INTERNATIONAL WORKSHOP ADITIVE MANUFACTURING

1ST INTERNATIONAL CONGRESS ON ADDITIVE MANUFACTURING BOOK OF ABSTRACTS

IWAM 22

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WELCOME

Additive manufacturing technologies are playing a decisive role in the laboratory environment, making a significant difference in STEAM education. Students use additive manufacturing to create physical models, topographic maps, biology artifacts, artwork, all types of engineering prototypes and solving mathematics challenges. By bringing additive manufacturing capabilities to the classroom, educators can raise interest in STEAM, introduce new concepts and capabilities, and help set the future for more skilled STEAM professionals.

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Promote learning through knowledge sharing between higher education courses with interconnection to the business context

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ABSTRACT

In the 2018/2019 academic year, the teachers of the Mechanical Technology I/Manufacturing Processes I and Safety and Environment course units of Bachelor and Higher Professional Technical (CTeSP) courses, respectively, designed a pedagogical proposal for teaching these course units in an interconnected way. For that purpose, two study visits to companies in the metal-mechanical area were carried out with both courses. An exchange of knowledge between the students was also promoted, once communication sessions between both courses were implemented. In general terms, CTeSP students recognized that the communication sessions held by their Bachelor colleagues were useful for the acquisition of knowledge in the field of mechanics. Similarly, the Bachelor students considered that the information transmitted by the CTeSP students alerted them to some safety precautions they should take when working in laboratories or, in the future, in industrial environments.

INTRODUCTION

Collaborative work between teachers with different backgrounds, by promoting debate on teaching and assessment practices, can boost the implementation of some practices that are more student-centered and in different learning contexts. In this sense, the exchange of knowledge between students, combined with the importance of the link to the business context, was the basis of the ideology of a teaching experience that took place with students from the courses of Mechanical Engineering and Technology and Industrial Management and the Higher Professional Technician (CTeSP) in Mechanical Technology and Vehicles, of a Polytechnic Higher Institution in the Northeast of Portugal (*see* Silva, Barros & Ribeiro, 2021). More specifically, the experiment carried out had as main objectives: (1) promote the improvement of student learning; (2) guide the classes so that the student has a more active role in their learning; (3) motivate students to engage in the construction of their knowledge; (4) contribute to CTeSP students having a more informed view on aspects related to the practice of the Mechanical Engineering degree; (5) to establish a greater connection between the courses and the business world/professional context; (6) to promote a more contextualized learning of contents and (7) to promote the development of transversal competences, such as organization and communication, teamwork, critical thinking and sharing with peers. In the following we present some of the opinions/perceptions of the teachers and students involved in the experience, analyzing their contribution to improving students' learning.

RESULTS

Most of the Bachelor students (86.5%) believe that presenting their work in front of a different audience allowed them to work on communication skills. The most significant difficulty highlighted by 48.6% of the students was the fact that they had to simplify the presentation so that their CTeSP colleagues would understand. Similarly, 83.3% of the CTeSP students who represented their colleagues in the presentation session considered that it allowed them to improve their communication skills and 66.7% that it was more rewarding to do it for their colleagues on the degree course than just for their classmates. In general terms, it can be considered that the CTeSP students' presentations on safety at work aspects were enriching for the Bachelor students. It should be noted that 89.2% of the Bachelor students consider that the information transmitted alerted them to some precautions they should take regarding safety at work in laboratories or, in the future, in industrial environments. In general, CTeSP students recognize the usefulness of the communication sessions held by their colleagues from the Bachelor courses for the acquisition of new knowledge in the field of mechanics.

Regarding the study visits, both Bachelor and CTeSP students had a very favorable opinion about their contribution to their learning, since more than 65% of the students agree or totally agree that: (i) It helped them to better understand the work of a mechanical engineer and (ii) It allowed them to observe aspects related to the topic of safety in the workplace. Furthermore, more than 65% agree or totally agree that these: (iii) Met their expectations; (iv) Contributed to enriching their knowledge, and (v) Helped them to better understand industrial practices.

CONCLUSIONS

The experience developed had an important contribution to the student's learning at various levels. The presentation to other audiences and all the logistics related to its preparation promoted the development of transversal skills, such as the ability to work in a team, select materials and synthesize information, communicate, and deepen the knowledge of technological means. However, as the sessions delivered by university students cover very specific knowledge of a certain area, the communication process for the target audience can become more complex. The study visits were an added value for the deepening of the student's knowledge, as they allowed them to come into contact with the working methods of companies linked to the mechanical sector and to observe the manufacturing processes in a real context. They also had the opportunity to observe the hazards and risks underlying certain activities in a business context.

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