

Multidisciplinary Group Projects as a Way of Reinforcing Undergraduate Student Multimedia Skills

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Abstract

We present here the results of a brief learning experience carried out in two laboratory curricular units of the Communication and Multimedia Design course of the Polytechnic of Coimbra, where students are responsible for ideating, developing and executing multimedia group projects, with marginal guidance and assistance from teachers, in order to improve their autonomy and problem-solving skills. In addition, these curricular units allow for consolidation of knowledge and skills acquired in others.

Both units are similarly organized, sharing the same main goals. However, as they are in different curricular years, they allow for students to apply different and improved skills and knowledge, with teachers being able to assess students' evolution in between both curricular units.

At the beginning of each curricular unit, teachers propose student groups to work on current issues and think of a campaign for raising awareness for those same issues. Over the last few years, students have worked on campaigns regarding NGO, elections, climate change, the COVID-19 pandemic, among other topics that may concern them as active citizens.

For evaluating teaching methodologies, students were asked about their experience through an online survey, which allowed to conclude that these units: promote autonomy, combining skills in each group and project; exceed expectations regarding the intended results; help closing the gap to the professional environment reality; benefit from having from different areas of expertise (media, arts, design and programming); are a good way of consolidating skills.

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Introduction

We present the results of a learning experience carried out in two multimedia laboratory curricular units – Multimedia Laboratory I (LM1), in the 3rd semester, and Multimedia Laboratory II (LM2), in the 5th semester – of the Communication and Multimedia Design degree course of the Higher Education School of the Polytechnic of Coimbra. Communication and Multimedia Design aims to provide its graduates the tools for a competent and responsible exercise in the domain of multimedia contents, combining the skills acquired in the areas of computer science, visual arts, visual communication and audio. Career prospects include jobs such as manager and producer in the fields of editing and graphic production, multimedia and audiovisual, graphic and image production manager, or web designer and programmer.

In both curricular units, students develop multidisciplinary projects, with two main goals: apply competences and skills obtained in other curricular units from previous or concurrent semesters – 1st, 2nd and 3rd semesters for LM1, and from the 1st to the 5th semesters, for LM2. Those skills mainly include programming, design, photography, video and communication techniques – or, in other words, combined, they encompass general multimedia skills.

These two curricular units deserve a closer look, as they are quite different from the others that compose the course degree and have just been introduced four years ago in the curricula.

In these curricular units, students develop multidisciplinary projects, consisting of a support platform – usually a website – where they place contents created by them, regarding a main subject, such as graphic identities, videos, small games, and other media. They make use of diverse knowledge and skills, such as how to communicate textual, visual and audio messages, apply concepts of interactivity, functionality, portability, and design, and edit or produce products for publication in social media.

As the curricular units are in different curricular years (in the 2nd and in the 3rd years), they allow for students to apply different and improved skills and knowledge, with teachers being able to assess students' evolution, including autonomy, from one curricular unit to another.

This last year, in order to assess the perception of the students regarding these curricular units, they were asked to answer an online inquiry after the end of the classes and evaluation was performed. We deal with the analysis of the results of the inquiry in the remaining document, which is organized as follows: in Section 2, we present an overview of creativity, autonomy and critical thinking; in Section 3, we describe the syllabuses of both curricular units; in Section 4, we address teaching and evaluation methodologies; then we proceed describe both the skills the students already possess and those they are expected to acquire or improve, in Section 5; in Section 6, we address the creativity of the students in their works; after that, in Section 7, we analyze the results of the inquiry; finally, in Section 8, we provide a general conclusion regarding the outcome of both curricular units.

An overview of creativity, autonomy and critical thinking

Higher education faces numerous challenges, such as social, economic, demographic, political, environmental, and technological. Constant technological transformation challenges teachers to develop innovative teaching and learning practices, while technological advances are changing the skills demanded of higher education students.

In a world dominated by technology, it is essential that students do not become mere automatons, but, on the contrary, know how to think for themselves, know how to work with their peers, have respect for the individuality of each one, and be empathetic and supportive of others and with the world around them. Thus, in addition to technical and artistic skills, we want students to acquire social and human skills that prepare them for the increasingly competitive and uncertain world. "Critical thinking and creativity are becoming increasingly important in the labor market, and contribute to a better personal and civic life" (Vicent-Lancrin, 2019, p. 18).

There are several approaches, thoughts, and interpretations about the concept of creativity, and define-it is not an easy task. There is no universal definition of creativity because it is complex and multifaceted (Treffinger et al., 2002).

When we think about creativity, we associate the image of a lamp that lights up in our heads (Morais, 2015). What do we have to do to light the lamp? Is there a light switch? Creativity is usually associated with creating something new, original, and innovative. According to John Cleese (2022, p.4), "Wherever you can find a way of doing things that is better than what has been done before, you are being creative."

For Mihaly Csikszentmihalyi (1996, p. 113), "creativity involves the production of novelty. The process of discovery involved in creating something new appears to be one of the most enjoyable activities any human can be involved in". According to the author of the systems theory (1996), creativity is a systemic process of interaction between the individual and the sociocultural context.

Readman (2011, p. 58) provokes media educators saying that "there is no such thing as creativity". Yet he suggests that creativity "is a product of language and social practice".

Tanggaard in its creative learning model also wrote that "creativity is an integral part of practice and consists of acting in new ways relative to practice – either by changing something or by stabilizing itself" (2014, p. 114).

Although creativity is an essential competence and one of the fundamental requirements in the labor market, according to Santos (2022), higher education still does not contemplate creativity as a transversal and necessary ability to face the multiple challenges of contemporary times. Creativity is a capital that could bring an unequivocal added value to education, regardless of the field of study, preparing students for the challenges linked to an uncertain present and an immeasurable future (Santos, 2022).

The transdisciplinary vision of creativity connects the human being to the world, the environment, life, and the educational scenario, as it seeks to overcome educational adversities to obtain different constructions of knowledge; leaving the individualistic certainties to think collectively, opening to the fruits of new ideas (Souza et al., 2020).

How can we teach creativity? We encourage and motivate students to solve problems and think outside the box. Creativity is about giving students the freedom to express themselves and give them the confidence to build their journey with autonomy. The multidisciplinary nature of the course, as we will see ahead, with different teachers helps to stimulate creativity and contribute to a transformative education.

Following Paulo Freire's pedagogy of autonomy (2008), we promote student's autonomy through the experience of several decisions that are being taken during the project. The pedagogy of autonomy is centered on experiences that stimulate decisions and responsibility, respect freedom, and promote critical thinking.

Jennifer Moon (2008, p. 57) suggested that "critical thinking is more than an activity that simply exists or does not exist – for it varies in quality and perhaps depth". The author presents a set of pedagogical ideas and examples of activities that support critical thinking. For Moon (2008, pp. 63-64), "critical thinking is a 'messy' concept with many ideas about it presented in forceful but conflicting ways that do not lead us easily to a coherent conclusion. But then there is a powerful idea behind the very messiness of it – because critical thinking itself is about the management of knowledge and beliefs in uncertain situations in such a way as to allow what we might call productive progress."

Our learning experience aims to train socially responsible, autonomous citizens, with critical thinking and creativity, to face the world in which they live.

Syllabus

Both curricular units adopt a similar syllabus, as their intent is not to introduce new concepts *per se*, but to solidify and improve student's competencies and skills. As such, the shared syllabus comprises the following items:

- communication of information through text, images (photography and video) and sound;
- planning, gathering and processing of information;
- management phases of a content production project – from rationale and motivation to execution and publication;
- definition of content hierarchy;
- definition and execution of individual and team projects;
- production of digital contents.

The choice for this syllabus mostly reflects the curricula of the Communication and Multimedia Design course. Thus, the curricular units aim to create an environment where students, working in groups, can produce works with a wider scope than those of other curricular units – that is, allowing for multidisciplinary works.

There are, nevertheless, some implied new competencies, such as the management phases of a project, its definition, and implementation. This is where the teachers engage more with the student groups.

There is, however, an important difference between both curricular units: in LM1, the students are given a specific subject and most of the works end up being a group specific development of that subject; in LM2, the students are given a general subject, with the groups choosing how to address that subject. For instance, in LM2, when the general subject was Non-Governmental Organizations (NGO), the students were asked to select an NGO of their preference and reformulate all communication and publication materials regarding it.

Teaching and Evaluation Methodologies

These curricular units aim to provide an eminently practical experience, where the fulfillment of activities integrated in a project leads to contact with the established learning objectives and syllabus.

Teaching methodologies include the involvement and accountability of students in the conception, development and implementation of a project, monitored by the teacher staff in view of its rationale and ultimate goal.

Thus, the teaching methodology concentrates on project-based learning. This methodology is focused on involving students in the debate of ideas, problem solving, activity planning and content production, not seeking to obtain a predetermined result (Blumenfeld et al., 1991). The teaching strategy used is intended to be emancipatory, stimulating autonomy and critical thinking (Freire, 2008, Freire and Faundez, 1985, Freire and Guimarães, 2013, Freire and Macedo, 2011).

As students are responsible for all the definitions of the group works and corresponding implementation, they end up building their autonomy. Although teachers do act when a group seems to be somewhat adrift, the general approach is to make oneself available to any questions or doubts the students may present or, at times, question choices made by the student groups.

In the presentation of both curricular units, the teachers propose students to work in small groups (typically with five elements), in order to discuss and present a topic of their choice to explore in their projects. They are encouraged to work on current issues or from their concerns, while young citizens, in order to empower them for active citizenship. Over the last few years, students have chosen to work on campaigns for alerting to climate changes, the Covid-19 pandemic, NGO, sustainable development, among other subjects. They also participated in local and national projects already being developed by school partners. One example is the project "Literacy for Democracy" (*Literacia para a Democracia*), part of the Active Citizens Program, a program consisting of public resources from Iceland, Liechtenstein and Norway (EEA Grants), being managed by the Calouste Gulbenkian Foundation and the Bissaya Barreto Foundation, that aims to strengthen democratic culture and civic awareness. The students also work with another national project "Letters for Life" (*Letras Prá Vida*), an adult literacy community project, and also with the regional project "Stories at the Table" (*Histórias*

à Mesa), where they collected life stories and gastronomic traditions in the rural areas from the center of Portugal, in the geographic area of the school.

Once the work subjects are chosen, and mostly in LM2, the students start the briefing with the entities and partners with whom they will work, in order to understand their necessities and expectations. With that briefing, the students have a first contact with the professional world, dealing with the choices and needs of the “customers”. In LM1, when needed, the teachers assume the role of “customers”.

Then they start planning, providing a brief description of their intended work and creating a Gantt diagram identifying the major tasks. It is expected that at the end they have an online page with various contents relating to the four scientific areas: computer science, visual arts, visual communication and audio. They chose the contents and the products to be developed, and the teachers, from different scientific areas, provide support through tutoring. These experience- and project-based learnings explore other methodology solutions, like the pedagogy of learning contexts (Figueiredo, 2016) and learning by experience (Dewey, 1997). Teachers transfer to students the control of the creation and management of content and act as moderators – students adopt an active role in the development of their works, while the teachers adopt a passive role. Context learning becomes richer, and students have more autonomy and emancipation and in turn become more creative.

Regarding the students’ evaluation, it is valued meeting project deadlines and goals, by assessing the integration of learning objectives and end product requirements. The project evaluation values group work (80% of the final grade), without prejudice of evaluating the students individually also according to their attendance, contributions throughout the classes and the presentation of the work (the remaining 20%). Although involvement in a group project is recommended and preferred, evaluation by final exam is possible by means of individual work at the end of the semester, accounting for the totality of the grade.

Although not directly used in the student’s evaluation, one fundamental aspect of the assessment of the work done by each group during the weeks of the semester is the production of weekly 15/5 reports, stating their position against the main timeline defined by each group, detailing what they have done in each week and what they plan to do in the next, discriminating tasks and group elements. They serve two main purposes: they allow for the teachers to easily get up to date with each group, and foremost, they are a way of making students and groups assess the evolution of their own work.

In addition to the stated above, it is worth mentioning that both curricular units aggregate four different scientific areas (that can also be grouped together under the multimedia umbrella): informatics, media studies, design and audio. For each of those areas, there is a teacher assigned to the classes, usually individually, although in some classes a combination of teachers may be present. The motivation for such an approach is for the students to ask for the collaboration or expertise of each teacher at different moments of their work.

As for the students’ success, those who were effectively evaluated did pass the curricular unit. Remarkably, the groups auto-evaluation matched within a range of 1 value (in a scale from 0 to 20) the evaluation from the teachers.

Skills

After attending both curricular units, necessarily on different levels, due to the different curricular years, the student should be able to:

- communicate specific multimedia messages to a specific target audience using adequate communication and information models;
- know how to select, analyze and design graphic products according to communicational, aesthetic and functional criteria;
- acquire knowledge about information design and its functional, aesthetic and cognitive principles;
- know how to define, organize and layout content, interpret and integrate in infographic projects;
- apply concepts of interactivity, functionality and portability;
- design and edit products for publishing in digital media;
- administer the publication of content on an online platform;
- master the features of social media and networks.

We consider these skills to be important, as they will assist students in the remainder of the degree, but, foremost, as they will prepare students for an internship in the last semester of the course, and, later, facilitate the introduction of students in the workplace.

Student's Creativity and Works

The last two years have been affected by the pandemic condition of Covid-19. Our homes have become workplaces. The students could not leave home to perform the work together or to collect video, photography or sound. Necessity is the mother of invention, and this moment was crucial for the development of creativity in the search for solutions. For example, in LM1, most students wanted to carry out awareness campaigns for the correct use of personal protective equipment. The pandemic has forced us to redouble health care, such as frequent hand washing or the mandatory use of a mask in public spaces. However, there were still glaring examples of misuse, or even non-use of care or personal protective equipment. The students created campaigns especially aimed at the correct use of protective care that could contribute to alleviating the situation. In this sense, the campaigns included, among other aspects, the definition of a graphic identity, the online presence, and the communication structure, as well as the assembly of videos and finally an authentic audio line to integrate in the audiovisual materials of the online dissemination channel. In the graphic design component, the students created the graphic identity of the campaign, adapting it to the means of dissemination and considering the logo, the typographic system applied to the logo and graphic identity. In the area of web programming, they created a campaign support page, to provide all the content created by them. In the media component, they created a

communication strategy and elaborated content, such as informative videos published on the site, as well as in social networks. They also performed capture, treatment and audio assembly for the videos or podcasts.

Due to the impact of the pandemic, one LM1 group chose to work on mental health, alerting people to the problem and promoting help and recovery for people affected by mental illness.

The fact that each of the students was confined in their own home, brought increased challenges, as one group stated in its work report: “each of us captured images with the material we had at home, because it was done with total isolation and social distancing, thus becoming a great challenge in the face of the limitations we faced. The technical material, for example, was not the same for each shoot, however we managed, from a distance, to compile all the content in what we consider to be a fantastic video, with relevant and pertinent information, in the form of personal testimony, about how the pandemic affected the mental health of each of us”.

Another LM1 student group wrote that they used the learning obtained in similar activities developed throughout the course to apply in this project. Despite the difficulties experienced due to the pandemic situation, “we always prioritize the safety and health of all members of the group, always choosing to gather at a distance, using Zoom or Discord”.

The students also told teachers that, throughout the project, they always felt the need for improvement and development of solutions, in addition to always wanting to improve their skills to apply in the professional future. As one group stated, “in developing this work, we feel the need to improve knowledge in the area, always considering the challenge of improving and developing our skills. We were able to better understand the importance of the relationship between the theoretical and practical plan. Having mental health as a topic of work was very important for us since we were able to gain a certain awareness of the subject and its severity and scale. Especially given the current situation in the world and knowing that many have been mentally affected by it, it is important to know how to be able to help others or even ourselves in case of need”.

In addition to professional skills, these students also report to develop social skills. Another working group, now in LM2, which chose to develop a campaign for an NGO, also emphasized the importance of course learning, innovation, but also the learning they had as a work team. “This work involved all the curricular units and all the teachings of the course. And this is inherent in all the creations of the collective and the way it approached and innovated the NGO. And we took from this not only the importance of the bases of the course that are constantly linked to each other, but also how fundamental it is to get out of the comfort zone, how important it is to challenge ourselves and then we can innovate. At the end of it all, this was the closing of a cycle and the fact that we did it together as a collective demonstrated how fundamental teamwork is, how this team is good, and how much we can learn from each other, values, teachings, and friendship.”

By carrying out these projects, students have different ideas, develop the ability to make decisions, experiment with different approaches, and develop the capacity for innovation and critical thinking. They stimulate creativity.

Later on, the companies that host the students in curricular internship, at the end of the course, evaluate the performance of the students in a very positive way, as we can see in the evaluation reported by the director of a photography company who received one of these students: "She is creative, can understand the briefings easily, and contributes positively with various quality inputs to our production concerns". The same is corroborated by the director of a design company who also received a student in curricular internship: "The student has multiple skills and is well prepared for working life". The companies value the multidisciplinary skills of the students as well as creativity.

Inquiry Analysis and Method

To avoid that the assessment of the perception of students about both curricular units would affect the student's answers, the teachers chose not to tell the students that they would answer an inquiry later, after the end of the semester. Furthermore, after the end of semester, the only viable way to try to reach every student would be an online enquiry.

The inquiry was divided into two main parts: one with multiple choice questions, mainly regarding functional aspects, and another with open answer questions in order for the students to express what they consider works well or that should be changed or improved.

Both curricular units combined have a grand total of 89 students that were evaluated – 42 students for LM1, and 47 for LM2. Of those, 31 students have answered the online inquiry about the units – that is, 35% of the total number of students.

Next, we will be addressing a selection of the most pertinent questions regarding the subject of this paper, starting with the multiple-choice questions.

One of the first questions asked was whether the students consider the existence of these two curricular units important in the course. Of the answers, 87.1% were positive, while 9.7% were negative, and the remaining standing for the unopinionated. This is relevant, establishing the importance attributed by the students to the curricular units as a means of consolidating competencies.

An interesting fact was that when these units were introduced in the curricula, there was some discussion about the need for two of them – that is, if one, in the last year of the degree wouldn't be sufficient. Although this is still up to debate, of the respondents that were in LM2, 52.2% agree that both units are needed as they explore different competencies, while 34.8% think they are too similar, and 13.1% don't have a formed opinion.

When asked to compare their current perception with the expectations at the beginning of classes, 80.6% of the students stated that their expectations were met or surpassed. This is important, as students tend to underestimate curricular units without written assessments and where they have to work in groups.

Regarding the option for introducing no new contents, focusing on consolidation of competencies and autonomy building, 64.5% of the students agree, while only 12.9% disagree or have no opinion (22.6%). Complementing this question, 93.5% of the students think that the curricular units foment autonomy in students.

As for the number and diversity of scientific areas involved – four distinct areas –, 90.3% of the students agree, although that number drops to 64.5% when asked if they subscribe to how classes are divided between the teachers. In an open answer question, the students elaborate that the calendarization of the classes between the teachers could be improved and that the number of classes with at least two teachers at the same time could increase. Nevertheless, most of them agree that multiple areas and teachers are an advantage, allowing for the combination of expertise, even if sometimes some minor contradictions may arise.

Finally, regarding the existence of only one major group project, promoting teamwork, 90.3% of the students agree with that decision.

Addressing the open answer questions, these were essentially a way of finding out the reason for some of the answers to multiple-choice questions, mostly those regarding the methodology used. There are some general conclusions about them.

For instance, the students think that having four teachers of different areas involved in the learning process is a good feature, allowing for comprehensive help when students need it. However, a couple of respondents noted some incoherences on the approaches or suggestions provided at different times by different teachers – which, even if they could be expected, should be avoided. Also on this issue, something the students think that should be improved is the sequence of classes attributed to each of the teachers, combined with more than one teacher for class – it would be the ideal solution, but it is beyond the capabilities of teachers, due to other teaching classes and constraints. Focusing on more critical reviews, they are mostly about minor issues on class operationalization, as already stated, than about the general approach followed in both units.

Concerning how the approach resembles real-life work settings, in general, the students consider that it is a good approach, namely when it refers to teamwork, autonomy, and a combination of different skills.

Conclusion

We have concluded that multidisciplinary group projects, namely when they are the only option available for students succeeding in a curricular unit, are a good way of reinforcing undergraduate student knowledge and skills, instilling, at the same time, a sense of autonomy.

We also found that while autonomy may be found somewhat menacing at the start for most of the students, once they start to acquire it, they get more involved and prouder of their work. A symptom of that is a large number of the students stating that both curricular units exceeded their expectations when everything they have ever done was essentially up to them.

Autonomy undoubtedly brings them more responsibility, more skills, such as critical thinking and creativity, in the search for solutions, in solving problems and consequently in the production of the final result.

This project-based learning experience, in addition to the improvement of skills, has brought students closer to the professional reality and better prepared them to face the increasingly demanding challenges of the labor market.

As for future directions, the most important thing to be considered is a clear distinction between the subjects (and competencies expected) of both curricular units, reinforcing autonomy in the works produced by each group, but foremost in choosing and planning the works, without the necessity of a main subject provided by the teachers.

Another aspect that should be improved is the distribution of the classes between the four teachers of both curricular units, in order to, when needed, provide timely feedback to the student's groups, even if teachers can be contacted outside the classrooms.

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