

Students' motivation to participate in virtual exchange and its moderating effect on global competence

ABSTRACT

The importance of global and intercultural competence across various fields has become increasingly evident. Since the COVID-19 health crisis, one approach that has gained acceptance in academia is Virtual Exchange, which facilitates interaction between students and academics from different geographical locations. The construct of Global Competence is understood to encompass three dimensions: Self-Awareness, Intercultural Competence, and Global Knowledge. Additionally, three types of motivation are identified: Mandatory, Rewarded, and Self-motivation. However, little is known about how students' motivation to participate in Virtual Exchange acts as a moderating factor in relation to the dimensions of Global Competence. This study aims to measure the moderating effect of students' motivation on Global Competence using the Multivariate Analysis of Variance (MANOVA) technique. The analysis modelled the relationship between Global Competence, its three dimensions, and the three types of motivation. Data were collected through a questionnaire administered to higher education students from various countries who had participated in virtual exchange projects. The study's results indicate a significant moderating effect of students' motivation to participate in Virtual Exchange projects on Global Competence, specifically within the Intercultural Competence dimension. No significant effects were found for the Self-Awareness and Global Knowledge dimensions. The findings suggest that students who expect to be rewarded for participating in Virtual Exchange programs show better results in the development of Intercultural Competence. In contrast, lower results are anticipated for students whose participation is motivated by mandatory requirements or self-motivation.

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1. INTRODUCTION

Research in diverse areas has identified Global Competence and Intercultural Competence as central concepts to understand and improve relations across cultures (Hammer et al., 2003). In the context of an intercultural cross-rela-

tion, according to Deardorff (2009), communication has developed to a level where a more effective collaboration with people anywhere in the world is more possible than ever before. One of the approaches that has been increasingly used to reach that communication and collaboration is Virtual Exchange (Helm & Van der Velden, 2021).

Educational institutions play a key role in preparing students for the global scenario they will face. Different definitions have been given for Global Competence and Intercultural Competence, apparently with no consensus among scholars. Some overlapping of conceptualization is observed when defining or addressing Global Competence and Intercultural Competence (e.g., Deardorff, 2006; Bennett, 2009; Parkinson, 2009; Spitzberg & Changnon, 2009; Morais & Ogden, 2011; Cascio & Boudreau, 2016; OECD, 2016; Hanada, 2019).

Global Competence refers to having an open mind, seeking to understand others in terms of their cultural norms, and leveraging the knowledge produced from that understanding to develop effectively outside one's own environment (Morais & Ogden, 2011). Fantini (2007) defines Intercultural Competence as a complex of abilities that help people to perform effectively and appropriately when interacting with others in terms of language and culture. According to Morais and Ogden (2011), the Global Competence construct includes the Intercultural Competence dimension, which, among various labels and components found in the literature (Griffith et al., 2016), is referred to by these authors as intercultural communication.

In this study, it is understood that, when addressing intercultural aspects, intercultural communication can be conceptualized as Intercultural Competence, as described by Deardorff (2006) and Fantini (2007). Therefore, we use the term Intercultural Competence.

Virtual Exchange projects, typically lasting weeks or months (Commander et al., 2022), show benefits of putting together students and professors from different contexts to communicate and collaborate (Helm & Van der Velden, 2021). This study considers Global Competence and its dimensions: Self-Awareness, Intercultural Competence (as mentioned earlier) and Global Knowledge with their respective components, specifically those related to the behaviors and attitudes of participants in Virtual Exchange projects that can aid intercultural skills (O'Dowd, 2020). Thus, this study aims to address the following question: how can these behavioral aspects affect Virtual Exchange participants, moderating the relationship between students' participation in Virtual Exchange and the dimensions of Global Competence? In this study, motivation is related to students' motivation to participate in Virtual Exchange projects, which we divided into three groups: Mandatory, Rewarded, and Self-motivation.

Thus, the aim of this study is to measure the moderating effect of students' motivation to participate in Virtual Exchange on Global Competence according to Morais and Ogden's (2011) construct. The Multivariate Analysis of Variance (MANOVA) technique was used to model the relationship of three types of motivation to participate in Virtual Exchange (Mandatory, Rewarded and Self-motivation) and Global Competence with three dimensions (Self-Awareness, Intercultural Competence and Global Knowledge). We hope to bring contributions for future studies dealing with the relationship among

the themes analysed here in greater depth, specifically the effect of students' motivation to participate in Virtual Exchange on the increasingly relevant concept of Global Competence for future professionals. After a brief literature review, the methodology is presented, followed by the results, discussion, and conclusions of the study.

2. LITERATURE REVIEW

2.1. GLOBAL AND INTERCULTURAL COMPETENCE

In this study, we consider Global Competence as a construct that forms part of a larger structure, namely, the Global Citizenship model (Morais & Ogden, 2011). For Morais and Ogden (2011), Global Competence is related to having an open mind and actively seeking to understand others in terms of their cultural norms and expectations and leveraging this knowledge to interact, communicate, and work effectively outside one's own environment. In that context, globally competent students are those who recognize their own limitations and abilities for engaging in intercultural encounters, showing intercultural communication skills and abilities to participate successfully in intercultural encounters, and demonstrating interest and knowledge about world issues and events (Morais & Ogden, 2011).

According to Morais and Ogden (2011), the construct of Global Competence is composed of three dimensions, namely: self-awareness, intercultural communication, and global knowledge. Self-awareness is related to the recognition of limitations and abilities to engage successfully in intercultural encounters. Intercultural communication concerns the ability to engage successfully in intercultural encounters. Global knowledge is about demonstrating interest and knowledge about world issues and events.

Similar definitions of Global Competence can be found in the OECD's (2016) work, where it is understood as a multidimensional capacity, where globally competent individuals are able to examine local, global, and intercultural issues to understand and appreciate different perspectives and world-views, interact successfully and respectfully with others, and take responsible action towards sustainability and collective well-being. Yet, for Sälzer and Roczen (2018), scientific theory-building for the construct of Global Competence is relatively new and undeveloped.

Helm et al. (2023) consider that global competences and citizenship have generally been addressed through student mobility with international exchanges, volunteering and/or service-learning programs, and internationalization at home approaches in universities.

Regarding the second dimension, that is, intercultural communication, scholars have used different labels and components to refer to it (Griffith et al., 2016). In this study, we adopt the understanding that when it comes to intercultural aspects, intercultural communication can be addressed and understood as Intercultural Competence (Deardorff, 2006; Fantini, 2007).

Fantini (2007, 2009) claims that Intercultural Competence is a complex of abilities needed to perform effectively and appropriately when

interacting with others who are linguistically and culturally different from oneself. Spitzberg and Changnon (2009) argue that Intercultural Competence is an appropriate and effective management of interaction between people who represent to some degree different or divergent affective, cognitive, and behavioral orientations to the world. Deardorff (2006) defines Intercultural Competence as effective and adequate communication and behavior in intercultural situations. Bennett (2009) states that Intercultural Competence is most viewed as a set of cognitive, affective, and behavioral skills and characteristics that support effective and appropriate interaction in a variety of cultural contexts.

There is no consensus on the terminology around Intercultural Competence, so an array of definitions has been proposed by different disciplines (Deardorff, 2011; Spitzberg & Changnon, 2009). Therefore, what is understood as Intercultural Competence in a given context may not be accepted in another. Apparently, there is no specific model of Intercultural Competence which could be generally applicable to different disciplines. Besides, Global Competence and Intercultural Competence are used interchangeably. For instance, Cascio and Boudreau (2016) deal with intercultural aspects in the context of Global Competence needed for global business. Parkinson (2009) follows a similar approach in relation to the engineering field. Hanada (2019) addressed the experience of studying abroad in relation to Intercultural Competence.

Also, all the Intercultural Competence definitions mentioned above involve latent variables, requiring further work to measure the relationships among them. In this paper, we focus on understanding the effect of students' motivation to participate in Virtual Exchange as a moderator in the relationship between the dimensions of Global Competence, based on the perceptions of higher education students from different countries participating in Virtual Exchange projects. Given the increase in Virtual Exchange initiatives and the limited literature on how students' motivation affects the development of Virtual Exchanges and students' global competencies, with this study, we seek to contribute to this gap. Our study may offer implications and contributions for other studies addressing several themes related to Global Competence (e.g., global citizenship education, internationalization of higher education, etc.). To the best of our knowledge, no studies have measured the relationship between the Global Competence construct and Virtual Exchange using the approach presented here. The most commonly used approach in the literature is pretest-posttest assessment.

As Deardorff (2011) states regarding Intercultural Competence, there is no silver bullet regarding an assessment tool. Given the complexity of the concept, it would be challenging, if not impossible, for one tool to measure an individual's Intercultural Competence. Therefore, when assessing Intercultural Competence, it is crucial to define this concept within the context in which it will be used (Deardorff, 2011).

In this study, we have chosen to use a definition of Global Competence (Morais & Ogden, 2011) and a definition of Intercultural Competence (Fantini, 2007, p. 9; 2009, p. 458). These definitions are applied within an increasingly dynamic and interconnected global context (Hammer et al., 2003).

2.2. VIRTUAL EXCHANGE

Since the COVID-19 health crisis, one of the approaches that has gained acceptance in academia to facilitate interaction between students and academics from different contexts and geographical locations is the Virtual Exchange (Helm et al., 2023). Also, Virtual Exchange is a relevant alternative in countries where costs associated with physical academic mobility may be prohibitive to most (Mendes & Finardi, 2023).

Virtual Exchange can be understood as an increasingly used approach in higher education and can be defined as the engagement of a group of learners in online intercultural interaction projects with partners from other cultural contexts or geographical locations as part of their educational programs (O'Dowd, 2018).

Thus, Virtual Exchange is an online learning initiative, typically lasting weeks or months (Commander et al., 2022), that concentrates its activities on participants' dialogues and interactions, trying to develop skills in intercultural awareness, empathy, collaboration in working groups (Helm & Van der Velden, 2021), and digital skills, as the activities are mediated by technologies. Research on Virtual Exchange has shown positive results regarding students' participation (e.g., Bassani & Buchem, 2019; Commander et al., 2022; Zheng et al., 2022; Gimeno, 2023).

At least two approaches preceded what is now proposed as a model for Virtual Exchange: e-tandem and telecollaboration. According to O'Dowd (2018), e-tandem and telecollaboration referred to the engagement of a group of learners in online intercultural interconnections. Those two approaches apparently failed to deepen the experience of participants in cultural aspects, relegating them to objectives focused on acquiring a second language (O'Dowd, 2020). New proposals for Virtual Exchange seek to prepare global citizens capable of developing in diverse cultural scenarios, including those that seek cooperation between participants offering discussions and ways of collaborating to solve problems that affect the cultures in question (O'Dowd, 2020). We took this appeal and sought to identify the moderating effect of students' motivation to participate in Virtual Exchange on the Global Competence dimensions. We operationalized motivation in three groups: Mandatory, Rewarded, and Self-motivation.

3. METHODOLOGY

This explanatory study adopts a quantitative approach (Lacruz & Leite, 2023), aiming to measure the moderating effect of students' motivation to participate in Virtual Exchange on the Global Competence construct. A survey with undergraduate and graduate students who have participated in Virtual Exchange projects/disciplines from different countries was carried out.

3.1. INSTRUMENT

A survey with a 7-point Likert scale (ranging from totally disagree to fully agree) was created based on the Global Competence construct in Morais and Ogden's (2011) model and shared with students on the QuestionPro platform (see Appendix A). The students were asked to self-evaluate their Global Competence according to their participation in Virtual Exchange with students from other countries. The questionnaire was divided into three blocks: the first one included questions about the respondent; the second included questions related to the Global Competence construct; and the third included a question related to the moderating variable of the model, namely, students' motivation to participate in Virtual Exchange, with three motivation levels (Mandatory – I just participated in the Virtual Exchange, because it is a mandatory discipline in my course; Rewarded – I just participated in the Virtual Exchange because, although it is not a mandatory discipline, it gives me credits that I need for my discipline/course; and Self-motivation – I decided to participate in the Virtual Exchange, because, even though it is not a mandatory discipline and does not give me any credit for my participation, I wanted to).

Table 1 presents the dimensions and details of the Global Competence model used in this study.

Table 1
Dimensions of the Global Competence model

Dimension	Code	Description	Measuring	Source
Self-awareness	SA1	How to develop a place to help mitigate a global environmental or social problem	7-point Likert scale	Morais and Ogden (2011)
	SA2	Ways to make a difference on some of the world's most worrisome problems		
	SA3	To get other people to care about global problems		
Intercultural competence	IC1	How much unconscious behavior and attitudes are adapted when interacting with people from other cultures	7-point Likert scale	Morais and Ogden (2011), Fantini (2007, 2009)
	IC2	How to adapt communication style to other people's cultural background		
	IC3	To communicate in different ways with people from different cultures		
Global knowledge	GK1	To be informed about current issues that affect international relationships	7-point Likert scale	Morais and Ogden (2011)
	GK2	To be comfortable expressing views regarding a pressing global problem in front of a group of people		
	GK3	To be able to write an opinion letter to a local media source expressing concerns over global inequalities and issues		

Note. Authors' own elaboration.

Content validity was established through alignment with the conceptual definitions of each construct (i.e., Morais & Ogden, 2011; Fantini, 2007, 2009). Regarding the reliability of the dimensions, McDonald's omega values indicated internal consistency (Self-awareness: $\omega = 0.779$; Intercultural competence: $\omega = 0.713$; Global knowledge: $\omega = 0.798$), exceeding the commonly accepted threshold of 0.7 (Flora, 2020). The outer loadings, obtained through principal component analysis, showed values above 0.7 (except for items SA3 = 0.634 and IC3 = 0.682), demonstrating convergent validity according to the criteria suggested by Hair et al. (2018).

3.2. QUANTITATIVE APPROACH

The MANOVA technique was used to model the relationship between students' motivation to participate in Virtual Exchange and the dimensions of the Global Competence construct (Morais & Ogden, 2011). The Pillai trace was used as the statistical test because the dependent variables are ordinal and the factor variable has more than two levels (i.e., three: mandatory, rewarded, and self-motivation).

This technique was used to measure the relationship between the variables Self-awareness, Intercultural Competence, and Global Knowledge, and the different types of motivation that influenced students' participation in Virtual Exchange, which was considered the moderating variable in the model (Aguinis, 1995; Aguinis & Gottfredson, 2010).

According to Aguinis and Gottfredson (2010), the direction or strength of a relationship (i.e., first-order relationship) depends on other factors, labelled as moderator variables because the first-order relationship is affected by the changes in the moderator variable.

The equation below represents the interaction of the variables of the model:

$$ST = S\alpha + S\beta + S\alpha.\beta + SW$$

Where: S = the sums-of-squares matrices

α = the first factor

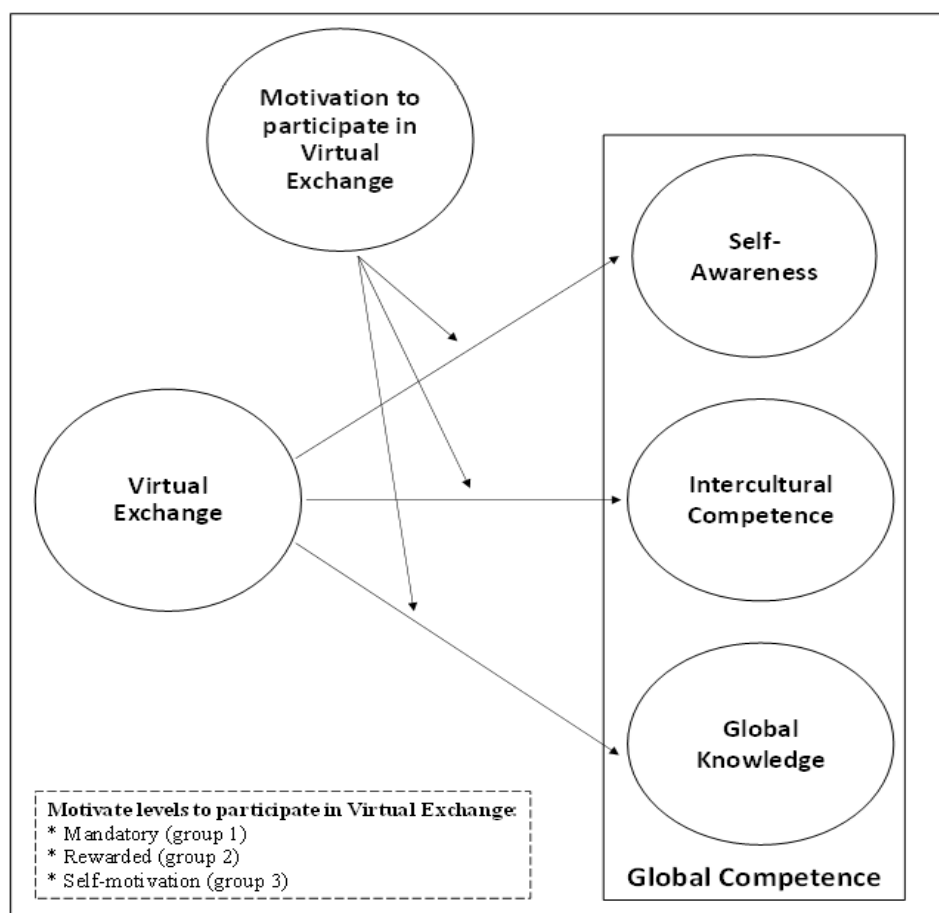
β = the second factor

$\alpha.\beta$ = the interaction of the two factors

W = within the groups

The research model is shown in Figure 1.

Figure 1
Research Model



Note. Authors' own elaboration.

Regarding the assumptions for processing a MANOVA, the homogeneity of the covariance matrix was verified using Box's test, and multivariate normality was assessed with the Shapiro-Wilk test. To detect common method bias, Harman's one-factor test (i.e., principal component analysis with a polychoric matrix) was performed. Additionally, to determine which groups were different in the univariate analysis, a post hoc analysis was conducted using the nonparametric Kruskal-Wallis test and the Dwass-Steel-Critchlow-Fligner pairwise comparison test. The data were processed using R software (R Core Team, 2022). See Appendix B for the R script.

3.3. SAMPLE

The survey link was sent to the students in November 2023 and remained open until March 2024. The participants in this research were undergraduate and graduate students who had participated in Virtual Exchange projects in different countries. These projects had the common objective of placing students in collaborative, culturally diverse scenarios, in addition to the specific objectives of each Virtual Exchange project. Table 2 presents some characteristics of the participants in this study.

Table 2
Virtual Exchange participants

Country of birth	
Brazil	64.89%
England	1.06%
Italy	3.19%
Switzerland	3.19%
Turkey	9.57%
Other	18.9%
Country of study when participating in the Virtual Exchange	
Brazil	59.57%
England	2.13%
Ireland	1.06%
Italy	2.13%
Spain	1.06%
Switzerland	3.19%
Turkey	8.51%
Other	22.34%
Degree (when participating in the Virtual Exchange)	
Undergraduate-level students	80%
Graduate-level students	20%
Gender	
Female	66%
Male	32%
Binary or diverse	1%
Prefer not to answer	1%
Course area	
Business course	9%
Education course	63%
Other courses	28%
Number of languages (apart from your native language and English)	
One	75%
Two	20%
Three	4%
Four	0%
Five	1%
More than five	0%
Sample size	
Total number of participant students	175
Total number of valid answers for statistical procedures	93

Note. Authors' own elaboration.

The minimum sample size for a MANOVA using the Pillai trace, with 3 dependent variables, 3 groups for the factor variable, a significance level of 0.05, statistical power of 0.8, and an effect size (η^2) of 0.1 (considered small), was estimated to be 82 observations (Statistics Kingdom, n.d.). A total of 175 questionnaires were received, with 93 valid observations. Eighty-one questionnaires were eliminated due to dropout, and one was excluded because it was considered "suspicious" (based on the time taken to complete the survey—63 seconds—and identical responses on all opinion variables). Thus, the sample size for this study exceeds the minimum requirement ($n = 93 > 82$). All data and materials have been made publicly available through the Harvard Dataverse platform and can be accessed at: <https://doi.org/10.7910/DVN/4G1WQB>.

Table 3 presents the descriptive statistics for the construct and the grouping variable.

Table 3
Descriptive statistics

Construct	Variable	Mean	Standard deviation	Minimum	Maximum
Self-awareness	SA1	4.69	1.367	1	7
	SA2	4.77	1.312	1	7
	SA3	4.95	1.280	1	7
Intercultural competence	IC1	5.58	1.097	2	7
	IC2	5.59	1.066	2	7
	IC3	5.69	0.978	3	7
Global knowledge	GK1	5.28	1.237	1	7
	GK2	4.75	1.487	1	7
	GK3	4.69	1.546	1	7
Frequencies by Group					
Groups		Counts		% of total	
Mandatory (group 1)		27		29.03	
Rewarded (group 2)		24		25.81	
Self-motivation (group 3)		42		45.16	

Note. Authors' own elaboration.

4. RESULTS

Three MANOVAs were conducted to examine the moderating effect of students' motivation to participate in Virtual Exchange on the three dimensions of the Global Competence construct (i.e., Self-awareness, Intercultural Competence, and Global Knowledge). Prior to performing the MANOVAs, the Harman one-factor test was conducted, and the results indicated that common method bias was not present in the data (cumulative variance = 43.4%, which is below the 50% threshold).

The results revealed no significant effect of students' motivation on

the Self-awareness dimension (p-value = 0.436). Similarly, no significant effect was found for the Global Knowledge dimension (p-value = 0.235). Therefore, motivation to participate in Virtual Exchange projects did not influence participants' perceptions of Self-awareness or Global Knowledge.

A different result was obtained for the second dimension of the Global Competence construct, that is, Intercultural Competence. There was a significant effect of students' motivation to participate in Virtual Exchange on the Intercultural Competence dimension of the Global Competence construct (p-value = 0.04). This suggests that motivation to participate in Virtual Exchange projects influenced participants' perceptions of their ability to interact effectively in diverse cultural contexts.

The homogeneity of the covariance matrix was confirmed using Box's test (p-value = 0.351), while the hypothesis of multivariate normality was rejected based on the Shapiro-Wilk test (p-value < 0.001). These results align with our decision to use the Pillai trace for processing the MANOVA.

Table 4 presents the MANOVA results using the Pillai trace test, which shows a significant effect of students' motivation to participate in Virtual Exchange on the Intercultural Competence dimension.

Table 4
MANOVA – Multivariate tests for Intercultural Competence

		value	F	df1	df2	p-value
Groups	Pillai trace	0.141	2.26	6	178	0.040

Group 1 = Mandatory; Group 2 = Rewarded; Group 3 = Self-motivation.

Note. Authors' own elaboration.

Table 4 shows that the multivariate analysis revealed a significant difference between the groups in terms of Intercultural Competence.

Table 5 presents the results of the univariate tests for the variables related to the Intercultural Competence dimension (i.e., IC1, IC2 and IC3).

Table 5
MANOVA – Univariate tests for Intercultural Competence

Dependent variable		Sum of squares	df	Mean square	F	p-value
Groups	IC1	9.60	2	4.798	4.27	0.017
	IC2	4.35	2	2.177	1.96	0.147
	IC3	3.57	2	1.787	1.91	0.155
Residuals	IC1	101.05	90	1.123		
	IC2	100.12	90	1.112		
	IC3	84.38	90	0.938		

Group 1 = Mandatory; group 2 = Rewarded; group 3 = Self-motivation.

Note. Authors' own elaboration.

Table 5 (univariate analysis) shows that only for variable IC1 is this difference statistically significant (p -value = 0.017).

Additionally, to determine which groups differed for the Intercultural Competence variable (IC1), a post-hoc analysis was conducted using the nonparametric Kruskal-Wallis test and the Dwass-Steel-Critchlow-Fligner pairwise comparison test (see Tables 6 and 7).

Table 6
Kruskal-Wallis test (IC1 variable)

	χ^2	df	p-value	ε^2
IC1	7.768	2	0.0206	0.0844

ε^2 = effect size.

Note. Authors' own elaboration.

The IC1 variable showed a significant effect on the second dimension of the Global Competence construct, namely Intercultural Competence. The epsilon-square value ($0.06 < \varepsilon^2 < 0.14$) suggests that the effect size is moderate (Barros et al., 2018). The IC1 variable relates to how much students unconsciously adjust their behavior and attitudes when interacting with people from different cultures. Specifically, the results of the Kruskal-Wallis post-hoc test indicate that there are differences between groups regarding this IC1 variable (p -value = 0.0206).

To determine where the differences lay, the Dwass-Steel-Critchlow-Fligner pairwise comparison test was carried out, and results are shown in Table 7. The test indicated a significant difference between group 2 (Rewarded) and group 3 (Self-motivation) (p -value = 0.0223). Regarding the comparison between group 1 (Mandatory) and 2 (Rewarded), no significant difference was identified at level 0.05. However, the comparison reaches significance only at $\alpha = 0.10$ (p -value = 0.0613). In relation to the comparison between group 1 (Mandatory) and 3 (Self-motivation), no significant differences were identified (p -value = 0.9967). In other words, groups 1 (Mandatory) and 3 (Self-motivation) are not statistically different, while group 2 is distinguished from the others.

Table 7
Dwass-Steel-Critchlow-Fligner pairwise comparison (variable IC1)

		W	p-value
Mandatory (group 1)	Rewarded (group 2)	3.1992	0.0613
Mandatory (group 1)	Self-motivation (group 3)	-0.1096	0.9967
Rewarded (group 2)	Self-motivation (group 3)	-3.7403	0.0223

Note. Authors' own elaboration.

Additionally, the mean values and confidence intervals show that the mean of group 2 (Rewarded) is higher than those of groups 1 (Mandatory) and 3 (Self-motivation), with no significant difference observed between the means of groups 1 and 3 (see Table 8).

Table 8
Confidence interval of mean

Variable	Group	Mean	95% Confidence Interval		90% Confidence Interval	
			Lower	Upper	Lower	Upper
IC1	Mandatory (group 1)	5.41	4.97	5.84	5.04	5.77
	Rewarded (group 2)	6.13	5.83	6.42	5.88	6.37
	Self-motivation (group 3)	5.38	5.03	5.73	5.09	5.67

Note. Authors' own elaboration.

5. DISCUSSION

The motivation to participate in Virtual Exchange projects did not affect the participants' perception of Self-Awareness and Global Knowledge. These results suggest that these aspects may be stable in specific educational contexts and/or that the duration (weeks or months) of the Virtual Exchange project was not enough to produce changes in these dimensions among the groups with distinct motivations. Yet, the role of academics responsible for activities in the Virtual Exchange, who might help to change students' motivation before and during the Virtual Exchange, did not affect their motivation regarding Self-Awareness and Global Knowledge.

On the other hand, motivation to participate in Virtual Exchange projects did affect participants' perception of their development of skills for interacting in diverse cultural contexts (see Table 4). However, this effect was observed only in the unconscious adaptation of behavior and attitudes when interacting with people from other cultures (see Table 5), and only Group 2 distinguished itself from the others (see Table 7).

Before going deeper into the significant difference found between groups, all the groups of the moderating factor variable are reminded: Mandatory (group 1) = I just participated in the Virtual Exchange, because it is a mandatory discipline in my course. Rewarded (group 2) = I just participated in the Virtual Exchange because, although it is not a mandatory discipline, it gives me credits that I need for my discipline/course. Self-motivation (group 3) = I decided to participate in the Virtual Exchange, because even though it is not a mandatory discipline and does not give me any credit for my participation, I wanted to.

These significant results in the comparison between group 2 and group 3 (at significance level $\alpha = 0.05$) and between group 2 and group 1 (at

significance level $\alpha = 0.10$) lead us to understand that there are differences between students' motivation to participate in a Virtual Exchange project/discipline expecting a reward for that participation (group 2) or because the participation is mandatory (group 1) and students who participated out of self-motivation (group 3) when it comes to Global Competence goals. The above-mentioned results are related to Intercultural Competence and, more specifically, related to how much students unconsciously adapt their behavior and attitudes when interacting with people from other cultures.

Our findings reveal that students' motivation to participate in Virtual Exchanges only affects the Intercultural Competence dimension of Global Competence (i.e., it does not affect the Self-Awareness and Global Knowledge dimensions). Although motivation does not influence all aspects of Global Competence, it plays an important role in shaping students' ability to adapt behaviors and attitudes in intercultural interactions.

The fact that only Intercultural Competence was affected by motivation implies that Virtual Exchanges may be more effective in developing specific global skills, particularly those related to intercultural communication. It also indicates that increasing Self-Awareness and Global Knowledge may require different strategies or long-term Virtual Exchange projects.

In addition, the study showed that among the different types of motivation (i.e., Rewarded, Self-motivation, and Mandatory), only students motivated by rewards (participating to earn course or subject credits) showed a significant difference in Intercultural Competence compared to other groups. This implies that reward-motivated students may engage more deeply in intercultural contexts due to external incentives that drive them to adapt and participate more effectively. This has implications for Virtual Exchange planning and is relevant for educators and institutions designing Virtual Exchange programs. Knowing that motivation, especially rewarded motivation, improves Intercultural Competence suggests that encouraging participation through academic rewards may increase student engagement in intercultural learning.

Indeed, O'Dowd (2020) states that Virtual Exchange projects seek to prepare global citizens capable of recognizing and developing in diverse cultural scenarios, with the possibility of offering discussions and ways to collaborate to solve problems that affect different cultures. Therefore, how Virtual Exchange projects are organized and how goals are defined are aspects to pay attention to before starting any Virtual Exchange initiative.

The significant finding of this study concerns the Intercultural Competence dimension of Morais and Ogden's Global Competence construct. Both Global Competence and Intercultural Competence are relevant concepts when we think about how to equip students for the global scenario. Thus, thinking about the definition of Global Competence, which refers to having an open mind seeking to understand others in terms of their cultural norms (Morais & Ogden, 2011) and Fantini's (2007) definition of Intercultural Competence as a complex of abilities that help people to perform effectively and appropriately when interacting with others, it is clear that planning and preparing Virtual Exchange projects to try to involve all the students is very important to reach the best results in terms of participation and engagement for the development of Global Competence among students.

6. CONCLUSIONS

In this study, we sought to measure the moderating effect of students' motivation to participate in Virtual Exchange on the Global Competence construct of Morais and Ogden's (2011) model. The MANOVA technique was used to model the relationship between Global Competence, its three dimensions: Self-Awareness, Intercultural Competence and Global Knowledge, and the variable considered as the moderating factor, namely students' motivation to participate in Virtual Exchange.

We conclude that students who participate in Virtual Exchanges with the expectation of receiving rewards, such as course credits, tend to show better results in developing Intercultural Competence. In contrast, students whose participation is driven by the requirement of a mandatory discipline or by self-motivation are less likely to demonstrate significant improvements in this area.

This study makes a significant theoretical contribution to the fields of virtual exchange, global competence, and intercultural studies by providing empirical evidence on how students' motivation to participate in virtual exchange projects can influence the development of these initiatives and, consequently, enhance students' global competencies.

From a practical stance, the results suggest that it is important to pay attention to students' engagement in the activities not only during the Virtual Exchange, but also before starting any Virtual Exchange initiative seeking to build Global Competence skills among students. Perhaps, one possibility for professors working with Virtual Exchange projects to motivate the students is to show them results from other Virtual Exchange experiences. Highlighting past successes and lessons learned can serve as both an encouragement for students and a valuable resource for academics when planning future Virtual Exchange projects.

This work was not without limitations. Some of these limitations are common to survey-based studies, where some features of the sample should be considered. In our case, although our sample represents different countries, there is a concentration of data in one of them: Brazil. Future studies should try to obtain a more varied sample. Cultural differences between countries or types of educational institutions may influence the observed effects. Thus, a research agenda emerges to investigate how specific cultural contexts may shape the way students respond to different types of motivation in Virtual Exchanges.

Additionally, future research could explore the effect of students' participation in Virtual Exchange on their Global Competence using Structural Equation Modeling (SEM). This approach would allow for a deeper understanding of the relationships among the latent variables within the model. Longitudinal studies could also provide valuable insights into the long-term effects of Virtual Exchange projects. Furthermore, comparing different exchange models—such as in-person, hybrid, or virtual exchanges—could expand the conversation on the role of Virtual Exchange relative to other educational approaches in higher education.

This study contributes to future research on Virtual Exchange and

Global Competence, specifically highlighting the importance of students' motivation in understanding the impact of the Virtual Exchange approach. Furthermore, it offers valuable insights for studies focused on the preparation and planning of Virtual Exchange projects. We emphasize that considering students' motivation is crucial for achieving their goals in both Virtual Exchange and Global Competence development.

Our findings offer valuable insights into how Virtual Exchange programs can foster the development of global skills, thereby better preparing students for the increasingly interconnected world of work. Virtual Exchange, as an accessible and scalable approach, has the potential to democratize access to these transformative experiences, particularly for students who lack the financial means to engage in traditional physical exchange programs. Based on these results, governments and higher education institutions can design and implement policies that promote Virtual Exchange initiatives, especially in regions where financial or geographic barriers limit participation in physical mobility programs.

AUTHORSHIP

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CONFLICT OF INTEREST

The authors declare that there are no external conflicts of interest, direct or indirect, personal or financial. or indirect, personal or financial interests related to this article.

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APPENDIX A

Questionnaire

Checking question

Have you participated or are you participating in a Virtual Exchange?

----Yes ----No

Demographic questions

Which gender do you identify with most?

---- Female -----Male ----Binary or diverse ----I prefer not to answer

What country are you from?

In what country do you study? (when participating in the Virtual Exchange)

How many languages do you speak apart from your native language and English? (Assuming Virtual Exchange in English)

----1 ----2 ----3 -----4 ----5 ----more than 5

Please indicate your course area.

----Business or Economics -----Education ----Other (which one) -----

Please, indicate your degree when participating in the Virtual Exchange

----Undergraduate ----Master's ----PhD ----Post Doctoral

Global competences (7-point Likert scale)

Self-awareness

Q1 = I know how to develop a place to help mitigate a global environmental or social problem.

Q2 = I know several ways in which I can make a difference on some of the world's most worrisome problems.

Q3 = I am able to get other people to care about global problems that concern me.

Intercultural competence

Q4 = I unconsciously adapt my behavior and attitudes when I am interacting with people from other cultures.

Q5 = I often adapt my communication style to other people's cultural background.

Q6 = I am able to communicate in different ways with people from different cultures.

Global knowledge

Q7 = I am informed of current issues that impact international relationships.

Q8 = I feel comfortable expressing my views regarding a pressing global problem in front of a group of people.

Q9 = I am able to write an opinion letter to a local media source expressing my concerns over global inequalities and issues.

Virtual Exchange

Q10. Please indicate which of the options below best explains why you decided to participate in the Virtual Exchange discipline or project.

----I just participated in the Virtual Exchange because it is a mandatory discipline in my course.

----I just participated in the Virtual Exchange because although it is not a mandatory discipline, it gives me credits that I need for my discipline/course.

----I decided to participate in the Virtual Exchange because even though it is not a mandatory discipline and does not give me any credit for my participation, I wanted to.

APPENDIX B

R script

```
#Import dataset -----
library(readr)
dataset <- read_delim(
  "dados.csv",
  delim = ";",
  escape_double = FALSE,
  trim_ws = TRUE)

#Harman's one-factor test -----
library(psych)
pca <- pca(
  dataset[,2:10],
  nfactor=1,
  cor="poly",
  fm="wls",
  rotate = "none")
pca$loadings # Cumulative variance < 50%

#Descriptive -----
library(jmv)
descriptives(
  data = dataset,
  vars = vars(SA1, SA2, SA3, IC1, IC2, IC3, GK1, GK2, GK3),
  desc = "rows",
  n = FALSE,
  missing = FALSE,
  median = FALSE)

descriptives(
  data = dataset,
  vars = Group,
  freq = TRUE)

#Reliability -----
##SA
reliability(
  data = dataset,
  vars = vars(SA1, SA2, SA3),
  omegaScale = TRUE)
```


##IC

```
reliability(  
  data = dataset,  
  vars = vars(IC1, IC2, IC3),  
  omegaScale = TRUE)
```

##GK

```
reliability(  
  data = dataset,  
  vars = vars(GK1, GK2, GK3),  
  omegaScale = TRUE)
```

#Validity (outer loading) -----

```
pca2 <- pca(  
  dataset[,2:10],  
  nfactor=3,  
  cor="poly",  
  fm="wls",  
  rotate = "varimax")  
pca2$loadings
```

#Manova -----

##SA

```
mancova(  
  data = dataset,  
  deps = vars(SA1, SA2, SA3),  
  factors = Group,  
  multivar = "pillai",  
  boxM = TRUE,  
  shapiro = TRUE)
```

##IC

```
mancova(  
  data = dataset,  
  deps = vars(IC1, IC2, IC3),  
  factors = Group,  
  multivar = "pillai",  
  boxM = TRUE,  
  shapiro = TRUE)
```

##GK

```
mancova(  
  data = dataset,  
  deps = vars(GK1, GK2, GK3),  
  factors = Group,  
  multivar = "pillai",  
  boxM = TRUE,  
  shapiro = TRUE)
```

#Kruskal-Wallis and post-hoc test (IC1) -----

```
anovaNP(  
  formula = IC1 ~ Group,  
  data = dataset,  
  es = TRUE,  
  pairs = TRUE)
```

#Confidence interval of mean

```
descriptives(  
  formula = IC1 ~ Group,  
  data = dataset,  
  desc = "rows",  
  n = FALSE,  
  missing = FALSE,  
  median = FALSE,  
  sd = FALSE,  
  min = FALSE,  
  max = FALSE,  
  ci = TRUE,  
  ciWidth = 95) # IC 95%
```

```
descriptives(  
  formula = IC1 ~ Group,  
  data = dataset,  
  desc = "rows",  
  n = FALSE,  
  missing = FALSE,  
  median = FALSE,  
  sd = FALSE,  
  min = FALSE,  
  max = FALSE,  
  ci = TRUE,  
  ciWidth = 90) # IC 90%
```

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A motivação de estudantes para participar em intercâmbios virtuais e o seu efeito moderador sobre a competência global

RESUMO

A importância da competência global e intercultural em diversas áreas é cada vez mais evidente. Desde a crise sanitária da COVID-19, uma das abordagens que tem ganho aceitação no meio académico é o Intercâmbio Virtual, que facilita a interação entre estudantes e académicos de diferentes localizações geográficas. O construto de Competência Global é compreendido como composto por três dimensões: Self-Awareness, Intercultural Competence e Global Knowledge. Além disso, identificam-se três tipos de motivação: Obrigatória, Recompensada e Automotivação. Contudo, pouco se sabe sobre o efeito da motivação dos alunos para participar em intercâmbios virtuais como fator moderador em relação às dimensões da Competência Global. Este estudo teve como objetivo medir o efeito moderador da motivação dos alunos na Competência Global, utilizando a técnica de Análise Multivariada de Variância (MANOVA) para modelar a relação entre a Competência Global, as suas três dimensões e os três tipos de motivação. Os dados foram recolhidos através de um questionário aplicado a estudantes de ensino superior de diversos países que participaram em projetos de intercâmbio virtual. Os resultados do estudo indicam um efeito moderador significativo da motivação dos alunos para participar em projetos de Intercâmbio Virtual sobre a Competência Global, especificamente na dimensão de Competência Intercultural. Nenhum efeito significativo foi encontrado nas dimensões Self-Awareness e Global Knowledge. Melhores resultados são esperados de alunos que aguardam ser recompensados ao participar em Intercâmbios Virtuais, especialmente aqueles que visam preparar e equipar os alunos em termos de Competências Interculturais. Resultados menos satisfatórios podem ser esperados de alunos cuja participação é motivada pela obrigatoriedade da disciplina ou pela automotivação.

Palavras-chave: Interculturalidade; Competência global; Moderação; Cidadania global; Motivação.

La motivación de los estudiantes para participar en intercambios virtuales y su efecto moderador sobre la competencia global

RESUMEN

La importancia de la competencia global e intercultural en diversas áreas es cada vez más evidente. Desde la crisis sanitaria del COVID-19, uno de los enfoques que ha ganado aceptación en el ámbito académico es el Intercambio Virtual, que facilita la interacción entre estudiantes y académicos de diferentes ubicaciones geográficas. El concepto de Competencia Global se entiende como compuesto por tres dimensiones: Self-Awareness, Intercultural Competence y Global Knowledge. Además, existen tres tipos de motivación: Obligatoria, Recompensada y Automotivación. Poco se sabe sobre el efecto de la motivación de los estudiantes para participar en intercambios virtuales como factor moderador en relación con las dimensiones de la Competencia Global. Este estudio tuvo como objetivo medir el efecto moderador de la motivación de los estudiantes para participar en intercambios virtuales sobre el concepto de Competencia Global, utilizando la técnica de Análisis Multivariado de Varianza (MANOVA) para modelar la relación entre la Competencia Global, sus tres dimensiones y los tres tipos de motivación. Los datos fueron recolectados mediante un cuestionario aplicado a estudiantes de educación superior de diferentes países que participaron en proyectos de intercambio virtual. Los resultados del estudio muestran un efecto moderador significativo de la motivación de los estudiantes para participar en proyectos de Intercambio Virtual sobre la Competencia Global, específicamente en la dimensión de Competencia Intercultural. No se encontraron efectos significativos en las dimensiones Self-Awareness y Global Knowledge. Se esperan mejores resultados de los estudiantes que esperan ser recompensados al participar en Intercambios Virtuales que buscan preparar y equipar a los estudiantes en términos de Competencias Interculturales. Menos se podría esperar de los estudiantes cuya participación se debe a que el Intercambio Virtual es una asignatura obligatoria o en que la participación de los estudiantes obedece a una automotivación.

Palabras clave: Interculturalidad; Competencia global; Moderación; Ciudadanía global; Motivación.