Global Competence in Canadian Teacher Candidates

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The purpose of the study was to determine the global competence of 115 Canadian teacher candidates using a new measurement tool. Non-parametric tests indicated several differences in self-reported global competence within individual indicators across the three areas of Exploring, Engaging, and Acting with global competence. Two indicators showed that male teacher candidates reported higher levels of global competence than did females in the Exploring and Acting areas. Teacher candidates intending to teach in middle and senior high school reported higher levels in one indicator within the Acting area. Moreover, Canadian-born teacher candidates reported higher levels of Engaging and Acting than did non-Canadian-born students across six indicators total. While there were no differences across the three areas by age, results showed that higher levels of experience in their teacher education program were associated with greater global competence across all three areas as indicated by five indicators total, with three at the Acting stage. Implications for teacher education are discussed.

Keywords: global competence, Canada, teacher candidates, teacher education, citizenship

INTRODUCTION

In an ever more connected global community, the ability to understand, communicate, appreciate, and work collaboratively with others is of utmost importance. One of the most common ways for children to learn and develop these skills is through effective programming within their schools. Teachers are recognized as "changemakers" in our local and global communities (Rensink, 2020, p. 14), and teacher education programs therefore have the responsibility of responding to our increasingly complex world by ensuring teachers are ready to take on these roles (Sjøen, 2021). Our understanding of how to develop teacher candidates' capacity to foster global competence within their own future students, however, is still nascent. The current study took place in Canada, and it used a newly developed set of global competence rubrics (Parmigiani et al., 2021) to explore the relationships between 115 teacher candidates' global competence, demographic variables, and programmatic variables within their teacher education program. Collectively, the findings of this study enhance our knowledge of global competence in teacher candidates, raise some questions, and point to areas of programmatic improvement for the development of global competence in teacher candidates.

Defining Global Competence

We situated our research in a current definition of global competence (GC) from the Organization for Economic Co-operation and Development (OECD) framework as "a multi-dimensional

construct that requires a combination of knowledge, skills, attitudes, and values successfully applied to global issues or intercultural situations. Global issues refer to those that affect all people and have deep implications for current and future generations" (OECD, 2018, n.p.). The Asia Society/OECD (2018) identified four actions that together indicate GC in students. Students with GC:

(1) investigate the world beyond their immediate environment by examining issues of local, global, and cultural significance;
(2) recognize, understand, and appreciate the perspectives and world views of others;
(3) communicate ideas effectively with diverse audiences by engaging in open, appropriate, and effective interactions across cultures; and
(4) take action for collective well-being and sustainable development both locally and globally (p. 5).

The Asia Society/OECD (2018) proposed that GC is necessary for employment, living harmoniously in multi-cultural societies, to communicate effectively, and for sustainable development—in effect highlighting the importance of GC for students and for future society. Given the growing importance of GC in our increasingly interdependent world, teacher education programs are called upon the redesign their coursework to "development globally competent teachers who prepare today's PK-12 children for life as interconnected and interdependent world" (Ramos et al., 2021, p. 311).

Importance of Global Competence for Teachers and Teacher Candidates

At a 2020 conference, the OECD released the findings of their 2018 PISA study of the GC of 15-year-old students from 66 countries, and related scholarship has examined these findings in terms of the equity of students' school-based access to opportunities for GC development (Mostafa, 2020). "Detailed analyses of the associations between … ten learning activities and the nine students' attitudes and dispositions [toward GC] revealed universally positive and significant relationships, with very few exceptions" (Mostafa, 2020, p. 4). Of the participating countries, Canadian students ranked 25/66 countries in terms of the types of GC learning activities offered to them by their teachers. Specifically, Canadian students reported experiencing an average of 6 of 10 recommended types of GC learning activities, above the OECD average of 5.5, but below those offered in 24 other countries such as the Philippines, Vietnam, and Mexico (Mostafa, 2020).

The OECD findings have clear implications within teacher preparation programs, as teachers are those with direct influence over school-based opportunities for the development of their students' GC. Education not only can counter racial, ethnic, and cultural prejudice, but can also promote students caring for intercultural, global issues that result in actions that maximize sustainability and collective well-being (Mostafa, 2020). The Asia Society/OECD (2018) have recognized teachers as being at the "forefront of educating for global competence," as well as

noting their "important [roles as] advocates and ambassadors who are leading the way" (p. 28). Within immersive curriculum, whole-school approaches, and school and system leadership, GC is conceptualized by OECD within an ecological model with teachers providing students with direct opportunities for growth where "the dividends of success are incalculable and …will multiply with each successive generation" (p. 34).

Teacher Behaviors That Contribute to Global Competence in Students

The 2018 PISA study of GC involved a series of questionnaires that linked ten specific types of learning opportunities with nine student attitudes and dispositions related to GC (Mostafa, 2020). Mostafa (2020) found that the most common activities across countries were learning about different cultures (76%) and learning how to solve conflicts with classmates (64%). Furthermore, the least common activities as reported by students across countries were learning about current events through the internet or news programming (41%) and celebrating cultural diversity during the school year.

In terms of pedagogy, most students experienced teacher-directed lessons, rather than participatory approaches to developing GC (Mostafa, 2020). Findings showed that student attitudes and dispositions toward GC were related not only to the number of types of GC learning activities to which they were exposed but also the pedagogy selected for those lessons (Mostafa, 2020). The student attitudes and dispositions examined in the 2018 PISA study included: "(1) Interest in learning about other cultures; (2) Attitudes toward immigrants; (3) Respect for people from other cultures; (4) Awareness of intercultural communication; (5) Perspective-taking ability, (6) Cognitive flexibility/adaptability; (7) Self-efficacy regarding global issues; (8) Agency regarding global issues; (9) Awareness of global issues" (Mostafa, 2020, p. 2). Specifically, Mostafa (2020) found that lessons that fostered knowledge about the interconnected nature of the world also fostered student self-efficacy for global issues. When students developed more positive dispositions toward GC, they also were more willing to learn to communicate with people from other backgrounds and to resolve conflicts. Importantly, these capacities were developed most effectively through integrated, consistent, habitual, and active pedagogy (Mostafa, 2020), including debates, discussions, games, project-based learning, and service learning—strategies that are viewed as being possible within the repertoire of "the average teacher" (Asia Society/OECD, 2018, p. 6). Implications for educators include integration of pedagogy for GC within subject areas and across them. Importantly, no matter the subject area.

To gain global competence, students need to be actively engaged in their learning and have the time and opportunity to reflect. They need to cultivate their curiosity and ability to think critically. "They must be able to take what they learn and use it to conceptualize possible solutions to complex problems." They have to be confident in expressing their ideas, but also willing to consider the ideas of others. They need to learn to collaborate with peers from different backgrounds and different nations. (Asia Society/OECD, 2018, p. 23).

Demographic Factors Associated With Student Global Competence

Mostafa (2020) found that not all students responded in similar ways to opportunities to develop GC. Specifically, girls participated more than boys in activities related to intercultural understanding, learning about other cultures, communication, and conflict resolution. More boys than girls participated in activities where interconnectedness of countries and their economies were studied, and boys were more likely to be invited by their teachers to discuss their viewpoints on current events related to international news.

Another area where demographic differences emerged related to socio-economic profiles of the students. The PISA study (Mostafa, 2020) found that those students who indicated advantages in terms of economic, cultural, or social status also experienced a greater number of types of GC learning experiences as compared with less advantaged students.

This finding was evident in over half to the participating countries, with the largest differences observed in Australia, Canada, Hong Kong, Korea, Macao, New Zealand, Scotland, and Chinese Taipei (Mostafa, 2020).

Development of Global Competence in Teacher Candidates

There is no prescribed pathway to developing globally competent teachers (Kopish, 2016), so teacher education programs design their courses based on findings related to effective practices. Parmigiani et al. (2022a) conducted a study across 17 European countries to determine 28 teacher educators' views on the most effective way to foster GC in their TCs. Findings related to programming aspects, content, and methods. Effective programming included formal inclusion of GC as a goal of programming as well as an assigned expert for its implementation into programming, rather than treatment as a fringe topic associated with Social Studies (Shaklee and Bailey, 2012). GC was understood to include (1) multicultural and intercultural knowledge, including inclusion of immigrants and refugees; (2) skills such as communication and co-operation related to acceptance of diversity through understandings of equity, equality, and democracy as well as social justice, self-reflection, well-being, and sustainability; and (3) teaching methods that included project-based learning, workshops, and seminars. Importantly, the need to develop attitudes and responsibility related to interconnectedness of local and global interests in teacher candidates (TCs) was highlighted.

Similar to the findings of the OECD study related to fostering GC in 15-year-old students (Mostafa, 2020), the importance of attitudes, skills, reflection, and active learning were also evident in the views of teacher educators as they related to development of TC's GC (Parmigiani et al., 2021, 2022b,c). It is unlikely that a content-based course on global citizenship alone will transfer to actual teaching practice without concurrent attention to TC's skills, dispositions, active learning, and reflection (Kopish, 2016), and the pedagogy and processes of teacher educations programs are therefore integral to ensuring teacher competence to foster GC in their own students. Zhao (2010) stressed that it is the responsibility of teacher education programs to ensure that their graduates are prepared to take actions that foster GC in their future students, being as attention to TC's preparedness for this role is essential to the goals of developing globally competent teacher and student populations.

RESEARCH QUESTIONS

Given the findings about the importance of GC not only to students and teacher candidates, but also to our collective futures, and within the recognition that teachers play a key role in fostering GC, the current study examined the GC of teacher candidates in a Canadian teacher education program. Our specific research questions were:

Which demographic factors are associated with higher levels of global competence in Canadian teacher candidates (gender, country of birth, age)?

Do higher levels of global competence correlate with later stages of the teacher education program?

MATERIALS AND METHODS

Context

This research project originated as part of a larger project initiated by Parmigiani et al. (2021, 2022a,b,c). After conducting a Delphi study aimed at validation of a set of rubrics to measure TCGC, the lead researcher contacted the participants to request that they collect data in their home countries to validate the internal consistency and reliability of the three rubrics. Given that GC does not lend itself to easy assessment (Sjøen, 2021), the development and international validation of a valid and reliable set of rubrics to measure TCGC is important development in GC teacher education. The data reported here were collected in Manitoba, Canada as part of that larger study of the global competence of TCs from Portugal, Italy, Norway, Slovakia, France, Israel, Australia, United Kingdom, Germany, and United States.

The teacher education program where the current data were collected in 2022 is located in a Manitoba, a central Canadian city of almost a million people. To be certified as a teacher in this province, TCs must hold two degrees: (1) a degree in a subject area taught within the province, and (2) a Bachelor of Education (B.Ed.) degree. TCs complete these requirements either concurrently by enrolling in a 5-year integrated program or consecutively be enrolling in the B.Ed. program once their initial degree is complete. In addition, TCs must be Canadian citizens or permanent residents who have successfully completed citizenship examinations in either English or French—Canada's two official languages. The language of instruction in this B.Ed. program is English.

Permission to conduct the research was obtained from the Canadian university's Human Research Ethics Board in January 2022. During the month of February 2022, all students enrolled in the undergraduate teacher education programs (N = 1198)

received an emailed invitation to participate during the week-long data collection period. By clicking on the link in the email, they were introduced to the consent procedures and rubrics.

Participants

Of the 1198 teacher candidates who received the email to complete the rubrics, 115 began and completed the rubrics, 10% of the total TC population at this university. For a description of the demographics of the sample, please see **Table 1**. **Table 1** indicates that a majority of our sample were female teacher candidates, and this is representative of teachers' gender in North America. The sample includes a balanced representation of candidates intending to teach in elementary and secondary schools. All of the teacher candidates were proficient in English, and most were native speakers.

Instruments

Data were collected using demographic questions and the newly validated Global Competence Rubrics (Parmigiani et al., 2021, 2022b,c). Please see **Table 2**. The Global Competence Rubrics includes three areas, each indicating the level of engagement with global competence activities.

The first area includes six indicators/criteria included into four dimensions and considers the TCs' "Exploring" stage

TABLE 1 | Demographic information.

Variable	Variable categories	n
Birthyear	1971–1990	11
	1991–1997	13
	1998	18
	1999	19
	2000	17
	2001	8
	2002	12
	2003	17
Gender	Male	19
	Female	94
	Other	2
Birth country	Canada	96
	Other	19
Intended grades	Kindergarten and Primary	46
	Middle school and Secondary	57
	Vocational Education	2
	Special Education	10
Program Year	One	12
	Two	16
	Three	28
	Four	30
	Five	29
English Proficiency	Beginner	0
	Intermediate	5
	Advanced	15
	Native speaker	94

Other includes Philippines (11), Paraguay, Jamaica, DRC, Vietnam, Syria, Argentina, United States, and South Korea.

of global competence. The dimensions are: openness; intent to experience/interact; global responsibility; ethical orientation. Sample indicators/criteria include: "I'm open to knowing and learning from people from diverse backgrounds" (dimension: openness) and "I'm willing to seize opportunities to interact with people from diverse contexts" (dimension: intent to experience/interact). The Cronbach Alpha value for this Exploring area was calculated using the current sample as 0.88, indicating very good internal reliability. Unfortunately, a coding error in the online survey resulted in errors in the first 41 response sets for the Exploring area only and these data were therefore disregarded, resulting in a complete data set from 74 students for this rubric only.

The second area includes seven indicators/criteria spread into five dimensions (global self-awareness; world views, perspectives and cultural diversity; inclusion and diversity; global challenges and conditions; sustainability) and considers the TCs' "Engaging" stage of global competence. Sample indicators/criteria include: "I demonstrate awareness of diverse and multiple perspectives when teaching/practicing in classrooms with students from diverse backgrounds" (dimension: world views, perspectives and cultural diversity) and "I try to contribute to the development of a more just, peaceful, and sustainable world" (dimension: sustainability). Cronbach Alpha value for this second area was calculated using the current sample as 0.86, indicating very good internal reliability.

The third area of the Global Competence Rubrics (Parmigiani et al., 2021, 2022b,c) includes 19 indicators/criteria grouped into seven dimensions (self-reflection; professional interaction/cooperation and multilingualism; managing complex learning environments; intercultural teaching; international practice; active teaching strategies; interactive assessment strategies) and considers the TCs' "Acting" stage of global competence. Sample indicators/criteria include: "I'm able to design a learning environment that embraces cultural diversity" (dimension: intercultural teaching) and "I'm able to support students from diverse backgrounds in working together on community-based authentic projects and real-world experiences" (dimension: active teaching strategies). The Cronbach Alpha value for this third area was calculated using the current sample is 0.97, indicating excellent internal reliability.

To measure the reliability and the internal consistency of the instrument, we also calculated the coefficient ω (McDonald, 1999; Raykov and Marcoulides, 2014; Padilla and Divers, 2015; Zhang and Yuan, 2015) and the average interitem correlation (Schutte et al., 2013; De Vaus, 2014) for each area.

As shown in **Table 3**, the coefficient ω values confirm a good level of reliability as well as the average interitem correlation. The critical values for coefficient ω are similar to Cronbach Alpha values. The average interitem correlation should fall between 0.15 and 0.50 (Clark and Watson, 1995; Zmnako and Chalabi, 2019). Spiliotopoulou (2009) specified that the average interitem correlation should be included "within the range of 0.15–0.20 for outcome measures that measure broad characteristics (i.e., general constructs such as extraversion) and between 0.40 and 0.50 for those tapping narrower ones (i.e., specific constructs such as talkativeness." The second case is

appropriate to the constructs related with global competence. Furthermore, DeVon et al. (2007) identified studies in which the average interitem correlation was considered acceptable with scores between 0.30 and 0.70.

Each indicator in all three areas of global competence asked that TCs report their responses on a 4-point scale,

with "not applicable – I'm not involved in this criterion" as a fifth choice." The four choices are: (1) "emerging – I show a low willingness to explore the criterion," (2) "developing – I show a willingness to explore the criterion but they tend to give up and not to deal with it thoroughly," (3) "achieving – I thoroughly explore the criterion," and

TABLE 2A | Global competence rubrics.

Dimensions	Indicators/Criteria		Not applicable	Levels			
				Emerging	Developing	Achieving	Extending
(A) Area A: Global competence – exploring							
A1 Openness	I'm open to knowing and learning from people from diverse backgrounds						
A2 Intent to experience/interact	A2a	I'm willing to experience diverse contexts					
	A2b	I'm willing to seize opportunities to interact with people from diverse contexts					
A3 Global responsibility	A3a	I feel responsibility to address ethical, social, economic and environmental challenges					
	A3b	I view the world as interconnected					
A4 Ethical orientation	I support rights, equity and social justice in different sectors such as gender, racial, religion, disability, etc.						

Free additional comments
This box may be used to write additional qualitative comments

The levels are structured as follows:
not applicable - I'm not involved in this criterion
emerging - I show a low willingness to explore the criterion
developing - I show a willingness to explore the criterion but tend to give up and not to deal with it thoroughly
achieving - I thoroughly explore the criterion
extending - I thoroughly explore, extend, and practice the criterion independently

(B) Area B: global competence – engaging.							
B1 Global self-awareness	B1a	I'm aware of the global impact of my actions on the natural and human world					
	B1b	I'm aware of the global impact of others' actions on the natural and human world					
B2 World views, perspectives and cultural diversity	B2a	I'm aware of multiple worldviews while interacting with people from all over the world					
	B2b	I demonstrate awareness of diverse and multiple perspectives when teaching/practicing in classrooms with students from diverse backgrounds					
B3 Inclusion and diversity	I seek inclusion and integration of all students in their classroom						
B4 Global challenges and conditions	I explore resources from varied perspectives and opportunities to stay informed on local and global issues						
B5 Sustainability	I try to contribute to the development of a more just, peaceful, and sustainable world						

Free additional comments
This box may be used to write additional qualitative comments

The levels are structured as follows:
not applicable - I'm not involved in this criterion
emerging - I show a low willingness to be engaged in the criterion
developing - I show a willingness to be engaged in the criterion but tend to give up and not to deal with it thoroughly
achieving - I'm thoroughly engaged in the criterion
extending - I'm thoroughly engaged in the criterion, extend, and practice it independently

(C) Area C: Global competence – acting.

C1	Self-reflection	C1a	I'm able to reflect deeply on the ways that I think about myself
		C1b	I'm able to reflect deeply on the ways that I think about the curriculum design and the teaching strategies
C2	Professional interaction/ cooperation and multilingualism	C2a	I'm able to interact and cooperate with colleagues, students, parents, etc. from diverse backgrounds
		C2b	I'm able to interact and cooperate with colleagues, students, parents, etc. from diverse linguistic backgrounds
C3	Managing complex learning environments	C3a	I'm able to observe the features of several learning environments and critically analyze diverse school contexts and systems
		C3b	I'm able to create effective learning environments and manage classes with students from diverse backgrounds
		C3c	I'm able to adapt their teaching strategies to several educational situations
C4	Intercultural teaching	C4a	I'm able to design instruction that matches their students' developmental needs
		C4b	I'm able to critically examine the curriculum to determine whether it reinforces negative cultural stereotypes
		C4c	I'm able to create learning environments where everybody can develop plural multifaceted learning, considering different points of view
		C4d	I'm able to design a learning environment that embraces cultural diversity
		C4e	I'm able to use experiences and perspectives of diverse students as conduits for teaching more effectively
C5	International practice	C5a	I'm able to practice in international school contexts
		C5b	I'm able to transfer into the school system of origin what they observed during the internship/placement abroad

Free additional comments
This box may be used to write additional qualitative comments

The levels are structured as follows:
Not applicable – I'm not involved in this criterion.
Emerging – I show a low willingness to explore the criterion.
Developing – I show a willingness to explore the criterion but they tend to give up and not to deal with it thoroughly.
Achieving – I thoroughly explore the criterion.
Extending – I thoroughly explore, extend, and practice the criterion independently.

(D)

C6	Active teaching strategies	C6a	I'm able to adopt interactive and cooperative strategies with students from diverse backgrounds
		C6b	I'm able to carry out inquiry-based models of teaching to enable students from diverse backgrounds to actively work on ideas in order to construct knowledge, solve problems, and develop their own understanding of the content
		C6c	I'm able to support students from diverse backgrounds in working together on community-based authentic projects and real-world experiences
		C6d	I'm able to develop global learning through discussions about news events occurring around the globe and to connect them to classroom subjects
C7	Interactive assessment strategies		I'm able to design and implement formative assessment methods to inform instruction with students from diverse backgrounds (self & peer assessment, portfolios, etc.)

Free additional comments
This box may be used to write additional qualitative comments

The levels are structured as follows:
Not applicable – I'm not involved in this criterion.
Emerging – I show a low willingness to explore the criterion.
Developing – I show a willingness to explore the criterion but they tend to give up and not to deal with it thoroughly.
Achieving – I thoroughly explore the criterion.
Extending – I thoroughly explore, extend, and practice the criterion independently.

(4) "extending – I thoroughly explore, extend, and practice the criterion independently." We considered this scale as an ordinal scale.

To answer the research questions in light of the ordinal nature of the rubric data based on our small sample, non-parametric analyses were conducted (Fagerland, 2012).

TABLE 3 | Reliability and internal consistency coefficients.

Area	Coefficient ω	Average interitem correlation
Exploring	0.88	0.56
Engaging	0.84	0.42
Acting	0.94	0.46

RESULTS

The first series of analyses considered the first research question related to the demographic characteristics of the participants and their relationships to the three global competence areas of Exploring, Engaging, and Acting.

Gender

A first analysis performed through an independent samples Kruskal–Wallis test indicated no significant differences in any of the three areas that we considered as dependent global competence variables by gender (p range 0.139–0.377).

Analyzing deeply the indicators/criteria of each area, however, we found a significant difference by gender for the indicator/criterion A3a (Exploring area: They feel responsibility to address ethical, social, economic and environmental challenges; included into the dimension "global responsibility"). The pairwise comparison included into the Kruskal–Wallis one-way analysis of variance showed that male students scored higher than female students (14.807; $p < 0.011$). This result has been confirmed by the Chi-square analysis. Male students more frequently than the female students indicated the highest point of the 4-point scale (extending - I thoroughly explore, extend, and practice the criterion independently). The adjusted standardized residuals, related to the 4th point of the scale and indicated in the contingency table for male and female students are, respectively, 2.4 and –2.9 (the z critical value for a 4×3 table is 2.39). This indicates that the expected count for female students is lower than the observed count. In addition, the observed count for male students is higher than the expected count.

Similarly, the pairwise comparison included into the Kruskal–Wallis test showed that male students scored higher than female students (462.500; $p < 0.034$) concerning the indicator/criterion C6d (Acting area: They are able to develop global learning through discussions about news events occurring around the globe and to connect them to classroom subjects; included into the dimension "active teaching strategies").

Future Intentions of Grade Level

To investigate potential differences, we grouped the student teachers into the following school categories: kindergarten and primary level, middle school and secondary level, special education, vocational education. We did not find any significant differences in the areas A (Exploring area) and B (Engaging area). However, the indicator/criterion C1a (Acting area: They are able to reflect deeply on the ways that they think about themselves, included into the dimension "self-reflection") showed that

middle school and secondary student teachers scored higher on this indicator/criterion (1,532.500; $p < 0.022$).

Birth Country

To analyze thoroughly the differences regarding the country of birth, we again performed a non-parametric test (Mann–Whitney U) on individual indicators/criteria within the rubrics. These analyses highlighted the specific dimensions that caused the birth country differences concerning the areas of Engaging and Acting in global competence. See **Table 4**.

As shown in **Table 4**, non-parametric tests demonstrated that indicator/criterion B5a is the only one with a significant difference in the area B, "Engaging." The difference has been confirmed also by the Chi-square analysis (8.211; df 3; $p < 0.042$). In particular, the adjusted standardized residuals, related to the 4th point of the scale (extending – I thoroughly explore, extend, and practice the criterion independently) and indicated in the contingency table for Canadian born and non-Canadian born student teachers are, respectively, 2.3 and –2.3 (the z critical value for a 4×2 Table is 2.13). This indicates that the expected count for non-Canadian student teachers is lower than the observed count. In addition, the observed count for Canadian student teachers is higher than the expected count. Similarly, the non-Canadian student teachers rated more times at the 2nd point of the scale (developing – I show a willingness to explore the criterion but they tend to give up and not to deal with it thoroughly) compared to the Canadian born student teachers (respectively, the adjusted standardized residuals are –2.3 and 2.3).

In addition, **Table 3** indicated that there are five indicators/criteria that showed significant differences between Canadian born and non-Canadian born student teachers in the Acting area. In particular, these indicators/criteria are mainly included into the dimensions "intercultural teaching" and "active teaching strategies." The chi-square analysis confirmed the differences for the indicator/criterion C3b. In particular, the non-Canadian born rated more times at the 2nd point of the scale (ASR respectively 2.2 and –2.2). The difference for the dimension/criterion C4b has also been confirmed by chi-square analysis. In particular, the Canadian born student teachers rated more consistently the 4th point of the scale (ASR respectively 2.4 and –2.4). Finally, the dimension/criterion C4c showed differences in the chi-square analysis (15.370; df 3; $p < 0.002$) for the 4th point scale (ASR 2.5 and –2.5) and for the lowest point of the scale (emerging – They show a low willingness to explore the criterion). The ASR are –3.1 for Canadian born student teachers and 3.1 for non-Canadian born student teachers.

Birth Year

We did not find any significant differences in non-parametric tests with birth year as independent variable. Kruskal–Wallis test results indicated that for Area A, $H(18) = 19.82$, $p = 0.34$; for Area B, $H(20) = 14.36$, $p = 0.81$; and for Area C, $H(20) = 16.05$, $p = 0.71$.

Program Year

Focusing on the program year as independent variable, we found interesting and significant differences in all three areas in

TABLE 4 | Differences among specific dimensions by country of birth.

#	Text		U Mann–Whitney	
	Dimension	Indicator/Criterion	U	p <
B5a	Sustainability	I try to contribute to the development of a more just, peaceful, and sustainable world	695.500	0.009
C3b	Managing complex learning environments	I'm able to create effective learning environments and manage classes with students from diverse backgrounds	541.000	0.022
C4b	Intercultural teaching	I'm able to critically examine the curriculum to determine whether it reinforces negative cultural stereotypes	482.500	0.007
C4c	Intercultural teaching	I'm able to create learning environments where everybody can develop plural multifaceted learning, considering different points of view	527.500	0.025
C6b	Active teaching strategies	I'm able to carry out inquiry-based models of teaching to enable students from diverse backgrounds to actively work on ideas in order to construct knowledge, solve problems, and develop their own understanding of the content	520.500	0.042
C6d	Active teaching strategies	I'm able to develop global learning through discussions about news events occurring around the globe and to connect them to classroom subjects	491.500	0.035

answer to our second research question. In the Exploring area, the indicator/criterion A3a (They feel responsibility to address ethical, social, economic, and environmental challenges; included in the dimension "global responsibility") showed differences between 1st and 5th program year (126.500; $p < 0.013$) and between 3rd and 5th program year (278.000; $p < 0.024$). In both cases, the students who were further along in their teacher education programs scored higher on this indicator/criterion.

In the Engaging area, we found differences in the indicator/criterion B2b (They demonstrate awareness of diverse and multiple perspectives when teaching/practicing in classrooms with students from diverse backgrounds, included in the dimension world views, perspectives and cultural diversity). In particular, we found significant differences between 5th program year student teachers and 2nd (309.000; $p < 0.021$), 3rd (517.000; $p < 0.025$) and 4th program year student teachers (553.500; $p < 0.020$). In all cases, the more advanced students scored higher on this indicator/criterion. In fact, the chi-square analysis revealed that the 5th program year student teachers rated more times the highest point of the 4-point scale (extending – I thoroughly explore, extend, and practice the criterion independently). The adjusted standardized residuals, related to the 4th point of the scale and indicated in the contingency table for 5th program year student teachers are 2.7 (the z critical value for a 5 × 4 Table is 2.64). This indicates that the observed count for these student teachers is higher than the expected count.

In the Acting area, we found differences in the indicators/criteria C1a (I'm able to reflect deeply on the ways that they think about themselves, included in the dimension self-reflection), C5b (I'm able to transfer into the school system of origin what they observed during the internship/placement abroad, included in the dimension international practice) and C7a (I'm able to design and implement formative assessment methods to inform instruction with students from diverse backgrounds [self and peer assessment, portfolios, etc.], included in the dimension interactive assessment strategies). In the first case, we found significant differences between 5th program year student teachers and 1st (246.000; $p < 0.010$) and 2nd program year student teachers (283.500; $p < 0.032$). In both cases, the

students who were further along in their program scored higher on this indicator/criterion. Regarding the indicator/criterion C5b, the differences were between 5th program year student teachers and 1st (51.500; $p < 0.025$) and 3rd program year student teachers (145.500; $p < 0.032$). Again, in both cases, the more advanced students scored higher on this indicator/criterion. The analysis of the last indicator/criterion (C7a) showed differences in the chi-square contingency table. The overall Chi-square value was 24.636 with df 12 and $p < 0.017$. In particular, the 2nd program year student teachers rated more times the lowest point of the 4-point scale (emerging – I show a low willingness to explore the criterion). The adjusted standardized residuals, related to the 1st point of the scale and indicated in the contingency table for 2nd program year student teachers are 3.0 (the z critical value for a 5 × 4 Table is 2.64). This means that the observed count for these student teachers is much higher than the expected count.

DISCUSSION

Collectively, the findings of the current study provide some positive news, raise some questions, and point to implications and future directions.

First, the finding that students' engagement with GC increased over their program years, but not with birth year, indicates that the students are developing higher GC from specific experiences during their teacher education program rather than simply by merit of more life experience. This is a positive programmatic outcome. However, given that TCs spend their last 2 years of the B.Ed. program in pedagogy-focused courses and also spend 32 full weeks in practicum placements over the course of their program, it is concerning that they are not indicating greater actions related to GC within the later years of their programs. Only 1 of the 6 Exploring criteria, 1 of the 7 Engaging criteria, and 3 of the 19 Acting criteria show positive differences in their levels across the years of the program, leaving 27 indicators unchanged. Moreover, a key component in the OECD (2018) definition of global competence is taking responsible *actions* related to

sustainability and well-being—the third area of the rubrics. If TCs are not yet taking actions themselves, as evidenced by the lack of development differences across program years in most indicators, how can they foster the development of these actions within their own future students?

A possible reason for this finding might be the extraordinary nature of the 2 years previous to the current study's data collection period. During that time of the data collection, the TCs were attending local practicums in pandemic conditions, had been taught their university courses online for 2 years, and were excluded from opportunities for international practicum placements. International practicum is one way that TCs can develop GC (Schenker, 2019; Kerkhoff and Cloud, 2020). While international practica is considered by some to be the gold standard in this regard (Kopish, 2016). Sjøen (2021) showed that TCs over-estimate their own development of GC during international practica. These experiences can also lead to TCs developing greater ethnocentric stereotypes, particularly when the home countries and host countries of the TCs have broad cultural differences (Sjøen, 2021). The effects of international practica on GC are influenced by characteristics of the practica, for example its duration (Behrnd and Porzelt, 2012), and by characteristics of the TCs, such as their openness to learning about others (Leutwyler and Meierhans, 2016). Whether they result in positive or negative outcomes, the TCs in the current study were restricted from such opportunities by the global pandemic, and this may have affected their development of GC over the course of their program, as these opportunities are typically undertaken in the last year of programming. This is a limitation of the current study and replication within more typical, non-pandemic conditions would add to the confidence in the findings.

The restrictions on travel necessitated by the pandemic do not necessarily prevent global exchanges, however, as programs such as the International Education and Resource Network (iEARN) offer more than 100 online project-based learning activities presented in multiple language that allow teacher facilitation of intercultural collaborative projects between school children in different countries (Rensink, 2020). If TCs were introduced to these learning opportunities as part of their teacher education programs, they would have opportunities to normalize virtual learning exchanges for their own future students even within the uncertainty of the global pandemic. Moreover, each iEARN project must answer the question of how the project will improve quality of life on the planet, fostering both agency and the action stage of GC in the students who take part. Other iEARN projects involve a digital storytelling exchange, where students create and narrate a 2-minute video. In this way, students have opportunities to reduce prejudice and strengthen understanding and tolerance of others around the world. These school-based learning opportunities have been recognized as one of sixteen models of the future of education, and they are noted for their capacity to develop empathy, co-operation, negotiation, leadership,

and social awareness (Rensink, 2020)—all important to the development of GC.

These types of online intercultural opportunities to develop GC are not limited to school children. A similar online opportunity for global development has been offered as part of teacher education and involved TC's examinations of museum art exhibits related to displacement and emigration (Hubard, 2020) through an inquiry-based course. Analysis of TC learning revealed gains in six themes related to GC including considering multiple perspectives, motivation to continue to learn more about global issues and different ways of life, and feeling others' experiences through sharing humanity. University courses such as this demonstrate that innovation approaches in TC education can play a similar role to international practicums in the development of TCGC, and they provide more access to equitable experiences than do cost-laden international practicum.

Second, our finding related to participants' country of birth raises some important questions. TCs born outside of Canada indicated lower scores in both engagement (one indicator) and actions (five indicators) related to CG. Indicators/criteria of difference in the Acting area are mainly included into the dimensions "intercultural teaching" and "active teaching strategies." Given that more than half of the TCs born outside of Canada were born in the Philippines— the country that indicated the highest exposure of students to teaching activities recommended for the development of GC (Mostafa, 2020)—this finding is anomalous. It might be expected that these students would demonstrate higher GC than Canadian students if they emigrated to Canada after receiving schooling in the Philippines. Alternatively, if they moved to Canada as young children and experienced the majority of their schooling in Canadian schools, we might expect there to be no significant difference between these TCs and the TCs born on Canada. The findings that the non-Canadian born TCs exhibited lower levels of both Engaging with and action related to GC will require further investigation.

Finally, the findings related to gender and global competence require examination. The differences relate to indicators in the areas Exploring and Acting. While the self-reported nature of the rubrics' procedures may have been a reflection that males tend to rate their own competence more highly than do females generally (Mayo et al., 2012), the Acting indicator and its relationship to the use of the news of current events that we found is also reflected in the PISA data: Mostafa (2020) found boys were more likely to be invited by their teachers to discuss their viewpoints on current events related to international news. It is possible that the male TCs in our study had developed their capacity for greater actions related to school-based discussions of the news as students themselves, or through facilitating these discussions on their practica as TCs. In either case, the link between teacher actions and student GC found in the PISA study (Mostafa, 2020) is supported in our study as well.

IMPLICATIONS AND FUTURE DIRECTIONS

Although we did not investigate the socio-economic status of the TCs in our study, it should be noted that the province in which the study took place is the province with Canada's long-standing, and highest child poverty rate (Frankel, 2021). Given that most of these TCs will eventually teach in Manitoba, the OECD's (2018) finding that lower socio-economic status (SES) is associated with lower exposure to teaching strategies that promote GC is of special importance. Moreover, the findings within the OECD data related to effects of SES on students' access to develop GC was highlighted as being especially evident in Canada, among several other countries. Within our study's Canadian province with the highest concentrations of children living in poverty (28.4% according to Frankel, 2021), it becomes even more imperative that teachers in Manitoba are proficient at fostering these competencies in their students. Ensuring that students from lower SES backgrounds have equal exposure to the learning activities that foster GC is dependent on the GC teaching competencies of their teachers. Although the current findings demonstrate some changes in the level of teacher candidate GC across the years of their teacher education program, the findings signal many areas where no growth is reported. These data and our findings are harbingers to the necessity for change in teacher education related to global competence.

Other implications of the findings relate to the diversity of the Canadian teaching force. Canada's birthrate has fallen to the lowest point in 15 years, with under 349,00 live births in 2020 (Statistics Canada, 2021), and this means that maintaining the economy, population, and teaching force through immigration will be the norm moving forward, at least for the foreseeable future. Attention to understanding and ameliorating the differences between the GC of Canadian-born and non-Canadian-born teachers found in the current study will be important to the skills set of the ever more diverse teaching force, the experiences of the students in schools, and ultimately to the interconnectedness of our global community.

Finally, for TCs to move from Engaging with GCs to taking actions related to GC, the expectation of these competencies within TC practica evaluation must become overt. The criteria by which we measure teacher competence is a signal of the values of teacher education programs and should reflect the values of our global community. UNESCO succinctly stated, "You measure what you treasure[1]." While many TCs have opportunities to explore and engage with GCs as part of their coursework, actions related to GC often take place outside of coursework and during practicum, both locally and globally. Given that

Canada has recognized the role of teachers in developing GC in their students (Sinay and Graikinis, 2018), it is incumbent on teacher education programs to revisit their practicum evaluation criteria to ensure they include indicators of Exploring, Engaging, and—most importantly— Acting with GC, both in local and international practica. In this way, graduating teacher candidates will be vetted for their competence within the indicators for Acting with global competence, and successful TCs will be ready to take up strategies and mindsets that foster GC in their own students.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation. Requests to access the Canadian database should be directed to LS at lj.sokal@uwinnipeg.ca.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Genoa and University of Winnipeg. Informed consent was indicated by participants through their subsequent completion of the voluntary online rubrics after reading the consent materials.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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[1] etico.iiep.unesco.org

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