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Designing an international research experience for graduate students

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As a result of the ongoing globalization, international student experiences are becoming fundamental to advance students' development and knowledge. Even though such growing importance, the body of knowledge regarding international interventions is dominated by subjective accounts and lacks contrasted results. In order to design an international research experience for graduate students, recommendations on the design and content of such experiences based on the review of literature were explored. A qualitative and bibliographical analysis of 40 studies evaluating the influence of international student interventions informed about the variables that such interventions should measure and the impact of such experiences on student development. Researchers especially measured the competencies intercultural development (83%), intellectual growth (58%), personal development (58%), professional development (50%), and academic development (15%). However, most of the studies failed to develop an appropriate research design that enables researchers to capture the breadth and depth of an international intervention. Results include addressing various competencies that students can gain during their experience abroad, using mixed methods to collect the data, whereby data should be collected at different time points including before, and multiple times after the international experience by different means.

KEYWORDS

international experience, research abroad, student competence, student development, design methodology

1. Introduction

With the current focus on globalization, international research collaborations are becoming increasingly important to facilitate a solution to complex problems and to maintain competitiveness in innovation and knowledge (Lynn and Salzman, 2006; Oda et al., 2020; Fitzgerald et al., 2021; Liu et al., 2023). International collaborations open the doors to world-class equipment, laboratories, and facilities access to unique data, ideas, and methods, which can flourish in creative opportunities for knowledge discovery and innovation (Wagner and Leydesdorff, 2005; Leak et al., 2018; Meyers and McCready, 2020). Lee and Bozeman (2005) explored, during a 3-year period, the relationship between research collaborations established from researchers affiliated with university research centers in the United States and researchers at other universities (abroad and/or in the United States) and publishing productivity. The study determined that publishing activity increases with the number of collaborators, even though the fractional publishing activity (publications over the number of collaborators) is not impacted the size of the collaborators' group. Recently, the analysis of the international research ties and productivity among 72 countries during a 20-year period has determined that the stability and

persistence of international research collaborations is associated with above-average productivity and citation frequency (Liu et al., 2023). Such international research collaborations between universities often result in the production of high-quality research outcomes (British Council, 2012). Indeed, the establishment of international research collaborations are noted to become even more important after the COVID pandemic (Goldsworthy et al., 2022). Moreover, international research experiences for graduate students provide opportunities to engage in research and establish long-lasting research collaborations with researchers abroad. There is an agreement that these experiences offer the opportunity to advance students' knowledge and enhance their research skills (Ingraham and Peterson, 2004; Leak et al., 2018; Wilson et al., 2019).

In addition, international experiences result in positive impacts on student development by gaining competencies in the fields of intercultural competence, professional development, intellectual growth, academic development, and personal development (Waldbaum, 1996; Ingraham and Peterson, 2004; Leak et al., 2018; Richardson et al., 2020). Furthermore, international student experiences enable students to build professional networks and make them more competitive on the job market (King and Ruiz-Gelices, 2003; Franklin, 2010; Leak et al., 2018). However, researchers mainly concentrated on analyzing study abroad experiences whereas possible benefits of international research experiences are still unclear and need to be further investigated (Black and Duhon, 2006; Clarke et al., 2009; Doyle, 2009).

The body of knowledge regarding international student experiences is currently dominated by subjective accounts and lacks contrasted results (Kirk, 2008; Royal Society, 2011). A common methodological design does not exist. Indeed, ineffective research designs have been used in the past to capture the breadth and depth of international interventions (Kirk, 2008). The assessment of international student experiences has often aimed at capturing the expectations of accrediting and funding institutions (Sutton et al., 2007), as opposed to tailoring the specific learning outcomes of the intervention. As a result, studies fail to inform educators and researchers alike on the specific competencies students can gain abroad. Often, data collection efforts rely on student subjective opinions that cannot be used to measure learning or other outcomes. Additionally, many instruments lack content validity and empirical strength, since they were developed for a to satisfy a specific sponsor or program and are not necessarily applicable to other interventions (Sutton et al., 2007; Jesiek et al., 2014).

The objective of this research is to ascertain the design an international research experience capable of effectively measuring the impact of such type of interventions. Literature was reviewed and analyzed to develop and recommend a research design capable of capturing the distinct facets of an international student experience. Additionally, competencies impacted by such an intervention were identified and discussed. Such competencies are intercultural competence, personal development, intellectual growth, professional development, and academic development.

The rest of this manuscript is structured as follows. The next section discusses the research methodology of the study presented in this paper, which is followed by recommendations on the research approach to be adopted by studies on international research interventions. Then, the discussion of each key competency through review of the social sciences literature precedes the retrospective

analysis of design methods on international students research studies. Finally, a discussion of the results and the conclusions summarize the contribution of this article.

2. Methodology

Relevant studies were identified using a systematic review methodology (Grant and Booth, 2009). Figure 1 illustrates the methodology. The databases Scopus and Education Resources Information Center (ERIC) were consulted using the search terms “international research experience,” “international student experience,” “research abroad,” “student abroad,” “study abroad,” and “education abroad.” Studies published in English as peer-reviewed journal articles or doctoral dissertations were included in the search. As a result, 11,155 articles published between 1996 and 2023 were identified containing at least one of the abovementioned search terms in their title, abstract, or keywords.

A further selection of those articles was made based on their title. Thereby, 8,342 publications were eliminated since they were not related to international research or student experiences. The abstracts of the remaining 2,813 articles and dissertations were further analyzed based on the following criteria: (1) college or university students; (2) empirical studies on international interventions, study abroad and international research experiences; and (3) analysis of competencies gained or improved during the intervention. As a result, 2,773 publications did not meet these criteria and thus were excluded. In total, 40 articles were identified for the bibliographical review. Table 1 contains the origin of the studies, with a predominance of North American studies followed by Western European studies. Studies mostly focused in engineering students followed by science students.

Open and axial coding were used to analyze the content and the design of the 40 studies (Creswell and Creswell, 2018) focusing on the following coding schemes to categorize the data: (1) competencies analyzed; (2) research methods including measures, analysis, validation, data collection timing, and data sources; and (3) study characteristics such as duration and purpose of the international intervention, or number of participants. As a result of the coding process, 17 subcompetencies were identified and grouped into five key competencies of intercultural competence, personal development, intellectual growth, professional development, and academic development. Figure 2 illustrates the trend of publication in each competency over the investigated period.

In order to define and explain each competency, its corresponding core literature was reviewed. Thus, literature on research designs in social studies was gathered to identify an appropriate research design that is capable of effectively measuring the impact of an international student experience. See details in section 4.

3. Measuring the student impact from an international intervention

In order to effectively measure the impact of an intervention, an appropriate research approach needs to be designed. To implement a research plan, the research method is needed to define the logical structure of the inquiry (De Vaus, 2001). Therefore, appropriately

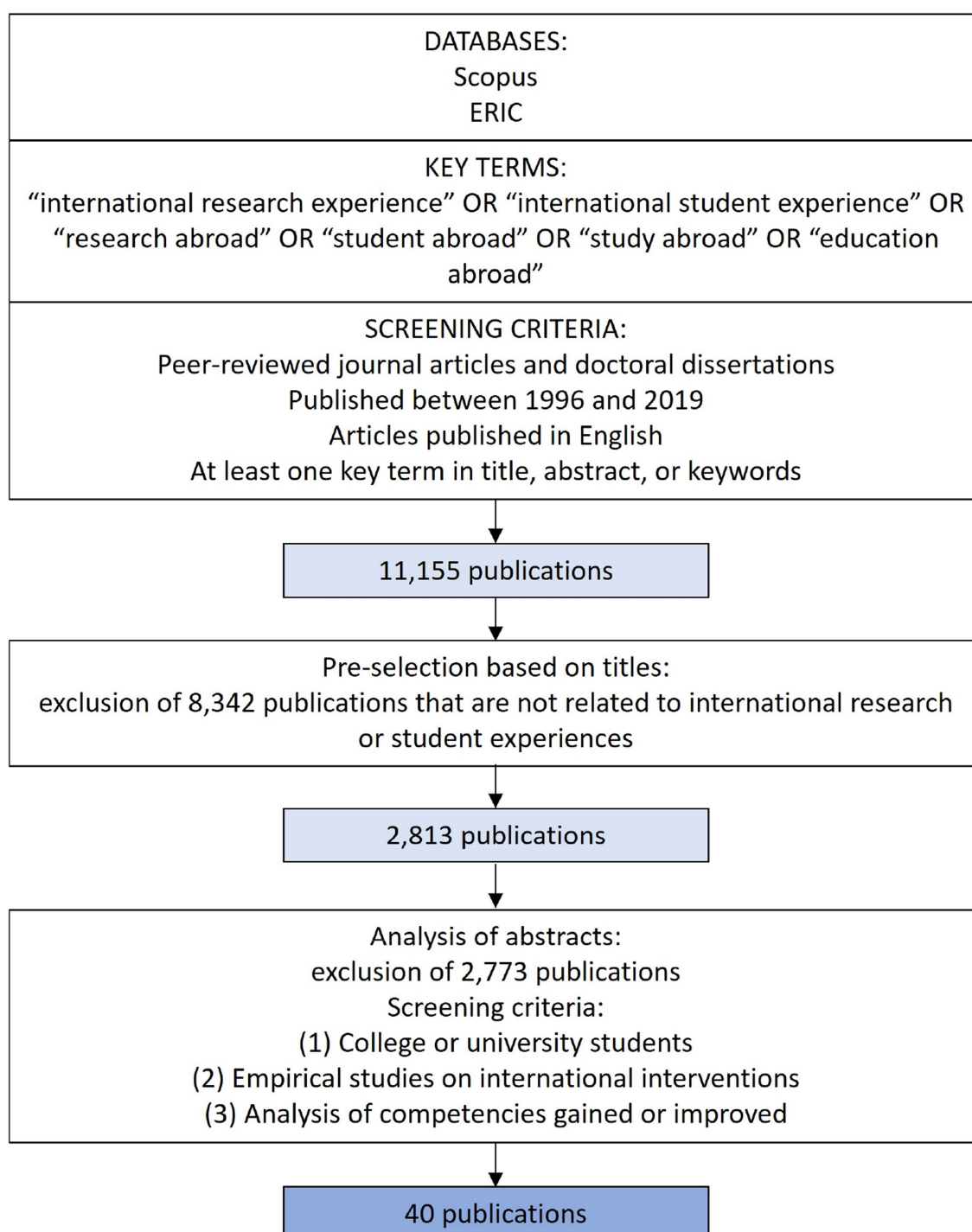


FIGURE 1
Research methodology.

defining the research purpose before planning a research study is necessary (Morgan, 2014).

By combining different and multiple methods, analysts, sources, and theories, the validity of a research study can be strengthened and bias minimized. Patton (2002) distinguishes four types of triangulation: (1) methods triangulation; (2) triangulation of data sources; (3) analyst triangulation; and (4) theory triangulation. Problems in social sciences are often too complex to be investigated

by using only a single data collection method. Different methods should be used to capture different aspects of a problem. Since not all methods have the same strengths and weaknesses, findings generated by different data collection methods need to be triangulated and checked for consistency. Also, since participants tend to report effects only because they expected them to occur, studies should not only rely on self-reported data (Pike, 1995; Rohs, 1999). In order to improve objectivity additional sources of observation close to the student

should be consulted. To enable triangulation, data should be collected at different times and through different data collection tools and sources. To increase the quality of the analysis, research findings should be reviewed by multiple investigators. Additionally, data should be analyzed by using different theoretical perspectives. By applying all four types of triangulation, systematic bias and distortion can be reduced (Patton, 2002).

An appropriate data collection method is necessary that matches with the purpose of the research study. When the research purpose is inductive, subjective, and contextual, qualitative methods like interviews and observations are well suited (Morgan, 2014) since they enable researchers to get in-depth insights into students' stories, behaviors, and individual experiences (Oda et al., 2020). Alternatively, if the research purpose is rather deductive, objective, and generalized, quantitative methods like surveys and experimental interventions are appropriate (Kumar, 2014; Morgan, 2014). In reality, though, a mixed methods research approach enables a holistic approach by combining the strengths of quantitative and qualitative approaches, which

ultimately enables a more complete understanding of the impact of the researched intervention compared to the use of only one research approach (Creswell and Creswell, 2018). On the one hand, the intent of quantitative research is to enable replications and generalizations of the findings through quantitative analysis. Thereby, bias is controlled by applying a deductive style and analyzing a large number of participants, often 30 or more to enable parametric statistics. On the other hand, qualitative research prefers an inductive reasoning approach to understand and make meaning of the experiences of individuals by analyzing their words and meanings (Morgan, 2014). Since problems in social sciences are often characterized by their complexity, one research approach is not enough to address the problem (Creswell and Creswell, 2018).

Capturing the sustained impact of international student experiences demands collecting not only the immediate but also the long-term impact since the former can rapidly vanish when the student returns to her/his domestic institution and life at home. For example, data collected immediately after the intervention (post) and also months or years after the intervention (post-post) can facilitate the assessment of the influence of time on the intervention, as well as identify the long-term impact on the students. In order to generate a baseline, data must also be collected before the intervention (pre) as the control measure (Kumar, 2014). Indeed, in order to enable comparisons with the post-intervention data, and therefore to analyze if the impact is caused by the intervention, data prior to the international experience needs to be collected (De Vaus, 2001; Kumar, 2014).

In order to increase the impact on students, a minimum length of the students' international experience should be defined. Koester (1985) found that the optimum length is between six and 12 months.

TABLE 1 Geographic origin of the studies.

Origin	Frequency
North America	33
South and Central America	0
Eastern Europe	1
Western Europe	4
Asia	2
Oceania	0

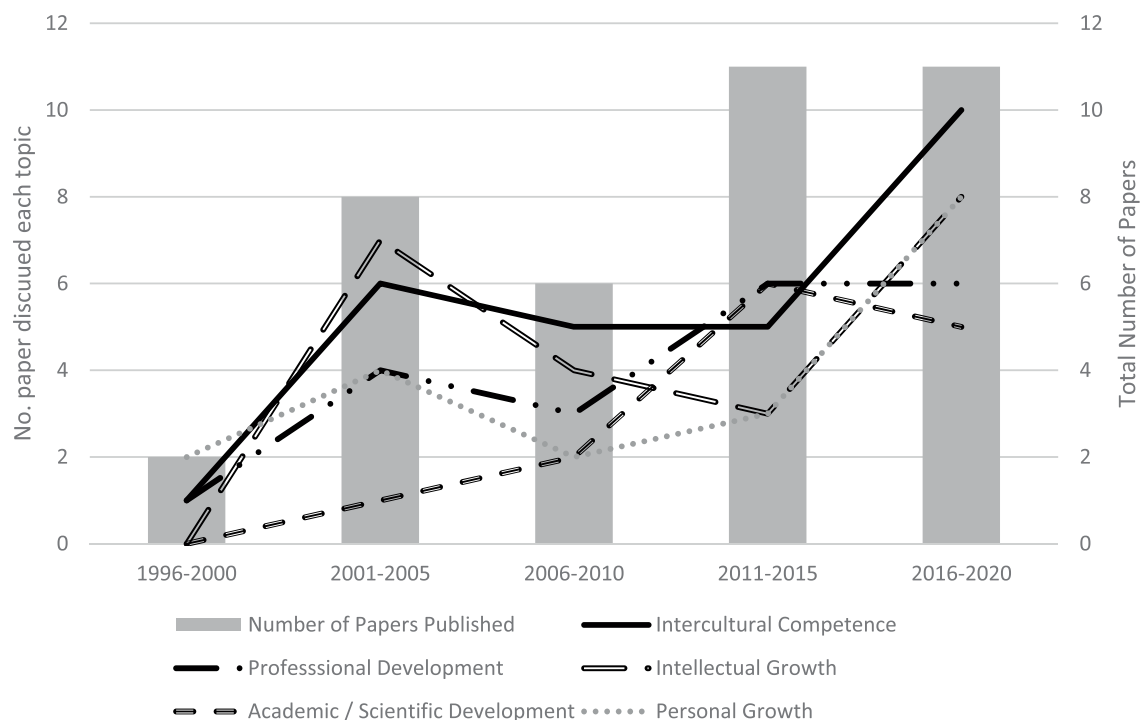


FIGURE 2
Breakdown of papers by key competencies.

To increase the possible impact even for shorter interventions, preparation activities prior to the international student experience and reflective activities after the students' return are needed (Sikkema and Niyekawa, 1987; Dwyer, 2004).

Finally, as stated in the previous section, the existing literature covers five student competencies impacted by international research experiences (Waldbaum, 1996; Ingraham and Peterson, 2004; Leak et al., 2018), which are intercultural competence, personal development, intellectual growth, professional development, and academic development. The design method should be designed to capture the impact of the student intervention in each of those competencies. Different tools are likely needed to capture the impact on each competency.

4. Student competencies

A review of the literature informed on the key competencies that students are susceptible to gain or improve as a result of their international intervention. Such competencies are intercultural competence, professional development, intellectual growth, academic development, and personal development (Waldbaum, 1996; Ingraham and Peterson, 2004; Leak et al., 2018). While there is agreement on such classification of competencies, opinions differ on its subcompetencies. For example, "second language proficiency" is often considered as an intercultural facet (Olson and Kroeger, 2001; Deardorff, 2006), while it is also considered an integral aspect of intellectual growth (Waldbaum, 1996; Ingraham and Peterson, 2004). For the purpose of this study, Table 2 contains a description of the 17 adopted subcompetencies, on which is expanded in the following paragraphs.

4.1. Intercultural competence

Different definitions of intercultural competence are used among scholars. Likewise, many different terms are used to describe the concept of intercultural competence like cross-cultural competence, global competence, or global citizenship (Deardorff, 2006). However, not only the terminology differs but also the definitions. While Olson and Kroeger (2001) focused on substantive knowledge, perceptual understanding, and intercultural communication, Ruben (1976) included displays of respect, interaction posture, orientation to knowledge, empathy, self-oriented role behavior, interaction management, and tolerance for ambiguity.

In order to elucidate discussions about intercultural competence and its connotations Deardorff (2006) and Hunter et al. (2006) conducted studies with seemingly different but complementary results. Based on Deardorff (2006) model, the level of intercultural competence depends on a person's skills, knowledge, and attitudes to effectively and appropriately communicate, behave, and adapt to intercultural settings. On the contrary, the study of Hunter et al. (2006) emphasizes that intercultural competence depends on the understanding of a person's own cultural background. Therefore, a person needs to establish self-awareness before exploring other cultures.

4.2. Professional development

Similarly, no consensual definition of professional development exists. Ducheny et al. (1997) identified three elements of professional development which many studies share: continuing training and familiarity with relevant research; supportive peer group or mentor; and organization in stages (e.g., level of training or formative training). In addition, Ducheny et al. (1997) conducted a survey to ascertain the meaning of professional development and resulted in facets such as personal and professional experiences, values, skills and areas of expertise, educational background, and professional relationships. Besides values, Watts (1987) included theoretical perspective and career goals in his definition.

In their study, Walther et al. (2011) identified competencies that influence students' professional development. Students need to be flexible and creative in order to solve complex problems. Moreover, they need to be able to interact and communicate with other people, self-organize themselves by planning their work and time, improve their own work performance, and work in an intercultural and interdisciplinary setting. Additionally, students need to possess knowledge and skills.

4.3. Intellectual growth

A majority of scholars agreed that academic performance as well as learning a second language or improving second language skills are dimensions of intellectual growth (Chickering and Reisser, 1993; Waldbaum, 1996; Ingraham and Peterson, 2004; McKeown, 2006). Waldbaum (1996) added creative growth gained through travel experiences and extra-curricular activities. This dimension is also supported by Chickering and Reisser (1993), who incorporate gains in cultural, aesthetic, and intellectual sophistication. Moreover, Chickering and Reisser (1993), Waldbaum (1996), and Ingraham and Peterson (2004) place intellectual or cognitive skills such as critical thinking and objective reasoning as part of intellectual growth. Finally, McKeown (2006) includes intercultural development in his definition of intellectual growth.

4.4. Academic development

College years hold huge potential for student development and growth. They have not just an impact on the student's education, but also on the student's career preparation and prospects, and knowledge and skills like problem-solving, critical thinking and communication skills. Optional students engaged in research have a better understanding of research methods and techniques (Hunter et al., 2007).

Åkerlind (2005) conducted a study to identify how researchers experience their own growth and development. Accordingly, academic development comprises academic performance (e.g., work output, academic standing), personal learning (e.g., accumulation of knowledge and skills), and disciplinary or social change (e.g., contribution to field of study). In a later study, Åkerlind (2008) determined how academics understand their role as researchers. Being a researcher implies fulfilling academic requirements, establishing oneself in the field of study, developing personally, and making a contribution to a larger community. The results essentially correspond to her earlier findings.

TABLE 2 Student competencies.

Competency	Subcompetency	Description
Intercultural competence	Global Awareness/Mindedness	Open-minded people are characterized by their broadened perspective, rejection of prejudices, and recognition of viewpoints different from their own worldviews (Clarke et al., 2009). Values that are important to open-minded individuals are responsibility, cultural pluralism, efficacy, global-centrism, and interconnectedness (Hett, 1993).
	Intercultural Communication	To understand and overcome communication differences between cultures is the basis of successful interactions (Williams, 2005). Effective communication skills include adaptability, empathy, cross-cultural awareness, intercultural relations, and cultural mediation (Olson and Kroeger, 2001).
	Openness to Diversity	Individuals need to be open to diversity to be able to embrace people from different cultural backgrounds and to interact with them (Clarke et al., 2009).
	Intercultural Sensitivity	The level of intercultural sensitivity provides insight into a person's ability to notice cultural differences and to adapt their own behavior while interacting with other people to show respect for other cultures (Bhawuk and Brislin, 1992).
Professional development	Networking	Connecting with other people and becoming part of a network can positively impact personal and professional outcomes resulting in career success, salary progression, and expatriate adjustment (Gibson et al., 2014).
	Professional Skills	Professional skills for engineers comprise communication skills, teamwork, understanding professional and ethical responsibility, engagement in life-long learning, knowledge of contemporary issues, and understanding of the impact of engineering solutions within a global and societal context (Schuman et al., 2005).
	Career Prospects	Career prospects comprise impacts on students' career paths and goals (Norris and Gillespie, 2009).
Intellectual growth	Second Language Proficiency	Second language proficiency includes learning a new language (Segalowitz and Freed, 2004), improving existing language skills (Norris and Gillespie, 2009), or recognizing the importance of learning foreign languages (Chang et al., 2009).
	Study Progress	Study progress refers to the students' course of study like gaining course-related knowledge (Chieffo and Griffiths, 2004), interest in academic study (Dwyer, 2004), or making decisions regarding course selections (Norris and Gillespie, 2009).
	Creative Growth	Chickering and Reisser (1993) talk about creative growth as an expansion of interests in disciplines like performing arts or philosophy.
	Intellectual/Cognitive Skills	The acquisition of intellectual/cognitive skills includes problem-solving competencies (Gmelch, 1997) and abilities in dealing with the unexpected (Ingraham and Peterson, 2004).
Academic development	Research Skills	Researchers need to acquire a certain skill set to be successful in their field of study, which comprises writing, analytical, and presentation skills (Bender et al., 2017; Leak et al., 2018).
	Collaboration	Lee and Bozeman (2005) conducted a study to examine a possible relationship between research collaborations and publishing productivity and reported that the total number of peer-reviewed publications is significantly associated with the total number of collaborators, which emphasizes the importance of building networks and collaborations with other researchers.
	Research Outcome	To establish oneself, researchers need to discover something new, publish their results, and make them available for the public (Åkerlind, 2008; Leak et al., 2018).
Personal development	Identity Development	An important factor of personal development is the establishment of the own identity, including being comfortable with oneself, developing self-esteem, self-acceptance, and self-confidence, and clarification of self-concept (Chickering and Reisser, 1993).
	Personal Independence and Maturity	International experiences have an impact on students' maturity and independence. Based on Gmelch's (1997) observations, being abroad means being in an unfamiliar environment, making a lot of decisions, and encounter problems which results in becoming more independent and mature.
	Relational Skills	To interact with other people and to build relationships, tolerance and respect are indispensable (Chickering and Reisser, 1993).

4.5. Personal development

Personal development is especially characterized by developing an own identity, interpersonal skills, and personal values and therefore becoming more mature and independent (Chickering and Reisser,

1993; Kuh, 1995; Gmelch, 1997; Hu and Kuh, 2003). Chickering and Reisser (1993) developed a model to describe the steps of college student development. These steps include developing competence, managing emotions, moving through autonomy toward interdependence, developing mature interpersonal relationships,

TABLE 3 Characteristics of the international interventions.

	Relative frequency	Total number
Type of international experience		
Study abroad	76%	31
Research abroad	15%	6
Internship abroad	3%	1
Study abroad + research abroad	3%	1
Study abroad + internship abroad	3%	1
Degree program		
Undergraduate students	45%	18
Graduate students	10%	4
Both	13%	5
Not specified	32%	13
Duration of international experience		
Less than 1 month	5%	2
Between 1 and 3 months	23%	9
Between 3 and 5 months	35%	14
More than 5 months	10%	4
Not specified	27%	11
Home institution		
US College or University	85%	34
Non-US College or University	15%	6
Number of participants		
Minimum		3
Maximum		6,391
Mean		643
Median		52

establishing identity, developing purpose, and developing integrity. Kuh (1995) explored college student's development by focusing on the dimensions of interpersonal competence, cognitive complexity, knowledge and academic skills, practical competence, and humanitarianism. Kuh (1995) also incorporated educational gains as a key competency. Similarly, Hu and Kuh (2003) focused on values and ethical standards, self-understanding, ability to get along with others, and teamwork skills, but added good health habits and physical fitness as their fifth dimension.

5. Retrospective analysis of design methods for international student experiences

Forty studies on international student experiences were reviewed with a design methods lens. Therefore, the design of the studies was investigated and compared with the design recommendations discussed above. Furthermore, student competencies reported in the reviewed studies were analyzed based on the classification in the

previous section. The characteristics of the reviewed studies are summarized in Table 3.

5.1. Measures on student competencies

Competencies students could improve during their time abroad include intercultural competence, personal development, intellectual growth, professional development, and academic development (Waldbaum, 1996; Ingraham and Peterson, 2004; Leak et al., 2018). An overview of the analyzed publications and the distribution of competencies and subcompetencies is presented in Table 4.

Eighty percent of the analyzed studies evaluated impacts on the students' intercultural competencies, followed by intellectual growth and personal development (60% each) and professional development (50%). Only 15% of the reviewed publications addressed academic development, which can be explained by the fact, that only 18% of the reviewed studies analyzed international research experiences. Interestingly, only 30% of the reviewed studies measured possible impacts on students' study progress and on the knowledge gained in their field of study, although 82% of the reviewed studies analyzed study abroad interventions. Distributions of the evaluated competencies and subcompetencies are shown in Figures 3, 4. It should be noted that the competencies intercultural competence and intellectual growth comprise four subcompetencies whereas the other competencies comprise three subcompetencies.

5.1.1. Intercultural competence

As facets of global awareness/mindedness researchers reported that students extended their worldviews (Hutchins, 1996; Orahod et al., 2008; Witkowski and Mendez, 2018), became more interested in world affairs (Zhai, 2000; Hadis, 2005; Braskamp et al., 2009), increased their understanding of their own culture (King and Ruiz-Gelices, 2003; Dwyer, 2004; Ingraham and Peterson, 2004), and gained knowledge and appreciation for other countries and cultures (Chieffo and Griffiths, 2004; Dwyer, 2004; Norris and Gillespie, 2009). The impact of an international student experience on intercultural sensitivity is reflected by increased cross-cultural tolerance (Chieffo and Griffiths, 2004; Black and Duhon, 2006), respect for other cultures (Zhai, 2000; Kitsantas and Meyers, 2001; Doyle, 2009), and a better understanding of different cultures (Zhai, 2000; Braskamp et al., 2009; Doyle, 2009). The influence on openness to diversity is especially reflected in an increased diversity of friends and contacts (Dwyer, 2004; Jesiek et al., 2014) and a greater appreciation of diversity (Clarke et al., 2009; Wilson, 2014). Participants of these studies especially improved their intercultural communication competencies by gaining cross-cultural communication skills which helped them to connect and interact with people from different cultures (Orahod et al., 2004; Franklin, 2010; Jesiek et al., 2014).

5.1.2. Personal development

Students whose identity development has been affected by the international student experience especially reported increased self-confidence (Dwyer, 2004; Black and Duhon, 2006; Bender et al., 2009; Wilson, 2014), self-esteem (Hutchins, 1996), self-understanding (Bender et al., 2009), self-reflection (Wilson, 2014), and emotional growth (Orahod et al., 2008). One third of the reviewed publications also report that the students became more mature and independent

TABLE 4 Overview of the analyzed publications and distribution of competencies and subcompetencies.

Authors (year)	Intercultural competence				Professional development			Intellectual growth				Personal development			Academic development		
	Global awareness/ mindedness	Intercultural communication	Openness to diversity	Intercultural sensitivity	Networking	Professional skills	Career prospects	Second language proficiency	Study progress	Creative growth	Intellectual/cognitive skills	Research skills	Research collaboration	Research outcome	Identity development	Personal independence and maturity	Relational skills
Anderson et al. (2006)	●		●	●													
Bates (1997)	●			●					●		●				●	●	
Bender et al. (2009)	●			●		●	●	●	●			●			●		
Bender et al. (2017)	●		●		●	●	●	●	●			●			●		
Benedict-Augustine (2010)	●					●	●										
Berg (2009)								●									
Black and Duhon (2006)			●	●											●	●	
Braskamp et al. (2009)	●		●	●											●		●
Chang et al. (2009)			●		●	●		●				●	●	●			
Chieffo and Griffiths (2004)																	
Clarke et al. (2009)	●	●	●	●													
Doyle (2009)				●											●	●	●
Dwyer (2004)	●		●			●	●	●	●						●	●	
Franklin (2010)	●	●				●	●	●			●				●	●	
Fujisaki (2013)																●	●
Gmelch (1997)											●				●	●	●
Hadis (2005)	●		●						●							●	
Huang (2013)						●	●										
Hutchins (1996)	●			●											●	●	
Ingraham and Peterson (2004)	●	●				●	●	●	●	●	●	●			●		●
Isabelli (2003)								●									
Jesiek et al. (2012)	●																
Jesiek et al. (2014)	●	●	●	●		●		●									
King and Ruiz-Gelices (2003)	●					●	●	●	●							●	
Kitsantas and Meyers (2001)	●			●													
Leak et al. (2018)	●				●		●			●		●	●	●	●	●	
Messer and Wolter (2007)									●								
Norris and Gillespie (2009)	●				●	●	●	●	●								
Orahood et al. (2004)	●	●	●	●		●	●	●			●				●		
Orahood et al. (2008)	●			●		●	●								●		
Paige et al. (2009)	●						●		●								
Rexeisen et al. (2008)				●													
Segalowitz and Freed (2004)								●									
Sobkowiak (2019)	●	●	●	●				●							●	●	●
Stronkhorst (2005)	●					●		●							●		
Williams (2005)	●	●		●													
Wilson (2014)	●		●			●									●		●
Wilson et al. (2019)						●	●				●	●		●	●		
Witkowsky and Mendez (2018)	●	●	●				●									●	●
Zhai (2000)	●	●	●	●		●	●		●						●	●	●

during their time abroad (Gmelch, 1997; King and Ruiz-Gelices, 2003; Black and Duhon, 2006; Franklin, 2010). Additionally, gains in relational skills have been reported as development of empathy and listening skills (Wilson, 2014; Witkowsky and Mendez, 2018), as well as increased adaptability, patience, and flexibility (Gmelch, 1997; Chieffo and Griffiths, 2004).

5.1.3. Intellectual growth

As part of the students' second language proficiencies, students improved their oral communication skills (Isabelli, 2003; Dwyer, 2004; Segalowitz and Freed, 2004; Berg, 2009), recognized the importance of learning foreign languages (Chang et al., 2009), and received more interest in learning a foreign language (Ingraham and Peterson, 2004). Impacts on students' study progress are reflected in gains of course-related knowledge (Chieffo and Griffiths, 2004; Bender et al., 2009, 2017), increased interest in further studies (King and Ruiz-Gelices, 2003; Dwyer, 2004) and making decisions regarding course selection (Dwyer, 2004; Norris and Gillespie, 2009). The acquisition of intellectual/cognitive skills becomes apparent through improved problem-solving competencies (Gmelch, 1997; Orahhood et al., 2004; Wilson et al., 2019) and increased abilities in dealing with the unexpected (Ingraham and Peterson, 2004). Creative growth was especially expressed by higher appreciation of arts (Chieffo and Griffiths, 2004; Ingraham and Peterson, 2004) and becoming more creative (Leak et al., 2018).

5.1.4. Professional development

Professional skills reported in the reviewed articles include verbal and non-verbal communication skills (Zhai, 2000; Chang et al., 2009; Wilson et al., 2019), interpersonal skills (Orahhood et al., 2008; Wilson et al., 2019), leadership skills (Chang et al., 2009), self-efficiency (Jesiek et al., 2014), and presentation skills (Bender et al., 2017) which are helpful to be successful in a work environment. During their time abroad, students also became aware of other career options and therefore changed their career directions (Norris and Gillespie, 2009; Huang, 2013; Leak et al., 2018) and developed an interest in working abroad or for an internationally oriented company (Ingraham and Peterson, 2004; Orahhood et al., 2004; Witkowski and Mendez, 2018). It is also reported that students became more competitive on the job market (King and Ruiz-Gelices, 2003; Franklin, 2010) and earn higher average incomes (King and Ruiz-Gelices, 2003; Franklin, 2010), which means that employers appreciate when students participate in international student experiences. Only three of the 40 reviewed publications measured that students could expand or establish their networks while being abroad (Chang et al., 2009; Norris and Gillespie, 2009; Leak et al., 2018).

5.1.5. Academic development

Impacts on the students' research skills were especially reported as improvements in writing, analytical, and presentation skills (Bender et al., 2017; Leak et al., 2018). Particularly, students could increase their research productivity (Leak et al., 2018; Wilson et al., 2019). They could also broaden their research perspective and gained access to new research tools (Chang et al., 2009) which partially resulted in changes in their research direction (Leak et al., 2018). Leak et al. (2018) also report a likely increase in the number of patents and publications from international students and that longstanding collaborations could have been developed.

5.1.6. Relevance of examined competencies

Scholars especially concentrated on these competencies since these are valuable skills that are attractive to potential employers and therefore improve the students' competitiveness on the job market (Clarke et al., 2009; Franklin, 2010; Jesiek et al., 2014). Spending time in a foreign country and within an unfamiliar cultural context is

accompanied by daily challenges which teach students to act, adapt, and work in cross-cultural settings (Gmelch, 1997). Even simply participating in such an intervention demonstrates the student's open-mindedness and initiative. However, these competencies will only be business success factors if the students are able to effectively articulate the achievements of their international student experience during their application process or while networking. Therefore, students need to reflect on their experiences to become better prepared and more proficient for their professional career (Orahhood et al., 2004).

If students are pursuing academic careers, international research collaborations are particularly valuable. Additionally, talking to researchers with different cultural backgrounds enhances the students' ability to articulate and discuss their own research competently and effectively. Therefore, to reap maximum benefit, students need to be taught about characteristics of successful collaborations and how to implement them (Leak et al., 2018).

5.2. Design method

The design analysis included data collection, analysis, and validation, as well as characteristics such as investigated international interventions and number of participants.

5.2.1. Competencies

Most research efforts to date failed to measure the impact of the international intervention on student competencies. Thus, the reviewed publications only tackled on average 2.6 competencies. In fact, one third of the studies included just one competency, 13% measure two, and only 10% included all five competencies (see Figure 5).

Analysis of the 17 subcompetencies revealed that, on average, only 4.9 different subcompetencies were analyzed by researchers. Most frequently, four (18%), one and six (both 15%) subcompetencies were addressed whereas 74% reported impacts on less than six of the 17 subcompetencies (see Figure 6).

To analyze non-trivial connections between the reviewed publications a network visualization has been created which displays connections in combination with the average publication years so that changes in the body of literature become visible (see Figure 7). Displayed terms are keywords at least four of the reviewed publications have in common when comparing titles and abstracts. Colors give an indication of the average publication year. Co-occurrences between terms are reflected by links between them. Terms are closer located to each other when they occur together in more publications.

The network visualization reveals that the focus of the researchers changed over the years. Impacts on the students' personal development were prevalent in older publications, whereas professional development and especially impacts on the students' careers were more present in younger publications. Since impacts on students' personal development have already been researched in previous studies, researchers shifted their focus on the changing requirements for employees as a result of the increasing importance of soft skills like communication skills (Williams, 2005; Clarke et al., 2009). Expectedly, intercultural competence remained important during the observed period due to the ongoing globalization and the demand of

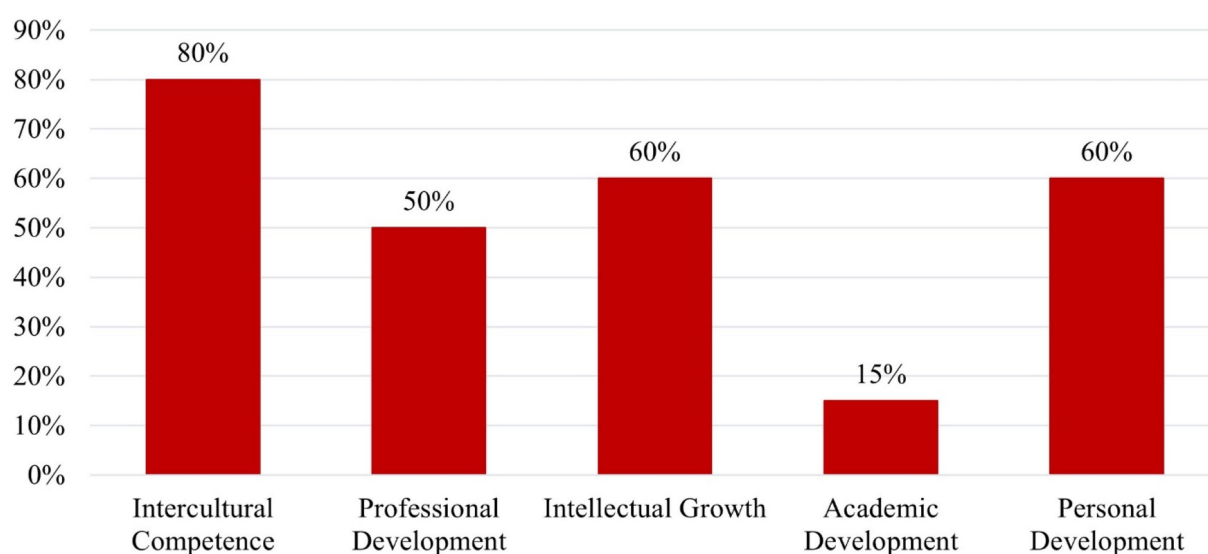


FIGURE 3
Distribution of competencies.

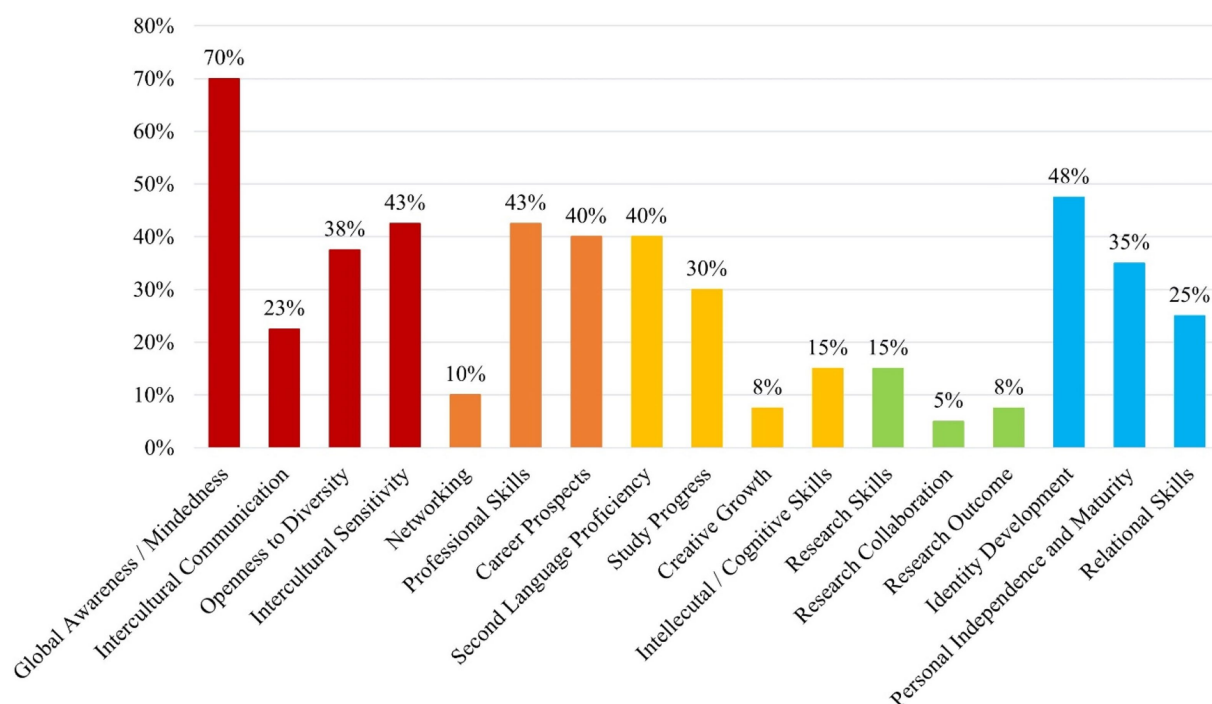


FIGURE 4
Distribution of subcompetencies.

interculturally competent employees (Orahoud et al., 2008; Norris and Gillespie, 2009).

5.2.2. Data collection tools and methods

In almost half of the studies (48%) only one data collection tool was used to assess the students' international experience and in all but two, the data was collected with the help of surveys alone. Two distinct

data collection approaches were used by 28 and 20% used three (see Figure 8). Such lack of heterogeneity in the data collection approach prevents a holistic analysis of possible impacts of an intervention, therefore a broad study focus is expedient.

Within the 40 reviewed studies, 12 different data collection tools were used (see Figure 9). A majority (78%) of the research teams used surveys, while 45% leveraged interviews. Fifteen percent analyzed

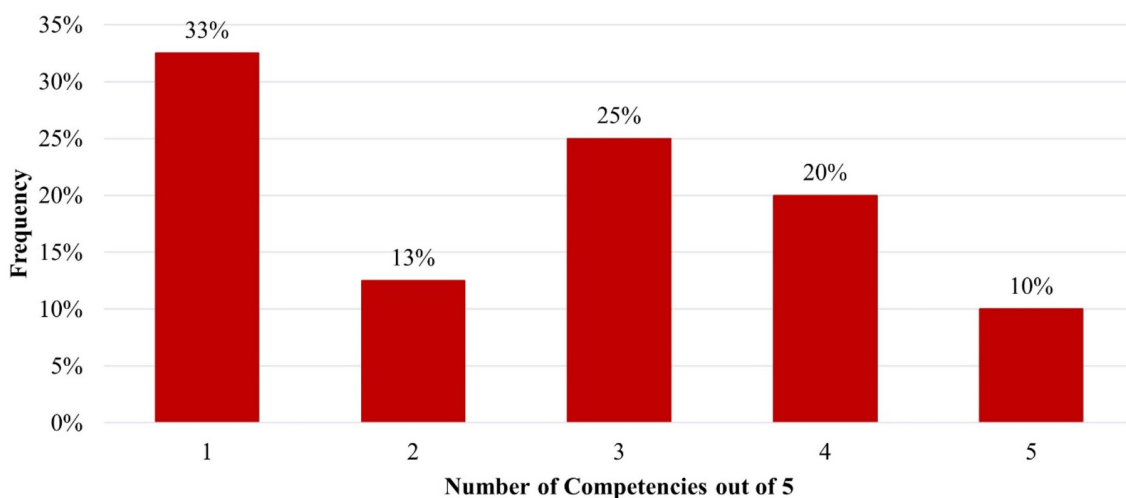


FIGURE 5
Competencies ($n=40$).

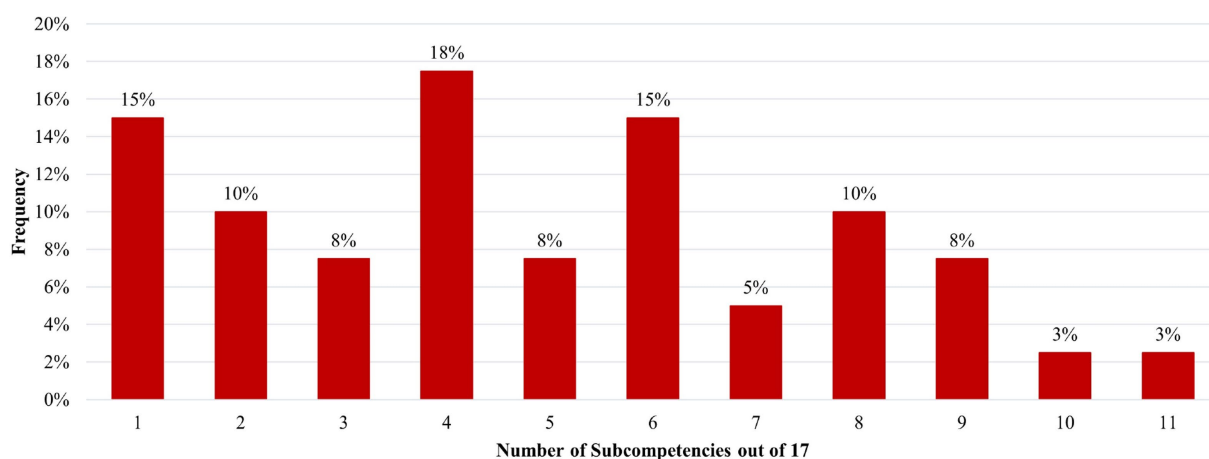


FIGURE 6
Subcompetencies ($n=40$).

student journals and 10% collected data through focus group sessions. To collect data about impacts on language proficiencies, language tests were conducted.

5.2.3. Data collection characteristics

Even though a mixed-method design is better suited to capture personal experiences, only 40% used such an approach. Almost as many studies (35%) used only quantitative data and 25% used only qualitative data. Based on that, the majority of the reviewed studies chose research designs that are not suitable for capturing the whole intervention. Therefore, it is crucial for future studies to choose an appropriate research design that is able to capture all relevant facets of the intervention.

Data should be collected at different times during a study in order to generate a baseline and to assess the influence of time on the intervention. However, only 5% of the reviewed studies collected their data pre, post, and post-post. Thirty-eight percent of the studies

collected data only once during their study, in particular, post-post intervention (30%). Thereby the time between the intervention and the data collection varies between 1 year and up to 52 years. Collecting data so long after the intervention may cause problems with a study's internal validity due to maturation so that the findings should be used with caution. Moreover, only four of these studies used a control group to validate their findings, resulting in validity and applicability issues. Thirty percent of the studies collected data before and after the international student experience, and 23% before, during, and after the international experience, so that no sustained impacts were measured (Figure 10).

In order to improve objectivity and to prevent biased results, data should be collected from other sources besides self-evaluation of the students. However, only 15% collected data also from the students' advisors in addition to students' self-evaluations. Four of them collected data from the students' host and home advisor and two only from the host advisors. Only one of these studies also collected data



5.2.4. Study validation

Even though control data is crucial for a study's validity, only 65% of the publications collected control data in order to establish a comparison standard against which the impact of the intervention can be measure. Thereby, 8% made use of a control group, 30% collected data pre intervention, and 27% did both.

An appropriate research design is crucial to capture the breadth and depth of an international student experience. However, many studies fail to properly design their research and therefore lack objectivity and contrasted results resulting in limitations of the findings due to validity and reliability issues. In order to design an international research experience that effectively captures all facets of an international intervention, the design must be able to measure the competencies that are potentially impacted by the international experience, including intercultural competence, personal development, intellectual growth, professional development, and academic development. By combining different and multiple methods, sources, analysts, and theories, and therefore by applying the concept of triangulation, a research study with low bias and strong implications results. Besides that, validity and reliability of a research study need to be addressed, so that the methods measure what they are supposed to measure and that findings can be generalized. To capture intermediate as well as longitudinal effects, data needs to be collected at different time points, including pre, post, and post-post.

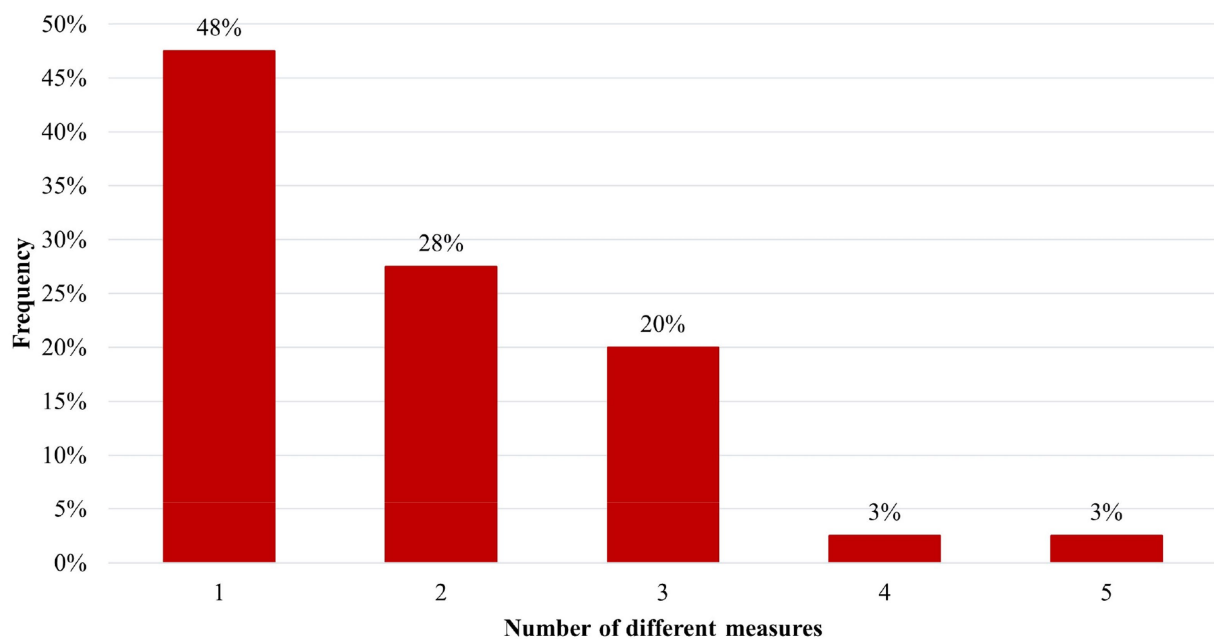


FIGURE 8
Number of distinct data collection tools per study ($n=40$).

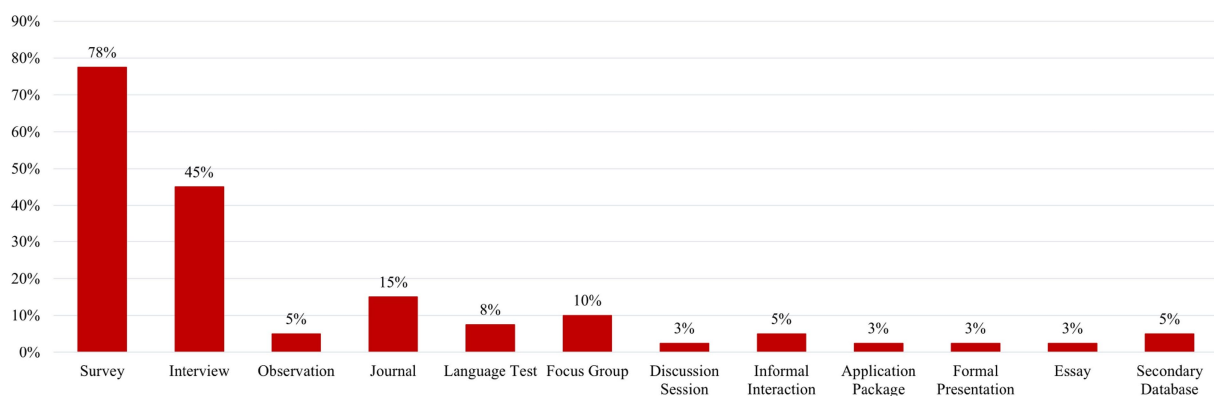


FIGURE 9
Distribution of data collection measures ($n=40$).

Based on these principles, a research design has been developed that is capable of capturing the complexity of an international research experience. Following the concept of triangulation, a mixed methods approach is applied to capture quantitative as well as qualitative aspects of an international experience. Quantitative data are collected through surveys. Thereby, two different surveys are used to capture all facets of an international intervention. The Intercultural Development Inventory (IDI), a valid and reliable tool that has already been psychometrically tested (Berg, 2009), was chosen to measure the impact on the students' intercultural development. To measure other aspects of an international experience, including impacts on the students' academic, personal, and professional development, as well as intellectual growth, the Student Progress Survey has been developed.

The surveys are administered several times over a 2.5-year period. Data is collected before the international intervention (pre) to generate

control data. In order to measure immediate impacts on the students, data is collected right after the students return to their home universities (post). Additionally, to analyze if the impacts sustain, the surveys are also distributed 1 year, as well as 2 years after the intervention (post-post). Since these data collection efforts only rely on the students' self-assessment, a third survey has been developed that collects data on the students' performance and development from their advisors. For a more complete understanding of the impacts of an international experience and to gain valuable background information, qualitative data are collected during interviews in addition to the quantitative survey data.

It is further of paramount importance to not only report and analyze the improved study's findings but also utilize them to improve future students' experiences. International student experiences offer the opportunity to develop valuable competencies that have a positive

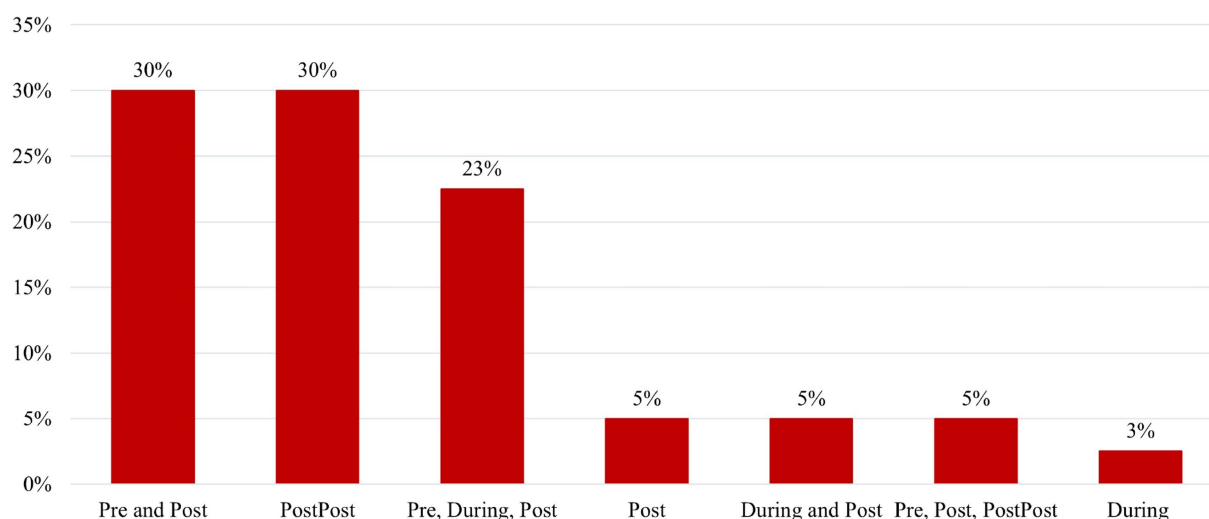


FIGURE 10
Distribution of timing of data collection ($n=40$).

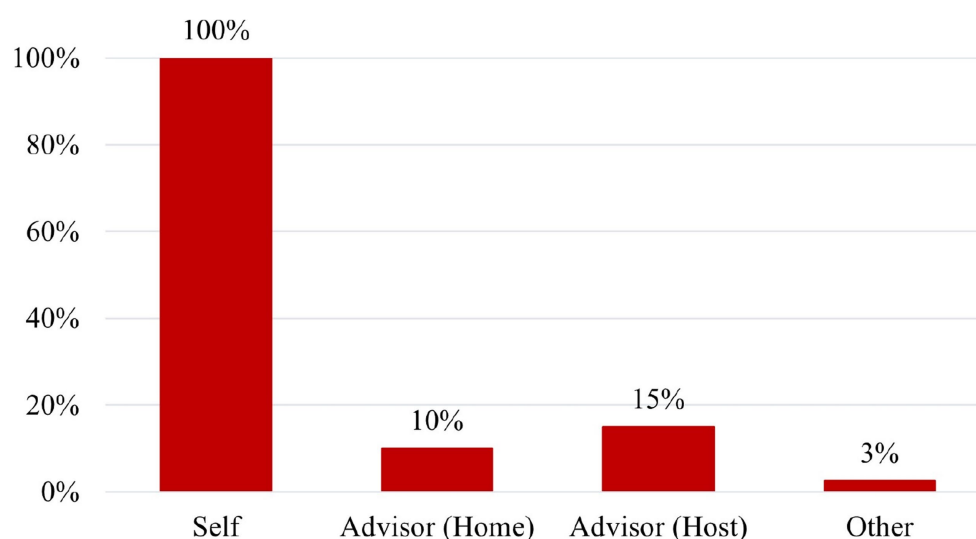


FIGURE 11
Data collection perspectives ($n=40$).

impact on the students' development and career, and hence increase the economic value pulled from the intervention. Students can gain valuable competencies while participating in an international experience. Today's employers are not only interested in the students' technical skills, but also in their soft skills. Particularly in our globalized world economy, cross cultural work settings and the ability to adroitly navigate them characterizes a valuable employee, especially when paired with adaptability, flexibility, and communication skills, among others.

Nevertheless, almost all current studies on international experiences do not account for the fact that students may require (guided) reflection on their newly acquired competencies, in order to deploy them successfully, or guidance on how to create and foster international networks and collaborations. Meaning many experiences

today cannot achieve their full potential because this effect has not been studied. In doing so, also shorter international experiences could have a significant positive effect on the students' development, if planned and executed carefully.

Based on that, a length of one semester has been chosen for the international experience in combination with preparation and reflection activities. Before students travel abroad, students have to engage in an onboarding session, as well as cultural awareness and leadership courses in order to best prepare them for their experience and to maximize the impact of the intervention. After the students return to their home university, students participate in reflective interviews and are encouraged to sustain and deepen their relationships with the host research team by publishing their results in collaboration with their hosts.

7. Conclusions and future research

Several research studies have been conducted in order to measure the impact of international student experiences on students' development and growth, categorized in five main competencies: intercultural competence, personal development, professional development, intellectual growth, and academic development. However, most of the reviewed studies failed to properly design their research study, resulting in issues with reliability and validity and therefore in the credibility of the findings. By applying the concept of triangulation, as discussed in detail, the proposed research study intends to vastly overhaul the current state of available literature, allowing for the first time to generalize and widely apply findings with minimal bias regarding the students' development.

Based on these findings, educators can re-design and better plan future international experiences to allow for the greatest benefits possible in a given time abroad. Having empirical data can help in better decision-making. This encompasses pre- and post-engagements with the students in order to raise their own awareness as to how much personal benefits they reaped and what and how they can put them forth beneficially in their future. Besides individual benefits for participants, an optimized international experience will simultaneously increase the economic value as the workforce productivity rises.

This study revealed that most of the reviewed publications focus on study abroad experiences. Little is known about the impacts of international research experiences. While participating in such an intervention, students are granted access to not only world-class facilities, but also unique sources of data, and ideas. However, impacts of research experiences on a students' research or dissertation have not yet been analyzed comprehensively. Furthermore, since current publications mainly focus on international experiences for undergraduate students, additional research about graduate experiences is necessary in order to develop interventions that cover the needs of graduate students.

As a limitation of this study, it needs to be acknowledged, that only studies published in English as peer-reviewed journal articles or dissertations were selected for this research. Therefore, potential studies that could provide valuable insights were omitted, since they were published in other outlets or languages other than English.

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Additionally, since the majority of the reviewed studies analyzed interventions conducted by universities and colleges in the United States, the generalizability of the findings is limited.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

VS, DG, and SA: conceptualization. VS: writing – original draft preparation and visualization. DG and SA: writing – review and editing, supervision, project administration, and funding acquisition. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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