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Internationalization Based on Content Modification Combined with Project Management Methodology: An Application in a Spanish Postgraduate Course in Building Engineering

David Bienvenido-Huertas [1,*] and Carlos Rubio-Bellido [2]

[1] Department of Building Construction, University of Granada, 18071 Granada, Spain
[2] Department of Building Construction II, University of Seville, 41012 Seville, Spain
* Correspondence: dbienvenido@ugr.es

Abstract: Internationalizing university studies can be something of a challenge for courses related to engineering and architecture because their content is mainly focused on the standards of the country. In this regard, the content of the degree programmes in building engineering in Spain is based on the Spanish Building Technical Code. For this reason, this paper analyses experimentation conducted in a postgraduate course in building engineering of the University of Seville. The goal of the study was to internationalize the course content of that course appropriately. For this purpose, a combined approach was developed based on using ISO standards and including appropriately the modifications through a project management methodology to reduce risks. Experimentation was conducted for three academic years: 2018/2019–2020/2021. The results showed that ISO standards were appropriately implemented in the teaching course content and accepted by students. Likewise, the use of a project management methodology could be an opportunity to improve teaching course content, thus reducing the risk related to the modifications of this process.

Keywords: internationalization; university education in building engineering; teaching quality; project management

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1. Introduction

The internationalization of higher education [1,2] has been widely analyzed in the last decades. Nowadays, the internationalization of higher education is a global and fundamental concept in universities. However, this can be defined as a complex phenomenon. There are many perspectives and analyses on internationalization in university studies, so there is no consensus on a unique approach to achieve it. There are many definitions, most of them generally defining the term of internationalization [3]. In this regard, Knight [4] defined internationalization as the integration process of an international dimension in the functions of higher education.

However, there are more needs for internationalization. Internationalizing university studies is today among the main university strategies due to several factors, such as cultural diversity and national economic development [5–7]. However, this strategy is highly conditioned by local policies because security problems or political movements could limit the internationalization degree of universities [8,9]. Likewise, the cultural and ideological characteristics of the region should be considered to know the success of the internationalization proposals [10,11]. Thus, the beliefs and ideologies of a region could modify or refocus both institutions' internationalization needs [12,13], aspects that could be seen in the language used in class [14], and the perception of internationalization as a simple academic mobility [15,16]. Finally, it should be noted that on many occasions the internationalization of students is forced by external causes, such as armed conflicts [17].

Nevertheless, the internationalization goal is increasingly considered in universities all over the world [3]. International educational pathways are more and more developed

in many universities [18]. However, there are no well-defined strategic plans for internationalization in higher education institutions [19,20]. In Europe, the European Parliament's report [21] states that European university institutions should tackle significant goals to improve teaching quality and include additional aspects, such as internationalization. Moreover, progressive European international cooperation is an additional motivation for university institutions to adopt an increasingly international strategy.

In the scientific literature, several studies have addressed the internationalization of the curricular itineraries of universities in various countries. Hung and Yeng [22] determined that international experience would help universities to offer better educational services to international students. Zheng and Kaapoor [23] analyzed the strategies adopted in China for the internationalization of universities. The approaches adopted by the government were based on bilingual courses, the invitation of foreign teachers and, to a lesser extent, the use of foreign material. However, the country's traditions and beliefs make internationalization difficult. This aspect has been reflected in the analysis of other countries, such as Japan [24] or Kenya [25]. These aspects suggest the need for individual approaches adapted to the characteristics of each country. This aspect has been reported by Sa and Serpa [26] when verifying the need to consider the traditions and methodologies of each country in the internationalization of higher education.

In Spanish universities, students' nationality has constantly changed in the last years. The policy of the university of the 21st century is clearly focused on student mobility [27], thus contributing to international cooperation among universities and providing society with graduates with a training based on the current globalization context [28]. All of this has been possible thanks to the various exchange programmes recently established. Thus, Ibero-American mobility grants and ERASMUS programmes are contributing to a greater internationalization of students from Spanish universities, and in various training levels (bachelor's degree, master's degree, and doctorate) [29].

Moreover, the characteristics of each country could imply that it is an attractive place for foreign students. This is the case in Spain. As for the ERASMUS programme, various reports have stated that the number of students who have chosen Spain has increased since its implementation in 1987, corresponding to 17% of students in the European Union [27]. Likewise, social and climate similarities between Spain and Latin American countries have contributed to a progressive increase of students from South America [30].

However, this greater internationalization of the Spanish university is also presenting new challenges that should be faced. The first and most important challenge is the appropriate internationalization of the content included in degrees, in which the teaching staff should play a fundamental role [31]. Universities are being adapted to these developments and aim to increase the degree of internationalization in their curriculums [32–34] through measures, e.g., using English as the course language or including a syllabus that explores global, intercultural and native perspectives [35,36]. In this regard, there is an increasing tendency focused on teaching courses in English to provide a multilingual training, thus removing borders between exchange students and Spanish teachings. However, as Alcón [31] indicated, this measure is not enough to adapt Spanish university degrees internationally as content should also be adapted. In this sense, the studies carried out by Altbach et al. [37] and de Wit and Altbach [38] also concluded that internationalization efforts should include the improvement of curricula with the inclusion of international content. Moreover, the use of English as the main language implies problems, such as terminological interference, because students should also use their mother tongue [39]. It could also be a new barrier for foreign students as their mother tongue could be Italian or German. Likewise, they could have a low level of English or not be very specialized, so they need to take English courses for this specific purpose [40].

Thus, the internationalization process of the university should be focused not only on teaching courses in English, but on modifying the course content towards a more and more international context. In this regard, mixed groups made up by students from various countries predominate in the architecture and engineering degrees of Spanish universities. One of the main problems could be language [41], although this depends on the students'

language level. According to Bilyushova and Belokon [42], learning and teaching aids for foreign students should be developed in engineering degree programmes, especially in construction, but keeping the methodologies used for native students. Likewise, these authors stressed the need for considering foreign students' training in course teaching loads. Dividing students into groups is not therefore a solution for the problem of teaching quality for foreign students as they prefer studying in groups with native students [43]. This aspect is consistent with the results provided by Zapp et al. [44], in which it is found that engineering degrees are the ones with the lowest level of internationalization (an aspect that does not occur in other branches, such as the social sciences). Thus, university training should be focused on effective ways to be more inclusive and fair, both for native and foreign students [45,46]. One of the problems of these Spanish degrees is that most content is strongly related to Spanish technical regulations. A greater internationalization level should be focused on the fact that the syllabus has the same competences at a national and international level, thus guaranteeing its usefulness for foreign students. Moreover, these changes should not be only focused on foreign students because, in the current globalization context, society demands professionals that can perform their duties in any country and with a quick adaptability degree. At this point, the standards established by the International Organization for Standardization (ISO) could be an opportunity to internationalize content. ISO standards are a set of procedures with international validity, and their teaching is within the scopes of an international teaching. Most procedures of Spanish regulations are adaptations of certain ISO standards, so adapting teaching content to these new standards is the only required aspect.

Likewise, students usually have difficulty in passing technical courses. For this reason, and to guarantee a correct integration of the internationalization modifications of the teaching content through ISO standards, this study addresses the integration of these modifications through a teaching methodology based on project management principles, complementary to the traditional content teaching. Project management is based on applying knowledge, skills, tools, and techniques, to the activities of the project to meet its requirements. As ISO 21500:2012 indicates, these techniques could be used by any kind of organization and in any kind of project, regardless of its complexity, size, and duration, considering the project as a set of processes made up of coordinated and controlled activities, with beginning and end dates, and conducted to achieve certain goals [47].

Finally, it is worth stressing that most studies have generally analyzed internationalization in institutions, but internationalization proposals made by teaching staff have not been individually analyzed [48]. According to Tossavainen [49], teachers could individually develop new internationalization strategies, but their continuity and control should be guaranteed for several years for their quality improvement. For this reason, this paper analyses a postgraduate course individually to achieve a greater internationalization level in its content. A postgraduate course was chosen because the internationalization goal could be a little bit more complex in these degrees as their specialization level is more advanced than in a bachelor's degree programme [50]. Thus, this paper aims to analyze the integration of ISO standards into the teaching content of a case study by using a project management methodology. The selection of a postgraduate degree in the field of construction engineering was due, on the one hand, to the existing limitations in internationalization approaches, and, on the other hand, to the lack of studies in the scientific literature on this branch. In this sense, Zapp et al. [44] has reflected how other areas have a higher level of internationalization, such as the social sciences. Likewise, Zapp et al. [44] found that science, technology, engineering, and mathematics (STEM) degrees are the ones with the lowest level of internationalization. Therefore, the use of an engineering degree as a case study made it possible to evaluate the possibilities of internationalization in Spain in a type of degree that does not usually present a high level of internationalization. The results of the study intend to address the existing knowledge gap in the scientific literature about the extension of the internationalization approach with the adaptation of the contents of the subjects [31,37,38], as well as the realization of a personalized implementation according to the teaching traditions and customs of each country [26].

2. Methodology

The methodological framework of this research study includes the selection of the case study (Section 2.1), the description of the modification of the teaching content through ISO standards (Section 2.2), and the description of the implementation and control workflow based on the project management theory (Section 2.3). The entire research process was designed and monitored by the authors during three academic years.

2.1. Case Study

This study was conducted in the Energy Audit and Certification course of the Master's Degree in Integral Management in Building of the University of Seville. It dates from the 2010/2011 academic year and is divided into three modules: (i) the core module (18 ECTS) provides students with an interdisciplinary training based on three courses, each with six ECTS, which are based on useful knowledge for the development of the subsequent courses of the master's degree; (ii) the specialist module (30 ECTS), which is made up by courses from the two specializations in the master's degree (specialization in environment and specialization in business management and administration); and (iii) the dissertation (12 ECTS), which focuses on a professional or research application of the content of the master's degree.

This master's degree is chosen by many international students. In this regard, students' country of origin has been recently diversified (Italy, Equator, Colombia, Chile, Egypt, Yemen, or China, among others). One of the reasons is that the master's degree is included in agreements focused on international double degree programmes. In particular, this master's degree is included in both the double degree programme of the Master's Degree in Integral Management in Building and the Bachelor's Degree in Building Sciences of the University of Bio-Bio (Chile) and the double degree programme of the Master's Degree in Integral Management in Building and the *Laurea Magistrale in Ingegnieria dei Sistemi Edilizi* of the Polytechnic of Bari (Italy).

The content of the various courses are clearly related to the technical regulation of Spain, mainly based on the Spanish Building Technical Code (CTE in Spanish) [51]. The content of the Energy Audit and Certification in Building course is closely related to the CTE as this code establishes the various aspects related to thermal and energy characterization in buildings. For this reason, until the 2017/2018 academic year, these aspects were only based on the CTE. This content clearly focuses on Spanish students, so students from other countries could be less interested in them as other regulatory procedures and developments could be established in their countries. However, the approach adopted through the CTE could be internationally adapted if ISO standards are used, instead of developing this regulation.

2.2. Modificaction of the Teaching Content

Most of the teaching course content is related to the CTE. Developing new teaching content based on ISO standards guarantees the international character of syllabuses. This is since much of the development of the CTE is based on adaptations of the ISO standards. These adaptations are based on the application of ISO to the characteristics of the country's climate and built environment. However, they limit the overview of ISO standards, so knowledge that can be applied internationally was not originally taught in the classroom. Therefore, the use of ISO standards as teaching material in the subject could make it possible to address these limitations. The international standards used were as follows:

- ISO 6781:1983—Thermal insulation—qualitative detection of thermal irregularities in building envelopes—infrared method [52].
- ISO 6946:2007—Building components and building elements—thermal resistance and thermal transmittance—calculation method [53].
- ISO 13788:2012—Hygrothermal performance of building components and building elements—internal surface temperature to avoid critical surface humidity and interstitial condensation—calculation methods [54].
- ISO 9972:2015—Thermal performance of buildings—determination of air permeability of buildings—fan pressurization method [55].

- ISO 9869-1:2014—Thermal insulation—building elements—in situ measurement of thermal resistance and thermal transmittance. Part 1: heat flow meter method [56].
- ISO 10077-1:2017—Thermal performance of windows, doors and shutters—calculation of thermal transmittance. Part 1: general [57].
- ISO 10211:2017—Thermal bridges in building construction—heat flows and surface temperatures—detailed calculations [58].
- ISO 9869-2:2018—Thermal insulation—building elements—in-situ measurement of thermal resistance and thermal transmittance. Part 2: infrared method for frame structure dwelling [59].

Figure 1 graphically represents the modifications proposed. Thus, to internationalize the teaching content, the thematic block related to the calculation of thermal transmittance (U-value) focused on the description of both ISO 6946 to calculate façades and roofs and ISO 10077-1 to calculate windows. Likewise, the thematic block related to experimental methods, which analyses in-situ characterization procedures of building envelope, was adapted to various test standards. The reason was that the class was focused on reviewing the scientific literature of the issue and students were not very interested in it, as surveys from previous academic years showed. For this reason, the thematic block was divided into four areas, each focused on the development of a different methodology: the blower door method through ISO 9972; the qualitative infrared thermography method through ISO 6781; the heat flow meter method through ISO 9869-1; and the quantitative infrared thermography method through ISO 9869-2. Finally, the thematic block related to the Spanish legislative framework was removed because most Spanish students already knew it, whereas foreign students were not quite interested in these aspects as their main goal was to carry out their professional activity in their countries of origin. Thus, the legislative framework was replaced by a block not very developed at a teaching level at Spanish universities: the analysis of thermal bridges. For this purpose, a thematic block based on ISO 10211 and ISO 13788 standards was developed. This thematic block was taught by using a two-dimensional simulation tool to revitalize teaching sessions and to provide students with more detailed knowledge on the evaluation procedures of thermal bridges.

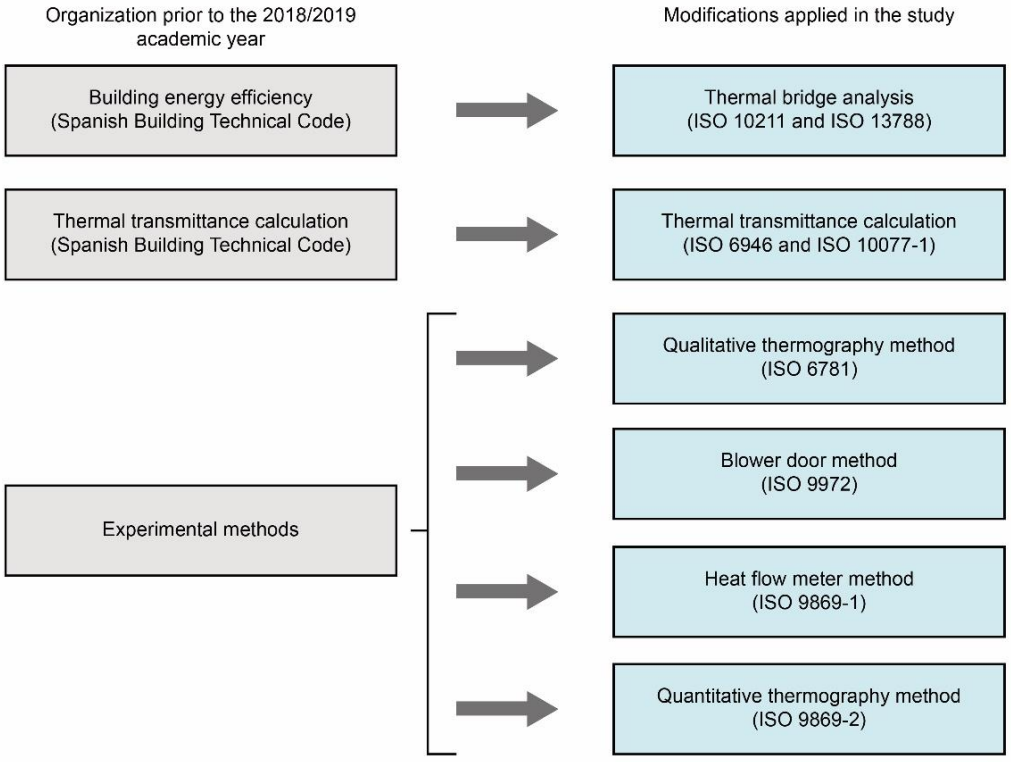

Figure 1. Modifications conducted in the course.

2.3. Implementation of Project Management Guidelines in the Modification of Teaching Content

The modifications were applied during the development of the course for three academic years: 2018/2019, 2019/2020, and 2020/2021. The authors of the study were responsible for the conceptualization, design, implementation, and monitoring, of the methodology proposed for the internationalization of the subject. For this purpose, a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis was previously performed. The SWOT analysis is a tool widely used by the business world to assess internal and external factors related to any product or service provided by a company. The results are shown in a 2×2 matrix, including the positive and negative aspects of these factors (Figure 2). Knowing these aspects is essential to increase the advantages and to decrease the weaknesses of a product or service and improve its performance [60]. The first SWOT analysis of the study was carried out from the interviews with all the teachers of the course (five teachers) (Figure 3). The interviews were conducted by the authors. Although the authors were also professors of the subject, they did not intervene in the factors that were finally reflected in the SWOT. This analysis was carried out before the first edition of the subject with the internationalization approach. The goal was to assess both the role of the internationalization presented in the course and the possible student perception. The strengths of the approach were the variety of content and the expected teaching quality improvement, as well as the advantage that the teaching content was not affected or modified by the changes of Spanish regulation. This aspect is widely interesting because the CTE is a technical document which is constantly changing [61]. The use of teaching content based on ISO standards would ensure greater stability in the content of the subject. The weaknesses were the possible lack of identification of the usefulness of the course content on the part of Spanish students, the technical complexity of the content (a usual aspect in engineering and architecture degrees), the difficulties to teach all course content as there is a limited time (four ECTS), and the possible barrier on the part of Spanish students as the training is not focused on the CTE. Therefore, the possibility that the national student did not value positively the changes proposed for the internationalization of the subject was raised. As for the external factors, the opportunities were the greater possibility of having foreign students, the international positioning of the degree, the possibility of teaching new content (such as the thematic block focused on thermal bridges), and the use of new computer tools. The external threats were mainly the barrier of the language for non-Spanish students and the possible impact of the modifications of the ISO standards on the teaching content.

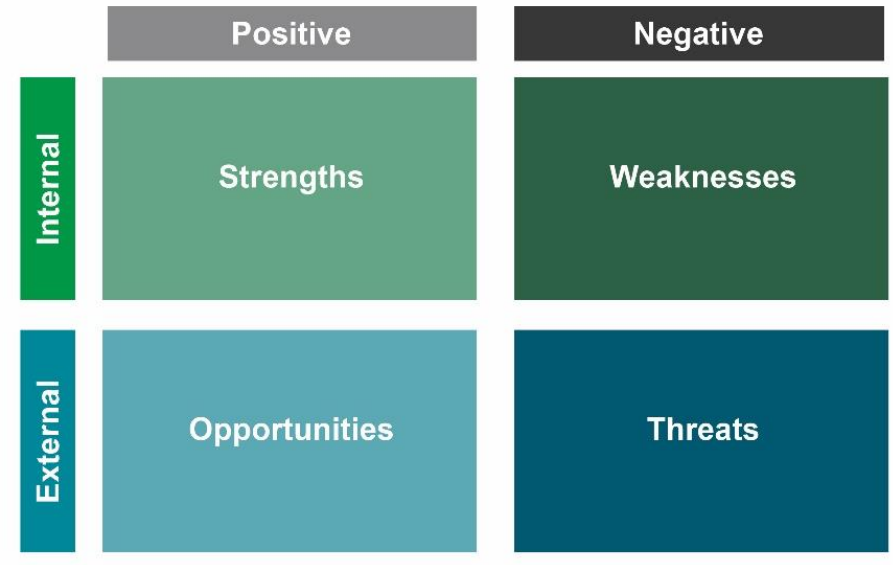

Figure 2. The SWOT matrix that shows the various factors considered.

Figure 3. Results of the SWOT analysis performed before implementing the ISO standards.

The guidelines included in A Guide to the Project Management Body of Knowledge [62] were used to implement appropriately the modification of these standards in the teaching content. This guide establishes a series of good practices to develop projects and is based on 49 processes. These processes are divided into various categories, such as quality, chronogram, or resources, and into sets of processes that should be performed from the beginning to the end of the project. The set of processes used depends on both the type of project and the manager's demands [62]. To achieve the goals established in this study, a total of eight processes were used to integrate appropriately the internationalization of the teaching content of the course chosen as case study (Table 1). These processes are implicitly related to planning processes to control the correct integration and evaluation of the new teaching course content.

Table 1. Processes related to the recommendations of good practices in projects used in the internationalization of the Energy Audit and Certification in Building course.

Process	Description
1. Requirement compilation	The needs and requirements to fulfil the goals of the project are determined and documented. These requirements involve factors that should be included in the result to meet certain specifications formally imposed.
2. Risk identification	The issues that could prevent the achievement of the goals proposed are described and recorded.
3. Risk response implementation	This process is based on tackling the actions to reduce or remove the project risk identified in Process 2.
4. Definition of activities	The project is divided into a series of activities to control the estimated duration.
5. Estimation of the activity duration	The duration of each activity identified in Process 4 is estimated.
6. Control of the project work	The progress of the project is monitored and reviewed to fulfil its requirements.
7. Scope validation	The acceptance or rejection of the scope required by the project is verified.
8. Project knowledge management	The knowledge acquired during the project should be critically analyzed to carry out future projects in a more effective way.

The adaptations of the processes aimed at integrating the internationalization of the teaching content of the Energy Audit and Certification in Building course are described below. Figure 4 includes the implementation workflow.

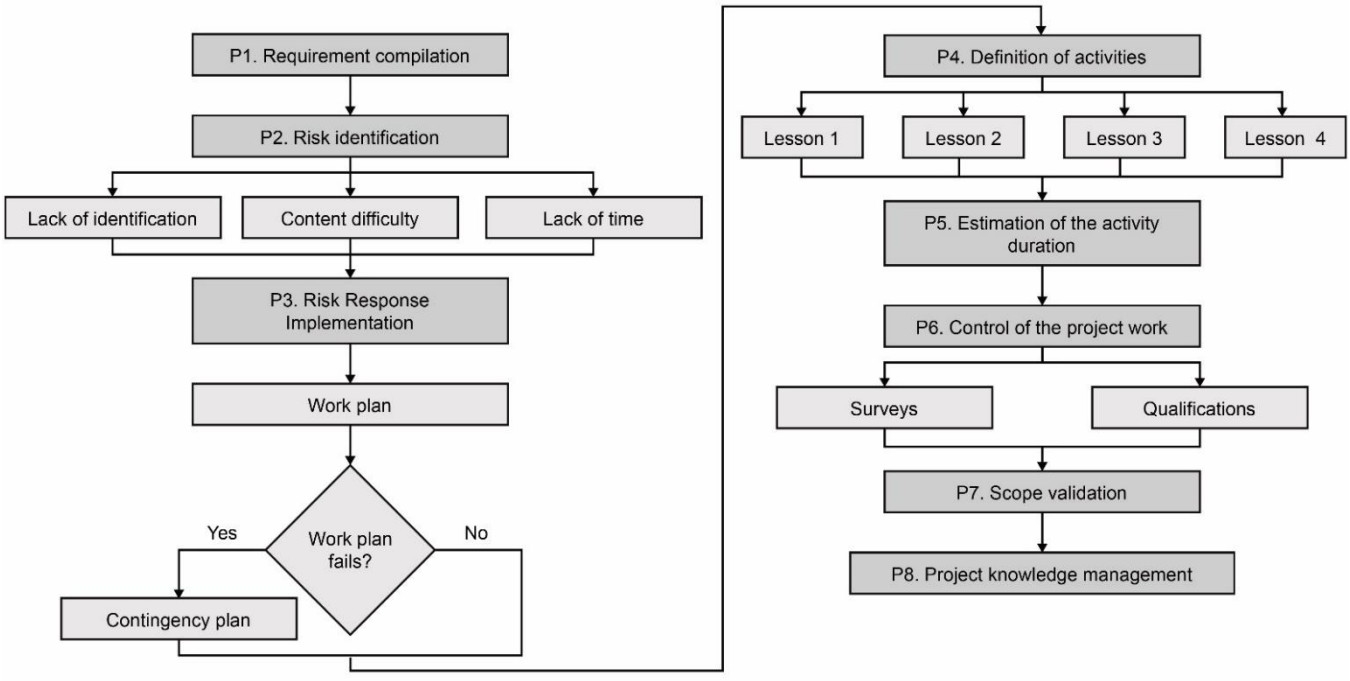

Figure 4. Workflow of the implementation processes of the modification of teaching content.

Process 1. Requirement compilation

As mentioned above, this process is based on determining and documenting the needs and requirements to fulfil the goals of the project. In this case, the essential goal of the project is to guarantee an appropriate integration of ISO standards into the teaching course content so that students accept and respond appropriately to it. Thus, the requirements related to these goals were compiled. To achieve the goals, the essential requirement was an appropriate students' degree of satisfaction of most of the modified teaching content. As the modifications of the teaching content corresponded to various standards, one of the requirements was the evaluation of both the acceptance level of each standard and their adjustment to students' interests. Likewise, other requirements were the participation of students in the various activities and the final students' evaluation in the course. This

process was initially conducted by the teaching staff to compare then the individual data compiled through the students' surveys.

Process 2. Risk identification

The goal of this process is detecting the potential risks related to the implementation of ISO standards. The main risks raised are related to the weaknesses detected in the SWOT analysis. The risks raised are intended to address those aspects that limit the effectiveness of the implementation of internationalization. One of these risks was the possible lack of identification of students with the rules, more accustomed to the delivery of content designed with state regulations. Likewise, the wide variety of advanced content included in the standards, together with the integration of new technical contents that have not been taught in the previous degree programmes of the students, could contribute to their lack of involvement in the class. The development process of the classes could also be delayed due to the possible doubts expressed by students. It should be noted that there were no risks associated with the threats of the SWOT analysis. The language barrier did not exist since the students participating in the three editions spoke Spanish (they were native, South American, or from other countries with an advanced level of Spanish). Regarding the changes that could arise in the ISO standards, during the three editions the ISO standards were not modified, so the contents of the subjects did not have to be adapted.

Process 3. Risk response implementation

Work and contingency plans are established with respect to the risks found in Process 2. In this regard, three potential risks related to the integration of ISO standards into the teaching course content were detected: (i) the lack of identification on the part of students; (ii) the complexity of course content; and (iii) the delay in course development.

For the first risk, a work plan was suggested. It consisted of developing an introduction of each standard based on how it was related to the technical regulation in Spain, so that students (particularly Spanish students) could be identified with the course content. Likewise, in case the expected work plan was not effective, the contingency plan was based on a presentation in which the discussion about the relations of the standard indicated with the Spanish regulation is broadened. This contingency plan could reduce the class duration that is aimed at teaching the standard to apply the contingency plan.

For the second risk, the work plan was based on designing the teaching content using an accessible language and with a difficulty adapted to the students' profile. For this purpose, students' profiles were assessed before beginning the classes. According to the average class level, presentations were adapted to two difficulty levels: medium and advanced. The modification of these presentations will be aimed at varying the practical exercises developed in class. If student levels are unknown, the use of the medium level in the presentations is suggested as contingency.

Finally, for the third risk, a contingency plan was suggested as it is an unpredictable factor within the class development. Thus, it was expected that the duration for solving doubts should be 15 min within the class development. If this duration was surpassed, the class content would be reduced, whereas new practical exercises would be carried out if that time was not consumed.

Processes 4 and 5. Definition of the activities and Estimation of the activity duration

The set of activities (or lessons) into which the project was divided were defined to estimate the duration. It is basically a breakdown of the time effort to teach the course content. The proposed activities were the following: (i) theoretical calculations, based on ISO 6946 and ISO 10077-1; (ii) thermal bridges, based on ISO 10211 and ISO 13788; (iii) experimental methods (part 1), based on ISO 6781 and ISO 9972; and (iv) experimental methods (part 2), based on ISO 9869-1 and ISO 9869-2. Table 2 includes the groups of the various ISO standards. It is important to consider that the time aimed at teaching these standards was four classes, so some standards were grouped. Each lesson included an introduction of the relations of the content to the Spanish regulation, with a duration between 5 and 10 min, and the rest of the time focused on teaching the content of each standard (it is important to remember that 15 min were left for possible doubts).

Table 2. Definition of the activities and their duration.

Activity	Lesson	ISO Standards	Duration
1	Theoretical calculations	ISO 6946, ISO 10077-1	2.5 h
2	Thermal bridges	ISO 10211, ISO 13788	2.5 h
3	Experimental methods (1/2)	ISO 6781, ISO 9972	2.5 h
4	Experimental methods (2/2)	ISO 9869-1, ISO 9869-2	2.5 h

Process 6. Control of the project work

Lessons were monitored to guarantee their correct development and students' degree of attention. For this purpose, 10 questions were asked in each lesson to evaluate critically, although constructively, student's degree of attention and to consolidate knowledge.

Process 7. Scope of the goal

The scope of the goal is validated, i.e., the evaluation of students' acceptance degree of the modification of the teaching content, as well as the qualifications obtained. For this purpose, a series of surveys were conducted to evaluate the acceptance degree of the changes suggested, and practical cases were carried out to develop the technical aspects. These surveys should be solved in the online hours of the course.

Process 8. Project knowledge management

Once all the previous processes are finished, the data compiled should be analyzed to manage the knowledge acquired during the project and make corrections in future works. Thus, this process aimed at managing the results obtained to guarantee a more appropriate integration of ISO standards into future editions of the Energy Audit and Certification course. The results obtained were critically described. In addition, the SWOT matrix made at the beginning of the project was compared to the results obtained to make the appropriate modifications in a new SWOT matrix and apply them in future editions of the course.

3. Results and Discussions

The results from applying the project management methodology allowed the correct integration of ISO standards into the teaching content of the Energy Audit and Certification in Building course to be controlled. Both the control of the performances of the various activities and the results obtained in Processes 7 and 8 are shown to discuss the results.

As for the control of the activity performances, it is worth stressing that all the activities planned to teach the lesson were carried out in the time predicted (Table 3). In this regard, the duration aimed at solving doubts was not consumed in the various sections, thus solving new cases in that time. There was almost whole-time consumption in the sections on thermal bridges.

Table 3. Time aimed at performing each activity.

Activity	Lesson	Relations with the CTE	Development of ISO Standards	Doubts
1	Theoretical calculations	10 min	134 min	6 min
2	Thermal bridges	10 min	127.5 min	12.5 min
3	Experimental methods (1/2)	5 min	145 min	0 min
4	Experimental methods (2/2)	5 min	140 min	5 min

Process 7 was evaluated by a series of students' satisfaction surveys in the three academic years. These surveys evaluated whether the course met students' expectations and those aspects to be improved. Figures 5–7 graphically summarizes the results obtained in the surveys.

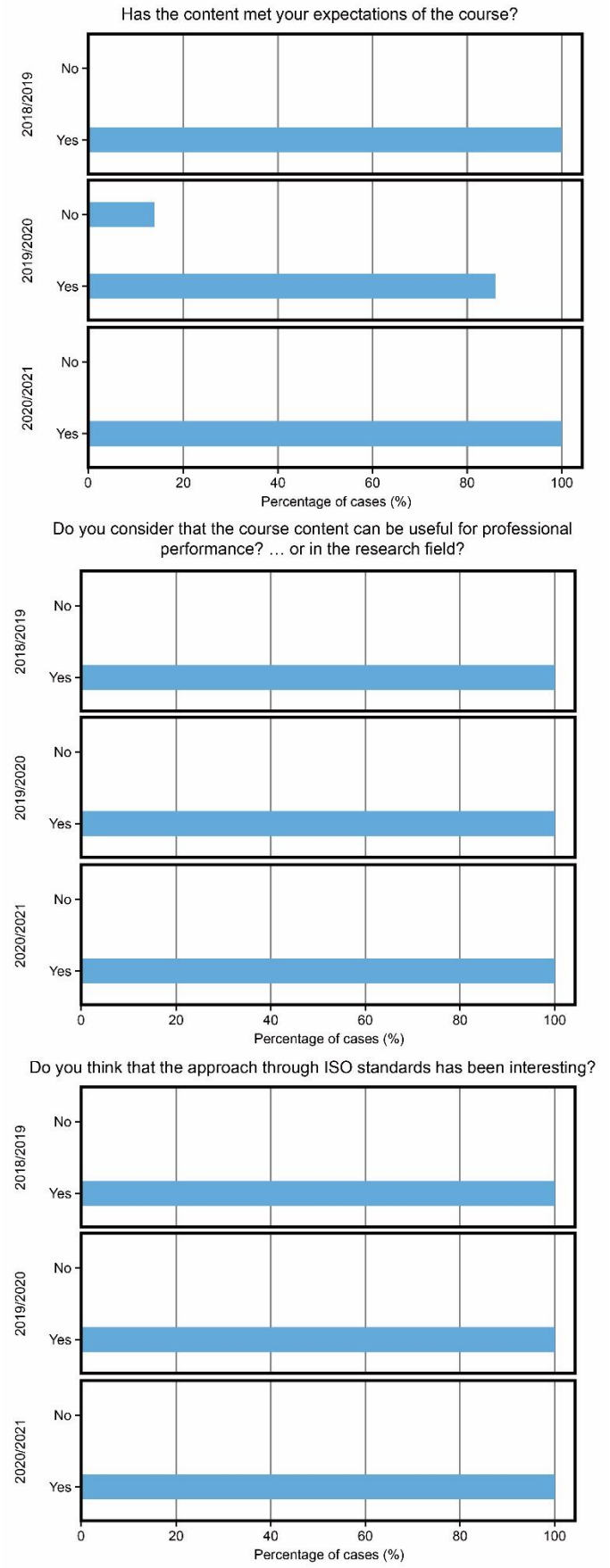

Figure 5. Results of the surveys answered by the students in the three academic years (Part 1).

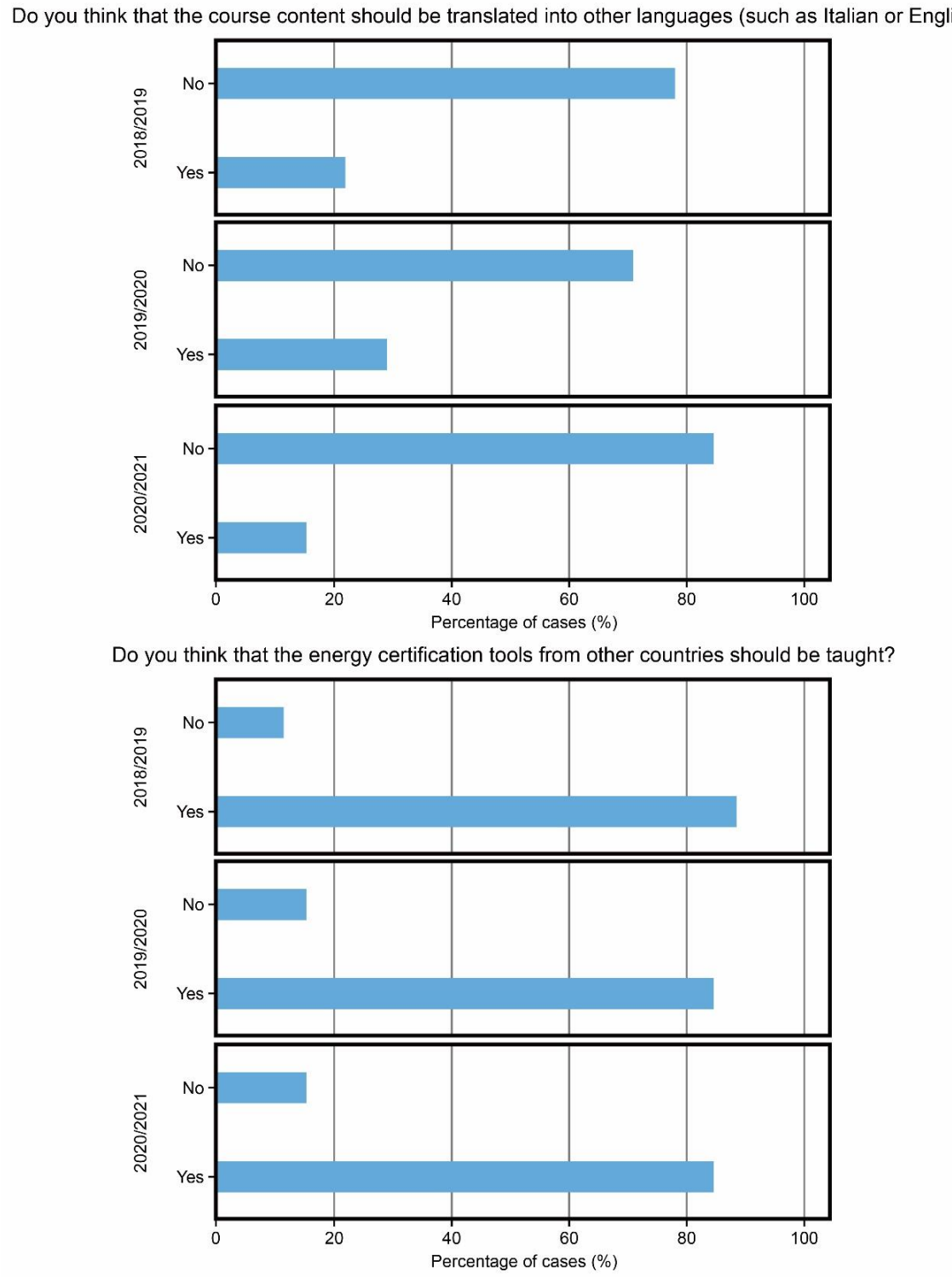

Figure 6. Results of the surveys answered by the students in the three academic years (Part 2).

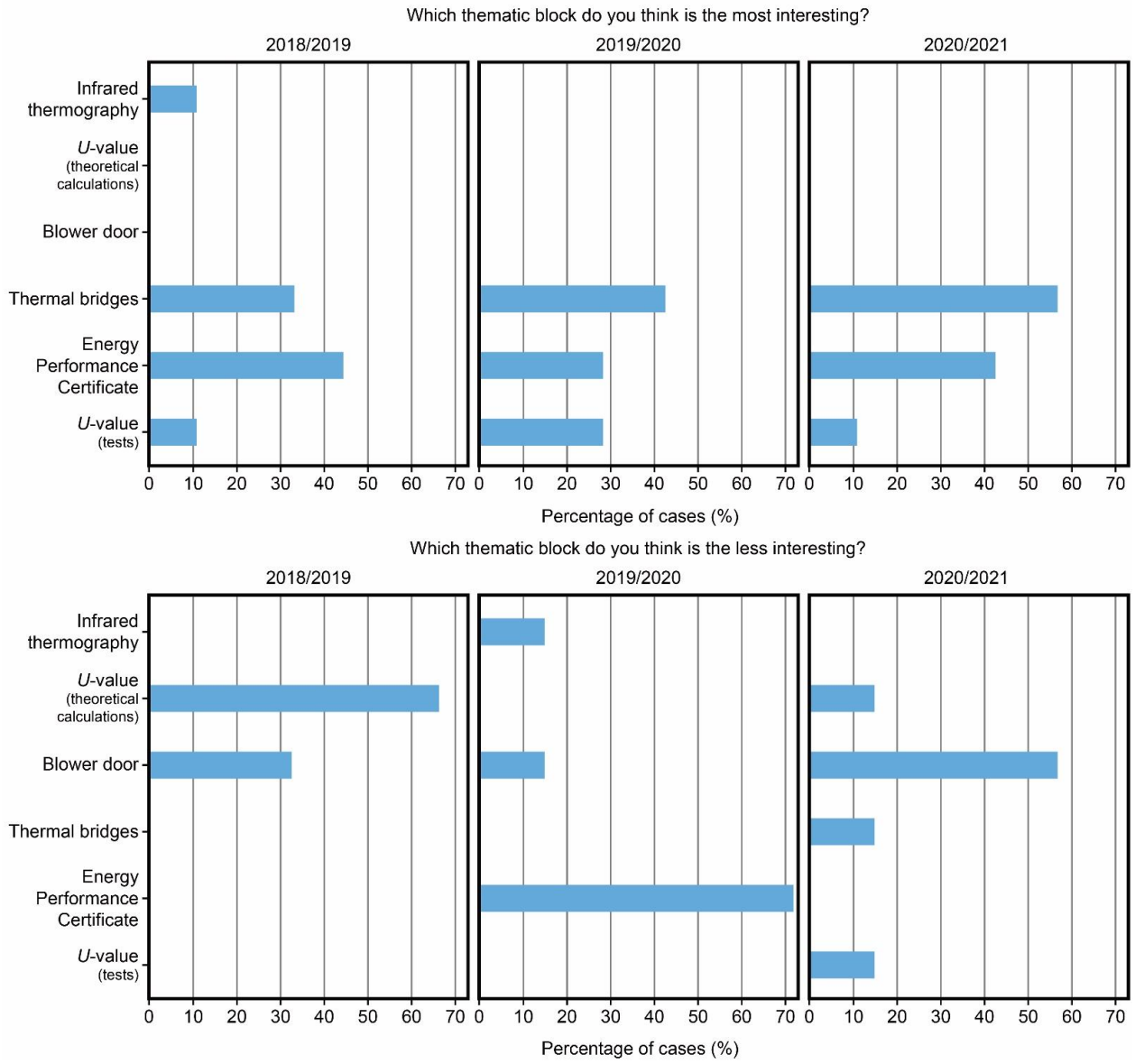

Figure 7. Results of the surveys answered by the students in the three academic years (Part 3).

As for students' degree of satisfaction with the course, between 81 and 100% of students in the three academic years stated that the course met their expectations (Figure 6). In addition, students also stressed the usefulness of the course for professional practice (both in the scientific scope and in private companies), as 100% students assessed it positively in the three academic years. The reason could be the use of ISO standards as course content because 100% of students positively assessed the usefulness of this approach in the course. These percentage values showed the success of the adaptation of the course content to a more useful approach for students from various countries, thus contributing to one of the goals of undergraduate students' internationalization: providing students with more skills for their professional performance in a globalized world [63]. It is true that a more negative assessment was detected in the 2019/2020 cohort, although the satisfaction percentage was 81%. It should be noted that, in the case of that academic year, one piece of equipment used in the experimental methods classes had to be sent to the technical service (blower door), so the part corresponding to this essay had to be taught from a theoretical perspective. In any case, the assessment of the internationalization experience was positive in most of the students of the 2019/2020 cohort.

Moreover, one of the threats detected in the SWOT analysis because of the language barrier was shown through the results of the surveys (Figure 7). According to the data obtained, students stated that there is no need to modify the teaching content to other languages: between 71 and 85% of students considered that it was not necessary. Nonetheless, 29% of students stated that it was necessary. Consequently, there is not an urgent need on the part of students, but some of them demanded a multilingual teaching content (particularly foreign students whose mother tongue was not Spanish). Thus, the existing threat in the SWOT analysis previously presented should not be rejected, and teaching staff should make an addition effort to provide their exchange students with teaching material in other languages. This could avoid the problem of language adaptation in the first year of long-term degrees [64,65]. As for a master's degree, students' adaptation time is very short, and the problems related to this barrier could be reduced if syllabuses are adapted to several languages. Likewise, a future challenge that the degree will have to address is the need to teach or not the content in another language, since the translation of the content of the subject does not have to suppose an elimination of the problem reported by the students.

Students accepted the modifications, but the degree of satisfaction in relation to the various thematic contents was different (Figure 7). There were certain similarities among the academic years analyzed, so students were more interested in the analysis blocks of thermal bridges, energy certification, and thermal transmittance tests, except for the infrared thermography tests, which were also the most chosen in the 2018/2019 academic year. Most thematic blocks corresponded to the new modifications of the course, except the block on energy certification, which was not modified. As for the less interesting blocks, very different evaluations were obtained in the three academic years. The less interesting block in the first academic year was theoretical thermal transmittance calculations, whereas in the year 2019/2020 students chose energy certification as the less interesting block. In the first case, it is possible that the block on theoretical calculation was the less interesting due to the complexity of the content. Although this content is interesting for the other thematic blocks, processes that imply a more enjoyable teaching should be established. This suggests the need for both considering whether the duration aimed at these contents is appropriate and establishing new work processes through the project management methodology to guarantee a greater degree of acceptance. The limitations associated with the degree of interest of students in the lections of theoretical calculation is more a characteristic gap of engineering degrees than something due to the internationalization process. Likewise, having a longer duration would allow a greater assimilation of the theoretical concepts of this block. Given the time limitations existing in the subject, the implementation of blended learning dynamics was proposed as a future line of evaluation. In the 2019/2020 academic year, students accepted more the content of this thematic block and less the energy certification. In this regard, it is interesting that the block of energy certification received both positive and negative evaluations in 2019/2020. The main cause is related to students' nationality. National students positively assessed the content of this thematic area, but international students stated certain limitations as the content is based on tools only validated in Spain. Another question dealt with the need for including other countries' certification tools. In principle, the possibility of teaching other countries' tools was not considered due to the many combinations that could take place. However, international students showed a great need of this aspect (Figure 6); between 85 and 88% of students considered that other countries' tools should be included. Thus, there is a new challenge on the internationalization possibilities of architecture and building teaching content as the existing gap between the official energy certification tools in Spain and those of other countries should be faced. An option to face this challenge could be the development of training modules that complement the main course content and are useful to develop those energy certification tools. Finally, in the 2020/2021 academic year, students chose blower door tests as the less interesting block. As this thematic block is mainly practical, students could be less interested as classes took place online (due to the COVID-19 lockdown). In this regard, the need for adapting the content to online teaching during the 2020/2021 academic year was a challenge (in the 2019/2020 academic

year, teaching took place before the COVID-19 lockdown). For this purpose, content was taught through online classes by reproducing face-to-face classes. However, the limitations to conduct an online dynamic and enjoyable class on test procedures was a gap difficult to solve. This aspect should be considered in the future in a more appropriate way because digital learning methods should not prevent an appropriate teaching as they ease the continuing of a high-quality education even in periods in which face-to-face classes are not possible [66,67]. This aspect is consistent with the impossibility of incorporating blended learning dynamics as a result of the results of the 2018/2019 cohort.

Likewise, within the management process of the knowledge acquired, a new SWOT analysis was conducted according to the results obtained in the practical sessions (Figure 8). To do this, all the teaching staff of the subject were interviewed again at the end of the 2020/2021 edition. The experience based on implementing ISO standards in the teaching content was satisfactory. Moreover, this guarantees a new teaching framework in the course that will be continuously tested in the next editions but supported by the success of the editions analyzed. In this regard, the use of the project management methodology guarantees the testing and readjustment of teaching content. Likewise, the new SWOT analysis rejected one of the possible weaknesses of the approach related to the lack of identification on the part of the Spanish students. However, the rest of the weaknesses and threats were maintained according to the aspects seen during the course. Moreover, the professional usefulness for the students of the course was considered within the strengths of the new approach. Finally, online classes were a clear threat for the optimal application of internationalization. Although this aspect is temporary (online classes only took place in the 2020/2021 academic year), it is possible that a similar situation takes place in the future, so appropriate protocols should be established to develop the course appropriately.

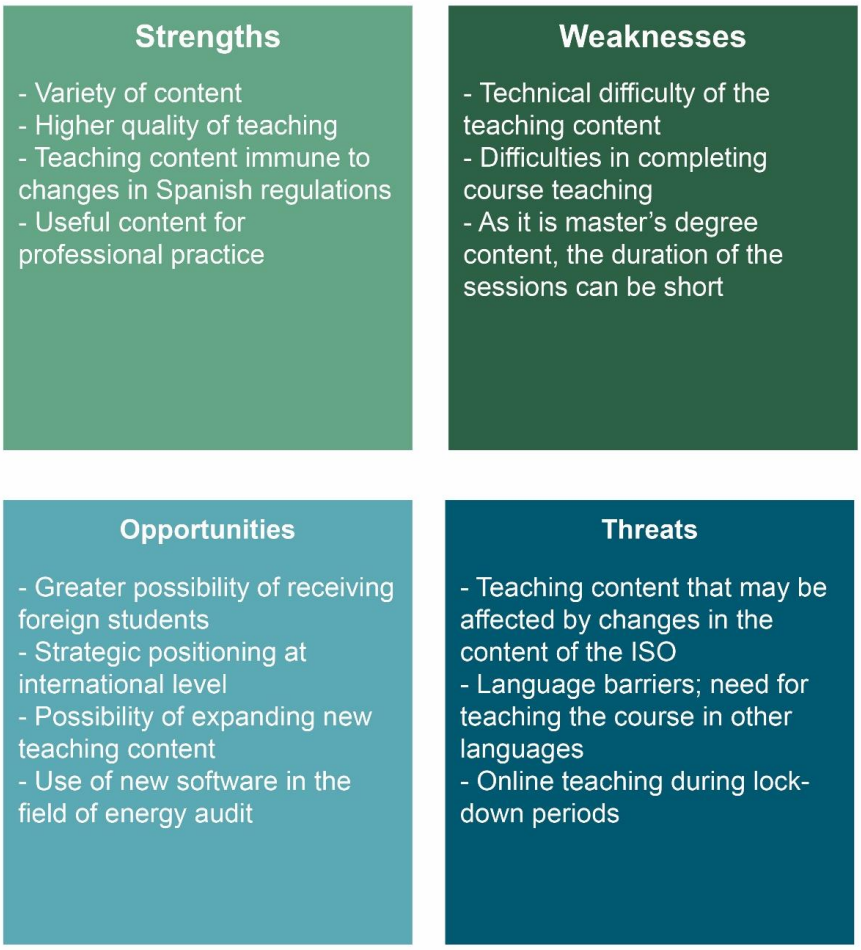

Figure 8. Results of the SWOT analysis conducted after implementing the ISO standards.

4. Limitations of This Study

One of the inherent limitations of the study is the area of application of the results. As this is a study that analyzes the implications of internationalization in a Spanish degree, it is to be expected that the level of success will vary in other regions. Thus, those degrees from other countries closely related to regional regulations could benefit from the results of this study. This aspect is expected to occur in countries in the European environment that have extensive development of energy efficiency regulations for buildings due to the transposition of European directives.

Another limitation of this research is the self-reported nature that may be subject to bias. The population analyzed was small due to the specific characteristics of the cohort it was focused on. Therefore, the participating population is characteristic of the teaching staff and students of the subject, since all the participants were included during the three evaluated editions. Thus, this study has established the feasibility of internationalization applications in engineering degrees based on the implementation of ISO standards.

5. Conclusions

The results of the experimentation conducted in the course of energy audits of the Master's Degree in Integral Management in Building of the University of Seville during the 2018/2019, 2019/2020, and 2020/2021, academic years confirmed that the internationalization of the teaching course content related to architecture and building is possible. In this sense, most of the participating students reflected in the surveys their satisfaction with the internationalization approach adopted. This aspect even included the usefulness of this approach for the best professional performance of students at the end of their studies. Thus, the use of ISO standards guarantees a development of the course that meets national and international students' interest, as well as appropriate knowledge for professional practice. In addition, no rejection was detected on the part of the Spanish students with the adoption of a more international approach, so it serves to strengthen the effectiveness of the approach adopted.

Nonetheless, the analysis also detected two aspects that should be faced to guarantee a full internationalization. The first aspect is related to teaching the content in other languages. Students (lower than 30%) do not think that it is required, but it should be tackled by the teaching staff in the medium term. The linguistic barrier should be addressed to guarantee that the degree of satisfaction of both international and national students is closer to 100%. The development of bibliographic material in the predominant languages among students could be one of these measures, although teaching classes in other languages should also be addressed. The second limitation is related to the possibility of teaching energy certification tools from other countries. This aspect could be more difficult than the linguistic barrier as the tools are usually different among countries and are only validated in their territory. The common practice in architecture and building degree programmes in Spain is teaching the many tools existing in Spain, but students from other countries are not interesting in them as they are not going to use them professionally. Thus, addressing this aspect could be a challenge as national students could reduce their degree of satisfaction if teaching focuses on other countries' tools that they hardly could put into practice in the future. Thus, further studies should address these two aspects to guarantee greater internationalization of teaching content.

To conclude, the results suggest that the project management methodology could systematize the improvements in teaching content related to technical teachings as they limit workflow and establish contingency plans to reduce the risks related to modifications. This systematic approach by processes therefore proves improvement aspects in the modification process of teaching content and in the results obtained, thus avoiding that these improvement points are unnoticed. This study describes in detail the adaptation process of the content of a course of the master's degree in building engineering of the University of Seville to have a more international approach; however, the results are expected to be extrapolated to other universities in Spain and in other countries of both Latin America

and the Mediterranean region due to the similarity of students' profiles and curriculums. Despite this, in future works the possibilities of internationalizing degrees from other countries with the approach used in this study should be addressed.

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