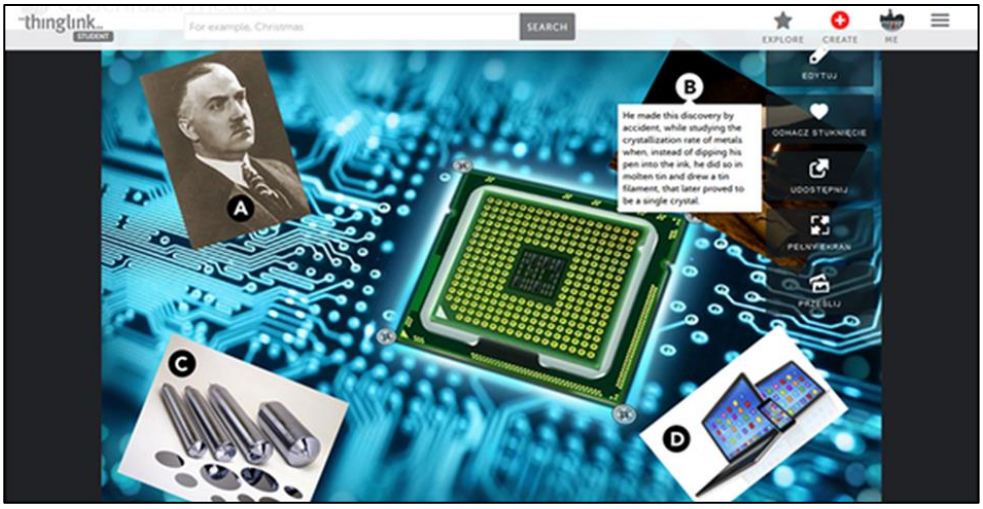

Figure 1. Group project assignment – Thinglink

Source: Based on students' collaborative work
https://www.thinglink.com/scene/842780152407523329 (accessed 10 July 2018)

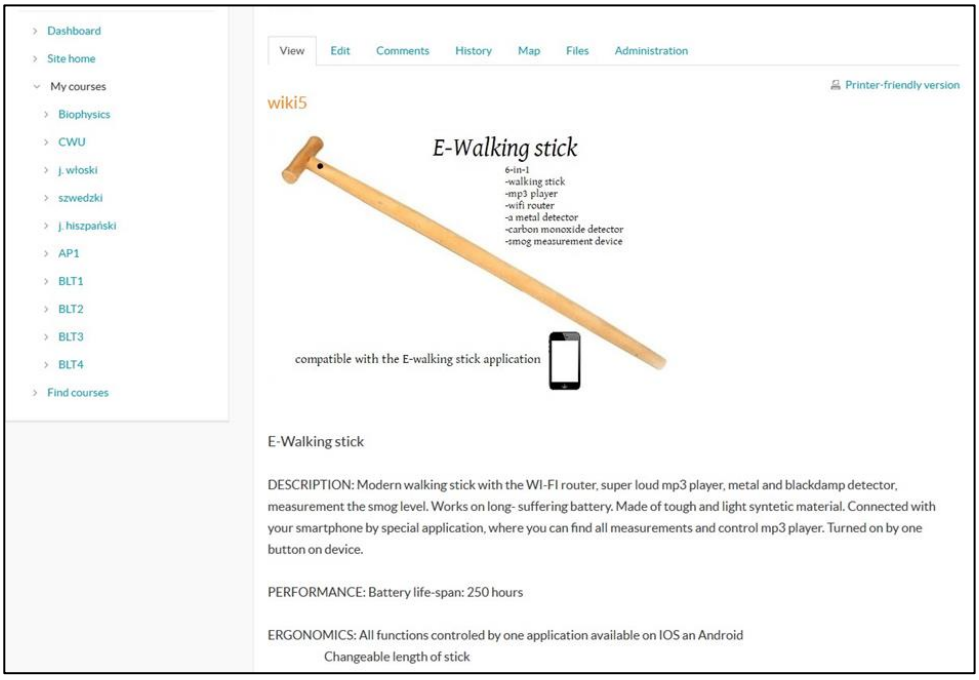

Figure 2. Group project assignment – Moodle wiki

Source: Based on students' collaborative work

In the second semester of the academic year 2017/2018 longer, 3-week projects were incorporated into the ESP course curriculum for three GUT groups. They required more involvement and more effort on the part of the participants in comparison with the short ones assigned previously. During a traditional class the students were divided into groups of three or four to work on each project. They were first introduced to the idea of online collaborative work and then they were presented with some general information about the topics of their projects, which included short films about theory and practice and suggestions for research. One group worked on future applications of virtual reality and augmented reality, and two on specifications of machines to ease life's problems. The next phase focused on collecting data on which to base designs and choose an online tool for collaborative work from the ones suggested, i.e. *mural*, *quip* and *easel.ly* (figs. 3, 4). For each group a wiki in Moodle was created, which they could use to share ideas and gather important information. After a week the teacher checked progress and the students informed her in class which tool they had chosen. The choice they had was limited to three online tools to save time on testing and finding the best one. Besides, the ones suggested seemed to be easy to use and adequate for the task.

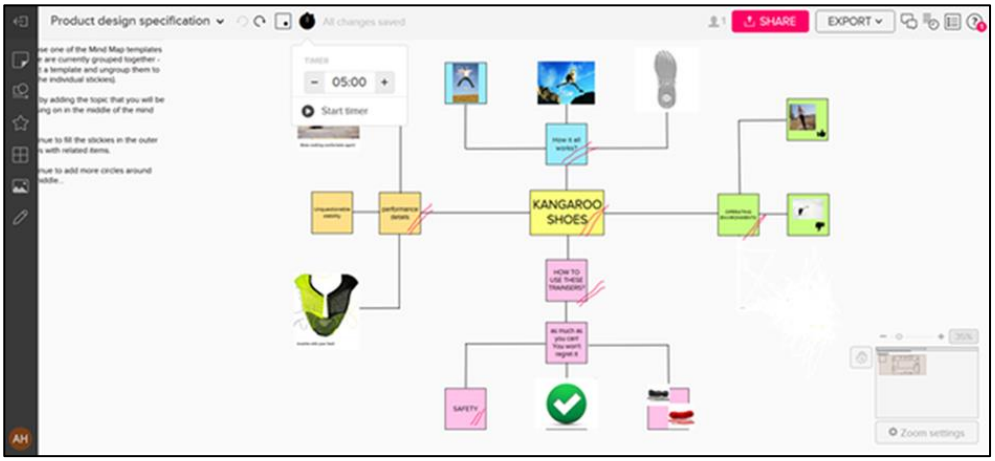

Figure 3. Group project assignment - mural

Source: Based on students' collaborative work https://app.mural.co/t/arnold3855/m/arnold3855/1528722732706/456beb6adab629be20f4bc91a92bda5469315e6b (accessed 10 July 2018)

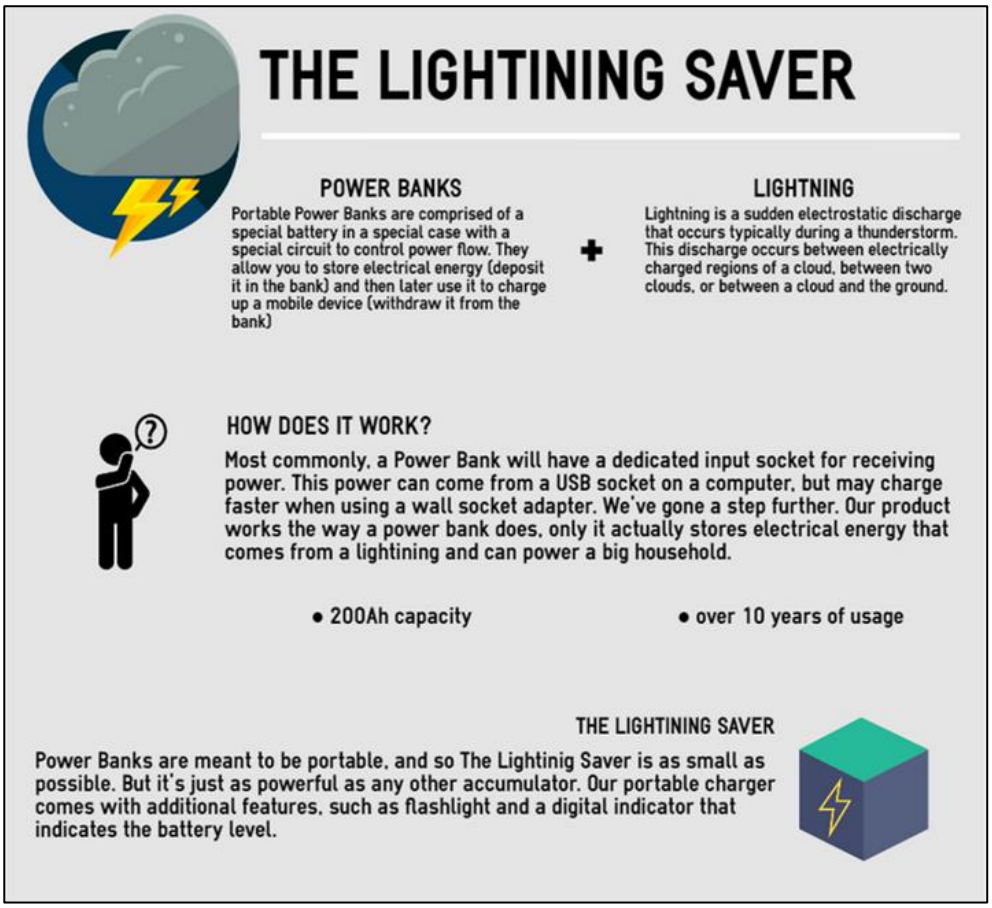

Figure 4. Group project assignment – easel.ly

Source: Based on students' collaborative work https://www.easel.ly/browserEasel/7651264 (accessed 10 July 2018)

Some students decided to prepare their final presentations with another tool, e.g. Google Docs (fig.5). Each group worked on their project for another two weeks and on completion the results were presented in class.

Figure 5. Group project assignment – Google Docs

Source: Based on students' collaborative work https://docs.google.com/presentation/d/175H7lF6rm6YYEUF5JKp0ydXM73wUAwjYfxH1_rekR84/present?token=AC4w5ViOC9eIR96n9RpTcc4QAYGGr5OkOQ%3A1528791392522&includes_info_params=1#slide=id.g3c4e07e2a9_0_61 (accessed 10 July 2018)

1.3 Research Questions and Methods

The qualitative and quantitative research into the nature of web-enhanced language classes at GUT and their impact on an increase in student competencies was initiated four years ago. Student's opinions and motivations shown in comments presented in class as well as answers to open-ended questions have already helped to uncover some trends to be further tested using quantitative research. Two basic tools have been used so far to produce a qualitative analysis: direct observation and group discussions. The quantitative research in each phase involved a paper survey. The research questions targeted in the second phase were as follows:

- What are the students' attitudes to online collaborative work?
- How effectively can the students work collaboratively in an online environment?
- How can an online environment created to enhance traditional classes help them to develop soft skills?

It can be assumed that the composition of each study group was homogeneous with respect to many factors: age, intellectual capacity, interest in science and engineering. Moreover, all 61 respondents were regular BSc students of the same university, whose level of English ranged from B2 to C1 according to the Common

European Framework of Reference for Languages. The only major difference was that two groups consisted of first-year students, i.e. the students of Mechanical Engineering and the students of Telecommunication and Electronics, and one consisted of second-year students, i.e. the students of Automation and Robotics, and Medical Engineering. It can be assumed that the participants of the latter group knew each other better and had more experience working together as it was the third semester of an ESP course that they had attended as a group.

The analysed data are presented as medians, minimum and maximum values or percentage, as appropriate. The comparison of two groups was analysed with the Mann-Whitney U test. The relationship between variables was tested with the Spearman's rank correlation coefficient. All results were considered significant at $p<0.05$. The statistical analyses were performed with STATISTICA 12.0 (StatSoft Inc.).

2. RESULTS AND DISCUSSION

2.1 Findings – long projects

The observation of the students' behaviour during all the stages of the project and after-the project discussions prove that a web-enhanced ESP course can include online project-based learning to satisfy various needs. The students enjoyed producing and presenting their collaborative work. The outcome was very satisfactory in terms of engagement and soft skills development. The productions included well-contextualised professional vocabulary and adequate grammar structures, as well as showed innovative solutions. Thus, they added to an increase in professional knowledge.

The students who participated in the long online projects stated that the task allowed them to improve their collaborative skills (table 1). More than half of the first-year students were satisfied with their progress. Some of them commented that they already possessed such competencies and they needed no further training. The second-year participants from the Automation and Robotics, and Medical Engineering specialisation showed more satisfaction from what they had learnt – as many as 80.77% chose the *definitely yes* and *probably yes* answers. It can be explained by the fact that the previous semesters of the English course involved individual work to a large extent, and that other coursework did not significantly contribute to an increase in the collaborative skill either.

Table 1.

Online project and increase in collaborative skills

Did the online project task allow you to	Definitely yes (%)	Probably yes (%)	Probably no (%)	Definitely no (%)	I do not know (%)	Total number of students

improve your collaborative skills?						
Mechanical Engineering	5.88	47.06	23.53	11.76	11.76	17
Telecommunication and Electronics	27.78	27.78	22.22	16.67	5.55	18
Automation and Robotics, and Medical Engineering	26.92	53.85	7.69	–	11.54	26

Source: Own work

The students could use the Moodle wiki tool, which was meant to support their work in the first phase of the project before they decided which additional tool to choose. However, most of them did not feel the need to share information using it (table 2). Only the Mechanical Engineering group regarded it as a convenient means to collect data and even to produce a final poster presenting their collaborative work (70.59% saw its suitability). The Telecommunication and Electronics group virtually did not use the Moodle tool – 66.67% had no opinion and said in class that they had not needed it. Almost half of the second-year students noticed the suitability of the wiki tool. In the questionnaire and during class discussions they stressed that they liked its simplicity. Yet, some of the respondents complained about the tool's functionalities and the limited editing possibilities.

Table 2.

Suitability of Moodle wiki for collaborative projects

Is the Moodle wiki tool suitable for collaborative projects?	Definitely yes (%)	Probably yes (%)	Probably no (%)	Definitely no (%)	I do not know (%)	Total number of students
Mechanical Engineering	17.65	52.94	11.76	5.88	11.76	17
Telecommunication and Electronics	5.55	5.55	11.11	11.11	66.67	18

Automation and Robotics, and Medical Engineering	15.38	26.92	19.23	11.54	26.92	26

Source: Own work

Two out of five Telecommunication and Electronics teams and four out of six Automation and Robotics and Medical Engineering teams used the *mural* tool to compose the final version of the project. Two teams, one Mechanical Engineering and one Automation and Robotics and Medical Engineering, chose *easel.ly*. The other ones decided to work on their projects using *Google Docs or wiki* and communicate via Facebook. They knew the tools, particularly *Google Docs*, and they stated in the questionnaire and during class presentations that they did not want to test any new solutions, which was a clear violation of the rules established for the task. They felt uncomfortable working together and they did not want to try any new environment. This was particularly seen in the case of the Mechanical group. Nevertheless more than half of the respondents (table 3) saw the suitability of the tool they had chosen for online collaborative work (ME: 58.82%, TE 66.67%, ARME: 84.61%). It must be emphasised that *mural* was the most popular tool and the best to produce a poster presenting the final version of the project.

Table 3.

Suitability of other online tools for collaborative projects

Is the tool you used suitable for collaborative projects?	Definitely yes (%)	Probably yes (%)	Probably no (%)	Definitely no (%)	I do not know (%)	Total number of students
Mechanical Engineering	23.53	35.29	5.88	–	35.29	17
Telecommunication and Electronics	50.00	16.67	16.67	5.55	11.11	18
Automation and Robotics, and Medical Engineering	46.15	38.46	15.38	–	–	26

Source: Own work

A substantial number of the respondents from each group (76.47%, 66.67%, 84.61% respectively) stated that an online collaborative task was an interesting addition to a face-to face class (table 4). The majority also pointed out that it increased their interest in learning Technical English, and that they would like to participate in similar activities at least once a semester.

Table 4.

Online tasks to enhance face-to-face classes

Is an online collaborative task an interesting addition to a face-to-face class?	Definitely yes (%)	Probably yes (%)	Probably no (%)	Definitely no (%)	I do not know (%)	Total number of students
Mechanical Engineering	52.94	23.53	11.76	11.76	–	17
Telecommunication and Electronics	38.89	27.78	16.67	11.11	5.55	18
Automation and Robotics, and Medical Engineering	46.15	38.46	7.69	3.85	3.85	26

Source: Own work

The majority of the students who participated in the survey think that collaborative projects should be included in the curricula of university courses (table 5). Only two students out of the total of 61 are rather against collaborative work in university education and another five have no opinion about it. It can be said that the students understand the importance of being able to work collaboratively, and they would like to master the skill when doing a degree. Their comments show that they lack sufficient practice and some of them even asked at the commencement of the activity if they could work individually on their projects. The reason they gave was that they did not like working in groups.

Table 5.

Collaborative tasks in university course curriculum

Should university course curricula include collaborative projects?	Definitely yes (%)	Probably yes (%)	Probably no (%)	Definitely no (%)	I do not know (%)	Total number of students
Mechanical Engineering	35.29	52.94	5.88	–	5.88	17
Telecommunication and	38.89	44.44	5.55	–	11.11	18

Electronics						
Automation and Robotics, and Medical Engineering	53.85	38.46	–	–	7.69	26

Source: Own work

The students also stated in the questionnaire that online tasks could contribute to the development of analytical and critical thinking skills (table 6). A positive attitude was expressed by 76.47%, 72.22%, 69.23% respondents respectively. Their understanding of the possibilities of an online learning environment seems to be based on the activities in which they were engaged. They involved analysing data collected in Internet research and critical discussion to be followed by creative productions. The tasks also added to an increase in students' media literacy skills as the majority of the data they studied came from films, documentaries, interactive poster presentations and infographics.

Table 6.

Online group tasks to develop analytical and critical thinking skills

Can online group tasks included in the curriculum of an English course help you develop analytical and critical thinking skills?	Definitely yes (%)	Probably yes (%)	Probably no (%)	Definitely no (%)	I do not know (%)	Total number of students
Mechanical Engineering	35.29	41.18	11.76	–	11.76	17
Telecommunication and Electronics	11.11	61.11	16.67	11.11	–	18
Automation and Robotics, and Medical Engineering	23.08	46.15	15.38	3.85	11.54	26

Source: Own work

Not only do the course participants perceive the impact of online tasks on the development of analytical and critical thinking skills, but they also understand that

other soft skills can be improved due to online interactions. Table 7 shows that as many as 88.24% of the students from the Mechanical Engineering group, 72.22% from the Telecommunication and Electronics group and 80.77% from the Automation and Robotics and Medical Engineering group think that online tasks on an English course can help develop different soft competencies. The students were familiar with the concept of soft skills as they were introduced to it in class prior to the commencement of their projects.

Table 7.

Online group tasks to develop soft skills

Can online group tasks included in the curriculum of an English course help you develop soft skills?	Definitely yes (%)	Probably yes (%)	Probably no (%)	Definitely no (%)	I do not know (%)	Total number of students
Mechanical Engineering	47.06	41.18	–	5.88	5.88	17
Telecommunication and Electronics	22.22	50.00	11.11	–	16.67	18
Automation and Robotics, and Medical Engineering	26.92	53.85	3.85	–	15.38	26

Source: Own work

The students' experience in using online collaborative tools was limited, which is clear from their comments in the questionnaire. The only tool some of them had used before was *Google Docs*, and they emphasised its usefulness and easiness to work with. From table 8 it can be seen that 15 students altogether (23.53%, 16.67% and 30.77%) out of the total of 61 had no experience collaborating using an online tool.

Table 8.

Experience in using collaborative tools

Have you used any online collaborative	Yes, often (%)	Yes, seldom yes (%)	Only once (%)	Definitely no (%)	I do not remember (%)	Total number of students

tools before?						
Mechanical Engineering	5.88	41.18	17.65	23.53	11.76	17
Telecommunication and Electronics	50.00	22.22	11.11	16.67	–	18
Automation and Robotics, and Medical Engineering	23.08	34.61	7.69	30.77	3.85	26

Source: Own work

2.2 Findings – comparison between short and long projects

The second stage of the research also focused on the comparison of the long, three-week, and short, one-week, projects with respect to students' attitudes towards online collaborative work, online tools and soft skills development. First, responses to four questions were analysed (Table 9). They targeted students' perception of collaborative skills, the *Moodle wiki* tool, other tools used for the projects and soft skills. Then, a correlation analysis was performed for the input data (Table 10).

Questionnaires completed by 134 respondents were statistically analysed – 73 (54%) came from the short project participants and 61 (46%) from the long project ones. The group sizes are unequal, which results from data availability.

Table 9.

Comparisons of results between short and long projects

Question	Number of participants in study		p-value	Interpretation
	Short project (academic year)	Long project		
Moodle	32 (2017/2018)	61	**0.019**	**Significant difference**
Tools	41 (2016/2017)	61	0.625	No difference
Collaborative skills	73 (2017/2018 & 2017/2018)	61	0.285	No difference
Softs skills	32 (2017/2018)	61	0.304	No difference

Source: Own work

When compared with the previous research stage, it can be noticed that there is no difference (medians = *rather yes*, p=0.304) between the way the participants of short projects and the long ones perceive their suitability for soft skills development (Figure 6).

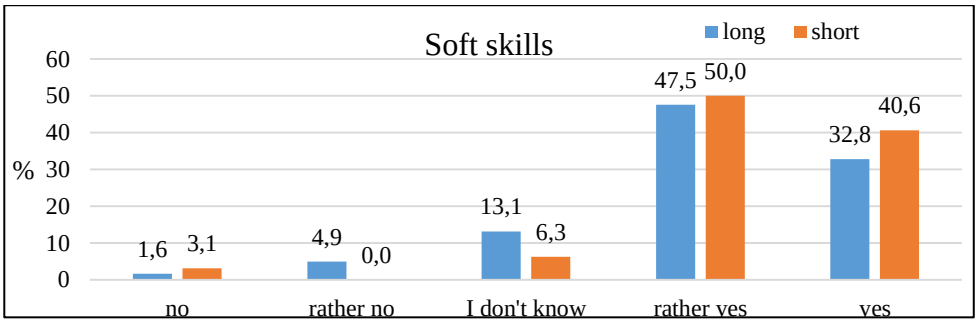

Figure 6. Distributions of answers about online group tasks to develop soft skills – short and long projects

Source: Own work

The students who filled in questionnaires on completion of their online group assignments in the academic year 2016/2017 and in the first semester of 2017/2018 stated that their short e-learning tasks contributed to an increase in their collaborative skills (medians = *rather yes*, p=0.322). A statistical analysis shows also no significant difference (p=0.285, p>0.05) between the answers of the short project participants and the long project ones in relation to collaborative skills (Figure 7).

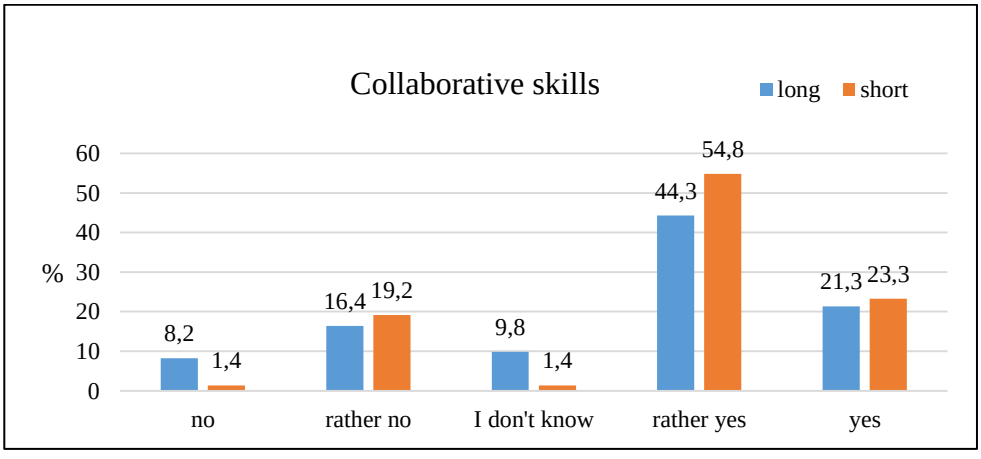

Figure 7. Distributions of answers about online projects and increase in collaborative skills – short and long projects

Source: Own work

In the students' opinions the online project activities they were engaged in supported soft skills development, which means that not only did their collaborative skills improve but they also felt more experienced in analytical and critical thinking competencies. These are the soft skills that the online tasks targeted.

Moreover, all the participants agree that the tool they used was suitable for online collaboration (Figure 8, medians = *rather yes*). In the case of the short projects it was *Thinglink* – the tool was non-negotiable and it was the teacher's decision. The students who completed long projects had a choice and most of them selected either *easel.ly* or *mural*, *mural* being the most favourable for that purpose. A statistical analysis shows no significant difference between the answers ($p=0.625$, $p>0.05$).

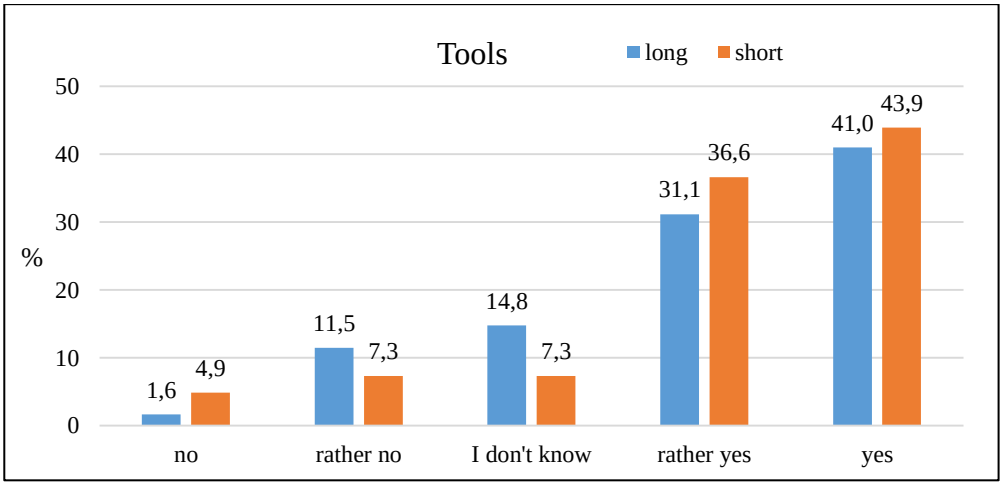

Figure 8. Distributions of answers about suitability of other online tools for collaborative projects – short and long projects

Source: Own work

All the tools were simple to use. However, *mural* offered more functionalities and was more visually appealing to the students.

As far as the *Moodle wiki* is concerned, there is a statistically significant difference between the responses ($p=0.019$, $p<0.05$). The short project participants rated its usefulness higher (median = *rather yes)* than the long project ones (median = *I don't know)*, which can be explained by the low complexity of the one-week assignments and the students' experience in work with *Moodle* (Figure 9*)*.

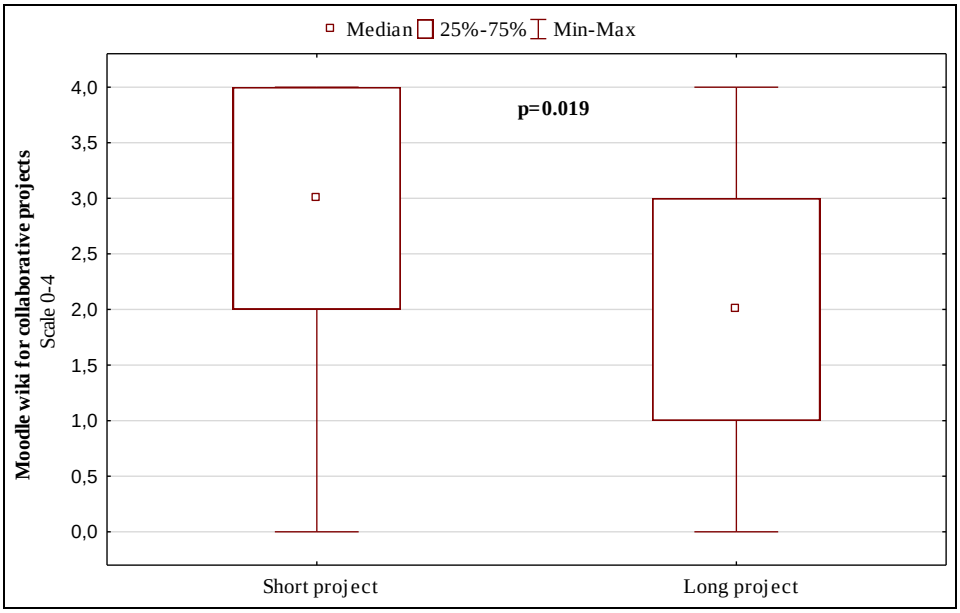

Figure 9. Comparisons of answers about suitability of Moodle wiki for collaborative projects – short and long projects

Source: Own work

Composing the final results of their research and making a presentation with any other tool required from the students much more involvement. There is a significant correlation between the students' evaluation of the *wiki* tool and soft skills development ($p<0.05$) – the higher they rated the Moodle tool and the group tasks, the more they appreciated the possibility of working on assignments to develop collaborative skills (Table 10).

Table 10.

Correlations between data from table 9

Sample size	Group	Variables	p-value	Correlation coefficient R
93	All (Long project & Short project 2017/2018)	Moodle & Soft skills	0.018	0.24
		Collaborative skills & Soft skills	0.002	0.32
32	Short project 2017/2018	Moodle & Soft skills	0.016	0.42
		Collaborative skills & Soft skills	0.011	0.44

61	Long project	Collaborative skills & Soft skills	0.032	0.29

Source: Own work

3. DISCUSSION

With their coursebook activities, traditional language classes offered by universities may become a regular and monotonous routine for students of science and technology, who have been learning English for many years, usually since the beginning of primary school. The presented research shows that educational programmes supplemented by web-based tasks, online group assignments in particular, may stimulate better engagement in course activities (Woo, Mehringer, Agostinho, Reeves 2007). They encourage students to explore up-to-date topics related to their study area, and motivate them to develop various soft skills.

The participants of the projects improved their collaborative, analytical and critical thinking competencies, which was observed in the comments they made both in class and in the questionnaires. It can be assumed that the survey and the experiment itself helped the students develop also their reflective skills. After responding to the questions their meta-awareness of the learning process increased, and they should better self-direct their education in the future.

Both short and long projects stimulated an increase in the soft skills they targeted. There is no significant difference between the way the short project participants and the long project ones perceived the suitability of the activities they were involved in. It can be assumed that it was not the length that impacted an increase in soft skills – it was the structure of the assignment and the character of the environment that contributed to it and to the students' satisfaction with being engaged in an innovative learning experience.

CONCLUSION

Since using Web 2.0 tools to enhance regular university courses is a relatively new phenomenon, only limited research has been conducted on their impact on soft skills development (Wawrzyniak-Guz 2016, Kołodziejczak, Roszak, Kowalewski, Ren-Kurc 2014). The research findings presented in this paper show similarities in the way students of different GUT faculties perceive web-enhanced collaborative learning. They treat it as a valuable addition to regular traditional classes. On the one hand, this may result from them being accustomed to using various technologies in many life contexts. On the other hand, it may prove that they understand that innovative methods of teaching and learning, and new educational environments can create opportunities for developing soft skills, whose possession is desired by employers.

The format of online activities may differ, but it is the inclusion of web-based tasks that seems to add value to university courses (Hamzah, Ariffin, Hamid 2017). A carefully structured environment can result in better learning outcomes measured by instruments available through the use of online tools. However, it is not sufficient to replace some traditional resources and activities that have always taken place in the traditional classroom with their equivalents developed in an innovative technology-based environment. An online component for use in class or outside it has to be incorporated into the learning design in a meaningful way so as to enhance and improve the learning experience (Mokwa-Tarnowska 2017).

By adding variety to the curriculum, by creating a web-enhanced environment, educators can develop a programme that will better motivate students and engage them in developing both hard and soft skills. Such instructional design may contribute to raising the quality of teaching and learning. New opportunities to develop different competencies may result in graduates being better prepared for professional challenges, but this is an area that has to be researched further.

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