



Designing Effective Pre-service Teacher Training in Inclusive Education: a Narrative Review of the Effects of Duration and Content Delivery Mode on Teachers' Attitudes Toward Inclusive Education

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Abstract

Inclusive education refers to an educational approach in which all students can learn and participate in the mainstream school system. The successful implementation of inclusive practices is strongly determined by teachers' attitudes toward inclusive education and teacher training is one of several factors influencing these attitudes. Given the diversity of such programs, the present narrative review investigated the optimal design for pre-service inclusive teacher programs in terms of its duration and content delivery mode. For this, we considered and analyzed 31 studies, comprising 36 international interventions. Although most studies did not adequately report statistics to draw unequivocal conclusions, our results suggest an overall positive effect of training on pre-service teacher attitudes toward inclusive education. The effects of the duration and delivery mode of such programs are discussed from the perspective of successful training design in the light of social psychological theories and empirical findings, thus providing novel avenues for future research.

Keywords Training program · Attitudes · Inclusive education · Content · Duration

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Inclusive education policy aims at offering equal learning opportunities to all students and has become a cornerstone of contemporary educational practices worldwide (UNESCO, 1994). In order to make good on the promise of equal opportunity, schools and notably teachers must be prepared to address the needs of all students, regardless of their physical and psychological characteristics (UNESCO, 2019; United Nations, 2006). Moreover, United Nations' Salamanca Statement was extremely powerful as a mean of stimulating such an educational change by emphasizing the value of education for all students in the general education system and prompted the abandonment of special schools and classes in favor of more inclusive school setting. Inclusive education therefore encompasses accessible curricula, instruction that takes into account students' individual learning and behavioral differences, and changes in teachers' mindsets and values (Symeonidou, 2017). For several years, questions of implementation within mainstream schools have been gaining momentum in social and educational sciences research (Popa-Roch et al., 2022). Beyond the development and evaluation of teaching methods, researchers have shown great interest in examining general teachers' attitudes and behaviors regarding the implementation of inclusive practices within their classes (Avramidis & Norwich, 2002; de Boer et al., 2011). Consequently, the present narrative review focuses on pre-service teachers' inclusive training programs as a determinant of their attitudes toward inclusive education. It specifically examines the impact of program's duration and content delivery mode on teachers' attitudes toward inclusive education, aiming to identify the most effective programs for fostering positive inclusive attitudes among pre-service teachers.

Teachers' Attitudes Toward Inclusive Education

Teachers' attitudes have emerged as a key object of study in the context of implementing inclusive practices in mainstream schooling (Avramidis & Norwich, 2002; de Boer et al., 2011; MacFarlane & Woolfson, 2013). In social psychology, personal attitudes reflect an individual's positive or negative evaluation of performing a specific behavior (Ajzen, 1991; Ajzen & Fishbein, 1977). Personal attitudes, alongside other social and personal variables, are a significant predictor of individual behavioral intentions and, consequently, behavior itself (Ajzen, 1991; see also the meta-analysis of Armitage & Conner, 2001). In the domain of inclusive education, this variable appears to be particularly crucial, as teachers' overall attitudes toward inclusive education are likely to influence their commitment to implementing corresponding practices (Avramidis & Norwich, 2002). For instance, MacFarlane and Woolfson (2013) demonstrated that teachers with more positive attitudes and higher self-efficacy had higher behavioral intentions to engage in inclusive practices.

Furthermore, a substantial body of research has explored teachers' attitudes toward inclusive education and the factors that influence them (see meta-analyses of Avramidis & Norwich, 2002; de Boer et al., 2011; van Steen & Wilson,

2020). Various factors have been demonstrated to shape teachers' attitudes, including variables related to teachers (e.g., self-efficacy; Desombre et al., 2019; Pit-ten Cate et al., 2018), students (e.g., type of disability, Jury et al., 2021), and the environment (e.g., school values, Perrin et al., 2021 or educational functions, Khamzina et al., 2021, 2023).

Inclusive Teacher Training Programs

Inclusive teacher training programs are another important variable impacting teachers' personal attitudes toward inclusive education (see Kurniawati et al., 2014; Lautenbach & Heyder, 2019; Tristani & Basset-Gunter, 2020 for systematic reviews). Indeed, classes that include students with special educational needs (SEN) represent an additional challenge for teachers, who may feel insufficiently prepared in their teaching methods for such heterogeneity (Hind et al., 2019). This perceived lack of training and preparedness can result in a diminished willingness to accommodate students with SEN and less favorable attitudes toward inclusive education (Pit-ten Cate et al., 2018).

Pre-service training refers to various educational programs and activities designed to enhance teachers' professional knowledge and skills, offering opportunities for in-service or pre-service teachers to familiarize themselves with novel approaches and methods (Kurniawati et al., 2014; Osamwonyi, 2016). Professional development is essential for equipping teachers and other practitioners with knowledge, skills, and information about ongoing assistance and resources necessary for effectively implementing inclusive education (Avramidis & Norwich, 2002; Odom et al., 2011). Research consistently indicates that teacher training yields positive outcomes and improvements in teaching self-efficacy (Forlin & Chambers, 2011; see also Kurniawati et al., 2014; Lautenbach & Heyder, 2019; Tristani & Basset-Gunter, 2020 for systematic reviews), knowledge (Brown et al., 2008) and teacher attitudes (Sharma et al., 2008).

The present narrative review focuses specifically on attitude improving of pre-service general teachers, as attitudes toward inclusive education have been shown to be strongly related to behavioral intentions in general (Ajzen, 1991) and intentions to implement inclusive practices in particular (MacFarlane & Woolfson, 2013). Furthermore, the duration (stand-alone units or infused programs) and delivery mode of content provided within inclusive programs (information-based, field experience, or mixed) are important aspects to consider when designing successful teacher training. However, despite the diversity of inclusive education training, research on the effects of these aspects suffers from a lack of consensus.

Regarding program duration, the findings are inconsistent (see Symeonidou, 2017, for a narrative review of this issue). On the one hand, several studies show that longer and more infused programs induce more positive effects on teachers' attitudes (Yellin et al., 2003). On the other hand, Sharma et al. (2008), comparing the effect sizes of stand-alone unit (i.e., short-term courses) and infused programs (i.e., long-term courses) on pre-service

teachers' attitudes, found that a stand-alone course at an Australian university had a larger effect ($\eta^2 = .62$) than a Canadian infused program ($\eta^2 = .12$; see also Forlin & Chambers, 2011).

Regarding content delivery mode of such programs, Lautenbach et al.'s (2020) experimental study comparing information-based (i.e., theoretical courses) and mixed programs (i.e., courses combining theoretical and practical content) revealed that mixed programs were more successful in promoting positive attitudes. Conversely, Lautenbach and Heyder's (2019) recent systematic review demonstrated that both information-based cognitive interventions and interventions combining information and practical field experience led to more positive attitudes toward inclusive education.

Given the inconsistencies in the literature, the present narrative review aimed to examine these two variables to identify the optimal training design in terms of its delivery mode and length.

Purposes and Overview

The present narrative review was specifically conducted to identify the best training design for inclusive teacher programs. It is particularly important as the number of training courses on inclusive education for pre-service teachers increases in many countries (UNESCO, 2020) and particularly in France (Kohout-Diaz, 2017). This review would allow to provide evidence-based recommendations for future educational programs. The objective of this review was threefold. The first objective was to examine the overall impact of pre-service teachers' training programs on their attitudes toward inclusive education. As designing a successful program requires identifying the optimal mode of duration and instructional delivery mode for such programs, the second and third aims of the review were to examine the effects of duration (stand-alone vs. infused programs) as well as delivery mode of the content (theoretical vs. practical vs. mixed) on pre-service teachers' attitudes toward inclusive education.

Method

Search Procedure

The timeframe for this review spans intervention studies focusing on attitudinal changes toward inclusive education among pre-service teachers between 1994 (studies published after the signing of the Salamanca Statement) and 2021 (the start year of the narrative review). Therefore, articles published until December 2021 were included. Given the differences in timeline of implementation of inclusive policies across the countries, the year of signature of Salamanca Statement was used as a cutoff point since it officially provides the international policymakers and governments with the main principles for inclusion thus serving a worldwide consensus on future directions for inclusive education all over the world.

The search covered literature in three languages: English, French (native language of the authors), and Italian (reviewed by a native Italian-speaking researcher of the team). Three methods were employed to identify relevant studies: searches in bibliographic databases, citation searches in other articles, and email requests to corresponding authors of articles identified by bibliographic and citation searches. Concerning the bibliographic database search, the literature search mostly utilized PsycInfo, ProQuest (for English and French literature), and Google Scholar (for Italian literature) databases. For the citation search, the bibliographies of all reviewed articles were inspected to identify and examine further studies on the effects of teacher training programs on teacher attitudes. Finally, emails requesting “file drawer” papers or unpublished data for review were sent to four researchers identified as those who studied the effects of inclusive teacher training in most of their studies.¹

Keywords

The search terms used were “teachers”/“pre-service teachers” AND “attitudes” AND “teacher education”/“teacher training” AND “inclusive education”/“inclusion” AND “special needs”/“disabilities.”

Data Extraction and Analysis

Figure 1 presents a flowchart detailing the study selection process. We followed PRISMA guidelines (Liberati et al., 2009) to extract and analyze the retrieved articles. A total of 4241 studies were identified through database searches (4143 records from databases such as PsychInfo, ProQuest, and Google Scholar and 98 records from supplementary sources such as references in relevant published meta-analyses and systematic reviews). After screening the titles, keywords, and abstracts of all papers and removing duplicates ($n = 26$), 156 records were reviewed according to the eligibility criteria. The inclusion criteria were based on the PICOS approach (Liberati et al., 2009; Zaugg et al., 2014). Studies had to include (a) pre-service teachers, (b) mainstream teachers, and (c) whose attitudes toward inclusive education were assessed quantitatively during pre-service teacher programs on inclusive education. Studies not fulfilling these five inclusion criteria, i.e., focusing on in-service teachers or qualitatively assessing behavior, intentions, knowledge, or self-efficacy (rather than attitudes), were excluded from the review. Furthermore, studies that did not explicitly mention both the duration (in hours, months, or semesters) and the delivery mode (theoretical vs. practical vs. mixed) of the programs studied were also excluded. In total, 45 articles fulfilled the inclusion criteria and were thus considered for further analysis. After an initial reading, 14 studies were excluded because they did not specify the duration

¹ The literature search also included gray literature. However, due to the limited timeframe and difficulties contacting master’s or PhD thesis authors (along with the lack of “file drawer” studies from several contacted authors), unpublished studies were not included in the final review.

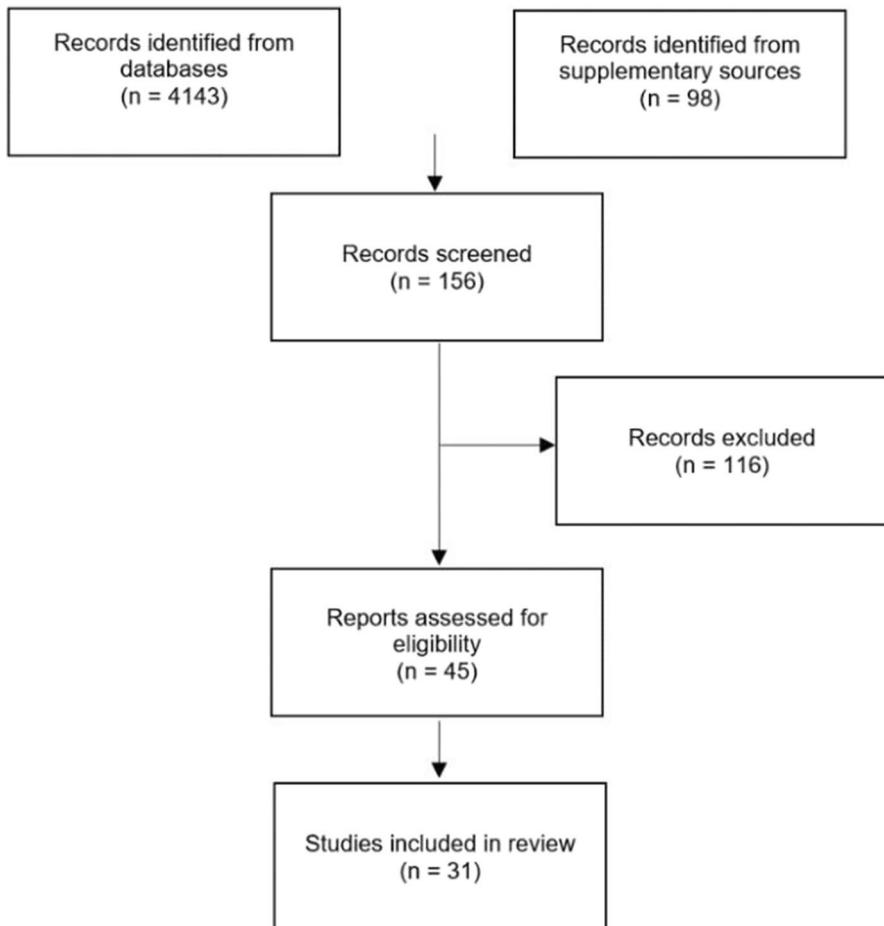


Fig. 1 Flowchart of study selection

or delivery mode of the program ($n = 3$); the dependent variable was other than pre-service teachers' attitudes (e.g., behaviors, knowledge, and self-efficacy, $n = 4$), was qualitative in nature ($n = 1$), or focused on in-service teachers as a population ($n = 6$). The initial reading resulted in the selection of 31 studies published in peer-reviewed journals for detailed analysis.

Transparency and Openness

The study's design, its hypotheses, and analyses were pre-registered through Open Science Framework. The registry form, all data, working sheets, and the articles reviewed can be accessed at https://osf.io/4fmsu/?view_only=c9b282b6ede6419b874ff8b4d9d1b61a.

Results

This section provides an overview of the studies included in the present narrative review.² A descriptive synthesis, including the descriptive analysis of these studies in terms of their population, country, study design, and measurement, is presented below. Tables 1 and 2 provide an overview of the studies included in this review.

As the primary aim of this paper was to examine the effects of duration and type of content delivery mode of courses on pre-service teachers' (PST) attitudes toward inclusive education, and considering that some studies included several programs (e.g., five programs in Sharma et al., 2008 and two programs in Sharma & Sokal, 2015, see Table 2), we focused on the interventions themselves rather than on the studies. A total of 36 programs were considered in the present review (out of a total of 31 papers). The examination and discussion of the effects of the duration and delivery mode variables on attitudes toward inclusive education is provided in depth in the last part of this section by using a narrative review approach (Baumeister & Leary, 1997).³

Participants

In all the reviewed studies, the target groups were pre-service teacher students attending university programs in inclusive education. In addition, a range of institutions delivered such teacher training programs with universities being the most common, followed by government and researchers themselves. Sample sizes for the studies varied considerably. The smallest sample sizes were reported in the studies by Yuknis (2015, $N = 18$) and Martínez (2003, $N = 23$). The largest sample size was reported in the study by Swain et al. (2012, $N = 777$).

Origin of Study

As our literature search did not have any geographical limitations, the studies included in our review were conducted in different countries. The majority of programs were implemented in North America (USA and Canada, $n = 19$), Australia ($n = 9$), Europe (Germany and Scotland, $n = 2$), Turkey ($n = 2$), and Asia (Hong Kong and Singapore, $n = 3$), with one study not reporting the country of the intervention (Hastings et al., 1996). As outlined above, two of the papers reviewed compared the effects of different international programs: Sharma et al. (2008) (comparison between Hong Kong, Singapore, Canada, and two Australian programs) and Sharma and Sokal (2015) (comparison between Canada and Australia).

² The critical analysis of primary studies included in the present review was conducted by using an adapted version of Downes et al.'s (2016) AXIS scale.

³ It should be noted that the inclusion of narrative review is a deviation from the pre-registered protocol. Only systematic review method was pre-registered in the initial version that can be found on the OSF page of the project.

Table 1 Overview of the included studies' characteristics

Author, year, country, journal name	Study design	Control group	$N_{(\text{sample})}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha), example of item	Results
Beacham and Rouse (2012) Scotland <i>Journal of Research in Special Educational Needs</i>	Pre-post design	X	216	1 year (N/A)	Coursework	15 self-constructed items (N/A) "All students can learn"	No significant change in attitudes after the training
Brown et al. (2008) USA <i>Teaching and Teacher Education</i>	Pre-post design + comparisons between experimental group and control group	Yes	208	1 semester (N/A)	Coursework	4 self-constructed items (N/A) "Meeting the needs of students with learning disabilities is primarily the responsibility of the special education teachers"	Attitudes are more positive for experimental than control group
Burton and Pace (2009) USA <i>School Science and Mathematics</i>	Pre-post design + comparisons between 1st year, 2nd year and 3rd year students	X	36	3 years (N/A)	1st year and 2nd year: coursework and little field experience; 3rd year: coursework and more structured fieldwork	20 self-constructed items (N/A) "I act differently around students with disabilities" (reversed item)	Descriptively no change for 1st and 2nd year students, positive change for 3rd year students

Table 1 (continued)

Author, year, country, journal name	Study design	Control group	$N_{(sample)}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha), example of item	Results
Campbell et al. (2003) Australia <i>Journal of Intellectual & Developmental Disability</i>	Pre-post design	X	274	13 weeks (39 h)	Coursework and field experience	Attitudes toward inclusive education for children with Down syndrome (N/A) "Inclusion of the child with Down syndrome would be beneficial to the other children socially and emotionally"	Attitudes are more positive after the training
Carroll et al. (2003) Australia <i>Teacher Education Quarterly</i>	Pre-post design	X	220	10 weeks (30 h)	Coursework and field experience	IPD ^a (6 factors, Cronbach's alpha varied from .54 to .91) "I feel frustrated because I don't know how to help"	Attitudes are more positive after the training

Table 1 (continued)

Author, year, country, journal name	Study design	Control group	$N_{(sample)}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha), example of item	Results
Cook (2002) USA <i>Teacher Education and Special Education</i>	Longitudinal (over 4 years)	X	181	4 years (N/A)	Coursework	ORI (4 factors, Cronbach's alpha varied from .63 to .83) "The inclusion of students with disabilities can be beneficial for students without disabilities"	Scores on three factors of ORI did not differ as function of the year of program
Forlin and Chambers (2011) Australia <i>Asia-Pacific Journal of Teacher Education</i>	Pre-post design	X	67	13 weeks (39 h)	Coursework and field experience	SACIE (.77) "Students who need an individualized academic program should be in regular classes"	Small but statistically insignificant difference ($d = .20$)
Gao and Mager (2011) USA <i>International Journal of Special Education</i>	Pre-post design	X	168	4 years (N/A)	Coursework and field experience	ATIES (N/A) "Students who cannot read standard print and need to use Braille should be in regular classes"	Attitudes are more positive after the training

Table 1 (continued)

Author, year, country, journal name	Study design	Control group	$N_{(sample)}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha), example of item	Results
Gürsel (2007) Turkey <i>Perceptual and Motor Skills</i>	Pre-post design + comparisons between experimental group and control group	Yes	78	14 weeks (42 h)	Coursework and field experience	ATDP scale, Form O (.69) "There shouldn't be special schools for disabled persons"	Attitudes are more positive after the training for experimental group ($d = .84$)
Hastings et al. (1996) England <i>British Journal of Special Education</i>	Pre-post design	Yes	100 (55 in control group)	9 weeks (N/A)	Coursework	ATDP scale, Form O (N/A)	No significant change in attitudes
Hodge et al. (2002) USA <i>Adapted Physical Activity Quarterly</i>	Pre-post design + comparisons between on campus and off campus groups	X	37	16 weeks (32 h)	Coursework and field experience	PEATID-III (N/A) "Teaching students labeled as disabled in regular physical education classes with non-disabled students will disrupt the harmony of the class"	No significant change in attitudes between the groups after the training

Table 1 (continued)

Author, year, country, journal name	Study design	Control group	$N_{\text{(sample)}}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha), example of item	Results
Ivey and Reinke (2002) USA <i>Electronic Journal for Inclusive Education</i>	Pre-post design	X	52	1 day (N/A)	Field experience	9-item scale adapted from Andrews and Clementson (1997) (.93) "I am familiar with inclusion"	Attitudes are more positive after the training
Killoran et al. (2014) Canada <i>International Journal of Inclusive Education</i>	Pre-post design + comparison between two groups	X	81	36 h	Coursework	ORM-Adapted ^b (N/A) "Many of the things teachers do with regular students in a classroom are appropriate for students with special needs"	Attitudes are more positive after the training for both groups
Loreman and Earle (2007) Canada <i>Exceptionality Education Canada</i>	Pre-post design with a measure in the middle of the program	X	68	2 years (N/A)	Coursework and field experience	ATIES (.92)	Attitudes are more positive by the end of the program

Table 1 (continued)

Author, year, country, journal name	Study design	Control group	$N_{\text{(sample)}}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha), example of item	Results
Lautenbach et al. (2020) Germany <i>Frontiers in Education</i>	Comparison between group 1 (coursework), group 2 (coursework and field experience), and group 3 (control group)	Yes	62	14 weeks (21 h)	Coursework in group 1 and coursework and field experience in group 2	15-item Questionnaire on Attitudes Toward Inclusion for Teachers (.87) "Children with special needs will be treated well by other children in an inclusive class"	Attitudes are more positive after the training for both experimental groups ($d = .87$) Larger increase in attitudes for group 2 (coursework and field experience) than in group 1 (coursework) ($d = .62$)
Martínez (2003) USA <i>Teacher Development</i>	Pre-post design	X	23	1 semester (N/A)	Coursework and field experience	ORI (.82)	No significant change in attitudes after the training
McCray and McHatton (2011) USA <i>Teacher Education Quarterly</i>	Pre-post design	X	115	16 weeks (32 h)	Coursework	22 self-constructed items (.91) "I believe most students with disabilities (regardless of the level of their disability) can be educated in the general education classroom"	Attitudes are more positive after the training

Table 1 (continued)

Author, year, country, journal name	Study design	Control group	$N_{\text{(sample)}}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha), example of item	Results
McHatton and Parker (2013) USA <i>Teacher Education and Special Education</i>	Pre-post design + comparison between elementary education and special education majors	X	56	1 semester (N/A)	Coursework and field experience	28 self-constructed items (.91). The same scale as above	Attitudes are more positive after the training for elementary education majors but not for the special education majors
Miller and Hinshaw (2012) USA <i>Journal of Instructional Psychology</i>	Pre-post design + post-retrospective pretest	X	40	1 semester (N/A)	Coursework	ORI (N/A)	Significant change on 2 items of 25 after the training A significant change in 10 out of 15 items in post-retrospective pre-test
Sharma and Nuttal (2016) Australia <i>Asia-Pacific Journal of Teacher Education</i>	Pre-post design	X	30	9 weeks (18 h)	Coursework	TATIS (.91) "Including students with special needs creates few additional problems for teachers class management"	Attitudes are more positive after the training ($d = 2.85$)
Stella et al. (2007) Hong Kong <i>Asia-Pacific Journal of Teacher Education</i>	Pre-post design	X	151	10 weeks (20 h)	Coursework and field experience	ATIES (.79)	Attitudes are more positive after the training

Table 1 (continued)

Author, year, country, journal name	Study design	Control group	$N_{(sample)}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha), example of item	Results
Sucuöğlu et al. (2015) Turkey <i>Journal of Early Childhood Teacher Education</i>	Pre-post design	X	30	16 sessions (48 h)	Coursework	ORI (.80)	Attitudes are more positive after the training
Swain et al. (2012) USA <i>Preventing School Failure</i>	Pre-post design	X	777	4 years (N/A)	Coursework and field experience	Attitudes Toward Inclusion Instrument (.84) "Students with disabilities should have the right to be in general classrooms"	Attitudes are more positive after the training
Tait and Purdie (2000) Australia <i>International Journal of Disability, Development and Education</i>	Pre-post design	X	481	1 year (N/A)	Coursework	IDP (N/A)	Attitudes are more positive on all dimensions after the training ($d = .29$)
Taylor and Ringla- ben (2012) USA <i>Higher Education Studies</i>	Pre-post design	X	292	15 weeks (N/A)	Coursework	ORI (N/A)	Attitudes are more positive after the training

Table 1 (continued)

Author, year, country, journal name	Study design	Control group	$N_{(sample)}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha), example of item	Results
Van Laarhoven et al. (2006) USA <i>Journal of Teacher Education</i>	Pre-post design + comparison between group 1 (experimental group, general education), group 2 (experimental group, special education), and control group	Yes	106 (53 in control group)	1 semester	Coursework and field experience	10 self-constructed items (adapted form of Minke et al.'s (1996) scale) (N/A) "The needs of the majority of children with disabilities can be met in the regular classroom"	Attitudes are more positive after the training for all groups with a bigger increase for two experimental groups
Varee and Boyle (2014) Australia <i>Educational Psychology: an International Journal of Experimental Educational Psychology</i>	Comparison between experimental group and control group	Yes	342	12 weeks (24 h)	Coursework	TAISA (.80) "All children with special educational needs should be included in the mainstream classroom full stop"	Attitudes are more positive after the training for experimental group ($d = .59$)
Yellin et al. (2003) USA <i>Action in Teacher Education</i>	Pre-post design + comparison between control group 1, control group 2, and experimental group	X	55	1 semester (N/A)	Coursework and field experience	ORI (.83)	Attitudes are more positive after the training for control group 1 versus two other groups

Table 1 (continued)

Author, year, country, journal name	Study design	Control group	$N_{(sample)}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha), example of item	Results
Yuknis (2015) USA <i>Deafness & Education International</i>	Pre-post design	X	18	1 semester (N/A)	Coursework	TATIS (N/A)	No significant change in attitudes after the training

Effect sizes (Cohen's *d*) are presented in parentheses for column "Results." *IDP* Interactions with Disabled Persons, *ORI* Opinions Relative to the Integration, *SACIE* Sentiments, Attitudes, and Concerns about Inclusive Education, *ATIES* Attitudes Toward Inclusive Education Scale, *ATDP* Attitudes Toward Disabled Persons, *PEATID-III* Physical Educators' Attitudes Toward Teaching Individuals with Disabilities-III, *ORM* Opinions Related to Mainstreaming, *TATIS* Teacher Attitudes Toward Inclusion Scale, *TAISA* Teacher Attitudes to Inclusion Scale

^a*IPD* (Interactions with People with Disabilities, Forlin et al., 2001) is a modified version of IDP (Getthing, 1994)

^b*ORM-A* (Opinions Related to Mainstreaming-Adapted, Larrivee & Cook, 1979) is a modified version of ORI

Table 2 Overview of studies considered in systematic review that compared several international training programs

	$N_{\text{(sample)}}$	Duration of program (in hours)	Content of program	Attitude measurement (Cronbach's alpha)	Results (Cohen's d effect sizes)
Sharma et al. (2008) <i>Disability & Society</i>					
Pre-post design + comparisons between 5 programs	Australia (AU1) 153	10 weeks (45 h)	Coursework and field experience	ATIES (.89)	Attitudes are more positive after the training ($d = 1.06$)
	Australia (AU2) 92	10 weeks (20 h)	Coursework	ATIES (.89)	Attitudes are more positive after the training ($d = 2.55$)
	Canada 58	2 years (N/A)	Coursework	ATIES (.89)	Attitudes are more positive after the training ($d = .74$)
	Hong Kong 182	10 weeks (20 h)	Coursework and field experience	ATIES (.89)	Attitudes are more positive after the training ($d = 1.03$)
	Singapore 182	10 weeks (30 h)	Coursework	ATIES (.89)	No significant change in attitudes after the training ($d = .06$)
Sharma and Sokal (2015) <i>Journal of Research in Special Educational Needs</i>					
Pre-post design + comparisons between 2 programs	Canada 60	30 h	Coursework and field experience	SPATI (.86)	Attitudes are more positive after the training ($d = 1.06$)
	Australia 25	18 h	Coursework and field experience	SPATI (.82)	Attitudes are more negative after the training ($d = -.38$)

Effect sizes (Cohen's d) are presented in parentheses for column "Results." ATIES Attitudes Toward Inclusive Education Scale, SPATI School Principals' Attitudes toward Inclusion

Study Design

The majority of studies used pre-/post-intervention study design ($n = 28$). One study used a longitudinal design (Cook, 2002). Six studies used a control group design (either in addition to a pre-post intervention design or a comparison between experimental and control group designs). One study employed a retrospective pretest design within a longitudinal design, asking students to respond to the same scale as the post-test scale “as if this was the first pretest, instead of the way you actually did” (Miller & Hinshaw, 2012).

Materials and Measurements

One of the search main inclusion criteria was a quantitative assessment of the outcome of pre-service teachers’ personal attitudes toward inclusive education. In the reviewed studies, this outcome was measured using various scales. In eight studies, pre-service teachers’ attitudes were assessed through previously validated questionnaires such as the Attitudes Toward Inclusive Education Scale (ATIES, Wilczenski, 1992; 16 items, 6-point Likert scale). Opinions Relative to the Integration of Students with Disabilities (ORI, Antonak & Larrivee, 1995; 25 items, 6-point Likert scale) was used in six other studies. Other scales such as the Interactions with People with Disabilities (Forlin et al., 2001, 20 items, 5-point Likert scale) and Attitudes Toward Disabled Persons (ATDP, Yuker et al., 1970, 20 items, 6-point Likert scale) were also used to assess teachers’ attitudes toward inclusive education. Several studies developed their own scales as outcome measures, such as the scale measuring the attitudes toward working with students with learning disabilities (4 items, binary “agree/disagree” scale) in Brown et al. (2008) or the Attitudes Toward Inclusion survey (McHatton & McCray, 2007; 28 items, 5-point Likert scale). Some studies used several scales simultaneously, as in Sharma et al. (2008) and Stella et al. (2007), which measured attitude through two different scales (ATIES and IDP), or Lautenbach et al. (2020), who used measures of explicit (ATIES) and implicit attitudes.

Besides attitudinal measures, supplementary measures were also provided to assess constructs such as self-efficacy (Forlin & Chambers, 2011), stress perception and implicit attitudes (Lautenbach et al., 2020), and knowledge about inclusive education (Brown et al., 2008; Sucuoğlu et al., 2015). Two studies also examined participants’ satisfaction levels with the course through pre and post semi-structured interviews (Martínez, 2003; Taylor & Ringlaben, 2012). As these constructs were outside the scope of the present review, they were not included or discussed in the present analyses.

Table 3 Summary of significantly positive, negative, and non-significant effects of interventions on inclusive attitudes as function of program duration (stand-alone and infused)

	Positive effect	Non-significant effect	Negative effect
Stand-alone ($n = 28$)	20 (71.4%)	7 (25%)	1 (3.6%)
Infused ($n = 8$)	5 (62%)	3 (38%)	0
N total ($n = 36$ interventions)	25	10	1

Table 4 Summary of significantly positive, negative, and non-significant effects of interventions on inclusive attitudes as function of program delivery mode of content (mixed, information cognitive-based, or practical)

	Positive effect	Non-significant effect	Negative effect
Information cognitive-based ($n = 16$)	11 (68.8%)	5 (31.2)	0
Mixed ($n = 19$)	13 (68.4%)	5 (26.3%)	1 (5.3%)
Practical field experience ($n = 1$)	1 (100%)	0	0
N total ($n = 36$ interventions)	25	10	1

Intervention Success

Overall, 25 out of 36 interventions reported a significant positive change in pre-service teachers' attitudes toward inclusive education⁴. Only one program had a negative effect (Sharma & Sokal, 2015): PST attitudes toward inclusive education became negative after implementing a Canadian program. Tables 3 and 4 summarize the results (in number of interventions and percentage) of the effects based on the program duration (Table 3) and its delivery mode of the content (Table 4).

Different Approaches in Duration and Content Delivery Mode of Programs

Considering that most studies (23 out of 31) did not provide statistical indicators, a meta-analytic systematic review approach seemed less suited for discussing the effectiveness of program duration and the specific delivery mode of content. Therefore, we adopted a narrative approach (Baumeister & Leary, 1997; Furley & Goldschmied, 2021) to explore in greater depth the effects of these two variables on pre-service teacher (PST) attitudes toward inclusive education.

Upon thorough examination of the selected papers, several questions emerged regarding the optimal duration and delivery mode of training program content to produce a positive shift in attitudes toward inclusive education among PSTs.

⁴ To illustrate the interventions' success rate, we reported the number and relative frequency of positive, negative, and non-significant effects. The limitations of this "vote-counting" method (Borenstein et al., 2021) are discussed in the final section.

These different approaches in the design of such programs are narratively discussed below, breaking down various aspects of each variable.

Different Approaches in Duration Employed in PST Programs

The present narrative review distinguished two primary formats for the duration of PST inclusive education programs: stand-alone units and infused programs. Stand-alone units refer to interventions that span several hours to one semester, whereas infused programs incorporate inclusive education content into a series of general seminar courses over several years (see also Symeonidou, 2017).

Stand-alone Programs A substantial number of programs studied in the considered papers concerned stand-alone courses ($n = 28$). The duration, measured in hours, varied considerably across these stand-alone programs. Among those specifying an exact number of hours, the shortest lasted a single day (Ivey & Reinke, 2002) and the longest was 48 h (Sucuoğlu et al., 2015). It should be noted that several studies did not specify the exact number of hours, only noting the duration in weeks (e.g., 9 weeks in Hastings et al., 1996; 15 weeks in Taylor & Ringlaben, 2012) or simply one semester (e.g., Brown et al., 2008; Martínez, 2003; McHatton & Parker, 2013; Miller & Hinshaw, 2012). Such programs were considered stand-alone units, since they were generally provided over one semester.

A majority of these stand-alone programs demonstrated a positive effect on PST attitudes toward inclusive education: 20 out of 28 stand-alone unit interventions (71.4%) engendered a positive attitudinal shift (see Table 3). For instance, the stand-alone intervention studied in Varcoe & Boyle, (2014) lasted for 24 h and yielded a positive effect on attitudes among PSTs who followed this program, compared to those without such training (see also Alvarez McHatton & Parker, 2013; Brown et al., 2008; Campbell et al., 2003; Carroll et al., 2003; Gürsel, 2007; Killoran et al., 2014; McCray & McHatton, 2011; Miller & Hinshaw, 2012; Sharma & Nuttal, 2016; Stella et al., 2007; Sucuoğlu et al., 2015; Taylor & Ringlaben, 2012; Van Laarhoven et al., 2006).

However, in their study on the effect of stand-alone programs, Yellin et al. (2003) argued that enrolment in a single semester-long course is not enough to promote a significant change in PST attitudes toward inclusive education. Indeed, seven of the 28 stand-alone programs did not yield a significant positive change in PST inclusive attitudes. For instance, Martínez (2003) observed no significant effect from a 15-week intervention, neither in PST attitudes nor in perceptions of teaching competence. Echoing Yellin et al. (2003), Martínez suggested that a single overview course might not be adequate to bring about positive changes in attitudes and that teacher preparation programs should consider incorporating multiple mandatory courses. Considering the findings from studies in which stand-alone interventions did not yield marked results, it seems longer programs or those more integrally infused into the PST curricula would be more effective in producing a positive change in attitudes toward inclusive education.

Infused Programs The present review examined eight infused programs, with durations ranging from 1 year ($n = 2$, Beacham & Rouse, 2012; Tait & Purdie, 2000) to 4 years ($n = 2$, Gao & Mager, 2011; Swain et al., 2012). Similar to the stand-alone programs, the outcomes of infused programs on PSTs' attitudes toward inclusive education were inconsistent.

To begin with, most of the reviewed studies support the notion that an infused teacher education program can positively impact PST attitudes toward inclusive education (Gao & Mager, 2011; Loreman & Earle, 2007; Sharma et al., 2008; Swain et al., 2012; Tait & Purdie, 2000). Indeed, five out of eight (62%) infused programs contributed to an increase in inclusive attitudes, while three programs (38%) had no effect. Highlighting this, Loreman and Earle (2007) observed a significant increase in Attitudes Toward Inclusive Education (ATIES, Wilczenski, 1992) following a 2-year program. They contended that an infusion unit can not only improve attitudes but also transmits a substantial amount of information about inclusive education across several years.

The review also examined three studies which suggested that infused approaches might not always outperform stand-alone programs. For instance, in Cook (2002), a 4-year program failed to yield a significant increase in PST attitudes. The author argued that the limited inclusive instruction and lack of required inclusive field experience could be the reason for this, rather than the program's infused format.

Taken together, these studies suggest that both stand-alone and infused programs can positively influence inclusive attitudes among PST. Furthermore, Sharma et al. (2008) juxtaposed four stand-alone programs with one infused program, gauging attitudes toward inclusive education with a consistent measure, the Attitudes Toward Inclusive Education Scale (Wilczenski, 1992) across the five programs. The four stand-alone programs lasted on average 20 h, including two mixed and one information-based cognitive program in Australia, as well as a mixed program in Hong Kong and a longer 30-h information-based cognitive course in Singapore. The fifth program, based in Canada, consisted in infused courses over 2 years. Overall, the authors found that all programs except the one in Singapore yielded a significant change in PST attitudes. Examining the eta squared values (η^2), the program administered by the Australian university exhibited the most significant change ($\eta^2 = .62$), trailed by the second Australian stand-alone intervention ($\eta^2 = .22$) and the similar Hong Kong university program ($\eta^2 = .21$). The infused Canadian program had a relatively small effect size in comparison ($\eta^2 = .12$). Drawing on these results, Sharma et al. (2008) suggested that single-subject programs might be capable of matching their infused counterparts' success in altering attitude scores. However, the pronounced attitude shifts seen in the Australian and Hong Kong stand-alone programs could be explained by differences in content. Sharma et al. (2008) therefore proposed that a program's content and pedagogy could be more significant predictors of success than mere duration.

Different Approaches in Content Delivery Mode Employed in PST Programs

The present narrative review has also similarly explored the effect had by the content delivery mode. Three different program types were analyzed: information-based cognitive interventions (i.e., theoretical courses, $n = 16$), field experience programs (i.e., practicums, $n = 1$), and mixed programs (i.e., combining theoretical coursework and field experience, $n = 19$). As with the duration variable described below, all three content delivery modes were found to positively influence PST attitudes (see Table 4). Only one study considered in the present review was exclusively practicum-based (Ivey & Reinke, 2002), focusing on outdoor activities. We therefore chose to center our discussion on the information-based cognitive and mixed courses.

Information-Based Cognitive Interventions The majority of the examined information-based cognitive interventions share similarities in their theoretical underpinnings. Notably, they offered theoretical courses on legislation and introductions on student learning and behavioral characteristics, as well as on inclusive teaching planning and classroom management.

Multiple studies underscore the potential of purely theoretical courses to have a significant impact on PSTs' attitudes (Brown et al., 2008; Killoran et al., 2014; McCray & McHatton, 2011; Miller & Hinshaw, 2012; Sharma et al., 2008; Sharma & Nuttal, 2016; Sucuoğlu et al., 2015; Tait & Purdie, 2000; Taylor & Ringlaben, 2012; Varcoe & Boyle, 2014). Out of 16 programs, 11 (68.8%) information cognitive-based programs generated an improvement in PSTs' attitudes toward inclusive education. For instance, the program studied by Sharma and Nuttal (2016) aimed to deepen understanding of inclusive education by dissecting local policies and legislation, exposing the rationale for and against this issue, and examining the impact of educators' attitudes on the teaching environment and the learning of effective classroom strategies. Enriching the program was a guest lecture by the parent of a student with a severe disability. The program culminated in students making presentations on how they planned to incorporate one of the research-based inclusive teaching strategies. By examining the subscales scores of Teachers' Attitudes Toward Inclusion Scale (TATIS, Bailey, 2004) before and after the course, Sharma and Nuttal (2016) observed that the course was particularly effective at increasing attitudes. They ascertained that implementing inclusion correctly would not add to teachers' workload or hinder PSTs' ability to manage the classroom. There was also a noticeable uplift in the belief that inclusion would not create learning challenges for both mainstream and special education needs (SEN) students. The authors concluded that equipping PSTs with a deeper understanding of students and their needs—beyond just disabling conditions—can foster positive attitudes, potentially diminishing tendencies to sideline them based on preconceived notions regarding their abilities. Similarly, in Brown et al. (2008), embedded instruction on adapting classroom assessments, with a focus on how to develop appropriate assessments for SEN students, was integrated into a general education testing and measurement framework. This approach not only positively influenced PSTs' attitudes toward meeting the needs of students with learning disabilities, it also increased their confidence to

work with SEN students. These authors therefore posit that instruction focused on how to address the needs of SEN students is capable of improving future educators' attitudes and their perceived confidence to teach SEN students.

However, other studies ($n = 5$) show that purely theoretical content might not suffice to positively influence PST attitudes toward inclusive education (Beacham & Rouse, 2012; Cook, 2002; Hastings et al., 1996; Sharma et al., 2008; Yuknis, 2015). For instance, the program studied by Hastings et al. (1996) offered a broad introduction to teaching techniques for children with SEN, as well as general information about children with severe learning difficulties. The authors did not find a significant effect of the course on the global attitude measure. Hastings et al. (1996) argued that such a global measure reflecting an intergroup level of attitudes might not be sensitive to the course's effects and that a more interpersonal measure (e.g., assessing perceptions and attribution of SEN student success) would more effectively evaluate attitudinal changes post-training. Similarly, Yuknis's (2015) program, which emphasized instructional methods for engaging with SEN students based on Universal Design of Learning principles, did not show a significant effect. Examining teachers' pre- and post-mean differences on the Teachers' Attitudes Toward Inclusion Scale (TATIS, Bailey, 2004), the author found no significant change in attitudes toward inclusive education after participants completed an introductory special education course.

Both Hastings et al. (1996) and Yuknis (2015) explain the absence of attitudinal shift by the use of inappropriate measures for assessing attitudes and a lack of interpersonal contact during training. Furthermore, Yuknis (2015) adds to the prevailing sentiment that one course is not enough to change attitudes, particularly if it provides neither direct experience nor in-depth discussion about key aspects of inclusive education.

In light of the feedback from the studies in which purely theoretical programs failed to induce a significant increase in PST attitudes, the main critique appears to be a lack of contact with SEN students during PST training. This deficiency might account for its non-significant effects on attitudes.

Mixed Interventions In the present paper, we examined a substantial number of studies ($n = 19$) that were concerned with mixed course design. These mixed interventions blend the theoretical knowledge found in information-based cognitive programs with practical activities. The latter included practicums in a regular school (Carroll et al., 2003), observations of elementary classroom teachers working with a small group of SEN students (Yellin et al., 2003), participation and organization of social activities with disabled persons (Forlin & Chambers, 2011), and attendance of guest lectures by disabled persons (Sharma et al., 2008).

Most of the mixed-design programs showed a significant effect on PST attitudes toward inclusive education (Alvarez McHatton & Parker, 2013; Campbell et al., 2003; Carroll et al., 2003; Gao & Mager, 2011; Gürsel 2007; Lautenbach et al., 2020; Loreman & Earle, 2007; Sharma et al., 2008; Sharma & Sokal, 2015; Stella et al., 2007; Swain et al., 2012; Van Laarhoven et al., 2006). Indeed, 13 interventions (68.4%) induced an increase in attitudes, while five programs (26.3%) found no change and one program (5.3%) provoked a negative effect (Sharma & Sokal,

2015). To illustrate, the program in Carroll et al.'s (2003) study integrated discussions on inclusive practices, such as adapting curricula for SEN students and a broad overview of classroom management techniques, alongside diverse practicum experiences. Students were additionally given multiple opportunities to interact and work alongside people with disabilities, either directly or via a buddy system in local schools where PSTs were paired with disabled students. By comparing the total scores and scores on specific subdimensions of the Interactions with People with Disabilities Scale (IPD, Forlin et al., 2001) before and after training, Carroll et al. (2003) observed that following the training, PSTs felt less ignorant, less frustrated, and less concerned during direct contact with disabled people. The authors argued that offering real-world opportunities in schools, rather than playing out fictitious teaching situations, enables PSTs to better apply what they have learned during their courses.

McHatton and Parker (2013) also examined the impact of a program that melded theoretical instruction (management and instructional courses) with the placement of PSTs in co-teaching pairs in inclusive classrooms for a full day. The pairing consisted of one elementary education teacher and one special education teacher. The authors observed that the attitudes of elementary education PSTs improved notably from the beginning to the end of the training. A year after the program concluded, these improved attitudes persisted, even increasing slightly. The authors highlighted the benefits of a program that offers PSTs a first contact with SEN students in a highly structured setting. Such programs could involve deliberate pairings with special education PSTs and field placements in inclusive classrooms. Such an approach, they believed, could dispel various myths and misconceptions associated with special education.

Although a large majority of studies considered here found that mixed interventions may influence PSTs' attitudes, it is important to note exceptions (Burton & Pace, 2009; Forlin & Chambers, 2011; Hodge et al., 2002; Martínez, 2003; Yellin et al., 2003). For example, Forlin and Chambers (2011) proposed PSTs with a hybrid course combining classical theoretical content with two more applied experiences. The first applied course, selected by a quarter of the teachers, involved direct contact with a disabled person in the form of social activities. The other applied experience involved identifying community programs in the local area that offer inclusive activities, such as recreational events for both disabled and non-disabled individuals, inclusive library programs, performing arts activities, or social clubs. These authors observed that the total score on the Sentiments, Attitudes, and Concerns about Inclusive Education scale (SACIE, Loreman & Earle, 2007) did not significantly change upon completion of the course. Although the effect was not significant, PSTs felt marginally more positively toward including all students, despite still expressing the least support for including students with physically aggressive behaviors. The authors concluded that the modest participation rate in the direct interaction experience involving disabled people might have influenced the absence of a broader shift in attitudes toward inclusive education post-course.

Finally, in Yellin et al.'s (2003) study, PSTs had regular campus coursework and engaged in 300 h of field experience, including observing in-service teachers in elementary classroom and attending guest lectures on various topics. The authors

did not observe significant differences between pre- and post-scores on the Opinions Relative to the Integration of Students with Disabilities scale (ORI, Antonak & Larrivee, 1995). They concluded that mere exposure does not guarantee improved inclusive attitudes among PSTs, especially when involvement with SEN students is somewhat superficial (primarily observation-based, with some small group participation). They also suggested that a single semester might be insufficient to meaningfully influence attitudes.

In order to identify which type of intervention has a stronger effect on PST attitudes, Lautenbach et al. (2020) compared the effects of information-based and mixed 14-week interventions on pre-service physical education teachers' implicit and explicit attitudes toward inclusive education. They used a quasi-experimental design, including a control group. In the information-based group, students discussed the topic of inclusive education and the importance of empathy in relating to students. The mixed intervention group mirrored the theoretical content but added 4 h of participation in a rehabilitation and disabled sports community for students. The study revealed a marked difference between the two groups: the combined intervention group displayed a more favorable explicit attitude than the information-based group, especially in the dimensions of "willingness to teach inclusively" and "promoting academic competencies." However, there were no significant differences in implicit attitudes. Interestingly, when compared to the control group, neither intervention displayed a significant effect on the two attitudinal measures. The authors conclude that although theoretical courses can increase awareness about inclusive education, without practical experience in inclusive settings, the stress perception of an inclusive experience might dampen PSTs' attitudes toward inclusive education. Furthermore, they argued that the nature of the contact experienced in the practical intervention plays an important role. In their study, PSTs engaged in sports activities together with SEN students, fostering an equal-status relationship, aligning with optimal contact conditions as described by Pettigrew et al., (2011).

Discussion

The present narrative review aimed to examine the effects of pre-service teachers' inclusive training programs on their attitudes toward inclusive education. Beyond examining the overall effect of pre-service course, our review aimed to go one step further by analyzing program duration and delivery mode of content in more depth and discussing the aspects of these two variables to be considered when it comes to conceive a successful PST training program on the inclusive education. Following PRISMA guidelines (Liberati et al., 2009), a total of 31 articles encompassing 36 programs were considered and analyzed. Regarding duration, 28 programs were stand-alone units and eight were infused curricula. In terms of delivery mode of content, 16 interventions consisted of information-based cognitive interventions, 19 were mixed interventions, and only one consisted of exclusively practical field experience.

All criteria were taken into account, and the majority of programs (69%) were shown to induce a positive effect on pre-service teachers' attitudes toward inclusive education. Such a finding confirms the extensive body of inclusive education research by demonstrating the robust impact of teacher training programs on attitudinal shift among pre-service teachers (Lautenbach & Heyder, 2019; Tristani & Bassett-Gunter, 2020). An analysis of the optimal duration and delivery mode of content for a training course reveals less obvious results.

Long or Short? Theoretical or Mixed?

Given the inconsistencies in the reviewed studies' findings, it is difficult to definitively conclude that any one type of duration or content delivery mode is the most effective at facilitating a positive attitudinal change. While stand-alone, infused, theoretical, practicum-format, and mixed interventions all positively impacted PSTs' attitudes, questions regarding the design of these programs should be further addressed in future studies. Nevertheless, despite these inconsistencies, our findings allow us to provide some concrete recommendations for achieving optimal program design in terms of duration and content delivery mode.

One of the most important takeaways is that duration alone does not solely dictate a program's success. Indeed, duration should be considered simultaneously alongside content delivery mode, as the latter appears to be a more significant determinant in program success (Lautenbach et al., 2020; Sharma et al., 2008).

With regard to programs' content delivery modes, there is a noted positive effect when the content leans more toward practical application. For instance, Burton and Pace (2009) identified a positive trend in attitudes during the final year of their program, which introduced a structured field experience. This was in contrast to the first 2 years, in which no change in attitudes was observed. These findings highlight the potential of practicums to positively impact attitudinal change, an idea that is further echoed by studies in which interventions did not produce significant effects, or even had a negative effect (see Sharma & Sokal, 2015). Beyond the statistical and methodological issues highlighted by authors of these studies (e.g., small sample size in Forlin & Chambers, 2011; Yuknis, 2015; inappropriate measure of attitudes in Yellin et al., 2003), their discussions raise some similar points. Indeed, the majority of them have consistently suggested that programs' lack of applied experiences and interpersonal contact with SEN students could be a factor explaining the absence of significant positive increase in inclusive attitudes (Forlin & Chambers, 2011; Hastings et al., 1996). In other words, providing PSTs direct experience with SEN students during training courses may not only reduce the misperceptions surrounding special education and promote the enrolment of SEN students (Swain et al., 2012) but also reduce teachers' perceived stress levels (Lautenbach et al., 2020). Supporting this notion, a substantial body of social psychology research has shown that positive intergroup contact is capable of changing an individual's attitude toward an outgroup (Pettigrew et al., 2011).

It is worth noting that the practical components in these programs might not be sufficient to promote positive shift in PST attitudes on their own; they ought

to be combined with background theory on inclusive education. For instance, one of the recurrent themes in many programs from the present review focuses on national and international legislation (see, for example, McCray & McHatton, 2011). The perceived social support from government entities and local policy-makers is shown to increase PST attitudes, as teachers feel more supported in their implementation of inclusive practices (Desombre et al., 2019; see also Hind et al., 2019). Another salient theoretical component present in several programs revolves around addressing the needs of all students, rather than focusing on disabling conditions (see for example, Sharma & Nuttal, 2016). This conception lays greater emphasis on mainstream education than on special education. Together with reflective practices (e.g., the ability to evaluate one's own teaching methods and those observed in other classes, see also Symeonidou, 2017), such theoretical content could provide future teachers with the tools needed to navigate classroom diversity, making them vital inclusions in any program.

In sum, most studies suggest that combining theoretical and practical elements in PST training programs can lead to more positive attitudes toward inclusive education. This is supported by the experimental findings of Lautenbach et al. (2020), which showed notable shifts in personal attitudes and stress perceptions when intervention-based and practical field experience were integrated. Field experiences, complementing theoretical introductions to inclusive education, could enable students to apply classroom-learned concepts in real-world settings. Moreover, the notion that mixed interventions have a greater effect on teachers' attitudes is in line with established theoretical models. According to the associative-propositional model (Gawronski & Bodenhausen, 2006), two distinct but intertwined processes underlie attitude formation: an immediate affective reaction toward the stimulus (the associative process), which is consequently confirmed or disconfirmed by new information (the propositional process). To change an attitude, one should directly influence either associative or propositional processes, as this can lead to indirect change in the other. By way of example, theoretical courses introduce new information that not only directly informs propositional processes but can also indirectly influence the associative process by forming new associations. Conversely, practical experiences will have a direct influence on associative processes, as new positive associations are activated as a result of direct contact with SEN students. If these new associations resonate with pre-existing beliefs, they can also indirectly shape propositional processes.

In summary, both theoretical considerations and empirical findings suggest that mixed interventions may improve teachers' attitudes toward inclusive education by targeting both propositional and associative processes (Lautenbach et al., 2019; 2020). Field experience increases participants' knowledge and skills, as it provides necessary opportunities for teachers to put new theoretical knowledge into practice (Kurniawati et al., 2014). While the present narrative review provides recommendations on the optimal duration and content delivery mode for pre-service teacher inclusive training, there is still room for further investigation. A promising approach would be to undertake experimental studies exploring the interactive effects of both duration and delivery mode on shaping PSTs' attitudes.

Limitations

Several limitations must be considered when attempting to generalize the present findings. Firstly, each study was rooted in its own unique cultural context and educational policy environment thus not allowing us to generalize the present conclusions. Although Salamanca Statement applies to all countries in terms of the development of inclusive policies, teachers' attitudes toward inclusive education are shaped by societal and historical artefacts specific to the given country (van Steen & Wilson, 2020). Indeed, inclusive education policies differ from one country to another and have been introduced at different points in time thus influencing teachers' attitudes toward inclusive education (Leyser et al., 1994). Linked to such contextual variability, educational policies in terms of pre- and in-service teachers' professional development on inclusive education might be also different as function of the country thus impacting the effect of such training on their attitudes and behaviors (Engelbrecht et al., 2017). One might speculate that the more recent the implementation of a policy, the less support it will receive from the population and teachers, given the time needed to adapt to changes in educational policy and dynamics, consequently impacting the relevance of teachers' programs and finally teachers' attitudes. Future studies should thus consider the important influence of the cultural and political context when examining effects of the training programs on teachers' attitudes toward inclusive education. These programs, often based on the latest research and developed by teacher-researchers, aim to improve understanding of and support for teachers' inclusive practices. Thus, considering how these contextual factors influence the outcomes of such training is essential to developing targeted strategies that promote positive changes in teachers' perceptions of inclusive education.

Although the majority of interventions have shown the positive effect on PSTs' attitudes toward inclusive education, it is important to reflect on what constitutes an effective attitudinal change on this topic and the measures used to gauge it. As detailed in Tables 1 and 2 and discussed above, the studies considered in the present review employed a range of scales, complicating the task of pinpointing a specific attitudinal change. Some studies focused exclusively on a particular student group, such as those with Down syndrome (Campbell et al., 2003), while others adopted a broader scope (e.g., the belief that "All students can learn", as seen in Beacham & Rouse, 2012). Moreover, concerns arise regarding the variability and reliability of these attitude measurement tools. Notably, 15 out of 31 studies did not report Cronbach's alpha, making it impossible to draw conclusions about the reliability of the attitude scales in those studies.

Such variability in the attitudes' measurement across the considered studies highlights also challenges in conceptualizing inclusion. Often, there is no consensus on this concept in the scientific literature (Göransson & Nilholm, 2014). Out of the four distinct definitions of inclusive education identified by Göransson and Nilholm (2014) as prevalent in empirical studies (i.e., placement, specified individualized, general individualized and community definition), the majority of those considered here equate inclusion with meeting the social and academic needs of SEN students. This aligns with the concept of inclusion more with special educational needs discourse. For instance, Forlin and Chambers (2011) identified the essential aspect of

inclusive practices as “providing individualized programs, support and instructions for students with specific needs” (p.18). Although a minority, other authors offer a broader conceptualization of inclusion as “the education of all students both with and without disabilities (e.g., learning disabilities, behavioral problems, etc.), in a regular elementary, junior high or high school classroom. Students attend school with their age and grade peers” (Ivey & Reinke, 2002, p.2; see also Hodge et al., 2002). This perspective aligns with the Salamanca Statement, which endorses an inclusive approach to educating all children, including those with diverse abilities (see also Loreman and Earle, 2007).

Still in line with the issue of defining effective attitudinal change, the efficacy of training duration and content delivery mode was evaluated based solely on self-reported PSTs’ attitudes toward inclusive education. Considering that other teacher-related variables, such as intentions, self-efficacy, knowledge, or concerns about disabled persons, are strongly linked to teachers’ attitudes (de Boer et al., 2011), it is necessary to examine the efficacy of training on these variables as well. Furthermore, the effects of such programs should also be examined not only on teachers’ self-reports of their beliefs but also on their actual behavior when including SEN students within their classes once they become in-service teachers, as well as the social and academic performance of all students. Indeed, given the attitude or intention-behavior gap (Sheeran & Webb, 2016), stakeholders must ensure the skills acquired in training are effectively transferred into real-world contexts. Furthermore, self-report measures can also present biases, particularly in infused programs. In such programs, the extended duration allows for stronger relationship to form between trainers and trainees that might cause the latter to provide responses on post-surveys that are more influenced by social desirability. In turn, trainers’ beliefs and in particular their concerns about inclusive education (e.g., lower academic standards, lack of resources, increased workload, and classroom management difficulties, see Jury et al., 2023) may influence trainees’ attitudes as well.

Finally, a further limitation of the present review is its lack of statistical robustness. The “vote-counting” approach (Borenstein et al., 2021) presented in the descriptive part of results focuses not on effect sizes, but on the number of studies reporting “statistically significant results.” Due to heterogeneous measures and diverse sample sizes across the studies included in this review, the comparison of effects might be biased when drawing conclusions on the consistency of effects. Ideally, determining which type of duration or delivery mode of content worked the best in the interventions would have involved conducting meta-regressions with a meta-analytic approach. However, given the frequent absence of statistical indicators in most of the studies considered, such analyses seemed impractical. For instance, only eight out of 31 studies provided sufficient statistical indicators (e.g., pre- and post-intervention attitude means, experimental and control group attitude means), limiting both the feasibility and relevance of meta-analytic procedures. This situation may indicate a reproducibility issue and the need for an open-access approach in research on inclusive pre-service teacher programs and in educational research in general (see also Ropovik et al., 2021). Placing greater emphasis on reporting descriptive data and effect sizes, and considering statistical power more thoroughly, could help address the replication crisis affecting educational science (Patall, 2021).

Conclusion

The present narrative review sought to identify best practices for pre-service teachers' inclusive education programs. Although our findings revealed no significant differences in the effects of duration and delivery mode content among the 36 programs considered, several novel avenues for future research should be explored. The future research should further investigate not only the effect of durations or delivery modes of content variables but should also go one step further and explore which aspects of each of these modalities would be more successful in inducing the attitudinal and behavioral change. For instance, what content in stand-alone programs would impact successfully teachers' attitudes toward inclusive education? This and similar questions may rise further reflections among policymakers and educators when it comes to conceive a successful pre-service teachers' training program on inclusive education.

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Data Availability This study's design and hypotheses were preregistered. The preregistration and all data have been made publicly available at the Open Science Framework and can be accessed at https://osf.io/4fmsu/?view_only=e2985c4b44354771bc4ed89617b315ea. Portions of this study were presented at 14e Congrès International de Psychologie Sociale d'ADRIPS, Bordeaux, France (2022).

Declarations

Competing Interests The authors declare no competing interests.

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