sustainability

MDPI

Article

Interdisciplinary Experience Using Technological Tools in Sport Science

Paula Gabriela Benavidez Lozano [1,2,*], M.ª Alejandra Ávalos-Ramos [3] and Lilyan Vega-Ramírez [3]

[1] Department of Physics, Systems Engineering and Signal Theory, Polytechnic School, University of Alicante, 03690 Alicante, Spain
[2] Institute of Physics Applied to Sciences and Technology, University of Alicante, 03690 Alicante, Spain
[3] Department of General and Specific Didactics, Faculty of Education, University of Alicante, 03690 Alicante, Spain; sandra.avalos@ua.es (M.A.Á.-R.); lilyan.vega@ua.es (L.V.-R.)
* Correspondence: paula.benavidez@ua.es

Received: 31 October 2020; Accepted: 23 November 2020; Published: 25 November 2020

check for updates

Abstract: In the framework that interdisciplinary projects could be a potential tool to improve learning processes in higher education, a teaching innovation experience was carried out. This study presents the didactic experience carried out between two first-year subjects of the Degree in Physical Activity and Sport Sciences. The experience consisted of designing and implementing a practice activity from an interdisciplinary approach and with the support of technological tools, such as the use of platforms, recordings and sports technique analysis software. The main aim of the present study was to assess such an experience according to students' perception. The instrument used to assess such an interdisciplinary experience was a questionnaire of 17 items. The sample comprised 79 students who attended both subjects simultaneously. The reliability of the instrument is ensured according to Cronbach's alpha (a = 0.903). The results of this study, as interdisciplinarity and organizational aspects, were highly assessed. The analysis of the survey also indicates that this interdisciplinary practice activity helped subjects to achieve a more meaningful level of both integrated and specific knowledge.

Keywords: biomechanics; gymnastic skills; interdisciplinary approach; technology-enhanced learning; teaching innovation experience

---

1. Introduction

The implementation of the European Higher Education Area (EHEA) promotes skills-based learning that students must develop. Consequently, González and Wagenaar [1] define the term "competencies" as a dynamic set of attributes, linked to the knowledge and implementation that describe the learning objectives of an educational program. This new plan has motivated university faculty to rethink teaching strategies, prioritizing the teaching process over what is taught and framing the contents in the context of their professional future. Under these premises, various debates and investigations [2–5] have arisen, motivating the launch of a series of experiences aimed to enhance the interrelationship between the knowledge acquired in the different disciplines or subjects.

In this context, we are experiencing how education evolves from a traditional educational model, by disciplines, to one where interdisciplinarity is prioritized. Morín [6] relates disciplines to a category that organizes scientific knowledge. Previously, Torres [7] pointed out that the classical educational model by disciplines is based on a fragmentation (or atomization) of knowledge which started at the beginning of the last century. He suggests that this traditional education model encourages students to develop memoirist strategies in order to meet their curricular requirements. This model entails several drawbacks, such as the difficulty of critical reflection, an abstract perception of concepts and an obvious difficulty in applying the acquired knowledge to their future professional environment.

On the other hand, opposed to the fragmentation of knowledge, is the educational approach based on the integration of knowledge [8]. This model, usually related to interdisciplinarity, has been highly promoted by countries such as the United States and Canada [9–11]. Proponents of interdisciplinarity in higher education point out that it promotes new forms of communication and collaboration between disciplines [12,13], allowing students to acquire specific useful problem-solving skills.

It is advisable to give a brief review of the discipline and interdisciplinarity terms. Although there is no absolute consensus about both definitions and the requirements to be defined as such [14], we highlight the following. On one side, Torres [7] (p. 58) states "A discipline is a way to organize and delimit a working territory, to concentrate research and experiences within a certain point of view". This disciplinary fragmentation is the product of research work that has allowed a profound understanding of specific fields that have managed to entrench themselves. On the other side, the term interdisciplinarity arises as a critique of an overly compartmentalized science. Cooke et al. [11] defines interdisciplinarity "as the way of building and creating new and multifaceted knowledge". For these authors, interdisciplinarity involves paths of collaboration and teamwork between people from different disciplines involved in a common problem. Therefore, interdisciplinarity promotes the integration of knowledge and facilitates the learning process, to the detriment of fragmentation in isolated disciplinary areas. Similar definitions can be found in Klein [15,16].

Numerous recent publications share experiences and reflections on interdisciplinary studies, and some of them are then mentioned, without intending to perform a full count of all of them. For instance, Cárdenas et al. [3] share their experience in the double Degree of Social Work and Social Education during two successive academic courses. For these authors, the experience was highly satisfactory for both the students and the teaching team. However, they point out that this methodology demands a high degree of coordination between the teachers in charge of the educational process. Furthermore, a number of studies focused on the statistical analysis of an interdisciplinarity experience can be found in the literature [17–20]. Another interesting proposal is the one detailed by Koch et al. [21] involving first-year university students in an interdisciplinary project. These authors state that this teaching framework confirms that interdisciplinary study projects should be considered as an effective approach to enhance higher education. In addition, these projects can potentially fulfil students' psychological needs and enhance students' academic engagement. Recently, Santaolalla et al. [5] designed and implemented an interdisciplinary model for education teachers, from which they developed an empirical study to analyze its impact on the learning process. Their results indicate an improvement in teaching skills and competencies when comparing pre- and post-experience data.

Regarding sports sciences, Piggott et al. [22] conducted a systematic analysis of 36 articles to determine whether talent identification, talent selection and competitive performance are based on interdisciplinary or multidisciplinary research. The main conclusion of this work is that most of the articles considered, which were focused on improving the understanding of athletic performance, were classified as interdisciplinary because of the incorporation of knowledge, methods and measures from three or more subdisciplines.

In Spain, the Royal Decree (RD) 1393/2007 [23] establishes the organization of Spanish university education to conform to the requirements of the EHEA. This RD indicates the need to establish pedagogical criteria and methodologies to ensure the quality of university studies. In the Spanish educational context, the use of active methodologies is strongly recommended, where autonomous work, decision-making and collaborative work are part of the teaching by competencies. In this sense, interdisciplinarity becomes more relevant, showing a global vision, not isolated, in search of solutions to different challenges or difficulties that society demands [5].

The preceding paragraphs show that the methodology based on interdisciplinarity is not something novel in itself, as it has been a manifest trend since the end of the last century and whose references remain valid today. In fact, it appears that this methodology has gained more support over the past two decades. However, it seems that both administrative and bureaucratic difficulties together with high demands for coordination among teachers may have delayed its implementation to a greater extent [10]. It is worth noting that there are essential advantages and disadvantages of both disciplinary and interdisciplinary approaches. Moreover, there is a broad discussion about different types of interdisciplinarity that the reader can consult in Griffin et al. [24]. It should be mentioned that we do not necessarily consider disciplines with a negative connotation. To ensure that interdisciplinarity makes sense, sufficiently developed disciplines supporting it should already have been developed. As Pozuelo et al. [8] suggest, in order to achieve a broader view of the object of study, it is necessary to increase the scope and to break the boundaries of the subjects.

In addition to previous premises, it is worth mentioning that using information and communication technologies (ICT's) as a complement to this strategy is a suitable resource to improve educational quality and performance. Cabero and Martínez [25] point out that these are tools that complement the acquisition, enrichment and generation of knowledge, so their inclusion in the teaching–learning process can be very useful to achieve more situated and integrated learning [26].

The concern of this research project is to develop a teaching methodology that involves students and enhances their engagement, improving their learning process through interdisciplinary practices.

Consequently, the work we are presenting is inspired by the interdisciplinary nature of the sports sciences, pointed out by Piggott et al. [22]. Our goal is to transfer this observed feature in the research field to the higher education environment. To do this, an interrelated and coordinated pilot practice activity was articulated and implemented between two first-year subjects: Biomechanics of Physical Activity (BPA) and Gymnastics and Artistic Skills (GAS), in the Degree in Physical Activity and Sport Sciences (PASS). This research aims to assess university students' perception of such interdisciplinary experience, supported by technological tools in terms of the organizational and acquisition of both integrated and specific knowledge.

2. Materials and Methods

2.1. Participants

This teaching experience was carried out with first-year PASS students of the University of Alicante, during the 2019–2020 academic year, linking the subjects of BPA and GAS. Students were invited to participate in this research study by answering an online questionnaire. The sample consists of N = 79 students (51 males and 28 females), which corresponds to about 72% of students enrolled in the academic year 2019–2020. The sample was selected for convenience and availability. Students were informed that their answers to the questionnaire were completely voluntary and anonymous.

2.2. Description of the Experience

In the first semester of the mentioned academic year, the faculty of both subjects designed and planned the interdisciplinary experience. During the second semester, the implementation of the educational practice was carried out. This practice consisted of students performing a specific gesture of gymnastic disciplines for further technical and biomechanical analysis. The characteristics of such gestures were carefully chosen in order to allow an enhanced technical and conceptual analysis for both subjects. The gesture chosen for the teaching practice was a vertical jump with previous race. From the point of view of the GAS subject, the jump is a fundamental and common gesture in gymnastics, where reaching a high height and a correct body posture in the flight phase are a guarantee of good technical efficiency. Therefore, flight time becomes the most relevant physical variable. Knowing the various phases that set up the jumps and the technical descriptors of each are issues that students should develop to optimize their execution. On the other hand, biomechanical analysis of jumps is usually a recurrent process for the BPA subject, since some relevant parameters for any athlete, i.e., jump height and developed power, can be obtained. Besides, by incorporating a previous race into the jump gesture, the analysis is even more interesting, as the theoretical framework related to practice is expanded.

The experience was performed during a total of three sessions, the first one was 3 h long and associated with the GAS subject, and then two sessions associated with BPA, which were 2 h long each. During the first session, the sports gesture, data collection (which implies the registration of the jump on the contact platform and recording of the gesture) and technical analysis were performed. It is worth noting that this phase of the activity was carried out in the tatami room of the University of Alicante, ensuring the ideal conditions for physical activity. At the beginning of the session, students were informed about how practice was going to be developed. A form for the technical analysis of the gesture was also provided by faculty. Quantitative biomechanical analysis of the jump was carried out during the 2 h BPA sessions. Previously, students had access to instructive resources and guidelines, which also included links to software tutorials usually used to perform the motion analysis. During the biomechanics session, different introductory activities were carried out both for the use of contact platforms (which was used to register the flight time and therefore jump height), as well as to the motion analysis software "kinovea". Figure 1 shows an example of the biomechanical analysis performed.

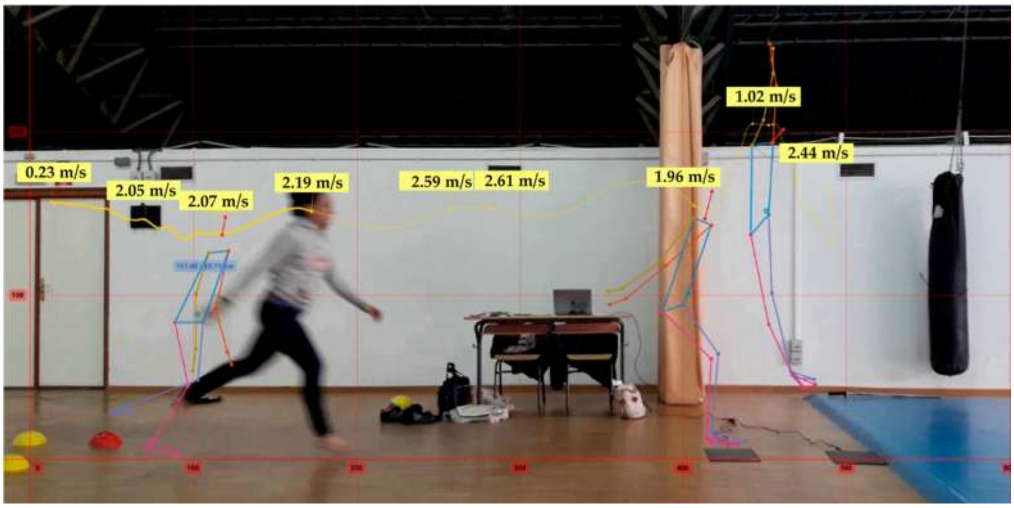

Figure 1. Example of a biomechanical analysis of a student.

2.3. Instrument

The teaching experience was assessed quantitatively through a closed response questionnaire that was provided to students after the educational experience and subsequently analyzed with SSPS 26.0.0.0 software. As our concern about this experience is rather specific regarding the context and the subjects involved, we developed our own questionnaire. We were particularly interested in knowing whether this practice activity contributes to acquiring an integrated knowledge of both subjects. Furthermore, another interesting aspect for us was the extent if the students achieve a better understanding of syllabus content. With this aim, the author elaborated a set of 17 items, which were reviewed by 3 experts in higher education. The questionnaire was developed for the evaluation of two thematic blocks. Block 1 is encouraged to assess the integral aspect of the experience (eight items) and Block 2 values the perception of the acquisition of specific knowledge (nine items). The questionnaire structure is shown in Table 1. Answers for each item were given on a five-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree), except for items 13 and 14, where the Likert scale corresponds to: 1: Very difficult; 2: Difficult; 3: Neutral; 4: Easy; 5: Very easy.

Table 1. Questionnaire items.

Item	Block 1
3	The time allocated to develop the practice activity has been sufficient.
4	The tasks set were sufficient for the number of students.
5	The material used for the practice activity in both subjects has been adequate.
8	Qualitative biomechanical analysis has helped me distinguish phased division from the technical gesture.
9	Quantitative biomechanical analysis has helped me to understand the technical requirements of the gesture posed in the GAS subject.
12	Performing this practice has made it easier for me to understand the different technical phases of a movement through the observation and self-assessment sheets.
15	In general, I think it is positive to do practices linking both subjects, BPA and GAS.
16	I would like to carry out practices linking the BPA subject with other subjects.
	Block 2
1	I believe that the practice activity has been properly explained in the BPA subject.
2	I believe that the practice activity has been properly explained in the GAS subject.
6	The complementary material recommended by the BPA teacher has helped me to improve the practice experience of sports gesture analysis.
7	The activity has helped me to understand the theoretical–practical concepts of the GAS subject.
10	Using motion analysis software has helped me understand the kinematics concepts of the BPA subject (e.g., average speed, instantaneous speed, etc.).
11	Performing this practice has helped me to understand the concepts of dynamics of the BPA subject (e.g., reaction force, impulse, initial strength principle).
13	The level of complexity of the practice from the point of view of biomechanical analysis has been . . .
14	The level of complexity of the practice from the point of view of technical execution has been . . .
17	I agree that learning this kind of biomechanical analysis will be useful in my professional future.

The reliability of the instrument was estimated through Cronbach's alpha to validate the internal consistency of the instrument ($\alpha = 0.908$). Table 2 shows the Cronbach's alpha values when removing each element. In this case, we can see that reliability of the questionnaire is adequate ($\alpha > 0.70$).

Table 2. Instrument reliability analysis.

Item	Average Scale if the Element Has Been Removed	Scale Variance if the Element Has Been Removed	Total Corrected Element Correlation	Cronbach's Alpha if the Item Has Been Removed
1	64.73	78.326	0.650	0.901
2	65.37	77.594	0.493	0.906
3	65.18	76.840	0.599	0.902
4	65.00	77.641	0.669	0.900
5	64.80	79.369	0.634	0.902
6	64.85	77.413	0.702	0.899
7	65.47	77.688	0.525	0.905
8	64.76	77.800	0.620	0.901
9	65.11	79.384	0.430	0.908
10	64.89	76.820	0.682	0.900
11	64.95	78.254	0.614	0.902
12	64.92	77.661	0.664	0.900
13	65.61	79.600	0.501	0.905
14	65.25	78.525	0.497	0.905
15	64.84	77.985	0.573	0.903
16	64.75	78.115	0.609	0.902
17	64.95	76.869	0.507	0.906
N = 0 79, α = 0.908				

2.4. Data Analysis

A descriptive statistical analysis from mean, medians and SD was performed through SSPS 26.0.0.0 software. Then, an exploratory factorial analysis of Block 1 was carried out to identify the variables that relate to each other.

3. Results

As noted in Table 3, the question "Qualitative biomechanical analysis has helped me distinguish phased division from the technical gesture" (item 8) and "I would like to carry out practices linking the BPA subject with other subjects" (item 16) are the highest-valued aspects ($M_e = 5$). Likewise, the items associated with the organizational aspects (items 3, 4 and 5) of the activity were satisfactorily valued by the students ($M_e = 4$). Items related to the proper acquisition of both integrated (items 9 and 12) and specific knowledge (item 7, 10 and 11) were optimally perceived ($M_e = 4$). Students also express a high interest in performing similar practices in the future (item 15) ($M_e = 4$). Participants also agree that the information, pre-practice explanations and supplementary material used (items 1, 2, 6) were appropriate ($M_e = 4$). In addition, students' assessments regarding the usefulness of the activity for their work future (item 17) were positive ($M_e = 4$).

Table 3. Descriptive statistics for students' perception of the educational experience (N = 79).

Item	Mean	Std. Error	Median	Std. Deviation
1	4.35	0.09	4.00	0.75
2	3.72	0.11	4.00	1.02
3	3.91	0.10	4.00	0.93
4	4.09	0.09	4.00	0.79
5	4.29	0.08	4.00	0.68
6	4.24	0.09	4.00	0.77
7	3.62	0.11	4.00	0.96
8	4.33	0.09	5.00	0.83
9	3.97	0.11	4.00	0.93
10	4.20	0.09	4.00	0.84
11	4.14	0.09	4.00	0.80
12	4.16	0.09	4.00	0.79
13	3.48	0.09	3.00	0.81
14	3.84	0.10	4.00	0.93
15	4.25	0.10	4.00	0.87
16	4.34	0.09	5.00	0.86
17	4.14	0.12	4.00	1.07

Finally, the assessments of the level of difficulty of the tasks proposed in the educational experience from the point of view of biomechanical analysis (items 13) correspond to a median value ($M_e = 3$) and, from the point of view of the technical execution of the jump (item 14), it was slightly simpler ($M_e = 4$).

Subsequently, an exploratory factorial analysis was performed. The results of Bartlett's sphericity test and the Kaiser–Mayer–Olkin (KMO) index are here addressed. Barlett's sphericity test is significant ($\chi^2 = 233.787$, gl = 28, p = 0.000), indicating that the correlation matrix is significantly different from the identity matrix—a correlation matrix of 0 between the variables—so it is susceptible to factor analysis. Similarly, the KMO index is 0.788, higher than 0.50. The next step is to analyze the number of factors obtained and the percentage of variance explained by each of them. In our example, two factors appear, the first explains 32.182% of the variance, the second explains 29.186% of the variance. In total, the two factors account for 61.386% of the variance, a percentage within the typical values (60–80%) established as the minimum requirement. We identify these components with the interdisciplinary and organizational aspects that set up the questionnaire. Table 4 shows the rotated factorial matrix—using the varimax method—in which the saturations, or factorial loads, of each item (or variable) appear in each factor for the items in Block 1.

Table 4. Rotated component matrix [a].

	Components	
Item	**Interdisciplinary Aspects**	**Organization**
8	0.758	
15	0.713	
9	0.695	
16	0.629	0.366
12	0.591	0.520
3		0.853
4		0.847
5	0.464	0.609
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		

[a] Rotation converged in three iterations.

4. Discussion

The results of our study show that students' assessment were highly positive regarding interdisciplinary and organizational aspects. Participants expressed an interest in continuing performing practices in this line and this helped them to better understand the content of both subjects. According to various authors [27,28], interdisciplinary strategies can influence other associated aspects, such as motivation or predisposition towards content to learn, determining factors and keys to meaningful learning that last over time.

The results indicate that the students positively value the advantages of integrating the knowledge that each discipline brings to apply it in their professional activities. Therefore, performing practices integrated into and related with the professional field is very enriching and motivating for their training process. Interdisciplinarity can facilitate a better understanding of curriculum content and offer higher quality in the acquisition of skills, thus achieving more solid learning [11] due to the relevance of these aspects. In addition, interdisciplinary practices promote the improvement and development of teaching skills [5], improving academic engagement, basic competencies and autonomy in the training of higher education students [21]. On the other hand, proposals for practices such as the one carried out in this study will bring us closer to the development of more thoughtful, critical and self-regulated learning skills. These will be able to ensure a more meaningful and situated learning towards the professional future of students [29–31].

It is also interesting to highlight the use of technologies in the development of the practice. It is present at two stages, first at the time of the execution of the technical gesture through the use of recording cameras and the contact platform to register the jump, and second in the subsequent analysis of the jump through the use of software for motion analysis. The students point out that the use of these tools has allowed them to improve the step of acquisition content usually required in the syllabus of the subjects. Along this line, Cabero and Martínez [25] argue that the use of technological resources facilitates the construction of knowledge. Likewise, such interdisciplinary proposals with technological support can allow a greater connection between theory and practice, thus offering more placed learnings of the specific contents to be developed [26], in this case, the kinematic analysis of the technical gesture. In this sense, this type of practice favors the connection between theory and practice. Vega, Hederich and Vidaci [32] argue that it is essential to expose theoretical–practical content in a linked way. The methodologies used need to take into account the learning context, the actions to be developed and the experience of students in the field of work. The use of problem-solving practices, challenge approaches or simulated practices would help to interrelate the practice with the theoretical aspects [31].

Concerning Block 2, where the perception of acquisition of specific knowledge was assessed in each subject, participants positively graded pre-practice explanations, as well as the material used.

The students point out the ability to better assimilate and understand the specific matter treated with this practice. Specific resources, such as observation, self-assessment and the co-assessment sheet of technical gestures, facilitated their learning. These resources that enable self-regulated learning can be useful in developing aspects such as responsibility and active involvement in the training process [33,34]. In addition, these complementary materials promote communication and feedback by providing learners with the necessary information to be aware of their progress [35,36].

Finally, students point out that the level of complexity of the practice was appropriate to their level of knowledge. In coincidence with Zhang et al. [37], the planning and organization of curriculum content and its adequacy in terms of the level of demand must be in line to ensure the continuity and interest of students towards what they learn. These considerations should be taken into account in the design of interdisciplinary practices in order to enhance comprehensive training. In this sense, many teachers point out having difficulties in planning a subject by competencies, and demand instructions and models from the institutions [38,39]. The design of interdisciplinary practices must be global and inclusive. These issues require a high degree of planning and coordination between teachers, constant involvement with and between students; and a fluid communication channel between both [3], issues that are not always easy to address.

One of the limitations of this study is the lack of a control group. As both subjects are mandatory in the curricula of first-year studies, and due to the uneven distribution of students in the different groups of each subject, it was impossible to have a control group. However, as the general idea of this pilot study was to observe a first reaction of learners to this kind of methodology, we considered it meaningful to assess the experience from the students' perspective. Another, limitation of this pilot study is based on the small number of subjects involved in the experience during a short period of time. However, despite these limitations, the results are strong, and the experience has been very satisfactory for faculty and students. The faculty involved in the educational experience noticed how students' interest and motivation increased in subsequent classes. This encourages the authors to take a step forward by extending this project. In the near future, we plan to design interdisciplinary projects, increasing the number of subjects involved and increasing the technical gestures to be analyzed. This will allow us to achieve necessary knowledge of the professional training of university students.

5. Conclusions

The main conclusions of this work are brought into line with the promotion of interdisciplinary practices given the numerous benefits that these imply. Students have perceived greater motivation, a greater understanding of the contents and more significant connection between the theoretical and the practice. This pilot study denotes the relevance of designing strategies that enhance thoughtful, meaningful and interdisciplinary learning. The apprenticeship of future professionals in the physical activity and sport science field must be practical and integrated into the professional context itself, supported by the technological resources necessary to promote the construction of knowledge. Therefore, it is necessary to propose interconnected and comprehensive educational practices and thus contribute to the development of competent professionals. Decision-making, teamwork and spaces for sharing experiences and knowledge could be the key to achieving these goals. The framework of this educational experience is the EHEA, promoting the global development of generic, specific and professional competencies. These are skills that are highly demanded in the current world of work.

Author Contributions: Conceptualization, P.G.B.L. and M.A.Á.-R.; methodology, P.G.B.L. and M.A.Á.-R.; software, P.G.B.L.; validation P.G.B.L., M.A.Á.-R. and L.V.-R.; formal analysis, P.G.B.L., M.A.Á.-R. and L.V.-R; investigation, P.G.B.L. and M.A.Á.-R.; resources, P.G.B.L. and M.A.Á.-R.; data curation, P.G.B.L. and L.V.-R; writing—original draft preparation, P.G.B.L. and M.A.Á.-R.; writing—review and editing, P.G.B.L., M.A.Á.-R. and L.V.-R.; visualization, P.G.B.L. and M.A.Á.-R.; supervision, M.A.Á.-R.; project administration, P.G.B.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Program Redes-I3CE for Research in University Teaching, from the Vice rectorate of Educational quality and innovation, Institute of Education Sciences of the University of Alicante (call 2019-20).

Acknowledgments: We thank all the students who voluntarily participated in the assessment instrument for this study.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

References

1. González, J.; Wagenaar, R. *Tuning Educational Structures in Europe. Informe Final Fase I*; Universidad de Deusto: Bilbao, Spain, 2003; p. 28.
2. Paytan, A.; Zoback, M.L. Crossing boundaries, hitting barriers. *Nature* **2007**, *445*, 950. [CrossRef]
3. Cárdenas, R.; Terrón, T.; Monreal, C. Interdisciplinariedad o multidisciplinariedad en el ámbito universitario. Desafíos para la coordinación docente. *Bordón. Rev. Pedagog.* **2015**, *67*, 167–183. [CrossRef]
4. Arroyo, M.J.; Pinedo, R.; Iglesia, M. Coordinación docente e interdisciplinariedad para la adquisición de competencias en el Grado de Educación Primaria e Infantil: Percepciones de alumnado y profesorado. *Tend. Pedagógicas* **2020**, *35*, 102–117. [CrossRef]
5. Santaolalla, E.; Urosa, B.; Martín, O.; Verde, A.; Díaz, T. Interdisciplinarity in teacher education: Evaluation of the effectiveness of an educational innovation project. *Sustainability* **2020**, *12*, 6748. [CrossRef]
6. Morin, E. *La Cabeza Bien Puesta. Repensar la Reforma, Reformar el Pensamiento*; Nueva Visión: Buenos Aires, Argentina, 2001.
7. Torres, J. *Globalización e Interdisciplinariedad: El Currículo Integrado*; Morata: Madrid, Spain, 1996.
8. Pozuelos, F.J.; Rodríguez, F.P.; Travé, G. Interdisciplinary approach in the Higher Education context. A case study. *Rev. Educ.* **2012**, *357*, 561–585. Available online: http://www.educacionyfp.gob.es/dctm/revistaeducacion/articulosre357/re35725.pdf?documentId=0901e72b8127d1fd (accessed on 13 October 2020).
9. Jacob, W.J. Interdisciplinary trends in higher education. *Palgrave Commun.* **2015**, *1*, 135–147. [CrossRef]
10. Shandas, V.; Brown, S.E. An empirical assessment of interdisciplinarity: Perspectives from graduate students and Program Administrators. *Innov. High. Educ.* **2016**, *41*, 411–423. [CrossRef]
11. Cooke, S.J.; Nguyen, V.M.; Anastakis, D.; Scott, S.D.; Turetskyd, M.R.; Amirfazli, A.; Hearn, A.; Milton, C.E.; Loewen, L.; Smith, E.E.; et al. Diverse perspectives on interdisciplinarity from Members of the College of the Royal Society of Canada. *Facets* **2020**, *5*, 138–165. [CrossRef]
12. Graybill, J.K.; Dooling, S.; Shandas, V.; Withey, J.; Greve, A.; Simon, G.L. A rough guide to interdisciplinarity: Graduate student perspectives. *BioScience* **2006**, *56*, 757–763. [CrossRef]
13. Graybill, J.K.; Shandas, V. Doctoral student and early career academic perspectives. In *The Oxford Handbook of Interdisciplinarity*; Frodeman, J.T., Klein, C., Mitcham, B., Holbrook, R., Eds.; Oxford University Press: Cambridge, UK, 2010; pp. 404–418.
14. Greckhamer, T.; Koro-Ljungberg, M.; Cilesiz, S.; Hayes, S. Demystifying interdisciplinary qualitative research. *Qual. Inq.* **2008**, *14*, 307–331. [CrossRef]
15. Klein, J.T. *Interdisciplinarity: History, Theory and Practice*; Wayne State University Press: Detroit, MI, USA, 1990.
16. Klein, J.T. Prospects for transdisciplinarity. *Futures* **2004**, *3*, 515–526. [CrossRef]
17. Hernández-Armenta, I.; Domínguez, A. Evaluación de percepciones sobre la interdisciplinariedad: Validación de instrumento para estudiantes de Educación Superior. *Form. Univ.* **2019**, *12*, 27–38. [CrossRef]
18. Lattuca, L.R.; Knight, D.; Bergom, I. Developing a measure of interdisciplinary competence. *Int. J. Eng. Educ.* **2013**, *29*, 726–739.
19. Lattuca, L.R.; Knight, D.; Seifert, T.A.; Reason, R.D.; Liu, Q. Examining the impact of interdisciplinary programs on student learning. *Innov. High. Educ.* **2017**, *42*, 1–17. [CrossRef]
20. Berasategi, N.; Aróstegui, I.; Jaureguizar, J.; Aizpurua, A.; Guerra, N.; Arribillaga-Iriarte, A. Interdisciplinary learning at University: Assessment of an interdisciplinary experience based on the case study methodology. *Sustainability* **2020**, *12*, 7732. [CrossRef]
21. Koch, F.D.; Dirsch-Weigand, A.; Awolin, M.; Pinkelman, R.J.; Hampe, M.J. Motivating first-year university students by interdisciplinary study projects. *Eur. J. Eng. Educ.* **2017**, *42*, 17–31. [CrossRef]

22. Piggott, B.; Müller, S.; Chivers, P.; Papaluca, C.; Hoyne, G. Is sports science answering the call for interdisciplinary research? A systematic review. *Eur. J. Sport Sci.* **2019**, *19*, 267–286. [CrossRef]
23. Royal Decree 1393/2007, of 29 October, Establishing the Organisation of Official University Education. Available online: https://www.boe.es/eli/es/rd/2007/10/29/1393 (accessed on 25 November 2020).
24. Griffin, G.; Medhurst, P.; Green, T. Interdisciplinarity in Interdisciplinary Research Programmes in the UK Report. 2006. Available online: https://www.york.ac.uk/res/researchintegration/Interdisciplinarity_UK.pdf (accessed on 30 September 2020).
25. Cabero, J.; Martínez, A. Las tecnologías de la información y comunicación y la formación inicial de los docentes. Modelos y competencias digitales. *Profr. Rev. Curric. Y Form. Profr.* **2019**, *23*, 247–268. [CrossRef]
26. Kok, M.; Komen, A.; van Capelleveen, L.; van der Kamp, J. The effects of self-controlled video feedback on motor learning and self-efficacy in a Physical Education setting: An exploratory study on the shot-put. *Phys. Educ. Sport Pedagog.* **2020**, *25*, 49–66. [CrossRef]
27. Calderón, A.; de Ojeda, D.M.; Campos, A. El Modelo de Educación Deportiva y la enseñanza de lenguas extranjeras: Una experiencia en Educación Primaria-G-SE. *Rev. Educ. Física* **2015**, *32*, 26–33.
28. Izquierdo, J.L. Propuesta de un proyecto interdisciplinar para el fomento del aprendizaje de los primeros auxilios en educación física. *EmásF Rev. Digit. Educ. Física* **2019**, *60*, 91–105.
29. Dyson, B.P.; Colby, R.; Barratt, M. The co-construction of cooperative learning in physical education with elementary classroom teachers. *J. Teach. Phys Educ.* **2016**, *35*, 370–380. [CrossRef]
30. Jonnaert, P.; Barrette, J.; Masciotra, D.; Yaya, M. La competencia como organizadora de los programas de formación: Hacia un desempeño competente. *Profr. Rev. Curric. Form. Profr.* **2008**, *12*, 1–32. Available online: http://www.ugr.es/~recfpro/rev123ART3.pdf (accessed on 30 September 2020).
31. Ruiz-Bueno, C.; García-Orriols, J. What does the learning patterns model contribute to the design of educational actions? *Rev. Colomb. Educ.* **2019**, *77*, 321–341. [CrossRef]
32. Vega, L.; Hederich, C.; Vidaci, A. Identificación de los patrones de aprendizaje: Estudiantes de Ciencias de la Actividad Física y el Deporte y Maestro en Educación Primaria. In *La Docencia en la Enseñanza Superior. Nuevas Aportaciones Desde la Investigación e Innovación Educativas*, 1st ed.; Roig-Vila, R., Ed.; Octaedro: Barcelona, Spain, 2020; pp. 455–461.
33. Panadero, E. A review of self-regulated learning: Six models and four directions for research. *Front. Psychol.* **2017**, *8*, 422. [CrossRef] [PubMed]
34. Zimmerman, B.J. From cognitive modeling to self-regulation: A social cognitive career path. *Educ. Psychol.* **2013**, *48*, 135–147. [CrossRef]
35. Kangalgil, M.; Özgül, F. Use of feedback in physical education and sports lessons for student point of view. *Univers. J. Educ. Res.* **2018**, *6*, 1235–1242. [CrossRef]
36. Asún, S.; Friar, A.; Aparicio, J.L.; Romero, M.D. Difficulties in the use of feedback in the training of physical education teachers. *Challenges* **2020**, *37*, 85–92.
37. Zhang, T.; Wang, Y.; Yli-piipari, S.; Chen, A. Power of the curriculum: Content, context, and learning in physical education. *Res. Q. Exerc. Sport* **2020**, 1–12. [CrossRef]
38. Arribas, T.L.; Mateu, J.C.; Ramírez, S.G. Lesson planning in physical education according to the key competences approach: Challenges and problems when applying at school. *Multidiscip. J. Educ. Res.* **2016**, *6*, 292–317. [CrossRef]
39. Caballero, J.A. La contribución del área de educación física a las competencias básicas: Opinión de los docentes. *EmásF Rev. Digit. Educ. Física* **2013**, *21*, 41–58.