

ONLINE POSTER PRESENTATION VS. ONSITE. AN EXPERIENCE IN THE PANDEMIC CONTEXT AT UNDERGRADUATE LEVEL

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Abstract

At present, the whole world is facing the COVID-19 pandemic and its impact on health, economics, society, as well as on all education levels. The pandemic has driven an unexpected change from onsite delivery to courses fully or partially delivered online. As a consequence, development and evaluation of the competences defined for each degree will also be affected by these changes, for which activities and methodologies will need to be re-defined and evaluation processes adapted. Oral poster presentation is a learning experience through which students are invited to acquire both specific and transversal competences which are important in a scientific career. To this aim, oral poster presentation has been part of a “scientific congress simulation” experience in which students of 4th year of Degree in Biotechnology are involved yearly as part of the course “Bioprocesses and Bioproducts” (Escuela Técnica Superior de Ingeniería Agronómica y del Medio Natural, Universitat Politècnica de València). Previous years results have confirmed that through this experience students develop specific and transversal competences related to the biotechnologist research profile such as data basis searching, synthesis of information, results interpretation, deadline accomplishment and time management, as well as oral communicative skills. Due to the current situation, an online version of this activity has been piloted during the academic year 2020-21 with the aid of Microsoft Teams®. Onsite follow-up by teachers has been replaced by regular face-to-face virtual meetings with each student team. Microsoft Teams® has also been used as a platform where uploading students’ deliverables (index of contents, abstract including the entailment of the topic with the sustainable development goals, poster and screencast files). Each student team was asked to record a 5-min screencast to be visualized in a synchronic virtual poster session in front of a panel of experts of three different areas: Food biotechnology, Environmental biotechnology, and Biomedicine. Not only poster presentation, but also interaction with the experts after screencast visualization were considered for the assessment. For the latter, rubrics were specifically developed and shared with the panel of experts. This contribution aims to present the main results of this experience by analysing the advantages and disadvantages of moving this activity from onsite to online, considering both students and teachers perceptions regarding development of the activity, quality of the results, as well as impact on assessment and competence development.

Keywords: COVID-19, competence assessment, online methodologies, undergraduate experiences, poster presentation.

1 INTRODUCTION

The Widespread of Coronavirus disease (COVID-19) during 2020 caused the sudden closure of schools and universities. In Spain, this closure started in early spring 2020 and the course was decided to continue in online mode until the end of the academic year. This unforeseen situation implied an unexpected and forced transformation from onsite delivery to courses fully delivered online, which had a significant impact on several aspects of the teaching-learning process. Some of the consequence of the COVID outbreak on higher education have been discussed in the recent literature [1, 2]: shifting from face-to-face to online sessions, overload of educational platforms, differences in assessment and evaluation methods, difficulties in online engagement of students, changes in universities support services, international students’ issues and travel restrictions, and mental health of students and lecturers, among others.

Universities opened again after some months to offer courses which, in most cases, are partially onsite and partially delivered online. Combination of online and onsite activities (hybrid learning methodologies) was common in the pre-pandemic period, for which university lecturers and students were already familiar with online delivery mode and the use of learning platforms. However, the

present situation relies more on online delivery for which most of the above-mentioned issues still need to be tackled to reduce impact of COVID-19 pandemic on current higher education. Regarding degrees' competences, development and evaluation of specific and transversal competences are expected to be affected by changes in the delivery method, for which activities and methodologies are to be re-defined and evaluation methods adapted. Adapted methodologies must ensure the development of the specific and generic competences which have been defined for each degree, as well as ensure their assessment based on specific learning outcomes. Therefore, criteria and adapted evaluation processes need to be described.

It is worth mentioning that the first impact of COVID-19 pandemic on education offered not time for transition, but action is required once there has been time for planning. Nevertheless, preparing new materials and adapting courses might also be overwhelming for lecturers, who also need to get used to new lecturing modes in which non-verbal communication is lost. Students are in principle expected to adapt more easily to online learning, but they might also be experimenting the consequences of the slow adaptation of the whole process. In addition, an increased workload at home in a context in which the relationship with their mates and teachers is reduced, together with their concerns on their education and performance, are important aspects to consider.

Online teaching and learning imply certain pedagogical knowledge related to course designing for better learning experiences and the creation of distinctive learning environments, with the aid of digital technologies [3]. This is of course challenging for university lecturers but the recent literature also suggests that it can also be an opportunity for reshaping higher education giving examples on competence development. In particular, references to digital competences' development [4] and the promotion of sustainable development issues [5] have been discussed. Regarding the latter, higher education has been said to be crucial for the promotion of sustainability at their three dimensions: economic, environmental and social [6]. Thus, moving to a more digital teaching may be a challenge for competences development and evaluation, but also a pivotal opportunity for change.

On the other hand, experimental and scientific competences development can be especially affected by the new situation. Development of these competences highly relies on lab practice and onsite participation; nevertheless, other scientific-related competences such as scientific communication skills (oral and written communication), time management and deadline accomplishment, data basis searching or awareness of contemporary problems, still have the opportunity to be developed in a realistic and updated manner.

Oral poster presentation is a learning experience through which students are invited to acquire both specific and transversal competences which are important in a scientific career. This strategy has been part of a "scientific congress simulation" experience in which students of 4th year of Degree in Biotechnology are involved yearly as part of the course "Bioprocesses and Bioproducts". In previous years, this experience had been confirmed as a good methodology to develop specific and transversal competences related to the biotechnology research profile [8]. Due to the current situation, an online version of this activity has been piloted during the academic year 2020-21 with the aid of Microsoft Teams®, in which on-site follow-up by teachers has been replaced by regular face-to-face virtual meetings with each student team and onsite poster presentation have been replaced by virtual sessions.

This contribution aims to present the main results of this experience by analysing the advantages and disadvantages of moving this activity from onsite to online, considering both students and teachers perceptions, as well as impact on assessment and competence development.

2 METHODOLOGY

2.1 Cohort of students

The activity was developed during the academic year 2020-21 in the course "Bioprocesses and Bioproducts" (4th year, semester A, Bachelor degree in Biotechnology, Escuela Técnica Superior de Ingeniería Agronómica y del Medio Natural, Universitat Politècnica de València). This is a compulsory course of 7.5 ECTS consisting of 4 ECTS of master classes, 1.25 ECTS of seminar theory, 1.75 ECTS laboratory practice and 0.5 ECTS of field practices. Seminar theory sessions were devoted to develop this learning activity with the regular advice of the teachers.

2.2 Virtual scientific congress simulation

The activity was developed around a *simulated virtual scientific congress* which was the framework for the challenge-based learning (CBL) approach used for this purpose. Students, in groups of 4-5 members, were appealed to contribute with a review scientific paper focused on biotechnological solutions to contemporary issues, such as industrial production of biofuels, non-meat alternative proteins, biopolymers for biomedical applications or next-generation natural drugs, among others. A total of 23 contributions were presented. Students were said to be participating in a virtual scientific congress, for which different deliverables and deadlines were established for their accomplishment, this including abstract and paper submissions, and oral poster presentation against a panel of 2 experts in the field (academic, researchers and/or professionals).

The challenge faced by students comprised the following steps in order of execution:

- a) Topic and tentative title proposal (*deliverable 1*). Teachers give their approval to the proposal or redirect it. Deadline: during the 1st seminar session.
- b) Search, reading and selection of scientific information from significant resources (scientific articles, patents, doctoral theses, ...) to meet the challenge. Information sharing and constructive discussion within the members of the group. Deadline: before the 2nd seminar session.
- c) Decision-making on the proposed biotechnological solution within students' group and proposal of the structure/preliminary index of the review article (*deliverable 2*). Teachers give their approval to the proposal or redirect it. Deadline: during the 2nd seminar session.
- d) Writing and submission of a scientific abstract (200 words of extension), including a reasonable description about the contribution of the academic work to the Sustainable Development Goals (SDGs) of United Nations' Agenda (*deliverable 3*). Deadline: at the end of the 2nd seminar session.
- e) Final review paper submission (15 pages of extension) containing a critical analysis, integration and effective discussion of contents, conclusions and future perspectives (*deliverable 4*). Deadline: before the 3rd seminar session.
- f) Scientific poster design (*deliverable 5*). Deadline: during the 3rd seminar session.
- g) Oral poster presentation in screencast format (5 min) (*deliverable 6*) and its defence (5 min) against the panel of experts, teachers and classmates. Deadline of deliverable 6: before defence session.

The most differential aspects of the methodology used, as compared to previous experience [8], was that the activity was planned to be completely carried out virtually. Microsoft Teams® was the virtual platform chosen for: (1) the supervision of the progress of the activity during seminar sessions, (2) students' files delivery according to the established deadlines and (3) the oral poster presentation and defence. Three 4-hour online seminar sessions per group (1.25 ECTS) were scheduled with calendar tab of Microsoft Teams® for the development of the activity. During each session, teachers advised students and followed-up the activity by a series of meetings programmed for each students group (4-5 members), by means of a separated team created by each group (in the Microsoft Teams® platform) as a virtual working space. Each 4-hour seminar session gave room for two complete round-meetings, i.e. teachers communicated with each group twice per session. Students, however, were asked to work and take advantage of the whole session to prepare and deliver the requested files/deliveries at the established deadlines. With respect to the oral poster defence, three consecutive 2-hour sessions were programmed considering the topics selected by students, which were clustered in: biomedicine session, food biotechnology session and environmental biotechnology session. The 23 contributions were allocated in the corresponding session, so that each session comprised 7 or 8 oral poster presentations.

2.3 Assessment of the activity

Three different rubrics, with 5 levels of performance ranging from E (unsatisfactory/1-2) to A (excellent/9-10), were prepared to standardise the assessment of the review article, the poster design and the oral poster defence. At the beginning of the activity, rubrics were provided and explained to students to ensure that learning expectations have been clearly communicated and understood. Table 1 presents an overview of the features evaluated in each rubric and the agents participating in the assessment of each deliverable.

Table 1. Overview of the rubrics designed to assess the three main deliverables of the CBL activity “Virtual scientific congress simulation”: review paper, poster design, and oral poster presentation and defence.

<i>Deliverable</i>	<i>Features assessed in the rubric and percentage of each one on the global score</i>	<i>Actors performing the assessment</i>
Review paper and progress of the activity	<ul style="list-style-type: none"> • Teamwork and decision-making (5%) • Progression of the work and deadline accomplishment (5%) • Organization, integration and discussion of contents in the paper (45%) • Written effective communication and use of scientific language (15%) • Format and quality of tables and figures (10%) • Conclusions and future perspectives (10%) • References: significance, citation and format (10%) 	Teachers
Poster design	<ul style="list-style-type: none"> • Relevance and appropriateness of the proposed title (10%) • Content of the poster: organization and synthesis of the selected topic (40%) • Effective use of visual resources. Relevance of images, graphics, tables (30%) • Ability to attract attention for its design (aesthetic aspects) (20%) 	Teachers Panel of Experts
Oral poster presentation and defence	<ul style="list-style-type: none"> • Oral effective communication and voice register (50%) • Time management of the presentation (20%) • Interaction with the panel of experts (defence) (30%) 	Teachers Panel of Experts

2.4 Students perception on the CBL approach and its contribution to competence development

This activity was designed to effectively contribute, through the CBL, to the Transversal Competences UPV Institutional Project which comprises a total of 13 transversal skills (TS01. Understanding and integration, TS02. Application and practical thinking, TS03. Analysis and problem solving, TS04. Innovation, creativity and entrepreneurship, TS 05. Design and project TS 06. Teamwork and leadership, TS07. Ethical, environmental and professional liability, TS08. Effective communication, TS09. Critical thinking, TS10. Planning and time management, TS11. Lifelong learning, TS12. Knowledge of contemporary issues and TS13. Specific instrumentation). To note, the course in which this activity takes place is “check-point” of level 2 acquisition of TS08 and TS12. Besides, the activity has been planned to contribute to the development of the following biotechnologist’s specific skills: apply biotechnological tools for developing innovative solutions and applications, identify emerging biotechnological techniques, assess social and environmental impact, and to search for, obtain and interpret information from the principal databases on biotechnology and related fields.

To gather student’s opinion about the CBL activity and its contribution to transversal and specific competence development, students were asked to complete an online survey before and after facing the challenge. Their participation in both surveys was voluntary and anonymous. Google Forms tool was selected for such purpose (Fig. 1) and students queried about their motivation regarding to participation in such activity “Simulated virtual scientific congress” and the degree of differentiation of the deliverables compared to other activities performed during their degree. In addition, students were asked to select the three specific skills of Bachelor’s degree in Biotechnology as well as the three transversal skills belonging to the UPV institutional project to which the development of the proposed challenge contribute the most.



Figure 1. Partial screenshot of the survey created and launched in Google Forms to gather students' perception on the CBL-activity "Simulated Virtual Scientific Congress".

3 RESULTS

3.1 Adaptation of the "simulated scientific congress" methodology to a "simulated virtual scientific congress" within a Challenge Based Learning framework

A total of 23 academic works were developed in the frame of the CBL-activity "Simulated virtual Scientific Congress". Most of the biotechnological proposals dealt with contemporary problems that could be classified in one of the following fields: medicine, food science and technology, and environmental fields, for which 3 clusters were distinguished. In Table 2, the title of the 23 contributions are presented and gathered according to the session in which they were included, together with their relationship to the SDGs indicated by students [9]. As it can be observed, some contributions could be classified in two different clusters. It is important to remind that students were completely free to choose one or other topic, as long as it matched the aims of the course and the definition of the challenge. This is the reason why more than one group decided to work on the same topic, e.g. edible vaccines, but with different approach. Within the chosen topics, students were interested in deepen into topics such as non-conventional protein sources, dairy products functionality, functional foods, edible vaccines production, human colonic microbiota and their role on mental health, allergies and infant well-being, pro-, post- and para-biotics for disease treatments, bioplastics production and degradability, non-chemical antitumoral agents or the bioremediation potentiality, among others. In most cases, students considered that the proposed solution contributed to the SDG3. "Good health and well-being". However, some contributions were identified with other SDGs. This is the case of "Golden crops" to the SDG1. "No poverty" and SDG2. "Zero hunger"; or "New non-conventional protein sources" and Pseudocereals as alternative vegetal source of proteins" which were also linked to the SDG12. "Industry and innovation" and SDG13. "Action climate aiming to climate change mitigation". As for the cluster Environmental biotechnology, contributions gathered in this group were mainly linked to the SDGs14 and SDGs15, specifically conceived to restore and promote sustainable uses of water and terrestrial ecosystems.

Once the topic contribution was agreed with teachers, students started working in their project keeping in mind the deliveries, the deadlines and the rubrics facilitated. As indicated previously, seminar sessions were monitored with Microsoft Teams®. Based on teachers' perception, it could be affirmed that this activity can be properly managed in online mode. In fact, the online modality positively contributed to the follow-up of the progress of the academic work and virtual face-to-face discussion between students' group and teachers throughout *video camera* and *microphone options*. In fact, each students' group and teachers were able to meet and discuss the work progress twice during each session. The *share screen option* also eased the interaction and ideas exchange to support and adequately advice students about the academic work development. To our mind, as compared to previous onsite experience, students were better approached by both teachers during online sessions than during onsite sessions in the classroom, partly thanks to the scheduled of group meetings and the co-liability of each student to talk and interact during the online session, gaining visibility.

With respect to documents delivery in the established deadlines, all groups met the deadlines initially scheduled. Microsoft Teams® offered a platform for sharing and delivering all the required files, which were worked by students and examined by the teachers. Each delivery had a specific name and code,

which facilitated its identification, and the control of deadlines accomplishment was favoured by the use of a virtual platform which registers the upload date. As for the quality of the files delivered and the work developed, there were not significant differences between the marks obtained by students this year with respect to previous years, in which the onsite methodology had been used.

Table 2. Titles of the 23 proposals developed by students in the frame of the CBL-activity “Simulated Virtual Scientific Congress” and their link-up to the 17 SDGs (<https://sdgs.un.org/goals>).

Cluster	Contribution Title	Link-up to the SDGs
FOOD BIOTECHNOLOGY	New non-conventional protein sources	SDG2, SDG3, SDG12, SDG13
	Post- and para-biotics for functional foods production	SDG3
	Edible vaccines	SDG3
	Microbiota and mental health: probiotic treatment	SDG3
	Golden crops	SDG1, SDG2, SDG3, SDG10
	Pseudocereals as alternative vegetal source of proteins	SDG2, SDG3, SDG12, SDG13
	Biopolymers opportunities in food active packaging and edible films	SDG12, SDG13, SDG14
	Functional dairy products: components, techniques and perspectives	SDG3
ENVIRONMENTAL BIOTECHNOLOGY	Bioremediation: bioventing	SDG15
	Bioconversion and revalorization of bread waste	SDG11, SDG12
	Bioremediation of common explosives	SDG3, SDG14, SDG15
	PET biodegradation by means of <i>Idionella</i>	SDG3, SDG14, SDG15
	Siderophores: concepts and applications	SDG3, SDG14, SDG15
	Heavy metals bioremediation	SDG3, SDG14, SDG15
	Biodisc hard drive	SDG14, SDG15
BIOMEDICINE	Biomedical applications of whey-protein	SDG3
	The role of probiotics in treating and preventing allergies	SDG3
	Oncological applications of collagen and its derivatives	SDG3
	Psychobiotics applications in mental health	SDG3
	Products preventing infant's microbiota imbalances	SDG3
	Production of antitumoral compounds from <i>Actinomycetes</i>	SDG3, SDG9
	Edible vaccines: the carrot case-study	SDG3
	High-level production of lycopene by means modified microorganisms	SDG3, SDG12

Third online session was devoted to poster design assistance. It must be said that students were quite autonomous because of a certain previous expertise regarding poster design acquired in previous courses. In general, students succeeded with poster design according to teachers' expectations. There are a wide number of applications and tools for designing visual resources (figures, diagram, tables, ...) which are usually part of scientific posters, and students were familiar with these tools. For screencast recording, teachers suggested and made tutorials of some of the most popular screencast recorders with available free-of-charge versions such as Screencastify or Flexclip, among others. Students were very motivated to participate in the recording and, although participation in the screencast of all group members was not mandatory, it was evidenced that most of them participated in their 5-min screencast presentation.

The three 2-hour defence sessions, one per cluster, were performed along the same day. Students seemed to be excited about knowing experts' opinion on their work and interacting with them. Both experts per panel posed at least one question to each students' group (Fig. 2). Experts communicated to the teachers that they were positively surprised about the academic level of the contributions and the engagement of students. Thus, grades giving by experts for both poster design and defence ranged from 7.75 to 10. It is important to point out that students enrolled in Biotechnology Bachelor's degree at UPV are highly motivated to achieve the challenging goals in the degree and committed to

devote time and effort to obtain the highest evaluation results as possible. Experts noted that students were very enthusiastic of defending the potential of biotechnological tools and applications as key elements to face the challenges of the next future, but they were blind about the economic and scale-up industrial production limitations of some of the bioprocesses. Finally, experts were also very interested and congratulated about participating in such activity.

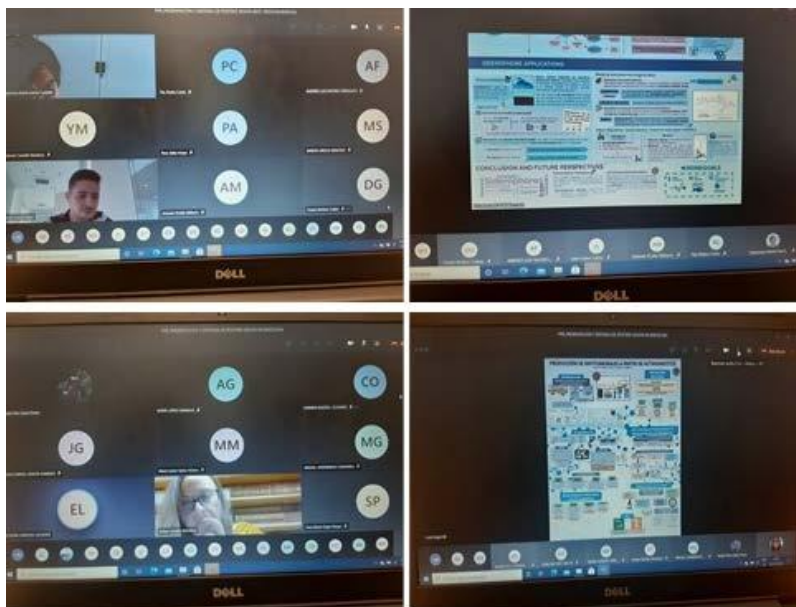


Figure 2. Screenshots of the oral poster defence sessions of Environmental Biotechnology (top) and Biomedicine (bottom) performed by Microsoft Teams.

3.2 Results of the survey regarding the development of the CBL activity and its contribution to competences development

As explained in the materials and methods section, students were presented two surveys: one at the beginning of the activity and another one after finishing it. 88 students answered the initial survey, whereas 50 answered the closing one. This difference could be explained by the fact that answering the survey was not compulsory in any case, but the initial one was introduced and completed during the first seminar session (online but synchronic), while the closing one was filled at any time after finishing the course.

Regarding the development of the activity, students were asked to rate their learning experience regarding the challenge proposed (Fig. 3). In addition, they were asked to which extent their response was conditioned by the workload they had experienced during the semester. 86% of students thought that the experience had contributed significantly to their learning: 20% considered the experience to be very motivating and significant, 28% considered it very motivating and significant for their learning but it required a lot of effort, and 38% considered it not-so-motivating and effort-requiring, although still significant for their learning. Less than 15% considered the experience not-motivating and not contributing to their learning. It is important to point out that 66% of students declared that their opinion was very influenced by the workload they had to face during the semester regarding other courses. In fact, it has been previously mentioned that one of the main issues students are facing during the COVID era are related to an increase workload [1, 2]. In this situation, more than ever, coordination among subjects is critical for the optimum performance of students and success of the teaching-learning process. However, as for time management and planning of this specific activity and course, more than 63% of students believed that the proposal of activities, deliveries and deadlines helped accomplish the tasks and properly distribute the workload, whereas only 12% considered it not to be helpful.



Figure 3. Students' opinion on the development of the CBL activity "simulation of a virtual scientific congress" with regard to contribution to learning and workload.

Students were also asked to rate, from 1st to 7th, the following activities or deliveries, with respect to their originality or degree of differentiation as compared to other activities performed during their degree: writing an abstract, linking with SDGs, writing a review report, designing a poster, recording a screencast, presentation against a panel of experts and simulation of a virtual scientific congress. Summary of the answers is presented in Fig. 4. Among the different activities listed, most differentiating aspects were: the defence against a panel of experts, the simulation of a virtual scientific congress and the fact of linking their work with the SDGs. These results endorse higher education and COVID outbreak as an opportunity for change and the development of sustainable development competencies, as suggested by some authors [4, 5]. In contrast, screencast recording, poster design and writing an abstract were at the last positions. In a study presented on a previous version of the activity in which oral presentation was moved to a poster presentation activity [8], this one of the aspects most valued; in contrast, the present study reveals poster presentation occupies the 4th to 7th place as for originality or differentiation. This reveals that the use of this methodology in this particular degree has increased significantly in the last years. The lack of originality of the screencast recording is also to mention. In this case, this might be related to COVID and online teaching. Screencast recording was already introduced some years ago in this course and activity, as a differentiating aspect; however, as presentations have been moved to online delivery this year, screencast could have become a generalized strategy.

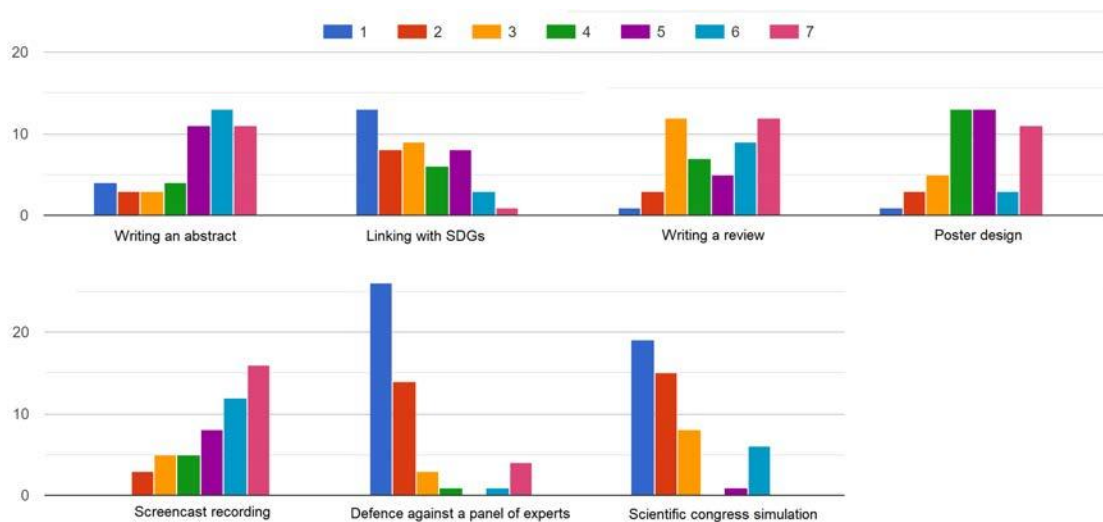


Figure 4. Students opinion on degree of differentiation of the activities and deliveries of the CBL activity "simulation of a virtual scientific congress".

Students also assessed the impact of the CBL activity on transversal and specific competences development. They were asked to select 3 competences they believed the challenge contributed to develop. According to the results obtained (Fig. 5), most students perceived their participation in the activity helped them develop CT05. Design and project, CT10. Planning and time management, CT06. Teamwork and leadership and CT08. Effective communication. Regarding degree specific competences, they strongly agreed on having developed competence for the search and use of

scientific information, identification of emerging biotechnological technologies and the ability to apply knowledge to biotechnological solutions and applications.

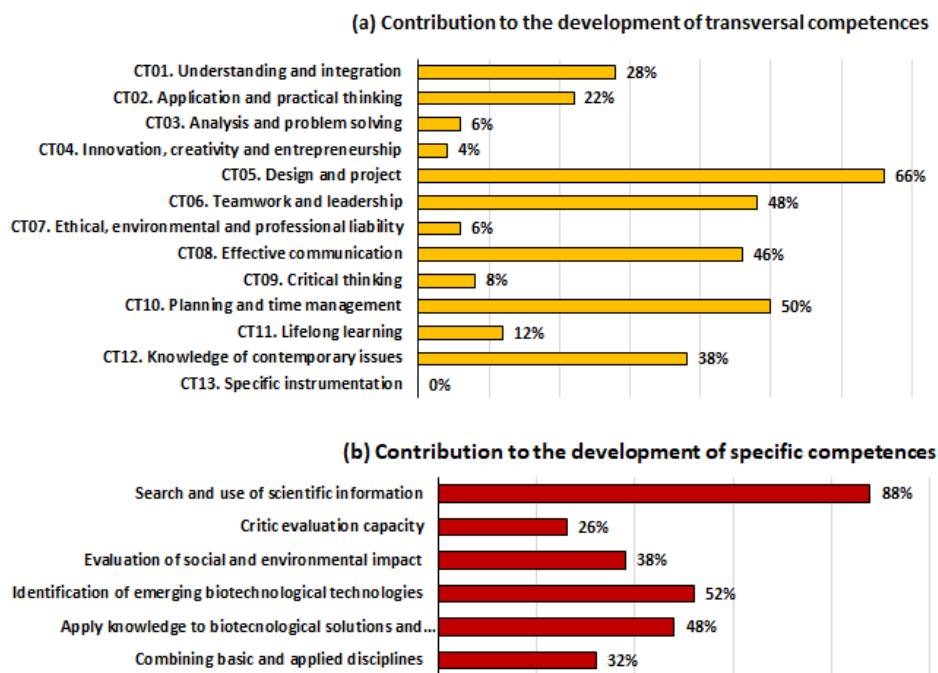


Figure 5. Students perception on the contribution of the CBL-activity “simulation of virtual scientific congress” to the development of transversal and scientific competences.

Finally, student’s overall perception on the activity was rated as interesting or very interesting by 74% of the students who answered to the final survey, 24 considered it quite interesting, whereas only a 2% rated it as not interesting.

4 CONCLUSIONS

The COVID-19 pandemic brought important changes in all spheres of life, the adaption being crucial for the success in teaching-learning process at higher education. The learning experience reported here evidences the efforts required to adjust not only the materials but also the learning methodology from onsite to online modality. Beyond the limitations and frustrations experimented by teachers and students in some cases, remote learning appears as a suitable format for the CBL-activity “Simulation of a virtual scientific congress”, and specifically for oral poster presentation against a panel of experts. This statement is supported by teachers’ and students’ opinions to this respect. Thus, students highly appreciated the proposed challenge, highlighting the synchronic defence against a panel of experts as a differentiative element compared to other tasks faced during their degree. Besides, students considered that the experience satisfactorily contributed to both specific and transversal skills development. Experimental and scientific competences development can be especially affected by the COVID outbreak since they highly rely on lab practice and onsite participation; however, other scientific-related competences such as scientific communication, time management, data basis searching or awareness of contemporary problems, still have the opportunity to be developed in a realistic and updated manner.

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