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THE SUSTAINABLE DEVELOPMENT GOALS APPLIED TO THE FUTURE OF DESIGN EDUCATION

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ABSTRACT
The current social situation makes designers face increasingly complex challenges, closely linked to environmental and social issues. Design education has to respond to this, since design competencies are required to manage them.
In this context, the present research studies how designers face these challenges under a competency approach. This paper relates the designer's competencies to the 17 Sustainable Development Goals (SDGs) and the action guide proposed by the UUEE with the 2030 Agenda for Sustainable Development.
From this perspective, the competencies that designers acquire during their training must be aligned with the SDGs. However, recent research indicates that design students have competency gaps when working in social, environmental or sustainable design processes [1] [2].
In traditional education, core competencies for sustainability, such as Integrated Problem-solving, Strategic or Critical thinking, according to UNESCO 2019 Sustainable Key Competencies, are not considered particularly important. However, they are fundamental competencies defined in previous research on Design Creative Competencies. Moreover, authors point out that applying the competency approach to sustainability is relevant to solve real social challenges and opportunities [3]. That is why this article proposes a parallelism between designers' competencies, in other words, those they use when developing creative processes, and the SDGs.
It is also required to analyse the competencies that enable them to solve problems 'with respect to real-world sustainability problems, challenges, and opportunities' [4]. This context leads to innovative questions about design students' curricular profile in the 21st century.

Keywords: Creative competencies, design-education, education for sustainable development goals, design for social innovation, Agenda 2030

1 INTRODUCTION
Today's students are the designers who will have to respond to tomorrow's social issues, and they clearly aim at significant socio-environmental challenges.
This underlines the need for students to be trained considering real and future problems. In this sense, recent research shows that design students have a formative gap when carrying out projects that deal with socio-cultural issues [5], [6], [7].
This research suggest evidence of curricular gaps in the students' profiles. Particularly, in those processes directly related to circular economy or sustainable projects. This evidence shows that we are not training designers for the current challenges.
The major social problems worldwide are a reality. In response to them, Europe created the 2030 Agenda approved by the United Nations (UN). This 15-year plan aims to achieve a more inclusive and sustainable future. To this purpose, the 17 Sustainable Development Goals (SDGs) were formulated. These cover several related issues, such as the end of poverty, environmental protection, health, access to education and decent work.
The present paper proposes that the natural inclusion of the SDGs in higher education in design responds to the exposed problematic. This can be done through the acquisition of competencies that are directly related to the SDGs. The aim is to train professionals who have internalised these issues and design accordingly.

Furthermore, higher education is directly linked to the SDGs [8]. Particularly, SDG number 4 refers to Quality Higher Education and how it directly impacts the other SDGs. More specifically, the goal for target 4.7 Education for Sustainable Development and Global Citizenship: *ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development*.
In addition, as Kioupi and Voulvoulis point out, this objective is necessary to guarantee the other goals [9].
This paper proposes to relate the competencies of designers to the SDGs. It is assumed that the competency-based approach to higher education corresponds to the educational SDGs proposed by Europe. Since it focuses on the development of students' knowledge and skills throughout the learning process. Nevertheless, it is essential that all teaching and the competencies acquired by the student are permeated by the SDGs and the socio-environmental problems that they will face as professionals.
Studies such as that carried out by Romero et al. [10] analyse this issue from the field of engineering. This paper argues for the need to work on it also from the field of design and the arts. These fields are closely related to the means of production and the way in which we perceive and relate to the world in which we actually live.
This is a complex problem. This scenario raises questions about the competency profiles of design students in the 21st century and their correlation with the SDGs. In turn, it has to be addressed both by academia and by companies and institutions that consider current and future social, technological and environmental challenges.
A useful starting point is to consider which competencies students acquire in their higher education in design, and to correlate these with the SDGs. For effective and long-term learning, it is important to define the key competencies that will enable students to address complex social and sustainable challenges.

2 METHODOLOGIES

The aim of this article is to correlate the design competencies with the SDGs proposed by Europe. Since certain similarities that can facilitate the inclusion of the SDGs in higher design education are found. For this purpose, a relational analysis is performed. This establishes whether each competency is linked to one, none or several of the SDGs.
The list of 10 competencies is one of the results of a doctoral research on the competencies of designers [11].
The definition of these competences is obtained through a mixed methodology [12]. Fourteen design and engineering professionals and students are interviewed. It is then contrasted in a case study in a product design SME. Qualitative data is collected through non-participant observation of 105 students and young design professionals at three universities in Europe. And finally, at the same time, an online questionnaire is created to collect designers' self-perception of their competences on an international scale. A sample of 1025 responses is analysed. This methodology is used to collect data to define the competences, and their correlation with the SDGs is observed.

3 DESIGN CREATIVE COMPETENCIES AND THE SDGS

1. *Learning (Curiosity + Knowledge internalisation)* The capability of acquiring and applying new knowledge, abilities and attitudes efficiently through study or an experience that can arise before, during or after the design process. It has to do with the curiosity that feeds the exploration of new and diverse knowledge sources, as well as the capacity to internalise and practically apply what is learnt. **- SDG4 Quality Education.**
2. *Aesthetic sensitivity (Aesthetic appreciation + Aesthetic Criteria)* The capability to perceive, value and determine the basis for the formal aspects of a project. It refers to the interest in applying decisions related to aesthetics as a priority as well as the capability to support these decisions with arguments, so they are not arbitrary.
3. *Teamwork (Delegation + Tolerance)* The capability to cooperate when developing a project in which many people are involved. It refers to being able to delegate based on trust and the capacity to tolerate diverse criteria and other opinions. **SDG5 Gender Equality; SDG8 Decent Work and Economic Growth; SDG10 Reduced Inequality.**

4. *Critical thinking (Questioning + Improvement proposition)* The capability to inquire and find solutions to improve. It refers to the ability to question certain realities of a project in a constructive way; in other words, with an ability to identify and materialise possibilities for improvement and development. **SDG8 Decent Work and Economic Growth; SDG12 Responsible Consumption and Production.**
5. *Oral Communication (Planning + Charisma)* The capability to orally transmit a message in a clear and attractive way when presenting or pitching a project. This includes first preparing and structuring the information that needs to be transmitted and the ability to communicate it to generate a positive impact on the receivers.
6. *Social and ecological sensitivity (Awareness + Compromise)* The capability to reflect upon the social and ecological aftermath of a project. It refers to both the interest and respect for others and the capacity to act in consequence creating responsible and ethically sustainable projects. **SDG5 Gender Equality; SDG10 Reduced Inequality; SDG11 Sustainable Cities and Communities; SDG12 Responsible Consumption and Production.**
7. *Autonomy (Self-management + Initiative)* It refers to the individual capability to manage and organise work in an autonomous way as well as to personal initiative when modifying a project. **SDG5 Gender Equality; SDG8 Decent Work and Economic Growth; SDG10 Reduced Inequality; SDG11 Sustainable Cities and Communities.**
8. *Leadership (Strategic vision + Coaching)* The capability to detect opportunities and achieve goals through a strategic approach to projects. It refers to a designer's capacity to plan and direct work as well as the ability to motivate colleagues through empathy and enthusiasm. **SDG5 Gender Equality; SDG8 Decent Work and Economic Growth; SDG10 Reduced Inequality.**
9. *Research (Search for information + Experimentation)* The capability to enrich the design process with theoretical and practical research. It refers to the capacity of obtaining information on references and users as well as to the ability to experiment through different work tools and materials.
10. *Innovation (Originality + Realisation)* The capability to have original feasible ideas. It refers to the tendency of a designer to be creative and open-minded in his/her way of thinking as well as his/her ability to find a functional way to materialise ideas. **SDG11 Sustainable Cities and Communities; SDG12 Responsible Consumption and Production**.

4 ANALYSES

In reference to the 10 competencies defined, an analysis of how many times the SDGs appear linked to each one of them is carried out. From this count, it can be seen that SDG4 Quality Education is directly related to one competency; SDG5 Gender Equality relates to 4; SDG8 Decent Work and Economic Growth relates to 4; SDG10 Reduced Inequality relates to 4 competencies; SDG11 Sustainable Cities and Communities relates to 2; and SDG12 Responsible Consumption and Production relates to 3 competencies.

This means that these 10 competencies contribute to 6 of the 17 SDGs. It should be noted that they were not drafted with this aim, as they were defined before Europe drafted the 2030 Agenda. Therefore, they are closely related to the SDGs, despite not being an explicit aim in their formulation.

However, 11 SDGs are not directly related to them. These are: SDG1 No Poverty, SDG2 Zero Hunger, SDG3 Good Health and Well-being, SDG6 Clean Water and Sanitation, SDG7 Affordable and Clean Energy, SDG9 Industry, Innovation and Infrastructure, SDG13 Climate Action, SDG14 Life Below Water, SDG15 Life On Land, SDG16 Peace, Justice, and Strong Institutions, SDG17 Partnerships for the Goals.

Nevertheless, it is true that although not explicitly named, SDG4 on education is directly related to others, such as the cases of poverty SDG1, health and wellbeing SDG3, gender equality SDG5, decent work and economic growth SDG8, responsible consumption and production SDG12, climate change SDG13, and peace, justice, and strong institutions SDG16 as noted by Kioupi and Voulvoulis in their research [9].

The very definition of the 17 SDGs considers them to be interlinked. They depend on each other. We cannot achieve equality of opportunity if we do not allow more equal access to higher education, which guarantees the knowledge necessary to obtain a job with good conditions to enable us to escape poverty and have the resources to be responsible consumers. It is therefore essential to understand this

connection and to approach the SDGs as a set of interrelationships, rather than as elements isolated from each other.

A particular example is the relationship found in the study conducted by Fabregá et al. [13]. In that research, a positive relationship is statistically demonstrated between self-knowledge, innovation and environmental commitment to promote sustainable development. This study provides evidence of the correlation of some competencies that are present in the field of design, and how they enhance environmental commitment. In addition, it also relates it directly to SDG4, since these are competencies acquired in higher education. This makes education a crucial point for developing these competencies. Their paper also points out that sustainability implies using clean products, eco-efficiency, sustainable development technologies and eco-design, highlighting the crucial role of design in environmental awareness.

Furthermore, this comparative study reveals that there are competencies that can be considered transversal within the learning process, as they are necessary at several educational levels. One example is Autonomy and Critical Thinking. Both are considered necessary to be able to face the SDGs in the field of design.

Likewise, certain SDGs can be considered transversals throughout the training and subjects that compose the degree in design. This is why a competency-based approach to implementing the SDGs in higher education can bring significant benefits. It is assumed that students have to acquire the know-how related to the SDGs that they can apply in their academic and professional work.

The aim is that when doing professional work, the SDGs are a way of doing, not a goal to be achieved. Therefore, the student's competence profile will provide the necessary knowledge and skills to solve real social and environmental challenges [3].

5 CONCLUSIONS

As a conclusion, the list of creative competencies of designers is directly correlated with the SDGs. However, the approach to education and the connection of the competencies with the SDGs needs to be more evident in order to influence the students. The aim is to make it an active part of their processes, so that the SDGs become part of the designers' know-how.

Sustainability Education (SE) is one of the most relevant lines of research that aims to link higher education in design with the SDGs. According to this research, it is necessary to integrate the basic social, environmental and ecological vocabularies into design education [5], [6], [7]. In this way, it will become part of students' own language. These studies also indicate that the awareness of personal responsibility and behaviour, material science and the shaping of learning with standards in higher education should be enhanced. All of this with the aim of developing a holistic educational approach in accordance with behaviour and core competencies for sustainability.

All these characteristics can be achieved in higher education by working with real projects. Students' work needs to be related to the SDGs. To this purpose, one potential way is for design students' challenges to be directly related to real problems. Working on real challenges and applying all knowledge in response to current problems that require the SDGs to be carried out. In this way, they will work on projects related to the complex, uncertain, diverse, social and rapidly changing context of sustainability.

In this context, a study analyses a specific case in China [8], studying how some measures taken in education in relation to COVID-19 contribute to achieving the SDGs. Particularly, the SDGs 1, 3, 4, 5, 8 and 10 as a result of measures that include medical services, online education, logistical support and the promotion of graduate employment. According to this approach, and in relation to the discussion of this paper, several studies report that SDG 4 on education can be used as a link for the other SDGs' inclusion. This is the case of the study on energy sustainability in teaching and outreach initiatives [14]. Besides, regarding the 11 SDGs that are not related to the defined competencies, it is therefore worth considering whether education should address all 17 SDGs. Understanding that they are not closely related to education, some of them may be more of a target that concerns companies, such as SDG8 on Decent Work and Economic Growth. However, students should be aware of them. Some of the students will probably form a company in the future. Then, they will have a role directly related to SDG8. Therefore, it is understood that the 17 SDGs must be reflected in higher education, to a greater or lesser extent.

Understanding that the 17 SDGs are a whole and are closely interrelated, this must be applied in universities through the actions and policies of the institution itself. The SDGs should be part of the

university's policy, processes, activities and day-to-day life in a cross-cutting manner. They should not be introduced only in isolated subjects. In this way, they can become students' know-how from the very beginning of their education.

In social inclusion and environmental preservation, design is one of the most directly related disciplines. For example, when carrying out projects with a social impact, with the participation of specific stakeholders; or when choosing the materials to be used and the waste they generate during the useful life of the designed product.

Therefore, design is a great partner to be able to solve some issues related to the SDGs. However, for this to happen, it is necessary that students learn these values from their higher education, so that the SDGs permeate their future projects quite naturally.

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