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Influence of E-learning training on the acquisition of competences in basketball coaches in Cantabria

Josep Alemany-Iturriaga^{1,2*}, Álvaro Velarde-Sotres^{3,4,5}, Javier Jorge⁶ and Kamil Giglio²

Abstract: The main aim of this study was to analyse the influence of e-learning training on the acquisition of competences in basketball coaches in Cantabria. The current landscape of basketball coach training shows an increasing demand for innovative training models and emerging pedagogies, including e-learning-based methodologies. The study sample consisted of fifty students from these courses, all above 16 years of age (36 males, 14 females). Among them, 16% resided outside the autonomous community of Cantabria, 10% resided more than 50 km from the city of Santander, 36% between 10 and 50 km, 14% less than 10 km, and 24% resided within Santander city. Data were collected through a Google Forms survey distributed by the Cantabrian Basketball Federation to training course students. Participation was voluntary and anonymous. The survey, consisting of 56 questions, was validated by two sports and health doctors and two senior basketball coaches. The collected data were processed and analysed using Microsoft® Excel version 16.74, and the results were expressed in percentages. The analysis revealed that 24.60% of the students trained through the e-learning methodology considered themselves fully qualified as basketball coaches, contrasting with 10.98% of those

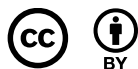
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trained via traditional face-to-face methodology. The results of the study provide insights into important characteristics that can be adjusted and improved within the investigated educational process. Moreover, the study concludes that e-learning training effectively qualifies basketball coaches in Cantabria.

Subjects: Sport Education; Youth Sport; Sports Coaching

Keywords: e-learning; education; competences; coach; basketball

1. Introduction

Historically, learning and education required a physical approach for it to be assimilated and integrated into the construction of knowledge itself. This approach was constrained by time and space, which were not always insurmountable barriers to learning (García, 2007). Suasti et al. (2020) emphasised how the teaching-learning process is constantly adapting to societal demands and student characteristics, such as students on basketball coaching courses in Cantabria who are looking for a training offer that avoids long-distance travel and is more accessible and cost-effective. According to Márquez-Baquero et al. (2023), students are constantly compelled to acquire new skills and knowledge, which has resulted in profound and long-lasting changes and redesigns in training models in recent decades (Molina-García et al., 2020). Rivera et al. (2017) proposed a model that divides the classroom into four distinct educational environments, eliminating the need for physical attendance:

- None-Virtual Distance Education: This is the conventional form of distance education, increasingly prevalent in regions of low development with limited access to telematic networks.
- Distance Education with Virtual Environments: This form is common among distance learning institutions, which often evolve from the classical model and start to incorporate the Internet into their educational offerings.
- Bimodal or Hybrid Learning Environments: These refer to *blended learning* approaches, also known as hybrid, mixed, or dual-mode learning. They represent the coexistence of two traditional models—face-to-face and distance learning—within the same institution.
- E-Learning: This term refers to distance education that predominantly employs the Internet as a transmission medium, primarily through virtual environments.

We presently exist within a knowledge society (Nonaka & Takeuchi, 1997), where training models and trends hinge upon information and communication technologies (ICT). According to Baena-Rojas et al. (2023), these technologies have played an increasingly significant role in higher education to bolster students' skills and qualifications. In the contemporary context, ICT is a crucial instrument for enhancing teaching-learning processes (Pla et al., 2020). Hence, novel methods and models of interaction, teaching, and learning are emerging that circumvent the spatial and temporal rigidity of conventional instruction (García, 2001). Characterised by their flexibility (García, 2001), these models leverage the Internet, and as suggested by Belmonte et al. (2020) and Carretero (2021), position students as active participants in building their knowledge.

This research analyses the initial and continuous training of sports coaches, focusing on basketball coaches. The aim is to provide them with the necessary competences to carry out their professional functions in accordance with the real demands of their respective fields of action (Rodríguez et al., 2022). According to Debesse's viewpoint (Jiménez & Lorenzo, 2010), such training should take three forms: self-education (the coach chooses to self-learn), inter-education (professional development takes place through knowledge exchange and mutual analysis between professional colleagues), and hetero education (training institutions are responsible for training sports coaches). According to Jiménez (2008), hetero education should help the sport coach to develop his or her own educational pathway and to generate a defining life pathway. Given that sport is recognised as an educational tool for people (Miñanas-Signes & Monfort-Pañego, 2020)

and sport coaching is seen as a meaningful learning model—where students comprehend and apply their cognitive and socioemotional skills in real situations (Segarra et al., 2023)—the sport coach emerges as an educational actor with new formative resources. These resources can come from self-learning, institutional training, or experiential knowledge exchange (Jiménez & Lorenzo, 2010), all of which contribute significantly to their training motivational processes (Pulido et al., 2022). ICT and virtual environments, which have recently changed the educational paradigm, enhance the potential of these resources. In times of uncertainty, Aparicio-Gómez et al. (2021) highlight the emergence of new pedagogies in these virtual learning environments, supporting individuals' educational processes in the context of communication networks and fostering a novel learning culture.

This study, therefore, focuses on analysing the relationship between e-learning and the courses offered by the Cantabrian Basketball Federation, designed within an open, interactive, flexible, and ICT-enhanced distance learning framework. Moreover, the traditional model is subject to several limitations, such as the distance between the student's home and the training centre, conflicts with work or academic schedules, economic resources, or global crises such as the COVID-19 pandemic (Pedró, 2020). Therefore, the study aims to explore the possibility of increasing the number of trainers through the appropriate development of competencies within an innovative training framework while ensuring the quality of training. To this end, the aim is to analyse the influence of e-learning training on the acquisition of competencies in basketball coaches in Cantabria.

2. Method

2.1. Design

The research employs a cross-sectional, non-experimental, quantitative methodological approach, wherein statistical techniques are utilised to analyse data gathered from surveys.

The problem was approached in a quantitative and descriptive manner via an *ad hoc* form for data collection. This form includes questions designed to elaborate on the variables, indicators of objectives, and predefined hypotheses, supplemented by classification questions (Fernández-Valmayor et al., 2007).

Stratified random sampling (MAE) was implemented based on the study levels provided by the Cantabrian Basketball Federation (Level 0, Level I, and Level II), as well as the modality (classroom or e-learning). Inclusion criteria for the sample are voluntary participation, whereas exclusion criteria encompass students who have not completed the e-learning courses.

Finally, we were able to determine the level of knowledge and satisfaction with the e-learning training among students of the Cantabrian Basketball Federation's basketball coaching courses. It has also ascertained the level of acquisition of primary competencies for a basketball coach, as outlined in the curriculum of the higher degree diploma of sports education in basketball specialty (Orden EDC, 2016), as detailed below:

- Capability to assemble a balanced basketball team by selecting players in accordance with the sports project and competitive demands.
- Aptitude to assess and classify basketball players based on their technical, physical, psychological, tactical skills, playing abilities, and competitiveness.
- Proficiency in planning the season, as well as programming short, medium, and long-term training schedules, global or specific development programs, team objectives, and required resources.
- Skill in designing collective or individual training sessions.
- Ability to conduct a training session, address existing contingencies, and achieve participant engagement and performance in line with proposed objectives and safety standards.

- Expertise in managing basketball teams during high-performance competitions, making suitable tactical adjustments, managing arising contingencies, and making optimal decisions in accordance with the rules and planned objectives.
- Competence in conducting scouting of one's own team and competitors, managing available technological and human resources, and establishing criteria for individual and collective efficiency.
- Aptitude to form multidisciplinary technical teams and coordinate their actions within the programming of a basketball team.
- Ability to evaluate the preparation process of a team and the results obtained.
- Proficiency in maintaining a professional identity and fostering a spirit of innovation and professional development, enabling adaptation to change in basketball and its organisational environment.

2.2. Participants

The present study employed non-probabilistic sampling for exploratory purposes and included a pilot survey. The eligible population for the survey consisted of 702 students (583 enrolled in the e-learning modality and 119 in the face-to-face modality) of the Cantabrian Basketball Federation's coach training courses.

For the study's design, a form based on the questionnaires of Leite et al. (2011), Santos et al. (2010), and Lozano et al. (2018) was sent, to which fifty participants responded, accounting for 7% of the total. All participants were over the age of 16, and the majority were men (male = 36; female = 14). Sixteen percent lived outside the autonomous community of Cantabria, 10% lived more than 50 kilometres from Santander, 36% lived between 10 and 50 kilometres from the city, 14% lived less than 10 kilometres away, and 24% lived within Santander itself. 70% of those polled were employed, 28% did not receive any type of financial remuneration, and the average for those who did was between 51 and 150 euros per month, with only 14% having an employment contract.

Regarding the training provided by the Cantabrian Basketball Federation, 78% of the respondents have participated in an e-learning training course, while 22% have only been trained through classroom training. Likewise, it is observed that the Level 0 or Initiation course has been taken by 86% of the participants in the study, with the result that 14% have not taken this course and have gone directly to Level I, which has only been completed by 44% of the respondents, while 34% of the respondents have completed the Level II course. None of them have obtained the title of Superior Basketball Coach given by the Spanish Basketball Federation.

2.3. Instrument

The data was collected through a Google Forms survey distributed by the Cantabrian Basketball Federation and validated by experts in the field of sports and senior basketball coaches.

The survey comprises 56 questions grouped into the following blocks:

- (1) Socio-demographic and Economic Data: This encompasses age, gender, place of residence, employment status as a basketball coach, category, financial remuneration, and contractual agreements.
- (2) Coach Training: This focuses on the course level undertaken, the applied methodology (classroom or e-learning), possession of the Superior Basketball Coach title from the Spanish Basketball Federation, course accessibility, satisfaction level with the training experience, and the degree of ICT proficiency.
- (3) Coach Training Effectiveness: This seeks the respondent's opinion on the adequacy of e-learning training for becoming a basketball coach, competency acquisition, and the need to supplement e-learning training with practical sessions.
- (4) Comparison of Learning Modalities (Face-to-Face and E-Learning): This concerns the respondent's views on which modality imparts better training, the advantages and disadvantages of the e-learning modality, and areas for improvement in the e-learning modality.

2.4. Data analysis

Two types of descriptive scales were used to establish the criteria for evaluating the questionnaire responses: a numerical rating scale (NRS) and a Likert scale, which allowed the coaches to accurately represent the degree of importance they assigned to each of the items answered.

The data collection was carried out anonymously and online between September 1 and 31 December 2022. The selection of the sample was the result of contacting basketball coaches in Cantabria through the Federation. Coaches who voluntarily accepted the survey, including minors with the approval of their parents or guardians, signed the informed consent form at the time of sending it.

By using an online form as a data collection tool, the tabulation of data was carried out automatically and the results subsequently analysed and interpreted. The percentages were calculated using Microsoft® Excel version 16.74.

3. Results

The findings of this study provide insight into important aspects of the educational process that can be improved and demonstrate that e-learning training effectively improves the qualifications of basketball coaches in Cantabria. According to the data, nearly three-quarters of the participants were male, and a similar proportion lived outside of Santander, where the Cantabrian Basketball Federation headquarters are located. Almost all respondents said that e-learning training made it easier to access the Cantabrian Basketball Federation's coaching courses, indicating a preference for this format over face-to-face instruction due to the elimination of time and cost constraints associated with travel. More than 80% of Cantabrian trainers rated their virtual training experiences as excellent or very good. This high rating is due to the format's accessibility, simplicity, quality, and convenience, especially during the pandemic. Respondents also praised the Cantabrian Basketball Federation tutors and course director for their professionalism and attentiveness.

Almost all respondents said that e-learning training made it easier to access the Cantabrian Basketball Federation's coaching courses, indicating a preference for this format over face-to-face instruction due to the elimination of time and cost constraints associated with travel. Virtual training was rated excellent or very good by more than 80% of Cantabrian trainers. This high rating is due to the format's simplicity, ease of use, quality, and convenience, especially during the pandemic. Respondents also praised the professionalism and attentiveness of the Cantabrian Basketball Federation tutors and course director.

3.1. Training as a basketball coach

Regarding accessibility, 82.1% of the respondents trained in the e-learning modality perceive that this type of training has significantly facilitated their access to the Cantabrian Basketball Federation's coaching courses. This is compared to 15.4% who believe it largely facilitated their access, and 2.5% who found it somewhat beneficial. Similarly, among those who undertook classroom-based training, 74% perceived that e-learning would significantly facilitate their access to the coaching courses, while 22% thought it would be very beneficial. 4% found it somewhat or not particularly helpful. In terms of satisfaction with the training received, more than 84% of those surveyed rated their e-learning experience in the Cantabria Basketball Federation's coaching courses as excellent or very good. Positive responses emphasised factors such as the simplicity, timeliness, intuitiveness, and flexibility of the e-learning methodology, particularly during the pandemic, and praised the quantity and quality of the provided materials and personalised tutorials. Conversely, classroom training was rated as excellent by 42% of respondents, very good by 30%, good by 18%, acceptable by 2%, while 8% had a negative experience. The survey also provides insight into the students' perceived digital competence. In the e-learning modality, 96.8% of respondents believe they have excellent or significant command and knowledge of ICTs. In comparison, 2.6% rate their command as good, the same percentage as those who believe they

fall short in this area. Among face-to-face trainees, 80% believe they have significant or excellent command and knowledge of ICTs, with 6% considering their proficiency as good, and 4% deeming their skills and knowledge insufficient.

3.2. Basketball coach training

In the context of e-learning coach training, 46.2% of e-learning and 40% of face-to-face trainees believe both the e-learning and classroom methodologies used by the Cantabrian Basketball Federation sufficiently support the acquisition of skills as basketball coaches. However, 53.8% of e-learning trainees and 44% of classroom trainees consider the theoretical aspects covered in both courses to be sufficient but lacking in practical application. As a result, 71.8% of respondents from both modalities believe additional practical training is necessary for their adequate qualification as basketball coaches. In assessing the acquisition of basketball coach competencies included in the curriculum of the higher degree diploma of sports education specializing in basketball (Government of Cantabria, 2016), we asked respondents about their perception after completing the training process. The data was separated based on those who have been trained with e-learning (Table 1) and those who have opted for classroom training (Table 2). When assessing whether the received training has enabled proficiency in the various skills selected, the results indicate that responses are considerably more positive for e-learning training than for classroom training. Furthermore, the proportion of negative responses or responses reflecting uncertainty is higher in the context of classroom training (Table 3). The evaluation results reveal that, among participants who believe they have fully acquired the competencies that qualify them as basketball coaches, the percentage is 13.62% higher for those trained via e-learning compared to those trained face-to-face. Similarly, the percentage of those who believe they are quite well trained and sufficiently trained is higher by 7.3% and 7.72% respectively for the e-learning group. On the contrary, negative evaluations or uncertainty are more prevalent among those trained face-to-face. Specifically, the percentage of those who believe they have not been trained much is 2.1% higher, 2.15% higher for those who consider that they have not been trained at all, with a notable difference of 24.85% for those who are unsure.

3.3. Comparison between face-to-face and e-learning modality

Respondents who have taken a face-to-face and online coach training course were asked which methodology they believe has trained them more adequately, with 60% preferring e-learning methodology, 30% preferring face-to-face and 10% being indifferent. Continuing with the comparison between both training modalities, Table 4 shows the most relevant responses derived from asking respondents about what they believe are the advantages and disadvantages of e-learning in training basketball coaches as provided by the Cantabrian Basketball Federation. The advantages, such as accessibility, autonomy, flexibility, time compatibility, quality of materials, high enrolment capacity, the possibility of overcoming geographical barriers and the option of asynchronous viewing of classes, outweighed the disadvantages. Among these were the lack of practical experience and interpersonal interactions, lengthy exams, lack of formative discussion, high demands on short-term memory, excessive workload, and information, and slow or non-existent feedback from tutors. Table 5 reflects the aspects that should be improved in the e-learning training provided by the Cantabria Basketball Federation for basketball coaches in Cantabria.

The study found that e-learning training received a more favourable perception than face-to-face instruction. This perception was even noted amongst those who had experienced both formats, with one in four e-learning students believing they were fully qualified as a basketball coach, compared to one in ten face-to-face students. Finally, it is worth highlighting that e-learning training is predominantly positively evaluated and instils greater confidence about adequate training compared to face-to-face training, which engenders more uncertainty, as evidenced in our results in Table 6.

Table 1. Perceptions of basketball coach competency acquisition in e-learning training

Competence	Completely	Very	Sufficient	Not much	No	Do not know
Building a basketball team	20.5%	48.7%	25.6%	-	-	5.2%
Valuation and classification of a basketball player	23.1%	48.7%	23.1%	2.6%	2.5%	-
Planning	28.2%	46.2%	23.1%	-	-	2.5%
Designing a training session	33.3%	46.2%	17.9%	-	-	2.6%
Conducting a training session	23.1%	43.6%	23.1%	6.8%	-	3.4%
Managing a basketball team during training competitions	17.9%	59%	12.8%	6.9%	-	3.4%
Scouting during training competitions	28.2%	43.6%	17.9%	6.9%	-	3.4%
Building technical teams in training categories	20.5%	43.6%	25.6%	4.3%	-	6%
Evaluating processes and results of a basketball team in training categories	23.1%	48.7%	23.1%	2.6%	-	2.5%
Professional training in training categories	28.2%	48.7%	12.8%	7.8%	-	2.5%

4. Discussion

The main aim of this study was to analyse the influence of e-learning training on the acquisition of competences in basketball coaches in Cantabria.

In relation to the objective of the study developed, Rivera et al. (2017) include this methodology within an asynchronous training model that obviates the need for a physical classroom, being viable in a field of sports education typically dependent on face-to-face modalities. Considering Campos and Martín's assertion in their study on the perception of professional competencies of Physical Activity and Sport Sciences graduates (Campos-Izquierdo & Martín-Acero, 2016, p. 343)—“it is quite or very important to possess all the specific professional competencies studied for an adequate and efficient professional performance in any of the occupations or job functions” - this study was designed with these competencies in mind. As Gil et al. (2023) did, we determined competencies like scientific, methodological, communicative, personal, and social competencies, focusing the study on the acquisition of these competencies through an analysis of e-learning and face-to-face training modalities. Feu et al. (2010) posit that training coaches is heterogeneous because it originates from diverse educational trajectories, such as the federative, formal education model that this study examines. Following these authors' approach, we designed a questionnaire to explore the training of sports coaches, specifically basketball coaches in Cantabria.

The results, demonstrating a male predominance among the respondents consistent with most sports-related studies such as Ayala-Zuloaga et al. (2015), confirm that e-learning training significantly facilitates access to formal sports education courses due to its inherent benefits (Espinosa-Izquierdo et al., 2021), thus overcoming barriers like distance or time constraints. Although Bonal and González (2021) reported significant inequalities in learning opportunities during the COVID-19 lockdown, hindering the acquisition and development of competencies and skills across different contexts, most respondents rated the e-learning training of the Cantabrian Basketball Federation's basketball coaches as excellent or very good. This favourable assessment is attributable to e-learning opportunities during pandemic times, like those experienced with COVID-19. Positive aspects such as easy course access and completion, coupled with the quantity and quality of the materials implemented in online sports training courses, contribute to this positive evaluation. Additionally, the students' ICT proficiency in the e-learning modality contributed to its successful implementation, overcoming some critical elements examined in studies such as García and Cabero (2016), and Augustyn and Juva (2014).

Table 2. Perceptions of basketball coach competency acquisition in face-to-face training

Competition	Completely	Very	Sufficient	Not much	No	Do not know
Building a basketball team	12%	38%	18%	4%	2%	26%
Valuation and classification of a basketball player	12%	40%	16%	2%	2%	28%
Planning	14%	38%	12%	6%	2%	28%
Designing a training session	12%	46%	8%	4%	2%	28%
Conduct a training session	8%	40%	18%	4%	2%	28%
Managing a basketball team during training competitions	8%	44%	12%	6%	2%	28%
Scouting during training competitions	12%	34%	12%	12%	2%	28%
Building technical teams in training categories	12%	36%	12%	8%	2%	30%
Evaluating processes and results of a basketball team in training categories	10%	40%	12%	6%	4%	28%
Professional training in training categories	10%	46%	8%	4%	4%	28%

Table 3. Average of total percentages of perceptions on the acquisition of basketball coach competencies in e-learning and classroom training

	Completely	Very	Sufficient	Not much	No	Do not know
E-learning training	24.60%	47.70%	20.50%	3.09%	0.24%	3.15%
Classroom training	10.98%	40.14%	12.78%	5.19%	2.39%	28%

Table 4. Advantages and disadvantages of CBF's e-learning training for coaches

Advantages	Disadvantages
Accessibility	Lack of practical experience
Autonomy	Lack of interpersonal relationships
Flexibility	Protracted exams
Time compatibility	Absence of formative discussion
Quality materials	High short-term memory demand
Enrolment capacity	Excessive workload and information
Overcoming distances	Slow or no feedback
Classes recorded at will	Long course duration

Table 5. Aspects that should be improved in the e-learning training of CBF coaches

Decrease in number and length of tests
Increased personalised tutoring
Internship module incorporation
More dynamic and entertaining video editing
Decrease in course duration

Table 6. Perception on the acquisition of basic skills in e-learning and classroom training

	E-learning	On-site
Completely	24.60 %	11.00 %
Very	47.70 %	40.20 %
Sufficient	20.50 %	12.80 %
Not much	4.10 %	5.50 %
Do not know	2.84 %	28.00 %
No	0.26 %	2.50 %

When analysing the training of basketball coaches through e-learning, attention has been paid to the level of impact of this type of training in reference to the practical knowledge acquired through it, as suggested by studies such as Jiménez and Lorenzo (2007), which focused on the analysis of training strategies in basketball coaches. Likewise, the present study reflects that this training modality addresses the theoretical requirements of such training but not the practical ones, as highlighted in the studies by Leite et al. (2011). The production of high-quality videos and explanatory tutorials, although valuable, does not fully meet the practical training needs of the participants due to limited personal interaction with other students and the inability to apply theoretical knowledge at the practical level.

Taking into account the objectives of studies such as Ruiz-Sanchis et al. (2016), which propose identifying the degree of development of the dimensions during the learning process, this study examines students' perceptions of the acquisition of the competencies required to perform as a basketball coach, as studied by Santos et al. (2010) when analysing the perception of coaches' competence and the recognition of training needs related to professional competences; that of Lozano et al. (2018) carried out to find out the profile of the basketball coach at the school stage; or that of Cunha et al. (2010), who studied the self-perception of professional competences of football coaches in terms of academic education. The results indicate that the level of positive perception of fundamental basketball coach training is higher in e-learning than during face-to-face training, where there is room for negative opinions, which are only residual in e-learning training. Most respondents trained with both models showed a preference for e-learning training, with 60% versus 30% who preferred face-to-face training and 10% being indifferent. These results reflect experiences in both modalities, leading to the identification of various advantages and disadvantages of e-learning training. The most prominent benefits include accessibility, autonomy, flexibility, compatibility with time constraints, quality of materials, the ability to overcome geographical distances, and a higher enrolment capacity. These benefits confirm that e-learning training utilising virtual environments facilitates and encourages potential students across Cantabria to participate. Conversely, e-learning training presents several challenges, such as the lack of interpersonal relationships, protracted exams, a deficiency in formative discussion, an intensive demand on short-term memory, excessive workload and information, challenging feedback mechanisms from trainers, extended course duration, and notably, the lack of practical experience. While the provided tutorials were of high quality, Blázquez Manzano (2009, p. 89) underscores "the significance of the tutor's role as active participants in the platform" within e-learning training. The quantity of tutors was also found to be inadequate in satisfying students' needs.

5. Conclusions

The study has identified several advantages and disadvantages associated with e-learning training, from which potential areas for improvement in this type of training can be identified, such as reducing the length and number of tests, providing more personalised tutorials, creating more dynamic videos, and incorporating a practical classroom module at some point during the course.

Similarly, from the results obtained the study participants suggest reducing the length and number of tests within the courses, incorporating an on-court practical module, producing more dynamic and engaging videos, reducing the length of the courses, and increasing personalised tutorials.

24.60% of the students trained with e-learning methodology consider themselves fully qualified as basketball coaches, compared to 10.98% of those trained with traditional face-to-face methods.

In conclusion, the e-learning training provided by the Cantabrian Basketball Federation effectively prepares basketball coaches, overcoming the limitations of face-to-face training and adapting to the new educational landscape caused by the COVID-19 pandemic.

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