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Anticipating Future Needs in Key Competences for Sustainability in Two Distance Learning Universities of Spain and Portugal

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Abstract: The current eco-social crisis includes global challenges such as climate change, environmental degradation and demographic shifts that call for a global response. The European Environment Agency claims that over the next decade, very different answers will be needed to the world's challenges than the ones provided over the past 40 years to confront the foreseeable global changes. Higher Education Institutions have their own responsibility in training future professionals in cross-cutting key competences for sustainability, which are defined through different frameworks. Considering that current students will need to overcome global challenges, this research aims to identify the ways in which Higher Education Institutions are anticipating the introduction of key competences for sustainability into the curricula of their programs. Specifically, it aims to detect the perception of the heads of three departments and three faculties of two universities in Spain and Portugal about the presence of key competences for sustainability in the selected degrees. For this study, a qualitative research approach was employed. The methodology used involved the application of interviews to departments and faculties heads. The results showed there is a growing interest in sustainability at Higher Education Institutions, but key competences for sustainability were not yet sufficiently valued as competences needed for the students in the future, in particular those linked with the professional world. Further similar research could be conducted at other levels (master's degree, doctorate).

Keywords: key competences for sustainability; higher education institutions; cross-cutting competences; education for sustainable development; curricula; distance learning universities

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1. Introduction

The establishment of competences in the curricula of European Higher Education Institutions (HEI) officially began following the Bologna Declaration (1999), which laid the foundations for the European Higher Education Area (EHEA) and allowed a rapprochement between HEIs and the labour market [1]. In this context, key competences were established as "those necessary for full personal fulfilment, active citizenship, social cohesion and employability in the knowledge society" [2] (p. 13).

Since then, the competences demanded by the labour market from HEIs have changed. The current eco-social crisis requires a new educational pact in which these institutions must actively participate [3] in the training of conscious and well-trained professionals, capable of facing the foreseeable changes of the planet. The key competences for sustainability are a significant contribution to this goal, as they "empower learners to embody sustainability

values and embrace complex systems in order to take or request action that restores and maintains ecosystem health and enhances justice, generating visions for sustainable futures" [4] (p. 12).

International organizations such as the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Organization for Economic Co-operation and Development (OECD), as well as different authors [4–7] have contributed to numerous studies on frameworks of key competences for sustainability, established in HEIs with special relevance. The development of these competence frameworks over the last several decades has remained linked to Education for Sustainable Development (ESD), which seeks to integrate "principles, knowledge, skills, perspectives and values related to sustainability" [8] (p. 29) in students in general and in HEI students in particular.

The present research seeks to determine if the competences for sustainability are considered in the curricula of the degrees of three departments of the Universidade Aberta of Lisbon (UAb) and three faculties of the National University of Distance Education (UNED) that belong to the following areas of knowledge: Education, Sciences and Humanities. To reach that point, interviews have been conducted with the heads of the departments/faculties to analyse their perceptions regarding the following aspects: the presence of sustainability criteria in the departments/faculties, the criteria for the selection of the degrees' cross-cutting competences, the presence of sustainability criteria in these competences, and the presence of sustainability criteria in the review of competences.

The present study is part of a wider research that studies the presence of competences for sustainability in both universities (UAb, UNED).

2. Conceptual Framework

2.1. Eco-Social Crisis—A New Education Pact as Part of the Solution

It is undeniable that the planet and today's society are going through an unprecedented eco-social crisis. Large international organizations with sustainability implications are not immune to these changes. According to UNESCO [3], the current crisis implies, among other issues, the problem of climate change, the increase in social and economic inequalities, the use of resources that exceeds planetary limits, and the disruptive use of new technologies.

For its part, the OECD [9] summarizes the planetary crisis into three crucial megatrends: technological progress and digital transformation, demographic changes, and globalization. This last concept is especially relevant in the context of eco-social crisis, since "it implies the integration of all economic activity in a global market that transcends geopolitical borders and is not subject to the regulation of national states" [10] (p. 524). The possible benefits of globalization must be reconsidered regarding the planetary limits it affects, being necessary to rethink what is meant by growth and progress, as well as the real meaning they have in relation to global sustainability [11].

Some international pacts have been created to minimize harmful human impacts on ecosystems and to develop great conditions for all, balancing the needs of society with the constraints of the biophysical environment. Specifically, the 2030 Agenda approved by the United Nations in 2015, with its 17 Sustainable Development Goals (SDGs), provides a framework for achieving global goals in many areas of life. Goal 4 focuses on the development of quality education for all, including the promotion of competences in citizens to meet the challenges of the future. This goal tries to ensure that "by 2030 all learners acquire knowledge and skills needed to promote sustainable development, among others, through ESD and sustainable lifestyles" [12].

Planetary sustainability can find part of its solution in the development of a new educative pact that incorporates the necessary tools for the students of HEIs to confront the foreseeable changes in the future and to be ready to carry out future jobs. According to UNESCO [3], there is a responsibility in the development of this new social contract for education that seeks to join efforts to a sustainable and peaceful future for all.

As Bastida [13] (p. 89) states, "the global eco-social crisis is also a crisis of education, of educative systems". Thus, the global crisis raises an enormous challenge in education, which has the responsibility of training future professionals on the knowledge, skills, attitudes, and values to overcome the circumstances of the future. Educational institutions, especially HEIs, should consider the existence of this crisis while designing their curricula.

2.2. Training Professionals in Cross-Cutting Key Competences for Sustainability in HEIs

Following the Bologna Process, the Lisbon Summit (2000) underlined the importance of the inclusion of competences in the HEI education system, within the political context of the European employment strategy [1]. Regarding professional demands, the concept of key competences arose from the Recommendation of the European Parliament and of the Council of 18 December 2006 [2], which was recently amended by [14] (p. 7) with the following definition: "key competences are those that all people need for their personal fulfilment and development, their employability, social integration, sustainable lifestyle, success in life in peaceful societies, healthy lifestyle, and active citizenship".

From that period to now, megatrends have changed the work dynamics and skills requirements [9]. For this reason, the situation about competences at HEIs has evolved to a different approach that not only integrates the vital role of key competences in labour insertion but that also tries to bring more relevance to the significance of sustainability in the anticipation of future planetary challenges. In this context, HEIs have an important responsibility in training professionals in competences, that is, knowledge, skills and attitudes, that promote sustainability so they can face challenges at global and local scales with confidence considering the environmental uncertainty of the future [15].

There are so many definitions of 'competence' that it is even more difficult to establish its meaning referring to sustainability. To explain the meaning of key competences for sustainability, this article relies on the definition provided by [7] (p. 17), which expresses that these competences facilitate "achieving successful performance and a positive outcome that progresses sustainability, while working on specific sustainability challenges and opportunities in a range of contexts". This is especially relevant in the training of current students (and the professionals of tomorrow).

International organisms have also contributed with their own definition of competences for promoting sustainability. UNESCO defines competences for ESD as those which "enable and empower individuals to reflect on their own actions by taking into account their current and future social, cultural, economic and environmental impacts from both a local and a global perspective" [6] (p. 39). For its part, the OECD regularly publishes documents about competences based on the evolution of major megatrends. The OCDE proposes the concept of 'transformative competences' as those to "address the growing need for young people to be innovative, responsible and aware, creating new value, reconciling tensions and dilemmas, and taking responsibility" [16] (p. 5).

The development of new ways of working are needed, with special emphasis on cross-cutting key competences, which play an important role in the promotion of sustainability due to their transversality. Moreover, the development of competences is not only important to the promotion of future professionals, but also to develop citizens that carry the message of sustainability through their daily life. Hence, it is possible to approach the curriculum from a humanistic point of view [17].

The development of all these aspects is highly related to ESD, the final goal to get the integration of sustainability at the curriculum level. The training of students in key competences for sustainability in HEIs would allow them to be integrated in a sustainable future, empowering them with tools to affront the new employments that will be required. It implies a personal, social and professional development by the training in competences for work, and for their quality of life [18].

2.3. Frameworks of Competences for Sustainability and Studies from Spain and Portugal

A framework of key competences for sustainability could be understood as a set of different key competences, functionally interrelated in an integrated way, that promotes the achievement of successful performance and a positive outcome around sustainability in a variety of contexts [7]. These frameworks provide us with lists of competences that are considered fundamental for the promotion of sustainability in HEIs, these institutions being some of the most important mirrors of societal needs.

There are several references in terms of key competence frameworks for sustainability at the international level. Here, there is a selection of the most relevant ones. The framework proposed by [5] is undoubtedly one of the most referenced frameworks to date. On the other hand, the framework established by [6] links to the work on competences for sustainability promoted by UNESCO. A more recent publication [7] presented a framework of competences for sustainability specific for the academic context. Finally, the recent research [4], "GreenComp—The European sustainability competence framework", is innovative because, among other things, it includes an action-focused competence. The competences proposed by each author are presented in Table 1.

Table 1. Frameworks of Key Competences for Sustainability.

Frameworks of Key Competences for Sustainability			
[5]	**[6]**	**[7]**	**[4]**
Systems-thinking competence	Systems-thinking competence	Systems-thinking competence	Systems thinking competence
Anticipatory competence	Anticipatory competence	Futures-thinking competence	Futures literacy competence Adaptability competence Exploratory thinking competence
Normative competence	Normative competence	Values-thinking competence	Valuing sustainability competence Supporting fairness competence Promoting nature competence
Strategic competence	Strategic competence	Strategic-thinking competence	
Interpersonal competence	Collaboration competence	Interpersonal competence	Collective action competence
	Self-awareness competence	Intrapersonal competence	Individual initiative competence
	Integrated problem-solving competence	Integrated problem-solving competence	Problem framing competence
	Critical thinking competence		Critical thinking competence
		Implementation competence	Political agency competence

This study considered frameworks of different authors to integrate the widest possible point of view, from an international perspective, of the key competences for sustainability that will be demanded from professionals.

These frameworks are the conceptual basis of different international studies, including research from Spain and Portugal, where different studies have been carried out

about ESD and the development of key competences for sustainability in HEIs. Most of these studies cited the framework [5], and some of them cited more recent competences frameworks [6,7]. The recent research [19], which studied new pathways to develop competences in ESD, includes the framework of [7]. For its part, ref. [20] is one of the most recent studies about key competences for sustainability, and it cites almost all the frameworks proposed in this study: [4,5,7].

There is literature related to key competences for sustainability in both Portugal and Spain. A study in Portugal focused on ESD through e-learning, including the study of competences on three levels (bachelor, master´s, doctorate) at the *Universidade Aberta de Lisboa* (UAb) [21]. Other studies have focused on the development of competences for sustainability in the degrees of UAb [22] and the adoption of sustainability competence-based education in academic disciplines of different HEIs [23]. There is also a Portuguese study about sustainability competences in Higher Education research [24].

In Spain, there are different studies about competences for sustainability in HEIs. In [15] the presence of sustainability in the degrees of *Universidad Nacional de Educación a Distancia* (UNED) is studied. The study [25] analyses the presence of competences for sustainability in some degrees of Valencia University, and [26] is a review of these competences. In addition, ref. [27] analyses the incorporation of cross-curricular key competences for sustainability into degree courses. Finally, the research of [28], which proposes a competence matrix based on the competences established by UNESCO (2014), is also relevant.

2.4. Distance Learning HEIs in Training in Key Competences for Sustainability

Today, new technologies are a fundamental part of human lives, and without a doubt they are especially relevant in distance learning HEIs, where technology-mediated training and face-to-face teaching are combined. Although there is still limited research on the effectiveness of distance learning in the development of competences for sustainability [29], there are some reasons that make it different from face-to-face learning.

First, distance learning reaches learners independently of time and space, differently from face-to-face learning, so the development of competences by students are more determined by their own self-organization. This situation allows students to be part of their own decisions and reflect on their own actions, which is essential for the development of sustainability awareness. Hence, distance learning differs greatly from face-to-face education because the possibility of studying autonomously and remotely offers many opportunities for the development of key competences and the acquisition of knowledge [30].

Moreover, in online distance learning, the interactions between teachers and students, among students, and between students and the learning materials and activities occur at a distance. Online platforms allow for asynchronous experiences, which offer students the chance to reflect, collaboratively, on different issues [31] related, among others, to sustainability. Sustainability needs to be reflected in order to be integrated, so the existence of spaces that allow students to think and reflect carefully are the doors to a new form of developing key competences for sustainability.

Finally, distance learning offers the chance to reach a great number of students simultaneously, which facilitates a higher formative and transformative capacity in global terms than in face-to-face learning, specifically regarding education for sustainability.

3. Materials and Methods

In this research, the use of semi-structured interviews was carried out to identify key competences for sustainability in the degrees of the two specific HEIs: UAb and UNED, both distance learning institutions.

3.1. The Universities of the Study

The universities of this study have certain characteristics in common. Firstly, both UAb and UNED are the only public institutions of distance Higher Education in Portugal

and Spain, respectively. On the other hand, both have developed a similar learning methodology, with the use of online media for learning and the inclusion of some face-to-face classes, such as laboratories or fieldwork, in the curricula of their degrees. In addition, both universities show an important commitment to both sustainability and the importance of learning in the use of new technologies, as shown by their institutional documents [32–34]. The selection of these two universities for the study is directly related to these characteristics.

3.2. Sample Size and Participants

At each of the two studied universities, three departments and three faculties were selected, associated with the three areas of knowledge: Education, Sciences, and Humanities. Considering the curricular contents of these degrees, a similarity correspondence was established between the departments of the UAb and the faculties of the UNED. The sample size (n = 6) included the heads of the three departments of UAb and the heads of the three faculties of UNED, all of which were interviewed.

At UAb, the heads had an average seniority in office from one to three years and represented the Department of Education and Distance Learning, the Department of Sciences and Technology, and the Department of Humanities. At UNED, the heads had a seniority of between three and seven years in office and represented the Faculty of Education, the Faculty of Sciences, and the Faculty of Philosophy. In total, the proportion of women was 33%, compared to a higher proportion of men in these positions (66%).

All degrees that belong to the departments/faculties of study were considered in this research. At UAb, the Department of Education includes one degree, the Department of Sciences includes four degrees, and the Department of Humanities includes three degrees. At UNED, the Faculty of Education includes three degrees, the Faculty of Sciences includes four degrees, and the Faculty of Philosophy includes two degrees. The curricular plans of these courses have been developed since the Bologna process, and the competences included in these plans were determined by the regulations established during that period.

3.3. Instrument

A semi-structured interview model was used, the objective of which was to obtain information from the interpretation of the phenomena described by the interviewees [35].

Four research questions were developed to make a diagnosis of the perceptions of the heads of the departments/faculties about the presence of key competences for sustainability in their institutions' degrees: 1. Do you consider that this department/faculty works on sustainability? 2. How is it decided which cross-cutting competences are developed in each degree? 3. What key competences for sustainability are important in the curricula of the degrees, considering the future challenges? 4. How are the curricula monitored and accredited? The reasons for choosing these research questions originated in the framework of a wider PhD research. These research questions derived from the studies specified in Section 2.3.

The research questions were organized into four categories (Table 2): 1. Sustainability in the department/faculty, 2. Cross-cutting key competences in the degrees, 3. Key competences for sustainability, and 4. Monitoring/review of competences. The first category was established to contextualize the sustainability in the departments/faculties. Then, the second category determined how the cross-cutting competences of the degrees are selected. The third category analysed which of these competences include sustainability criteria. Finally, the fourth category determined if the sustainability criteria are considered in the reviews of competences. Each category corresponded to one of the research questions.

Within each of the questions, as the interview is semi-structured, sub-categories emerged from what the interviewees said. Both categories and sub-categories are analysed in the results.

Table 2. Categories derived from the research questions.

Categories
1. Sustainability in the department/faculty. Perception about the sustainability consideration in the department/faculty
2. Cross-cutting key competences in the degrees. Perception about the selection of these competences in the degrees.
3. Key competences for sustainability. Perception of the presence of sustainability criteria in the competences of the degrees.
4. Monitoring/review of competences. Perception of the presence of sustainability criteria in the reviews of competences.

3.4. Procedure

The process of contacting the heads of departments of UAb took place during the months of November–December 2021. Then, the interviews were carried out between the months of December 2021 and June 2022, one of them online (due to COVID-19) and two of them face-to-face. These interviews were framed in a research stay at UAb during the academic year 2021–2022. In relation to the interviews with the heads of faculties of UNED, these were conducted during the months of November–December 2022, all of them face-to-face at the headquarters of the corresponding faculties of UNED. The interviews were audio recorded, transcribed, and coded, and a qualitative content analysis followed to obtain a systematic description of the data collected.

3.5. Interview Analysis (Coding and Data Extraction)

The ATLAS.ti software for qualitative data analysis [36] was used for the coding of text documents from the interviews.

The present qualitative research was carried out through an interpretative analysis of the empirical data. It started with individual observations and reached generalizations, so that it is accepted that an external reality is captured through the perceptions [37] of the interviewer.

The data that were analysed from the text of the interviews were coded and categorized. Although these two terms are very similar, codification implies "the assignment of one or more keywords to a segment of text to enable subsequent identification of a statement, whereas categorization involves a more systemic conceptualization" [35] (p. 138). Numerous codes emerged from the analysis of the interviews and were included within each of the subcategories. Then, different relationships were established among the subcategories.

The steps followed in the research are listed below:

1. Establishment of four categories from the research questions;
2. Codification: numerous codes were created from the reading of the interviews transcribed in ATLAS.ti. Several reviews were conducted until all interview information was detailed into these codes. The data emerged from the texts;
3. Creation of subcategories from the codes and relationships between categories.

4. Results and Discussion

The structure of the results is organized in four different sections, each of which corresponds to each of the categories pre-established in Section 3. Within the categories, the sub-categories were detailed based on participants' responses.

The first category analysed the level of relationship or familiarity with sustainability in the different departments (UAb) and faculties (UNED). This provided a first approximation of the context of sustainability in each of the universities.

The second category focused on the cross-cutting competences of the degrees, including the frameworks of competences used in the department/faculty, the variations in these competences since the Bologna process, and the criteria for choosing them, including

sustainability criteria. With this category, it was possible to establish the importance given to these competences in each department/faculty and determine if they fit current and future global demands.

Then, the third category delved deeper in the sustainability criteria of the competences of the degrees. A review of the concept of 'key competence for sustainability' and a review of the frameworks of these competences is carried out, and the presence of these competences in the curricula is assessed.

The fourth category was centred on the monitoring and reviewing of competences (frequency and methodology of review and the existence of curricular reviews based on global challenges and possible reports about competences). With this category, it was possible to detect if the criteria for sustainability were being considered in the revision of curricula.

4.1. Sustainability in the Department/Faculty

In this study, the perception about the presence of sustainability differed depending on the department and faculty. One of the interviewees stated "there is an inherent responsibility of the departments/faculties in terms of sustainability" (#1). Another one stated that "in his faculty there are many applications of sustainability, not because it is sustainable, but because it is necessary" (#5). Meanwhile, another head reaffirmed the commitment of the faculty with sustainability: "When we started this dean team, we made the first deanery that includes the word sustainability of the university" (#6). Finally, although sustainability is treated more holistically in some areas, interviewee #3 took the view that "there is still a lack of debate and reflection on the departments/faculties about this topic". As it is explained in the research [4], this reflection is necessary for teachers and students to deeply change their perspectives, beliefs, and behaviours towards sustainability.

On the other hand, in general it was observed that the concept of sustainability, although it was familiar, did not have major significance within the different departments/faculties, although it was well established in some degrees, specifically in Environmental Sciences (UAb, UNED) and in Education (UAb, UNED). Sustainability is represented in different subjects, such as the subject of Environmental Education in the degree of Environmental Sciences and Social Education (UNED); the subjects Sustainable development: educational implications, Education, economy and development, and Social justice and Education in the degree of Pedagogy (UNED); the subject Society of knowledge, technology and education in the degree of Social Education (UNED); the subjects Education and Development, Education and equity in contemporary society, and Ethics and Education in the degree of Education (UAb); the subjects of Education for sustainability and Introduction to Ethics and Environmental Citizenship in the degree of Environmental Sciences (UAb); and the subject Globalization, citizenship and identity in the degree of European Studies and the degrees of Applied Languages. All these subjects are already anticipating the needs of the professional futures of students in some way by including sustainability aspects, even competences with sustainability criteria. However, it is notable that most of these subjects are optional. As it is stated in the research [38], it would also be important that sustainability is included in mandatory subjects to obtain a more global vision.

Another aspect that emphasised the importance of sustainability in the departments and faculties is the presence of doctorates, Chairs or research groups specifically related to this topic. At UAb, all the interviewees (#1, #2, #3) were appointed to the Doctorate in Social Sustainability and Development, as a reference of the HEIs in the teaching of the principles of sustainability. It is worth mentioning that this doctorate includes communication between professors of different departments. This is a good example of the necessary call for collaboration among actors to integrate sustainability in HEIs [39].

For its part, the Faculty of Education of UNED develops different sustainability projects carried out in the UNESCO Chair in Environmental Education and Sustainable Development (#6). This Chair is a reference, as it is formed by professors and coordinators with

specific trajectories in the topic and who are usually deeply concerned with the integration of sustainability in the university, including the key competences for sustainability.

So, the existence of doctorates, Chairs or research groups that promote the development of sustainability at universities is important. However, as it is stressed by all the interviewees, more relevant is the teacher's autonomy when establishing sustainability criteria in the degrees and subjects. As one of the interviewees stated, "Officially there is a relationship of the faculty with sustainability, but then it depends on the people" (#5). As the professors are a key piece in the transmission of competences, there is a clear need in training them in ESD so they can all work together in a "holistic, integrated, interdisciplinary and systemic manner" [40] (p. 100).

However, it is crucial to consider that sustainability operates from different ideological frameworks. Each professor and head of department/faculty develop (consciously or unconsciously) an ideological framework that determines the process of teaching–learning [41] and the way the information is transmitted to the students. For this study, the interviewees cited some frameworks in terms of sustainability: the 2030 Agenda (#1), Horizon 2030 (#4), SDGs (#2), the UAb Strategic Plan (#2), the paradigm of sustainable development (#4), the paradigm of human development (#3), and the paradigm of the three spheres of sustainability (#3). This variety of frameworks demonstrates that there is a varied understanding of the meaning of sustainability, which has implications within the departments/faculties of the HEIs studied.

Some of these frameworks integrate the international perspective (2030 Agenda, Horizon 2030, SDGs), while others gave importance to the university guidelines (UAb Strategic Plan). Finally, other interviewees developed more concrete frameworks based on paradigms (the paradigm of sustainable development, the paradigm of the three spheres of sustainability, and the paradigm of human development). This last one is in line with the proposal of [42] about the need for integrating the paradigm of Sustainable Human Development into the curricula of HEIs.

There is also a common perception among some of the interviewees (#1, #4, #5) that they understand the sustainability concept from an environmental prism, which is a repeated issue in other research studies [43]. However, in general, the interviewees are aware of the importance of the global aspect of sustainability, that integrates more issues. As some interviewees affirmed: "Sustainability is everywhere" (#1); "As a head I am concern about the way that sustainability is transversal to several areas" (#2); and "It is a broad cultural issue, in all spheres of society" (#3). This transversal approach is indispensable for the establishment of criteria that advocate real sustainability in the curricula. As UNESCO states [3] (p. 64), "the interdisciplinary approach helps students access and produce knowledge while building their capacity to critique and apply it".

To develop the transversality and interdisciplinarity of sustainability in HEIs, it is crucial that it is embodied in the strategic plans of these institutions. In fact, one of the interviewees (#2) referred to these documents as significant in applying sustainable criteria within their departments/faculties. The existence of strategic plans [32,33] that propose sustainability as a main axis allows for a clear influence from the universities towards their heads of departments/faculties. As one of the interviewees (#4) stated: "the sustainability policy of the university is established by the Rectorate".

These policies, together with good management and planning, will largely determine the success of these measures in an institution [44], and therefore, they improve the possibility of establishing sustainability criteria in its programs, especially regarding competences. Moreover, as one of the interviewees (#5) explained, it is necessary to have institutional support and the necessary financial resources to be able to implement the measures that are demanded from the higher positions of the HEI in terms of sustainability. As the authors of [45] affirmed, it is necessary to move towards a more sustainable society starting from the HEIs. This is important not only in the university as a whole, but also in each department/faculty.

Analysing each university separately, in UAb, the configuration of the departments in the same building allows for a high degree of communication between them. As stated by [22], this characteristic improves the easy integration of pedagogical approaches and interdisciplinary working groups, which undoubtedly favours the assumption of sustainability in the HEI. In addition, the UAb strategic plan gives value to sustainability as a fundamental line of action in this HEI. This plan [33] reinforces the commitment of this HEI to the integration of sustainability in different areas of the institution, including its curricula.

Meanwhile, the three faculties of UNED are located on the same campus. Two of these faculties are contiguous to each other and somewhat further away from the third one. Despite the physical distance between these faculties, UNED clearly maintains the same lines of action in all its headquarters. This is due, among other things, to the existence of a strategic plan, which establishes sustainability as one of its main axes, as well as the improvement in students' employability, in order to respond to the demands of society [32].

4.2. Cross-Cutting Key Competences in the Degrees

Since the establishment of the key competences in the context of the EHEA, there have been many changes both at the European and the global level [46], which led to a re-establishment of the criteria for the selection of these competences in the degrees. Considering those changes, the degrees´ cross-cutting competences should be chosen in relation to competence frameworks that consider the current and future demands of society.

The interviewees were asked which competence frameworks had helped them in the department/faculty to choose the degrees' competences. At UAb, the pedagogical model was cited by interviewee #2. The existence of this reference document for the entire university is crucial for the development of common pedagogic strategies, including the establishment of competences. In fact, this document explicitly named "the need of development of cross-cutting competences for the Society of Knowledge" [34] (p. 10) and the existence of "metacognitive competences (learning to learn), self-development through lifelong learning, and autonomy capacity in group contexts" [34] (p. 9). As this document was created in the framework of the Bologna process, the criteria of these competences integrate many important aspects for the development of the students, but they still do not include sustainability criteria.

At UNED, interviewee #6 cited the *Libros Blancos* in Spain, which were the basis for the establishment of competences in the degrees since the Bologna process and the adaptation to the EHEA [47]. In these documents, the cross-cutting competences were named general competences and were divided into three different groups: instrumental competences, interpersonal competences, and systemic competences. Although the development of these reference documents was very important during the Bologna process at a national level, they have not evolved to the current global demands since then.

So, in both cases (UAb, UNED), the referenced frameworks of competences included important criteria for the development of students, but if we compare these criteria to the cross-cutting competences needed to meet the demands of 21st century [6] (p. 33), there is still a long path to the establishment of criteria in the curricula that will develop citizens prepared to meet future demands.

Most of the interviews (#1, #2, #3, #4) confirmed that there have been hardly any variations in the cross-cutting competences of the degrees since the beginning of the Bologna process to the present. As stated by [48], this seems to be a common perception among professors about the introduction of the competency-based approach in the HEI system. This situation may be due to the fact that, as some interviewees (#4, #6) stated, "cross-cutting or transversal competences usually tend to have less relevance than the specific competences of the subjects". Apart from that, although nowadays the cross-cutting competences have a lot of potential, there is still a lack of real development in the educative centres in this regard [49] (p. 391).

The design by competences started with the creation of the EHEA, but it is still not always carried out effectively, which is a great barrier to the introduction of new criteria into the cross-cutting competences. In fact, most of the interviewees (#1, #2, #3, #4, #5) mentioned that it is more common for professors to design curricula based on contents (knowledge) instead of competences. This is also reflected in the criteria for choosing competences (see Table 3) in all areas of knowledge. As a competence is understood as a set of "knowledge, skills and attitudes" [5] (p. 204), [7] (p. 17), it would be appropriate that all these elements were included when designing the curricula, although it depends on the objectives of the area of knowledge, as demonstrated by the interviews.

Table 3. Main criteria for the establishment of cross-cutting competences in the degrees of the three areas of knowledge (Humanities, Education, Sciences).

Criteria for the Establishment of Cross-Cutting Competences in the Degrees		
Humanities	**Education**	**Sciences**
	Insertion in several dimensions of their lives	Needs of the labour market Labour demands of the future
Apply the knowledge acquired (Moving from knowledge to action)		
The criteria are based on contents instead of competences		

In general, in the areas of Education, there is a greater tendency to design by competences (including knowledge, skills, and attitudes). According to the interviews, there is a successful case in which a degree has been designed by competences. Interviewee #6 stated that it is preferable to introduce sustainability into the curricula through transversal competences rather than through a subject: "we did not want to introduce it as individual subjects, but through a transversal competence", and he added that "the idea of transversal competences is a very good idea because it goes through all the subjects". This is in accordance with the proposal of [42], which underlined the importance of introducing key competences for sustainability in a transversal manner for a holistic educative process.

Another interviewee added that "the general or transversal competences should be acquired at home, including values" (#5). This is in line with the statement made by [50], which establish that ethics must undoubtedly always be considered as the pillar of environmental education. This moral message should penetrate the curricula, raising awareness on the relevance of cross-cutting competences for training students, not only for the professional demands, but also for their evolution as citizens capable of changing and improving their own environment.

Regarding the criteria considered for choosing cross-cutting key competences in the departments/faculties, some of the interviewees chose the needs of the labour market (especially in sciences) as one of the most relevant aspects to consider in the training of HEI students (Table 3). It is important to consider the development of cross-cutting competences to improve the employability of the students, and for their adaptation to the labour demands of the future, especially in distance universities such as UAb, where all programs are directed to the public over 21 years old or working students [51] (p. 568).

Other criteria cited when choosing cross-cutting competences were the acquisition of knowledge as well as the need to apply the knowledge acquired (moving from knowledge to action); these criteria were especially employed in Education and the Humanities (Table 3). This is in line with the recent proposal of [4], which brings a new competence for action-based sustainability that encourages students to act individually and collectively to shape sustainable futures. Such competence can also invite students to demand action from those responsible for making change happen, as well as allow them to help others change their attitudes and behaviours [52].

One of the interviewees (#3) provided a broad criterion in the choice of competences: "those that allow our students to have a possibility of insertion in several dimensions of their

lives" (Table 3), which is in accordance with the broad definition of key competences for lifelong learning established by [14] that emphasizes various aspects such as employability, social life, sustainable lifestyle, peaceful living, and active citizenship.

Several of the interviewees stressed, again, that academic freedom or teaching autonomy in the choice of competences is very relevant.

4.3. Key Competences for Sustainability

Having underlined the importance of cross-cutting competences in the training of university students for the future, these competences should introduce sustainability criteria to be aligned with the international frameworks [4–7] and with the strategic plans of the universities in this study [32,33].

When the interviewees were asked if the cross-cutting competences prepare students for the global challenges of the future, the answers given were diverse. Several of the interviewees said that the curricula are not usually explicit about what students will need in the future, although contents are usually developed with this aspect in mind. Another interviewee expressed that the training of students for the future is a priority and that there is a need for these competences to be aligned with sustainability. Other interviewees stated they were not sure about if the competences of the curricula prepare students for the future, but that there is a need to think ahead, specifically in the climatic and political dimensions, as is corroborated by [53], which finds these two issues as some of the most relevant factors to consider globally.

As expected, each of the interviewees emphasizes the challenges (environmental, social, economic) that are most relevant to their area of expertise. As the interviewees in the area of sciences observed, the development of competences for sustainability is more related to applications for sustainability, such as energy technology or computing efficiency. This is in accordance with the affirmation of [43] (p. 17), which stated that the degrees of engineering and science are focused on the use of technological solutions for sustainable development.

This focus on operational trends and technology efficiency should not imply giving less importance to other areas (e.g., social impacts, human development, etc.) that are directly related to the development of key competences to sustainability. Some of the interviewees were aware of the importance of including every aspect of sustainability, and such awareness was reflected when they talked about transversality in the curricula. In contrast, some of them stated that training in all these challenges "is not the main objective" of the curricula (#4).

On the other hand, there was widespread agreement, specifically at UAb, about the importance of the challenge of technological or digital transformation when establishing the future needs of students, which makes sense considering the type of universities being studied here. This technological dimension and the need for digital transformation are stressed in both strategic plans [32,33]. The possibility of online learning takes special relevance in these universities, where many students (especially at UAb) combine studies and work, having the option of directly use the cross-cutting competences at their job position.

Regarding the concrete key competences for the future, the following were proposed by the interviewees: digital competences, written competences, research capacity, ability to read and analyse scientific articles, capacity to mobilize knowledge to take action, competences to deal with unpredictability*, critical thinking capacity*, adaptability*, capacity for expression, participation in community*, education in values*, and education in economics. Some of these competences, marked with an asterisk (*) are related to some of the competences established in the key competence frameworks for sustainability proposed in this article (see Section 2.3). The frameworks are established in Table 1, and the definitions are explained in Table 4, which relate the frameworks with the competences proposed by the interviewees.

Table 4. Definitions of the key competences for sustainability by [4–7].

Definitions of the Key Competences for Sustainability		
	Definitions by Authors	**Competences Proposed**
Systems-thinking competence	"Ability to collectively analyze complex systems across different domains (society, environment, economy, etc.) and across different scales (local to global), thereby considering cascading effects, inertia, feedback loops and other systemic features related to sustainability issues and sustainability problem-solving frameworks." ([5] (p. 207); [7] (p. 16)). "The ability to recognize and understand relationships, to analyse complex systems, to perceive the ways in which systems are embedded within different domains and different scales, and to deal with uncertainty" ([6] (p. 44)). "To approach a sustainability problem from all sides; to consider time, space and context in order to understand how elements interact within and between systems" ([4] (p. 14)).	
Anticipatory Competence	"Ability to collectively analyze, evaluate, and craft rich "pictures" of the future related to sustainability issues and sustainability problem-solving frame- works". ([5] (p. 207); [7] (p. 16)). "The ability to understand and evaluate multiple futures—possible, probable and desirable—and to create one's own visions for the future, to apply the precautionary principle, to assess the consequences of actions, and to deal with risks and changes" ([6] (p. 44)).	Deal with Unpredictability Adaptability
Futures literacy	"To envision alternative sustainable futures by imagining and developing alternative scenarios and identifying the steps needed to achieve a preferred sustainable future" ([4] (p. 15)).	
Adaptability	"To manage transitions and challenges in complex sustainability situations and make decisions related to the future in the face of uncertainty, ambiguity and risk" ([4] (p. 15)).	
Exploratory thinking	"To adopt a relational way of thinking by exploring and linking different disciplines, using creativity and experimentation with novel ideas or methods" ([4] (p. 15)).	
Normative Competence	"Ability to collectively map, specify, apply, reconcile, and negotiate sustainability values, principles, goals, and targets" ([5] (p. 207); [7] (p. 16)). "The ability to understand and reflect on the norms and values that underlie one's actions and to negotiate sustainability values, principles, goals and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions" ([6] (p. 44))	Education in values
Valuing sustainability competence	"To reflect on personal values; identify and explain how values vary among people and over time, while critically evaluating how they align with sustainability values" ([4] (p. 14)).	
Supporting fairness competence	"To support equity and justice for current and future generations and learn from previous generations for sustainability" ([4] (p. 4)).	
Promoting nature competence	"To acknowledge that humans are part of nature; and to respect the needs and rights of other species and of nature itself in order to restore and regenerate healthy and resilient ecosystems" ([4] (p. 14)).	
Strategic competence	"Ability to collectively design and implement interventions, transitions, and transformative governance strategies toward sustainability". (([5] (p. 207); [7] (p. 16)). "The ability to collectively develop and implement innovative actions that further sustainability at the local level and further afield" ([6] (p. 44))	

Table 4. *Cont.*

Definitions of the Key Competences for Sustainability		
	Definitions by Authors	**Competences Proposed**
Self-awareness competence	"The ability to reflect on one's own role in the local community and (global) society, continu-ally evaluate and further motivate one's actions, and deal with one's feelings and desires" ([6] (p. 45))	
Individual initiative competence	"To identify own potential for sustainability and to actively contribute to improving prospects for the community and the planet" ([4] (p. 15)).	
Interpersonal Competence/ Collaboration Competence	"Ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving" ([5] (p. 207); [7] (p. 16)). "The ability to learn from others; understand and respect the needs, perspectives and actions of others (empathy); understand, relate to and be sensitive to others (empathic leadership), deal with conflicts in a group; and facilitate collaborative and participatory problem-solving" ([6] (p. 44))	Participation in community
Collective action competence	"To act for change in collaboration with others" ([4] (p. 15)).	
Integrated problem-solving competence	"Is a meta-competency of meaningfully using and integrating the five key competencies [left] for solving sustainability problems and fostering sustainable development. It is the ability "to apply different problem-solving frameworks to complex sustainability problems and develop viable solution options" in order to "meaningfully integrate problem analysis, sustainability assessment, visioning and strategy building" ([5] (p. 207); [7] (p. 16)). "The overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution that promote sustainable development—integrating the above-mentioned competencies" ([6] (p. 45))	
Problem framing competence	"To formulate current or potential challenges as a sustainability problem in terms of difficulty, people involved, time and geographical scope, in order to identify suitable approaches to anticipating and preventing problems, and to mitigating and adapting to already existing problems" ([4] (p. 14))	
Critical thinking competence	"The ability to question norms, practices and opinions; reflect on own one's values, perceptions and actions; and take a position in the sustainability discourse" ([6] (p. 44)) "To assess information and arguments, identify assumptions, challenge the status quo, and reflect on how personal, social and cultural backgrounds influence thinking and conclusions" ([4] (p. 14))	Critical thinking capacity
Political agency competence	"To navigate the political system, identify political responsibility and accountability for unsustainable behavior, and demand effective policies for sustainability " ([4] (p. 14))	

As it is shown in Table 4, the interviewees gave special importance to the following key competences for sustainability: anticipatory competence, normative competence, interpersonal or collaboration competence, and critical thinking competence [5,7], which correspond, respectively, with the following competences proposed by [4]: futures literacy, adaptability, and exploratory-thinking; valuing sustainability competence, supporting fairness competence, and promoting nature competence; collective action competence; and critical thinking competence.

Although the concept of competence for sustainability was not well-known by all interviewees, they had an idea in mind of its impact. The general perception is that these competences are not yet integrated in a general way, but they believed that they could become so in the future. The interviewee #3 added: "In a way, I think it is not done explicitly. Implicitly, I think these competences are present." One the other hand, one of the interviewees talks about the "need to value what is already done, from the perspective of sustainability" (#1), instead of creating more content or competences. The interviewee #5 added "There is no need to change everything in any way about sustainability. No need for radical changes". This point of view is in accordance with the denial level of "no change" in the curricula, proposed by [54].

On the other side, one of the interviewees affirmed that the key competences for sustainability are being considered in the design of curricula, especially in the area of knowledge of Education. As it has been said before, in this area, there is a special interest in competences for sustainability, which are intended, among other things, to "train citizens, professionals and people, with personal and sustainable projects" (#3). The area of education, in fact, has developed numerous studies related to competences for sustainability and its evaluation in the university level, as is seen in studies such as [55].

In one case, the creation of a new degree was designed based on competences with sustainability criteria: "sustainability, human rights, and design for all. These have been our three most important transversal competences" (#6). This decision of integrating key competences for sustainability in the curricula, according to one of the interviewees, depends on the motivation of the professor's team in improving the quality of the degrees and including sustainability in them. Most of the interviewees gave importance to the existence of key competences for sustainability in the HEI's curricula, although all of them agreed that these competences are not still explicit in the curricula. The author [56] (p. 2) explains that "although teachers may understand this integration in a theoretical sense, they encounter obstacles when putting it into practice".

On the one hand, again, the relevance of academic freedom or teaching autonomy was shown as a relevant factor to establish the key competences for sustainability in the curricula of the degrees. As some authors express [48], this is one of the many predominant factors when making changes in HEI curricula: the role of the professor. On the other hand, it is necessary to remember the unifying role of HEIs in anticipating future needs. Some of the interviewees stressed the importance of interdepartmental communication when establishing sustainability criteria in degrees, which is generally difficult due to the intrinsic structure of these institutions, where opportunities for interdisciplinary collaboration are limited [57].

As it was underlined in Section 4.1., the existence of strategic plans enables greater inclusion of sustainability in universities. In UAb, the existence of a strategic plan [33] that somehow promotes key competences for sustainability is a great step in the introduction of these competences in the degrees of the university. Meanwhile, in UNED, a proposal framework of generic competences of the university itself has been developed which establishes four broad categories or competence areas, considering the Knowledge Society and lifelong learning contexts [58]. This kind of initiatives makes it easier to establish sustainability criteria in the competences of the degrees.

According to the interviewees, some of the obstacles that prevent the insertion of key competences for sustainability in the degrees' curricula are the following. Firstly, at the institutional level, the inclusion of such competences, although it is a recommendation, is not a requirement. The majority of interviewees agreed that it is necessary to establish clear guidelines from the Rectorates of the HEI so that these types of competences are established officially in the degrees. Secondly, as key competences for sustainability are composed of complex elements and relationships, they usually need more time dedicated to them than other competences. The lack of time of the professors prevents the insertion of these competences by requiring greater dedication for their real implementation in the classes. Thirdly, some of them argued that more training or awareness on the part of the

professors about sustainability would be necessary. In fact, the lack of training in this kind of innovative procedure in HEI degrees is one of the remaining issues in the HEI systems in Spain [59] and in Portugal [60].

It is also important to consider that in most HEIs, the process of making changes is slow [61]. To accomplish real changes in the training of key competences for sustainability in future professionals, all agents of the institution should be involved (professors, students, coordinators of degrees, deans/department directors). The commitment of all members of the HEI, especially from the upper ranks, as well as communication between the parties, is crucial for the success of the sustainability initiatives of HEIs [39].

Some of the interviewees pointed to the idea that the promotion of sustainability in the curricula can be developed by the contents and methodologies instead of competences. Although the goal of this article is the establishment of competences, there is a challenge that demands not only the development of competences, but also methodologies or approaches that address from different points of view the complex sustainability challenges facing the planet [62].

It was suggested that, in many cases, it is easier to make changes of competences in doctoral and master's programs, as well as in non-formal courses, than in degree programs.

4.4. Monitoring/Review of Competences

The frequency of revision of the degrees' curricula in both Spain and Portugal is around every 3–6 years. In terms of HEI quality reviews, the Higher Education Evaluation and Accreditation Agency (A3ES) of Portugal and the National Agency for Quality Assessment and Accreditation (ANECA) of Spain are responsible for the monitoring and evaluation of curricula (including competences) in the universities of study. In addition, each university has a specific internal organization in charge of curricula revision and quality.

The results showed that, in general, curricular reviews do not explicitly consider the future global challenges, although in most cases they work considering scientific updates and the realities of the students.

In general, reports are made for national assessment and accreditation agencies. In some cases annual reports are made by departments/faculties where competences are evaluated, but key competences for sustainability are not yet explicitly addressed.

4.5. Limitations of the Study and Further Studies

As the present study is part of a wider research work, the sample included the heads of three departments of UAb and the heads of the three faculties of UNED. Hence, the sample size covered the total range of departments and faculties of study, so the interviews which were carried out included the greatest possible representativeness for this study.

In addition, this research was carried out using manual and software-assisted content analysis techniques, so meaningful insights have some subjectivities. This results in some limitations which should be acknowledged before generalizing the findings.

In subsequent studies, interviews will be conducted with the coordinators of the selected degrees in the established universities. In the future, research about the perception of sustainability criteria in the specific competences of the curricula could be considered. In addition, similar studies at different levels (master's degree, doctorate) could be carried out.

5. Conclusions

As the key competences for sustainability are understood by different international organizations and the relevant research as a fundamental requirement for the education and qualification of HEI students to confront the foreseeable global changes of the future, those competences should be considered in HEIs when designing current curricula. The choice of a concrete framework of competences depends on the objectives of each institution.

At the universities of study, there is a general awareness about the importance of sustainability, although it is not yet fully integrated in the departments/faculties. The following aspects were considered relevant when implementing sustainability in the de-

partments/faculties: the variety of sustainability frameworks; the development of transversality; the professors' autonomy; the existence of research groups, Chairs, doctorates, and subjects related to sustainability; and the existence of sustainability criteria in the policies and strategic plans of the universities.

The research continued determining the selection of cross-cutting competences in the selected degrees. Various frameworks were cited, such as the Pedagogical Model of UAb (Portugal) and the *Libros Blancos* (Spain). Although these frameworks are a good starting point to implement the cross-cutting competences from the perspective of the needs and demands of society, they still do not include international recommendations for sustainability. In fact, the cross-cutting competences have hardly changed since the start of the Bologna process until now. This can be due, in part, to the lack of international competence frameworks of reference and to the little practice of some teachers in designing by competences. The criteria for choosing competences were different across the departments and faculties, but almost all of them agreed that is more common to design curricula based on contents instead of competences. This is an obstacle for the implementation of sustainability criteria in the cross-cutting key competences.

The key competences for sustainability seem to be more integrated in some departments/faculties than in others. While some interviewees had the opinion that it is not necessary to make changes in the curricula about sustainability, some specific degrees of the area of Education have already integrated subjects and competences with sustainability criteria. The interviewees proposed different competences for the challenges of the future, including adaptability, dealing with unpredictability, education in values, participation in community, and critical thinking capacity, which are related to the key competences for sustainability already proposed in previous research. For the implementation of these competences in the curricula, the interviewees pointed to teaching autonomy and the university's strategic plans and policies as being important. However, some obstacles are found for this implementation: the fact that it is a recommendation instead a requirement; the lack of time for professors to design these types of competences; and the need for training in designing by competences and in sustainability issues.

The results showed that, in general, global challenges are not explicitly considered when carrying out curricular reviews, although in many cases, scientific updates and students' realities were considered. In general, the reports made for the national assessment and accreditation agencies, as well as the annual reports made by some departments/faculties, do not consider the key competences for sustainability.

To conclude, despite the fact that universities of this study are committed to sustainability, there is no explicit integration of the key competences for sustainability in the curricula nor in the assessment reviews, although some initiatives are underway. Given the results, in general, it is considered relevant to train students in sustainability to face the challenges of the future, so universities should continue working on this. In addition, giving professors and heads of department/faculties concrete instructions about how to include these competences in the curricula could improve their definitive establishment. Moreover, it is important to consider that those key persons have large experience on working with adult students mostly already integrated in the labour market, who will also be the professionals that confront the future challenges.

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