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Review article

Learning strategies in initial teacher training: a systematic review

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Abstract

A systematic review is presented using the PRISMA protocol in order to analyse the link between teaching methodology and learning strategies in initial teacher training at the university level. The key descriptors were initial teacher training, learning strategies and teaching methodologies at the university level. The results yielded 13 articles from different countries between 2000 and 2021, which employed mixed research designs. It is suggested that methodologies are being implemented at the university level, while learning strategies could be linked to student motivation. Moreover, the relationship between methodologies and learning strategies in the university context promotes meaningful learning.

Keywords systematic review; methodology; learning strategies; initial teacher training; pre-service teacher education; higher education

Introduction and rationale

The incorporation of the European Higher Education Area into the university environment has led to changes in the teaching–learning processes, affecting both university degrees and curricula for initial teacher training (Bozu and Aránega, 2017; Jerónimo-Arango et al., 2020).

The university teacher must undergo a shift in attitude to prioritise the improvement of teaching and learning processes. This change is suggested to involve challenging the preconceived ideas that view education merely in terms of the training of individuals. It is crucial to embrace innovative methodologies and alternatives, departing from traditional approaches. This shift should encourage the development of students' intellectual, professional and communicative skills, as well as personal growth, ultimately contributing to their future success as educators. To prepare for their future role as teachers, students must acquire various skills, and critical thinking more particularly, thus highlighting the necessity for educational practices that promote this skill (Ferrada and Villena, 2010; Higgs, 2013; Jerónimo-Arango et al., 2020; León et al., 2011; Pierce and Kalkman, 2003).

Teacher training programmes should incorporate initiatives centred on active learning and developing learning strategies. This approach is vital, considering the observed relationship between academic achievement and subsequent performance as future teachers, and it could be achieved by implementing training programmes that include metacognitive courses (Buzza and Allinotte, 2013; Hashmi et al., 2019).

Several research studies have reported relevant findings on the dynamics of student learning and teaching methodologies, including aspects such as students' autonomous capacity, the development of critical thinking and the effective use of learning strategies (Cossío and Hernández, 2016; Jerónimo-Arango et al., 2020). The existing relationship between interactive teaching–learning processes focused on students makes it clear that the main objective pursued is the construction of knowledge, favouring conceptual changes related to the subject taught (Du Plessis, 2020; Leduc et al., 2016).

Given the scarcity of such work, it is important to conduct studies on methodological and learning strategies in initial teacher training. The present study seeks to fill this gap by conducting a systematic review of research on the links between teaching methodology and learning strategies in the context of initial university teacher training. The specific objectives are: (1) to identify which teaching methodologies are implemented in initial university teacher training; (2) to determine what type of learning strategies university students implement during their initial teacher training; and (3) to verify if there is a relationship between the methodology implemented in the classroom and the learning strategies employed in initial university teacher training.

Review methodology

The present work constitutes a systematic review of the literature (Gough, 2013; Sánchez-Meca and Botella, 2010), following the guidelines established by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol (Moher et al., 2009, 2015).

This review was conducted in two phases. In the initial phase, a bibliographic mapping was carried out (Hallinger, 2013; Hallinger and Kovačević, 2019). This involved gathering data on the countries where the thematic approach was studied, the sources of access (including databases and repositories), the language used, the number of articles published and the temporal evolution of the theme. Subsequently, decisions were made to specify the descriptors used in the literature search, the criteria for the inclusion and exclusion of documents, and the strategy to be used for searching and categorising the information. This phase used equations with Boolean operators. The second phase involved a thematic analysis (Crowe et al., 2015) to select the identified documents, following a peer-review procedure (Sarthou, 2016).

The subject was explored in education repositories, chosen for their open-access nature and current popularity (Aguillo et al., 2010). The most notable of these are HAL-SHS (Sciences de l'Homme et de la Société, operated under the auspices of the French government's National Centre for Scientific Research), SSOAR (Social Science Open Access Repository, funded by the German Research Foundation) and SSRN (Social Sciences Research Network, belonging to the Dutch publishing group Elsevier). However, we focused only on HAL-SHS, because of its outstanding position in the world

ranking 'Transparent Ranking: All Repositories (September 2020)', where it was ranked 32 out of 2,773 (Cybermetrics Laboratory, 2020).

We included databases recognised by the degree of impact of their publications in the educational field and their relevance for shedding light on emerging issues in this field of study (ERIC, Web of Science and SCOPUS).

We limited our search to publications from 2000 to 2021. This time frame was selected to obtain a deep global perspective on the subject and its temporal evolution. The search was also limited to the university educational field. As the main criterion, documents were selected based on their relevance to the subject matter, and those not directly related were discarded.

Initial bibliographic mapping

We used keywords linked to the subject matter, as described in ERIC's and UNESCO's Thesauri (Sunny and Angadi, 2017). These were 'learning strategies', 'higher education', 'pre-service teacher education', 'initial teacher training' and 'methodology'.

Data extracted from the HAL-SHS repository were for 'learning strategies' (n = 962); 'higher education' (n = 2,898); 'pre-service teacher education' (n = 158); 'initial teacher training' (n = 130); and 'methodology' (n = 8,097).

The number of articles found in the databases was impressive. In ERIC, the articles for 'learning strategies' totalled 87,776; 'higher education', 383,329; 'pre-service teacher education', 47,601; 'initial teacher training', 2,870; and 'methodology', 85,168. In Web of Science, the articles found for 'learning strategies' totalled 217,922; 'higher education', 561,470; 'pre-service teacher education', 8,503; 'initial teacher training', 6,280; and 'methodology', 2,153,768. In the SCOPUS database, the articles for 'learning strategies' totalled 178,934; 'higher education', 528,806; 'pre-service teacher education', 6,554; 'initial teacher training', 4,188; and 'methodology', 3,162,810.

The combination of keywords was applied both in the repositories and across the databases. The term 'methodology' was used as a general descriptor, since the Thesauri found it impossible to classify the type of methodology.

It was found that combining the descriptors 'initial teacher training' and 'pre-service teacher education' generated fewer results. However, more results were generated when using two different search equations, prompting the decision to pursue this approach.

The bibliographic mapping revealed relevant data regarding the selected keywords, with variations depending on the search platform. After analysing the information obtained, the following keywords were chosen: 'learning strategies', 'higher education, 'pre-service teacher education, 'initial teacher training' and 'methodology'. The criteria used in the literature search are displayed in Table 1.

Table 1. Inclusion and exclusion criteria used in literature search

Included in the search	Excluded from the search
• Scientific studies found from the search equation with the keywords defined for the study. • Scientific studies published between 2000 and 2021. • Scientific studies found in repositories and databases. • Scientific studies in English. • Studies in which the main subject of study is the same as ours.	• Scientific studies that are not within the specified time interval. • Scientific studies that are not in the selected language. • Scientific studies that are not considered relevant in our field. • Scientific studies from other repositories or databases not indicated.

The search equations generated results by applying the filters to the databases (Table 2).

Table 2. Database search specifications

Database	Search specifications. Topic (TS)	No. of items
Web of Science (WOS)	TS = ((initial teacher training OR pre-service teacher education) AND (learning strategies) AND (methodology) AND (higher education))	8
	TS = ((initial teacher training) AND (methodology) AND (higher education))	31
	TS = ((initial teacher training) AND (learning strategies) AND (higher education))	24
	TS = ((initial teacher training) AND (learning strategies) AND (methodology) AND (higher education))	4
	TS = ((pre-service teacher education) AND (methodology) AND (higher education))	31
	TS = ((pre-service teacher education) AND (learning strategies) AND (higher education))	54
	TS = ((pre-service teacher education) AND (learning strategies) AND (methodology) AND (higher education))	5
	Search filters: Subject area: Web of Science main database Research domains: social sciences (SSCI) Language: English and Spanish Type of documents: all document types Time period: 2000–21.	
SCOPUS	TITLE-ABS-KEY ('initial teacher training OR pre-service teacher education') AND TITLE-ABS-KEY ('learning strategies') AND TITLE-ABS-KEY ('methodology') AND TITLE-ABS-KEY ('higher education')	0
	TITLE-ABS-KEY ('initial teacher training') AND TITLE-ABS-KEY ('methodology') AND TITLE-ABS-KEY ('higher education')	32
	TITLE-ABS-KEY ('initial teacher training') AND TITLE-ABS-KEY ('learning strategies') AND TITLE-ABS-KEY ('higher education')	3
	TITLE-ABS-KEY ('initial teacher training') AND TITLE-ABS-KEY ('learning strategies') AND TITLE-ABS-KEY ('methodology') AND TITLE-ABS-KEY ('higher education')	1
	TITLE-ABS-KEY ('pre-service teacher education') AND TITLE-ABS-KEY ('methodology') AND TITLE-ABS-KEY ('higher education')	2
	TITLE-ABS-KEY ('pre-service teacher education') AND TITLE-ABS-KEY ('learning strategies') AND TITLE-ABS-KEY ('higher education')	1
	TITLE-ABS-KEY ('pre-service teacher education') AND TITLE-ABS-KEY ('learning strategies') AND TITLE-ABS-KEY ('methodology') AND TITLE-ABS-KEY ('higher education')	0
	Search filters: Subject area: SCOPUS database Domains of research: social sciences Language: English and Spanish Type of documents: all document types Time period: 2000–21.	
ERIC	'initial teacher training' AND 'pre-service teacher education' AND ' methodology' AND 'higher education'.	1*
	'initial teacher training' AND 'pre-service teacher education' AND 'learning strategies' AND 'higher education'.	26
	'initial teacher training' AND 'pre-service teacher education' AND 'learning strategies' AND 'methodology' AND 'higher education'.	11
	'initial teacher training' OR 'pre-service teacher education' AND 'learning strategies' AND 'methodology' AND 'higher education'.	48
	'pre-service teacher education' AND 'learning strategies' AND 'methodology' AND 'higher education'.	9
	Search filters: Subject area: ERIC database Domains of research: social sciences Language: all languages Descriptor: higher education Type of documents: all document types Time period: 2000–21.	

Note: * One of the results is a book containing 92 articles.

The attempt to replicate the exact search equations used in the databases within the repositories proved unsuccessful, yielding 0 findings. Consequently, less complex equations were needed (Table 3). These simplified equations produced results indicating that the number of findings obtained in the databases was higher compared to the analysed repository.

Table 3. HAL-SHS repository search specifications

Repositories	Search specifications	No. of items
HAL-SHS	Initial teacher training and methodology	6
	Pre-service teacher education and methodology	10
	Initial teacher training and learning strategies	4
	Pre-service teacher education and learning strategies	1
	Initial teacher training and higher education	8
	Pre-service teacher education and higher education	6
	Search filters: Subject area: HAL-SHS Repository Research domains: default search field (several criteria) Language: English and Spanish Type of documents: all document types Time period: 2000–21.	

Finally, the document selection process is shown in Table 4, following the PRISMA protocol (Moher et al., 2009, 2015).

Table 4. Phases in the selection of studies

IDENTIFICATION	The number of documents identified after the application of search filters: Web of Science = 158 SCOPUS = 39 ERIC = 95 HAL-SHS = 35 Total number of articles identified in the databases (*n* = 327)	
CITATION	Number of documents after elimination of duplicates (*n* = 286)	Number of duplicate items excluded (*n* = 41)
IDENTITY	Number of documents for which eligibility was assessed (*n* = 13)	Number of items excluded and reason for exclusion (*n* = 273*)
INCLUSION	Number of items included (*n* = 13)	

Note: * The suitability criterion was applied using thematic and content analysis. Articles focused on university degrees related to information and communication technologies, methodological competencies in doctoral students, teaching profession from an economic standpoint (labour market), and those linked to the areas of mathematics, physical education and languages, among others, were excluded.

Thematic analysis and qualitative assessment

Following the parameters of grounded theory (Strauss and Corbin, 2002), the final articles underwent a review process involving multiple readings. This process moved from a general to a specific perspective,

aiming to identify concepts or ideas associated with teaching methodologies and learning strategies during initial teacher training in higher education.

During the first review, categories were established based on author details, year, country of origin, research purpose, sample characteristics, instruments used, conclusions and study limitations. The second reading focused on extracting topics or themes, using both content analysis and thematic analysis (Crowe et al., 2015), with the objectives of the present study serving as a reference point.

The topics identified were teaching methodologies in initial teacher training, learning strategies, and the relationship between teaching methodology and learning strategies. To manage this information, the data analysis program NVivo 1.5.1 was employed. This tool facilitated a review of the results and the organisation of information into categories, extracting key themes.

Results

The results will be presented in two sections: the bibliographic mapping and the thematic analysis.

According to the bibliographic mapping described in the Methodology section (Table 5), the countries that analysed this issue were Spain, Mexico, South Africa, Chile, India, the UK, Colombia, France, Canada and Latvia. This distribution indicates that our topics of interest are indeed common and relevant on a global scale.

The analysed articles focused on the students' perception of the methodology used, the impact of new models applied by the teacher, perceptions of both students and teachers concerning the relationship between theory and practice, the impact of teacher training on educational practices, learning strategies in undergraduate and graduate students, and cooperative learning as an active methodology.

The sample of articles showed diversity in terms of content and focus. Specifically, 21 per cent of the articles were associated with documents, 47.4 per cent were centred on university students, 15.8 per cent focused on teachers and 15.8 per cent addressed research aimed at students and teachers.

Various instruments were employed for data collection, including questionnaires, in-depth and semi-structured interviews, scales, narratives, discussion groups, inventories and documentary sources. Notably, several studies utilised more than one measuring instrument.

Examining the temporal evolution of the subject matter revealed a notable progression. In the first decade of the twenty-first century, no publications were found. However, starting in 2010, three studies emerged. These studies covered a range of issues, such as the implementation of innovative methodologies, cooperative learning in initial teacher training within the framework of the University Master's Degree in Secondary Education Teacher Training, the models of science and praxis guiding the training processes of pedagogy professionals in higher education, and the application of learner-centred psychological principles (LCPs) in higher education and student-centred educational practices (teacher training). In subsequent years, the focus of the research expanded. In 2011, the motivation of students to perform various tasks in the university environment was explored. In 2012, the focus was on exploring John Dewey's ideas about experience and experiential learning, particularly in the participation of teacher trainees in the university context through initial teacher training. The year 2013 saw three research studies showing the differences between university students in the Education Sciences and Law training programmes concerning learning styles, the relationship between theory and practice, and the analysis of teaching–learning theories.

In 2016, attention shifted towards measuring the effects of teacher training. In 2017, articles explored the satisfaction levels of teachers and students concerning the transition from a Diploma to a Degree in Primary Education.

In 2019, two articles were published on assessing metacognitive awareness in prospective faculty members and analysing learning strategies used by undergraduate students. In 2020, perceptions of student-centred teaching were explored.

Various conclusions can be drawn from the articles. Positive effects of cooperative learning on students were evidenced, with improvements noted in the quality of learning strategies and the development of information-processing strategies. Contrarily, findings suggested that teacher training might not necessarily correspond to the development of a reflective teaching professional. However, adopting student-centred practices was identified as a means to address the particular needs of each individual. Real-world cases highlight how greater student motivation can be achieved by implementing

active methodologies and more broad-based and focused initial teacher training. Additionally, the literature highlighted significant differences in learning styles between certain training programmes, and disparities in teachers' perceptions of the importance of educational research theory and the use of teaching–learning approaches. Challenges included a lack of visible results regarding the impact of short-term training programmes on classroom practice, a lack of consensus among teachers and students regarding the extension of initial teacher training programmes, and a significant and positive relationship between teachers' metacognitive knowledge and cognitive self-regulation. Finally, we found significant differences in the use of learning strategies between undergraduate and graduate students in education, and a limited understanding of student-centred teaching by prospective teachers.

Table 5. Results obtained in the systematic literature review

Author (year)	Country	Aim	Sample	Instrument	Conclusion
Bozu and Aránega (2017)	Spain	To determine the degree of satisfaction of teachers and students (from Diploma to Degree in Primary Education).	17 informants (teacher-trainers, practicum tutors and students).	In-depth interviews, narratives and focus groups.	Lack of consensus between teachers and students (desirable extension of the initial teacher training programme); unfavourable conditions in the classroom for the implementation of methodologies that promote the development of competencies.
Canales and García (2013)	Mexico	To determine if there are differences between university students of education and those of sciences and law.	University students (212 students) aged 18–25 years.	Kolb learning styles inventory and a demographic questionnaire.	Significant differences between learning styles of training programmes.
Du Plessis (2020)	South Africa	Explore the perceptions, experiences and challenges of learner-centred teaching.	Fourth-year students (Bachelor of Education).	Data collection and analysis.	Prospective teachers have a limited understanding of student-centred teaching.
Ferrada and Villena (2010)	Chile	To unravel the model(s) of science and praxis that underlie the training processes of pedagogical professionals.	Case study of a pedagogy career project.	Semi-structured interviews and career project documents.	Teacher training does not encourage the development of reflective teaching professionals.
Hashmi et al. (2019)	India	To assess metacognitive awareness in future teachers and the extent to which initial training institutions contribute to such awareness.	400 future teachers.	Metacognitive Awareness Inventory (MAI).	A significant and positive relationship between teachers' metacognitive knowledge and cognitive self-regulation.

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Higgs (2013)	South Africa	To discuss the various views of teachers involved on the place for theory in educational research and practice in teacher education.	Professors from three South African universities: University of South Africa; University of Stellenbosch; and North-West University.	Interview (open-ended questions).	Teachers' perception about the importance of theory in educational research and practice is linked to teacher training. Therefore, the findings highlight the need to implement theory in the teacher training curriculum, and to acquire critical thinking to address classroom challenges successfully.
Iredale (2012)	UK	Exploring John Dewey's ideas about experience and experiential learning. The context of teacher trainee participation in higher education through initial teacher training.	Documents.	–	Initial teacher training should be both broad-based and focused.
Jerónimo-Arango et al. (2020)	Colombia	To analyse learning strategies in undergraduate and graduate students of education.	534 students.	Support and Control Strategies and Strategies Related to Information Processing Scale (CEVEAPEU).	Significant differences in the use of learning strategies between undergraduate and graduate students.
Leduc et al. (2016)	France and Quebec	To measure the effects of teacher training on the practices of future teachers in the university setting.	12 teachers from Quebec and France.	Teacher training (6 of the teachers received it and the other 6 did not).	Short-term training has no visible impact on classroom practices.
León et al. (2011)	Spain	Cooperative learning as an innovative methodology and essential content in initial teacher training in the Master's Degree in Teacher Training for Secondary Education.	Documents.	–	Cooperative learning has positive effects on students in improving the quality of learning strategies, developing information processing strategies, and favouring critical and constructive thinking.
Martínez-Berruezo and García-Varela (2011)	Spain	To analyse the value that students attach to the various tasks performed at the university as a determining factor for motivation.	Students of the Teaching Diploma of the University of Alcalá.	Motivated Strategies Learning Questionnaire (MSLQ) by Pintrich et al. (1991) and semi-structured interviews.	Active methodologies based on real cases generate greater motivation in students' learning.

Ozola and Purviņš (2013)	Latvia	Analysis of teaching and learning theories.	16 female teachers.	Opinions on the terms 'teaching' and 'learning'.	Teachers use different approaches to teaching and learning; they understand it as a complete process; the teacher's role is linked to managing and guiding the teaching and learning process.
Pierce and Kalkman (2003)	–	Application of learner-centred psychological principles (LCPs) in higher education, and learner-centred educational practices in teacher training courses.	Documents.	–	Learner-centred practices are fluid and respond to the particular needs of each individual. The specific practices carried out in the classroom cannot be extrapolated out of context. These techniques promote the development of reflective teachers and students.

The thematic analysis revealed three topics that emerged across the reviewed literature. These themes were teaching methodologies in initial teacher training, learning strategies and the relationship between teaching methodologies and learning strategies. In addition, the thematic analysis was conducted with a keen consideration of the research objectives outlined in this study.

The first theme was teaching methodologies in initial teacher training. The relationship between educational theory and practice in research was studied by Higgs (2013), confirming the importance of both in teacher education, and highlighting that exposure to various theoretical frameworks promoted critical reflection on practice in students. True learning changes how students understand and experience the environment around them, so teachers must adapt their different teaching–learning approaches. It was shown that not all teachers link these as a complete process, and instead choose to guide and manage it (Ozola and Purviņš, 2013). Teachers were aware of the benefits of student learning and motivation, and learning methodologies focused on autonomous work and the acquisition of competencies (Bozu and Aránega, 2017; León et al., 2011). The impact of cooperative learning on learning goals, and its positive effects on certain variables (academic, affective and social) in students, was observed in the study by León et al. (2011). It appears that the methodologies used by teachers generate significant changes in students, since a link was found between an active, more participatory methodology and a less rigorous evaluation and more practical tasks contextualised in the students' reality (Martínez-Berruezo and García-Varela, 2011). This leads to the need for teachers to be trained in specific pedagogical practices, allowing for the use of student-centred teaching, and their specific involvement in teaching practice, decision making and problem solving, collaboration and communication with others, and the confidence that enables them to teach in the classroom (Du Plessis, 2020; Ferrada and Villena, 2010). Therefore, it is necessary to broaden the background of experiences and learning based on these, since their limited nature restricts their ability to adapt the appropriate strategy depending on the situation (Iredale, 2012). Several learning styles gave value to concrete experience and the feedback process, such as Kolb's model (Canales and García, 2013). It is also highlighted that if pedagogical training limits the shift to a learner-centred approach, this does not significantly impact the practices implemented in the classroom (Leduc et al., 2016).

The second theme, learning strategies, revealed important insight into the differences between new and postgraduate students, highlighting the need to incorporate learning strategies into training programmes (Jerónimo-Arango et al., 2020). Hashmi et al. (2019) emphasise the importance

of developing self-regulation skills in future teachers to achieve maximum performance within the metacognitive strategies. As support strategies, future teachers must know how to work on student motivation and attributions, skills closely related to cooperative learning, since working with peers fosters the development of effective social skills (León et al., 2011).

Regarding the third theme, the relationship between teaching methodologies and learning strategies, León et al. (2011) state that the situations generated in cooperative learning have a positive impact on learning strategies. Specifically, these situations enhance information-processing strategies, ultimately fostering critical and constructive thinking among students, and helping them acquire skills from cognitive and emotional perspectives. Hashmi et al. (2019) recommend that future teachers undergo training with a teaching methodology specifically designed to promote metacognitive skills. The implications of learner-centred psychological principles in higher education include the idea that learner-centred practices are fluid in nature and responsive to individual needs (Pierce and Kalkman, 2003).

Discussion

This study has analysed the teaching methodologies implemented in initial teacher training, shedding light on an ongoing challenge in a society that demands continual adaptation. An important aspect highlighted by the findings is the notable need for professional teacher training directed towards a reflective professional model (Ferrada and Villena, 2010). Teachers must be trained to develop skills such as the ability to create alternatives for emerging problems, utilise and generate knowledge effectively, and leverage resources to define the foundations for problem solving. Furthermore, this study draws attention to the distinct lack of studies based on the models of science and praxis (that is, how teachers construct knowledge during their initial training process).

It is thus important to consider the potential risks associated with experience-based learning, especially when considering the reflective practice that is integrated into teacher training curricula. It is worth emphasising that teachers often have a limited repertoire of experiences, leading to disengagement from reflective practice and, at times, reliance on the help of other professionals (Iredale, 2012).

Student-centred practices, which are tailored to the individual characteristics of each student, were sometimes difficult to extrapolate to other settings (Pierce and Kalkman, 2003). Teachers need to be aware of the learning styles of their students to modulate the teaching strategies proposed in the classroom and improve the level of knowledge acquisition (Canales and García, 2013).

Cooperative learning emerged as a teaching methodology with positive effects on the classroom, to the detriment of less favourable outcomes associated with competitive and individualistic approaches to achieving higher performance and productivity in academic tasks (Johnson et al., 1981; León et al., 2011). Initial teacher training in cooperation and cooperative learning is closely linked to educational objectives. However, the successful implementation of cooperative learning requires careful planning by teachers, both during and at the end of group work. Our findings highlight the notable absence of these strategies in the classroom, which could be attributed to factors including inadequate pedagogical training or a preference for traditional teaching methods to minimise challenges, such as loss of control of the students, incomplete curriculum coverage, or conflicts within groups. However, it is suggested that a change in the teacher's role could potentially overcome these challenges and facilitate the proper functioning of cooperative learning (León et al., 2011). León et al. (2011) also highlight the significance of incorporating various resources into the classroom when implementing active methodologies, including spaces, materials, media and timetables.

It is interesting to highlight the integration of information and communication technology as a source of support in teaching tasks. When coupled with a participatory methodology, this approach encourages students to be more active, autonomous and reflective in their learning processes (Martínez-Berruezo and García-Varela, 2011). Pintrich (2000) contributes to this perspective by emphasising the value that students give to tasks, framing it as a cognitive commitment. A high score in this aspect corresponds to a greater commitment, reinforcing the idea that tasks are perceived as applicable, practical and interesting, as found in the study conducted by Martínez-Berruezo and García-Varela (2011).

The juncture between theory and practice in teacher training has been studied for several years. For example, Higgs (2013) emphasises the pivotal role of theory in educational research and practice within initial teacher training. Proposing the integration of theory into the teacher education curriculum, Higgs (2013) suggests that this approach could cultivate a critical perspective to address various educational issues. The study by Colén-Riau and Castro-González (2017) examines the Degree in Primary Education curriculum, revealing a notable problem concerning the fragmentation between theory and practice. This study highlights the absence of significant and shared development in initial teacher training, emphasising the need for a more cohesive integration of theory and practice. Further insights on this issue were generated by studies linking methodological approaches to the professional demands placed on future teachers. These are emphasised as important in the assessment provided by students in the study conducted by Hortigüela-Alcalá et al. (2018).

Future teachers are expressing a demand for change towards teaching methodologies that are focused on students. This shift moves away from the mere transmission of information towards the implementation of methodologies that include students' autonomous work and practical activities aimed at acquiring competencies (Bozu and Aránega, 2017). Ozola and Purviņš (2013) show that contemporary education is based on the active role of both teachers and students. They find that not all teachers were aware of the teaching–learning link. When this link is absent, it adversely affects the active participation of students in the learning process.

A lack of consensus between teachers and students emerges regarding the expansion of the initial teacher training programme (Bozu and Aránega, 2017), since university classrooms are not considered conducive to applying methodologies that foster the acquisition of various competencies.

Thus, there is an emphasis on the need to prioritise student-centred learning, given its perceived effectiveness compared to traditional methodologies. This transformation can be achieved through teaching methodologies that promote student awareness, engaging them in reflection and control over their learning processes. This empowerment enables students to modify and adapt their learning strategies (Du Plessis, 2020; Jerónimo-Arango et al., 2020). Furthermore, there is a suggested need to implement programmes with active methodologies that promote learning strategies and skills to favour the assimilation of knowledge among students (Buzza and Allinotte, 2013).

The issue of conceptual references and learning strategies has attracted interest from the scientific community in recent years. For example, the study by León et al. (2011), based on several other studies (Cava, 1998; Del Caño and Mazaira, 2002), points out that cooperative learning manifests in various positive outcomes, including intrinsic motivation, self-esteem, group cohesion and participation of students. Moreover, Solsona (1999) states that cooperative learning plays a role in fostering communication and expression skills, while evidence was found suggesting a positive relationship between cooperation and the ability to empathise or put oneself in the emotional position of another person.

In line with the above, research by Martínez-Berruezo and García-Varela (2011) reveals that incorporating practical work and real problems significantly influences students' commitment to task achievement. These elements not only facilitate complete immersion in the course, but also produce an increase in intrinsic motivation.

Jerónimo-Arango et al. (2020) shed light on the limited use of learning strategies within education programmes. This study identifies the challenges students face in transforming information into knowledge, highlighting that student teachers possess socio-cognitive resources enabling them to construct knowledge in various educational contexts. However, metacognitive strategies were found to be underutilised, a trend attributed to a lack of academic training. Therefore, this research highlights the need to promote the use of learning strategies in the classroom.

Metacognition is a key element for successful learning. In their study, Hashmi et al. (2019) conclude that it is very important for prospective teachers to develop metacognition skills, framed as higher order thinking, involving active control over the cognitive processes present in learning.

Concerning the relationship between the methodologies implemented and the learning strategies in the university environment, there is a lack of existing research on the impact of initial teacher training (pedagogical training, student-centred learning) on the teaching practice itself, with few significant results on this issue (Leduc et al., 2016).

According to Pareja et al. (2019), their Master's Degree in Professional Teacher Training has introduced methodological innovation through project-based learning from an interdisciplinary perspective. They report noteworthy findings, including positive student feedback on the relationship

between theoretical course content and its applicability to their professional future. Furthermore, they emphasise the need to be given a longer period to develop a project, since this would help them to acquire deep learning strategies.

Martínez-Berruezo and García-Varela (2011) report a link between student motivation (determined by the extent to which tasks develop certain professional competencies) and teaching methodologies supported by a virtual environment in teaching practice.

Thus, implementing the SIRECA (Real Situations in Schools and Classrooms) model is suggested to have played a role in bridging the gap between theory and practice. This model advocates for the use of diverse learning environments more closely linked to real-world situations (Domínguez-Fernández et al., 2019).

Conclusions

In line with the objectives set out in this study, we have identified the teaching methodologies that are currently implemented in initial teacher training, such as cooperative learning. The need to promote active methodologies is a recurring theme in several studies. There is a growing recognition of the need to change the conception of teaching, particularly in the context of initial teacher training and the medium-term indirect impact on teaching and learning. Moreover, the inclusion of learning strategies in the content of teacher training programmes is highlighted as a crucial element for comprehensive and effective teacher training.

The learning strategies employed in higher education are closely linked to academic achievement, student satisfaction and the development of both intrinsic and extrinsic motivation. The relationship observed between the methodology implemented at the classroom level and the learning strategies in initial teacher training at the university level indicates the need to promote intrinsic motivation in students. This can be achieved by using various active methodologies that promote more meaningful learning, necessitating the modification and adaptation of learning strategies employed in academic tasks.

This review has highlighted the need for collaboration and cooperation among teachers, facilitating the exchange of experiences and sharing of teaching practices. This collaborative approach is pivotal for expanding their professional background through continuous training and implementing the necessary resources to support these objectives. While some research has been conducted on this topic in the past decade, it is surprising how few studies have been published on the subject. Nonetheless, the global interest in this topic remains evident. Additionally, recent years have witnessed a trend towards using methodologies that employ digital platforms.

The review process has several limitations that warrant consideration. For instance, the search filters used in the repositories could be more refined, particularly concerning the publication language. This challenge was mitigated by the manual screening of the documents. Additionally, the use of the ERIC and UNESCO Thesauri presented a limitation, as it was not possible to specify the keywords 'methodology of teaching', necessitating the use of the broader term 'methodology'. However, this did not pose a significant problem, since the thematic analysis discarded those articles that were not relevant.

For future reviews, it is advisable to refine the search filters used in the repositories to enhance search efficiency, and to include other variables that influence students, such as support strategies. The need to consider publications in repositories is emphasised, since these provide valuable publication metrics for the scientific community.

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Declarations and conflicts of interest

Research ethics statement

Not applicable to this article.

Consent for publication statement

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Conflicts of interest statement

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