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Global Competency Integration in STEAM Fields in Higher Education

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Abstract: The concept of Global Competency (GC) has a growing presence in many collegiate mission statements in the United States. This interconnected, multidisciplinary approach coincides with that of the concept of Science, Technology, Engineering, Arts, and Mathematics (STEAM) education. The focus of this study was to identify what extent GC is present in the classrooms and curriculums, as well as the implementation methods higher education instructors observe and / or utilize in their STEAM field programs. The participants in this study were STEAM-field instructors at higher education institutions in the United States in which GC or an equivalent term is located in their mission or strategic plan. Seventy-six instructors from the midwestern United States completed a survey to generate a GC integration score, and 13 of those also participated in an interview. The quantitative analysis identified a statistically significant difference between the integration scores of Arts and Science instructors and Arts and Engineering instructors. Qualitative analysis identified curriculum and instruction-based strategies of successful integration, common barriers to integration, and the sentiment that integration varies greatly from a regional and sometimes institution-wide setting. The findings of this study can help standardize the concept and integration of GC in higher education as well as provide curriculum developers and administrators with a look at how GC is represented in the current climate of higher education.

Keywords: STEAM; Global Competency; Curriculum; Higher Education.
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Introduction

As culture and technology are rapidly advancing, education naturally evolves as well. Within this educational evolution lies the concepts of Science, Technology, Engineering, Art, and Mathematics (STEAM) education (Catterall, 2017) and Global Competency (GC) (Chandir & Gorur, 2021). The STEAM educational framework encourages students to experience meaningful connections within each subject area (Belbase et al., 2022), while GC promotes students to experience meaningful connections to different cultures (OECD, 2018). At their core, these two concepts are similar because of their interconnectedness (Belbase et al., 2022). GC and STEAM education are both cross-disciplinary approaches that require an understanding and utilization of diverse perspectives and methods. Another common thread between these two concepts is their shared lack of consensus (Carter, 2020; Vera Cruz et al., 2018). Neither STEAM nor GC has an absolute, globally adopted definition or a standardized method of curriculum implementation, which causes variance in language and assessment data (Chandir & Gorur, 2021; Rodríguez-Nieto & Alsina, 2022).

Although this variance exists, the concept of GC frequently appears in mission statements and syllabi at higher education institutions (Carter, 2020). According to Schleicher (2014), “many experts agree that it is insufficient for learners to simply know facts and be aware of similarities and differences that influence attitudes across cultures and contexts” (p. 9) and that students neeed to know how to apply their learning to a variety of different roles and contexts. Apart from their contributions to society, GC also benefits the students personally and academically as studies have shown students are more culturally sensitive than their teachers (Carter, 2020).

Due to the many different definitions and interpretations of GC in higher education, there has been a lack of information on how the concept is most represented in the curriculum (Carter, 2020). Implementation methods have been discussed in research, such as the exploration of the elements of ethnomathematics (Rodríguez-Nieto & Alsina, 2022) and the development of a global approach to space exploration (Iqbal et al., 2021). Though evidence of integration is certainly observable, the presence and frequency of these methods have not been analyzed (Rodríguez-Nieto & Alsina, 2022).

The data collected from this study has the potential to assist curriculum development by conveying the current state of GC integration in STEAM fields in higher education. Results will provide instructors, administrators, and curriculum evaluators and developers with insight on how current GC initiatives are implemented and may produce helpful data to aid in evaluating existing initiatives. This study intends to contribute to the standardization of GC integration in higher education curricula.

By using the Organisation for Economic Co-operation and Development (OECD) and the Programme for International Student Assessment's (PISA) 2018 Global Competency Framework and Alkin's Theoretical Framework for the Analysis of Curriculum and Instructional Reform, this study addresses the following questions:
RQ1: How is Global Competency implemented in higher education STEAM field curricula?
RQ2: What aspects of Global Competency are most present in higher education STEAM field classes?

Literature Review

The purpose of this literature review is to outline the definitions, benefits, educational contexts, and connections between STEAM and GC. To achieve this, the history and components of STEAM education are discussed, followed by documented benefits and how STEAM has been integrated into education thus far. Next, a definition of GC is established, followed by evidence of its importance. GC is then analyzed in an educational context. A discussion about the link between GC and STEAM in the context of Higher Education concludes the review, along with how this study addresses gaps that exist in the current research.

STEAM in Education

The History of STEAM

STEAM is an acronym for Science, Technology, Engineering, Art, and Mathematics and refers to the subjects as well as an intentional interconnected framework for learning. Originally, the transdisciplinary concept of "SMET" (Science, Mathematics, Engineering, and Technology) was introduced in education (Catterall, 2017). In the 1990s, American Scientist R. Colwell proposed the acronym "STEM" (Topalska, 2021) as "there were concerns of SMET's potentially negative association with the word *smut*" (Alghamdi, 2023, p. 247). The addition of Art to create "STEAM"

is credited to Engineering and Technology teacher Georgette Yakman, who in 2006 founded the STEAM educational framework (Topalska, 2021).

The STEAM framework consists of STEM subject areas that have historically been male-dominated fields; however, a study by Wajngurt and Sloan (2014) found that the inclusion of the Arts for STEAM has shown significantly higher levels of involvement from females. There has been some debate about what is included in the Arts that the "A" in STEAM stands for. Some researchers feel that the inclusion of Arts refers to visual art and design (Maeda, 2013), while others think that Art refers to the Liberal Arts, which includes the Humanities, Physical Arts, Music, and Social Sciences (Lewis, 2015; Yamada, 2021). Educators have also interpreted the "A" in STEAM as a different discipline altogether: Agriculture. Interpretations of STEAM include the "A" for Art, Agriculture, and STEAM-H to include Agriculture and Health, though all interpretations represent a multidisciplinary approach to learning (Fatimah et al., 2023).

STEAM Benefits and Integration

STEAM in education promotes transdisciplinary learning as well as mutual respect for the coexistence of each subject (Belbase et al., 2022). STEAM education allows students to develop a holistic approach to real-world problems in a way that incorporates more creativity than STEM education (Belbase et al., 2022). STEAM education allows students to practice creativity as the main learning activity instead of a tool for learning and helps promote social-emotional learning (Graham, 2021). Studies have shown that students in STEAM education are more motivated in terms of academic achievement than those in STEM education (Dahlem, 2023). Project-based learning (PBL) is commonly present in the STEAM educational framework. PBL is a student-centered, inquiry-based approach to learning in which students cooperate to solve real-life issues (Chung & Li, 2021).

While STEAM first emerged as a framework for K-12 education, it has slowly trickled into higher education (Lewis, 2015). Studies have shown that using this framework in STEAM higher education subjects has had a long-lasting effect on students, particularly in coursework, teamwork, and decision-making (Kang, 2019). Historically, STEM subjects in higher education have implemented Fine Arts concepts and activities to approach STEAM integration. Other universities have implemented programs or extracurricular activities to establish STEAM connections at their institutions (Carter et al., 2021). One common method of STEAM implementation is through Design Thinking, a practice in which students collaborate through the problem-solving process (Graham, 2021).

Global Competency

Defining Global Competency

The general concept of GC is widely used in multiple fields, yet there are many different definitions and terms that describe this (Carter, 2020; Chandir & Gorur, 2021). Other terms used to discuss GC include intercultural competence, intercultural communication, cross-cultural communication, international education, global mindset, or global

awareness (Schleicher, 2014b). In many cases, the establishment of the most accurate term and definition for this concept is selected so that the components are weighted appropriately for the context of use (Chandir & Gorur, 2021). The term GC combines ideas from the terms above and comprehensively includes an individual's ability to effectively communicate, understand global and local interconnectedness and developments, and "the disposition to engage responsibly and effectively in a global environment" (Schleicher, 2014, p.6). The word "competence" does not reflect a single skill but rather a combination of knowledge, skills, values, and attitudes towards other cultures (OECD, 2018). To accurately approach this research, a working definition of GC needs to be established. This study's definition comes from the Programme for International Student Assessment (PISA):

> Global Competency is the capacity of an individual to understand that we learn, work and live in an international, interconnected and interdependent society and the capability to use that knowledge to inform one's dispositions, behaviours and actions when navigating, interacting, communicating and participating in a variety of roles and international contexts as a reflective individual. (Schleicher, 2014, p.9)

This definition was chosen because it can be applied appropriately to various contexts but may specifically address concerns in higher education, as discussed later in the research. Aspects of GC can fall into 4 main categories: knowledge, skills, attitudes, and behaviors. As the definition implies, there are specific aspects that fall under these main categories, including but not limited to communication skills, self-awareness, language skills, informed debate, and value of diversity (Schleicher, 2014). Carter (2020) states the main concepts include "open-mindedness and genuine interest in other cultures; being observant and knowledgeable about cultural differences and similarities; having an ability to resist stereotypes and anticipate complexity; and being able and willing to modify behavior" (p. 25). Though this study does not contain a list of every aspect of GC, a more thorough list is provided in the following section.

International education was historically considered a concept reserved for the privileged because the student is expected to "take advantage of the 'increased travel opportunities, increased student mobility and the proliferation of communication devices' and able to contribute to the 7 trillion-dollar travel industry and be among the 4.5 million tertiary students studying overseas" (Chandir & Gorur, 2021, pp. 9-10). To eliminate the financially inequitable expectation of studying abroad, the definition for this study omits the necessity of travel and can be applied appropriately to young adults at higher education institutions.

Benefits of Global Competency Integration

GC has gained more importance recently since international borders are being crossed more and more frequently due to the surge of immigrants and refugees globally (Arar et al., 2019). Studies have shown that "68.5 million people around the world have been forced from their homes: one person every two seconds is forcibly displaced as a result" (Arar et al., 2019, p.1). Because of the growing rate of ethnocultural conflicts, displaced people, and immigrants, GC is needed to help promote cultural awareness, respect, and diversity (OECD, 2018). The growing use of technology such as email, video chat, and discussion boards is another factor that removes the limit of borders in international

communication (Brown, 2015). GC encourages people to not only respect and value cultural diversity but also to view cultural diversity as an asset and goal (OECD, 2018).

Global Competency in an Educational Context

Education can play a crucial part in the development of GC in young people because global issues and developments can be presented in ways where students can think critically and connect them to their own lives (OECD, 2018). On education's influence on student values, the OECD states:

> An education that encourages valuing dignity, human rights and diversity emphasises shared commonalities that unite people around the world, rather than the issues that divide them; provides learning experiences so that students see the world from many different perspectives, enabling them to examine their own thoughts and beliefs, and their society's norms and traditions; encourages people to understand the significance of another person's sufferings; and emphasises the importance of reasoning, careful argument, logical analysis, self-questioning, the pursuit of truth and objectivity. (OECD, 2018, p. 18)

Research also shows the value and importance of graduate students engaging with literature and scholars from different cultures (Liu et al., 2020).

As higher education students graduate and enter a competitive global workplace, the mindsets and skills that GC promotes are paramount, yet GC implementation and utilization best practices have yet to be developed or standardized. As Kinzie et al. (2017) stated, "To date, little comparable, cross-institutional information has been available about institutional goals and perspectives on internationalization, students' perceptions of global learning, and the extent to which students participate in activities associated with global learning gains" (p. 30). Multiple studies have developed ways to assess students' levels of GC (Li & Xu, 2016; Liu et al., 2020; Ravitz, 2014), but there is a lack of research on curriculum implementation (Kinzie et al., 2017).

Global Competency and STEAM in Higher Education

As outlined above, GC and STEAM within higher education are concepts that relate and interact with each other. Both concepts utilize PBL and interdisciplinary approaches to education (Chung & Li, 2021; Kang, 2019; Liu et al., 2020). Studies of concepts such as Ethnomathematics in higher education have shown the demand for contextualizing STEAM subjects in a global sense (Rosa & Orey, 2017). A 2021 study conducted on virtual communities of practice (VCoP) within STEAM subjects shows that VCoPs have the capability to provide "tighter feedback loops and more readily available information" with people from other countries and cultures (Jantakun et al., 2021).

Despite the commonalities, the standardization of this relationship is yet to be determined, partially because different cultures and ethnicities have different definitions for STEAM concepts (Vera Cruz et al., 2018). There is also a lack of research informing to what extent the implementation of GC is taking place (Kinzie et al., 2017). Researchers have

discussed that existing information on the STEAM curriculum tends to be more quantitative and that qualitative responses could reveal more insights about teachers' experiences within STEAM subjects (Alghamdi, 2023).

Theoretical Framework

The main function of this research is to examine the presence of GC in the STEAM curriculum. Therefore, the lens from which I'm approaching this research relies upon a clear understanding of GC and curricular structure. The following theories from PISA and Alkin (1973) support this study and allow for a deeper understanding of its main components.

PISA 2018 Framework

PISA's 2018 framework was developed in 2014 by the PISA governing board specifically designed to define and outline the assessment of GC (Schleicher, 2014b). The primary utilization of this framework comes from the working definition of GC, which is present in the literature review and the survey measures of this study. The development of this definition is most appropriate for this study because it was formulated to address an educational context as well as a means for evaluation, both of which are of prime importance to this research. Much like the definition, the overall framework addresses cognitive as well as non-cognitive elements of GC, including tools and ways of working (skills and competencies), ways of thinking (capabilities), and living in the world (behaviors and attitudes).

The three main components of GC PISA outlined in this framework include student background, processes, and non-cognitive background. This study is focusing on the processes component, which contains teaching and learning (professional knowledge, curriculum, and teaching practices), school policies (resources, school climate, management, and leadership) and governace (evaluation, accountability, and decision-making). The breakdown of the processes component compliments the deconstruction of curriculum in Alkin's framework below and allows for this research to pinpoint where GC is being integrated, if at all. This study also utilizes the elements of knowledge, skills, attitudes, and behaviors listed in the PISA framework, refered to in this study's RQ2 as aspects of Global Competency (See Table 1).

Table 1

Categories of Knowledge, Skills, Attitudes, and Behaviours Contributing to Global Competence

	Categories (Initial)			
	Language/Communication (*e.g.*, Intercultural communication)	**Culture/Identities**	**Principles/ Values (as relevant to learning and work)**	**Systems/Institutions/Events/Trends**
Knowledge	Knowledge of: ▪ Information technology ▪ Different modes of communication ▪ The importance and variations of audience ▪ Other languages Awareness of: ▪ Other languages and their relative importance around the world ▪ Intercultural communication	Knowledge of: ▪ Multiple cultures ▪ Cultural variation ▪ Impact of culture ▪ Variations in identity ▪ The history and geography of different cultures (or awareness that different cultures have their own histories)	Knowledge of: ▪ Stewardship ▪ Familial relationships ▪ Social relationships ▪ Professional/work relationships Support for: ▪ Networking and partnerships ▪ Accessibility ▪ Fairness and Equality ▪ Cultural diversity	Knowledge of: ▪ World regions and cultures ▪ Major current issues of global significance ▪ Interconnectedness and interdependence in the world ▪ Key economic and political institutions in the world ▪ Changing geographic patterns of work and working in the world ▪ Changing social patterns of work and working in the world ▪ International and transnational law ▪ Changing patterns of education and learning ▪ Information and communications technologies and their reach and impact ▪ The geography and history of different cultures ▪ Career/employability trends
Skills (*e.g.*, critical thinking, problem solving, decision making, categorizing, reflection)	▪ Verbal skills ▪ Ability to adapt one's language (speaking, writing) ▪ Non-verbal skills ▪ Ability to observe and respond/use appropriately ▪ Ability to develop/present reasoned argument, synthesise information, etc. ▪ Ability to use different modes of communication ▪ Ability for self-awareness	▪ Ability to work well with people from other cultures and parts of the world ▪ Ability to explain cultures/identities or aspects of ▪ Ability to consider and appreciate cultures/identities ▪ Ability to integrate diverse perspectives	▪ Ability to analyse, evaluate, make decisions/decision-making, influence, reflect	▪ Ability to think critically about systems/institutions/events/ ▪ Ability to grasp complex issues and concepts quickly ▪ Ability to deal with change and challenging situations
Attitudes (*e.g.*, dispositions, intentions)	▪ Openness to speakers of other languages ▪ Willingness to collaborate ▪ Willingness/openness to learn other languages ▪ Willingness/openness to adapt communication behaviours ▪ Enjoy getting to know people from other parts of the world	▪ Respect and value diversity ▪ Possessing a self-image ▪ Openness to and awareness of interconnectedness and interdependence ▪ Interest in culture/other cultures and identities ▪ Openness to travel for education and work ▪ Willingness to collaborate	▪ Having a global mindset ▪ Possessing a mindset/open mindedness towards fairness, equality, etc. ▪ Possessing the intent to act/behave according to principles/values ▪ Possessing beliefs that reflect principles/values ▪ Having concern consistent with principles/values ▪ Having the proclivity to act consistently with principles/values	▪ Interest in the world around you – a global mindset ▪ Disposition to engage in the world/issues/events ▪ Possessing career aspirations ▪ Possessing/openness to global life-style aspirations ▪ Willingness to test one's abilities and take calculated risks
		▪ Enjoy travelling and exploring other cultures and parts of the world ▪ Enjoy living in another country	▪ Willingness to understand/uphold principles/values ▪ Disposition to defend/courage to defend principles/values	
Behaviours (*e.g.*, actions)	▪ Working with/relating to others ▪ Use other/additional languages (*e.g.*, English) ▪ Thinking about how one communicates; adapting communication ▪ Open and positive about intercultural communication	▪ Working with/relating to others ▪ Using/applying appropriate behaviours (*e.g.*, to show respect) ▪ Empathy with and valuing of multiple perspectives ▪ Values diversity and global engagement	▪ Current participation in community/society consistent with principles/values ▪ Personal action, *e.g.* related to upholding/promoting principles and values ▪ Working with/relating to others	▪ Working with/relating to others ▪ "Investing" globally and not just locally ▪ Having an open mind ▪ Embracing change and new situations ▪ Seeking networks and partnerships across the world

Note. Reprinted from "PISA 2018 Framework Plans: 38th meeting of the PISA Governing Board" by A. Schleicher, 2014 14-16. 2014 by OECD. Reprinted with permission from A. Schleicher.

The framework itself has been a topic of analysis in educational assessment research, as seen in a 2018 study about GC achievement indicators and challenges based on the framework's parameters (Sälzer & Roczen, 2018). Much like this study, PISA's GC Framework has been used in analyzing GC integration, though previous contexts have focused on teacher education programs (Parmigiani et al., 2022). While this study also focuses on integration, it expands on past research to apply the framework to a different population in a mixed methods model, rather than purely qualitative.

Theoretical Framework for the Analysis of Curriculum and Instructional Reform

The *Theoretical Framework for the Analysis of Curriculum and Instructional Reform* (Alkin, 1973) discusses the difference between curriculum (ends) and instruction (means) with a focus on evaluation. The framework identifies and defines each part of the curriculum and instruction (C&I) process, including stakeholders and developmental factors. Alkin states that part of C&I planning is the consideration of what comes next for that student outside of the current year's curriculum, which complements the comprehensive, forward-thinking approach of PISA's GC framework. Alkin outlines organizational levels of C&I in which I plan to pinpoint where, if applicable, GC implementation is occurring most often. This framework assisted me in discovering if the implementation was most commonly considered in curriculum goals, instructional operations, or the attitudes in which the curriculum was delivered or presented to students.

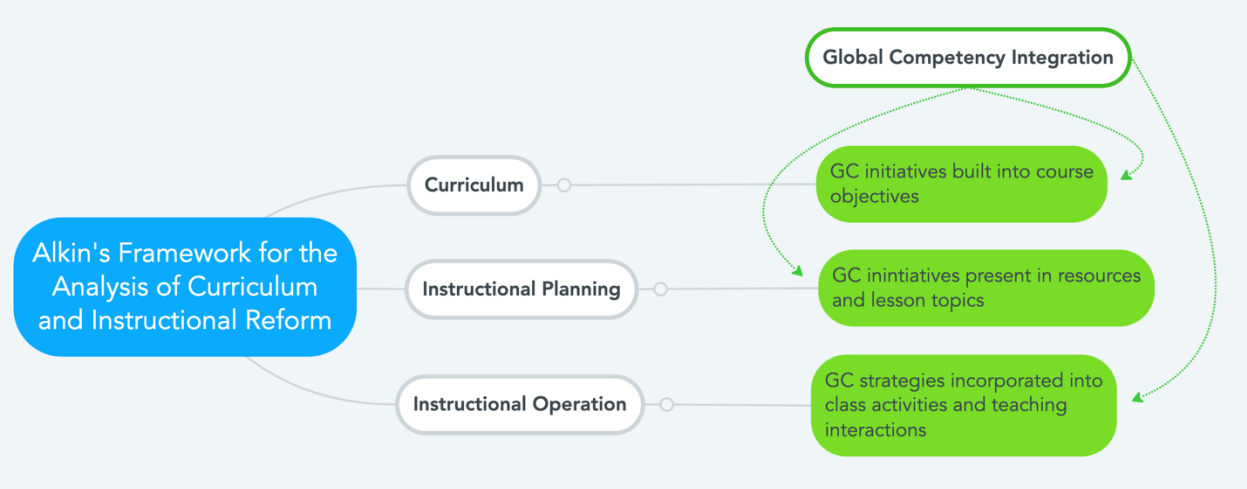
Alkin's 1973 framework was developed to address a national curriculum reform effort in Sweden and is now referenced internationally in educational research publications. This theoretical framework has been used to aid in the process of curricular revision in the United States (Ballard et al., 2013), to study how different factors connect to educational program implementation in a study in Israel (Doron, 1977), and has been used to organize levels and the sequence of content in educational research (Ekici, 2010). In 2018, Alkin's framework was built upon and used to create valid and reliable evaluation tools that measure the implementation of blended learning in mathematics courses (Mahendra et al.). The extension and application of this framework in recent years provides evidence of its usefulness in evaluating the implementation of curricular concepts, which supports effors in answering RQ1.

In pursuing this research, I used these theories by combining them in a way not previously explored. As indicated in the review of literature, there are many cases in which GC is assessed within a student context. Analyzing GC integration in instructors is a context that has been previously unexamined. The combination of analyzing GC and curriculum and instruction as applied to specific subject areas (STEAM) will further the existing application of these frameworks. These theories were combined to interpret the results of this study, specifically what concepts of the GC framework exist at which points that were outlined in Alkin's framework. This study examines the intersection of these frameworks to discover which section(s) of curriculum planning and application support GC integration (See Figure 1). Alkin's framework provides a foundation of key elements, places, and times that provide clarity when analyzing the presence of a key curricular concept, such as GC. The PISA framework guides this study's methods in

determining what elements to include in survey and interview data collection, while Alkin's framework guides the analysis of curricular structure and the intersection of GC and STEAM in C&I.

Figure 1

Alkin Framework and GC Integration



Method

Context

This study focuses on GC implementation in 7 midwestern states in the United States. The states included were Wisconsin, Iowa, Missouri, Illinois, Indiana, Michigan, and Ohio. Universities were then selected via web research to source participants. Only universities with electronically published mission statements, values, strategic plans, and/or initiatives mentioned GC or a GC equivalent phrase were selected. Global initiative, global learning, international society, global society, global community, global partnership, and global citizenship were used to search for GC. Universities that did not have this sentiment expressed on their websites were not selected because this study aims to measure the extent to which GC is implemented only when an institutional expectation exists to do so. A total of 15 universities were selected, after which came the selection of potential participants. Using the university website, publicly available email addresses for current instructors of Science, Technology, Engineering, Fine Arts, or Mathematics were collected. 4737 Emails with a link to the GC in STEAM Fields Survey were sent to potential participants with a 1.6% response rate.

Measures

A human participant consent form was included at the start of the Microsoft Forms survey, and it stated that participation in the research was completely voluntary (see Appendix A). After digitally indicating consent, the

participant was then directed to the survey questions. The form was totally anonymous, and the participants' identities remained confidential.

The GC in STEAM Fields Survey consisted of 7 questions pertaining to participant demographics and GC integration. None of the questions required a written response, and 2 of the questions presented multiple scenarios in which a Likert scale was used to indicate frequency or agreement. The main function of the Likert scale questions was to generate the "GC score," a composite numerical representation of GC implementation used in the quantitative data analysis process. The practice of interpreting Likert data into composite scores has been shown to be an effective way of translating survey data into interval data (Subedi, 2016) and allows for Likert data to be accurately used in further statistical analyses (Joshi et al., 2015). An "almost daily" or "to a great extent" response to a survey question increases their GC score, and an "almost never" or "not really" response does not increase the score, with middle values corresponding to the scale. Content from this survey came from *A Survey for Measuring 21st Century Teaching and Learning: West Virginia 21st Century Teaching and Learning Survey* by Ravitz (2014) and *Measuring graduate students' global competence: Instrument development and an empirical study with a Chinese sample* by Liu et al. (2020) (See Table 2). The reliability of Ravitz's survey has been explored and, according to Ravitz, "has demonstrated excellent reliability, improving on reliable measures from previous studies (std. alpha > .90, inter-item correlations > .58)" (2014, p.1). In terms of reliability of the Liu et al. content, "...The alpha coefficient of the entire scale (33 items) was .929, which demonstrates a very high level of reliability (≥ .90) and very good internal consistency of the scale" (Liu et al., 2020, p.9). Written permission for the use of both surveys was granted by the authors.

The concepts in Ravitz's survey are critical thinking skills, collaboration skills, communication skills, creativity and innovation skills, self-direction skills, global and cultural connections, local connections, and using technology as a tool for learning. Ravitz defines global and cultural connections as "students being able to understand global, geo-political issues including awareness of geography, culture, language, history, and literature from other countries" (2014, p.2). The survey questions in the global and cultural connections section of the survey are the only questions being used in the GC in STEAM Fields Survey because of their relevance. These questions are included because of the support of the PISA framework and definition of GC utilized in this study, specifically because the issues address knowledge (3a, 3e), skills (3b, 3c), and behaviors (3d, 3f) in relation to GC (See Table 2). Question 6 addresses assessment of GC and is reworked from Ravitz's question on the extent of assessment instructors agree with. This was done to provide an absolute yes or no about assessment practices rather than collecting data on the attitudes instructors have about the practice.

Question 4d from the GC in STEAM Fields Survey is from the Liu et al. survey and is included because of the relevance to curriculum and instructional pratices from a faculty member's perspective. Question 4e is also from Liu et al. and is edited slightly to maintain the faculty member's perspective. Instead of "I consider myself valuable to my country and society" (Liu et al., 2020, p. 4) the question has been reframed to "My students consider themselves valuable to their countries and societies". Other questions in the Liu et al. survey are not utilized because of the student-

centered aspect of the questions and redundancy to previously selected questions from the Ravitz survey. Questions 5, 7, and 8 were written by the researcher to directly address the research questions. These questions and the answer options provided are grounded in both PISA's aspects of GC (See Table 1) and Alkin's curriculum reform framework.

Table 2

GC in STEAM Fields Survey Item Sources

Item number	Question	Source
1, 2, 9	N/A	N/A (consent and demographics)
3a	Study information about other countries or cultures?	Ravitz (2014)
3b	Use information or ideas that come from people in other countries or cultures?	Ravitz (2014)
3c	Discuss issues related to global interdependency (for example, global environment trends, global market economy)?	Ravitz (2014)
3d	Understand the life experiences of people in cultures besides their own?	Ravitz (2014)
3e	Study the geography of distant countries?	Ravitz (2014)
3f	Reflect on how their own experiences and local issues are connected to global issues?	Ravitz (2014)
4a	I have tried to develop students' skills in making global connections.	Ravitz (2014)
4b	Most students have learned to make global connections while in my class.	Ravitz (2014)
4c	I have been able to effectively assess students' skills in making global connections.	Ravitz (2014)
4d	I know the internationally accepted theories and schools of thought in my field of study or profession.	Liu et al. (2020)
4e	My students consider themselves valuable to their countries and societies.	Liu et al. (2020)
5	In your class, what global cultural aspect(s) are your students exposed to the most?	Original, supported by PISA Framework
6	Do you assess students' levels of Global Competency?	Ravitz (2014)
7	Is the implementation of Global Competency discussed among your institution's faculty and/or administrators?	Original, supported by PISA Framework
8	From your understanding, how does your institution prioritize Global Competency integration?	Original, supported by PISA Framework

At the end of the GC in STEAM Fields Survey, instructors were asked if they would be interested in participating in a 20–30-minute interview for qualitative data collection. Email correspondence followed with these participants to schedule a Zoom interview. The interviews were one-on-one between the researcher and the participant and held exclusively online. Interview participants were read a scripted introduction pertaining to consent, which included their right not to answer any questions and a verbal agreement regarding the recording of the interview. The interview was formatted as a semi-structured interview to collect qualitative data and build a narrative on GC integration in STEAM departments, and an interview script was used (see Appendix B).

After providing demographic information about their institutional roles, participants were asked to review this study's definition of GC. Participants were asked if it was consistent with how it is understood within their institution. The interview questions then followed the general structure of the survey with questions regarding GC implementation in the curriculum, day-to-day student interactions, assessment, and faculty perceptions. The semi-structured nature of this interview allowed for clarifying questions that helped expand the understanding of participant experiences. At the conclusion of the interview, the Zoom transcription was reviewed with the cloud-recorded video to ensure accuracy. The reviewed transcription data was reformatted to remove any personal identifiers and then coded within MAXQDA.

Participant Demographics

Due to the selective nature of this study, it is known that all participants were STEAM field instructors in the midwestern United States at higher education institutions that prioritize GC integration. 76 participants completed the survey. The areas taught consisted of 42.1% Science, 32.9% Fine Arts, 15.8% Engineering, 6.6% Technology, and 2.6% Mathematics. 16 Participants (21.1%) indicated two or more STEAM subject areas taught, including 10 participants who indicated their main subject taught was Mathematics, 5 participants who indicated their main subject taught was Technology, and 1 participant who indicated their main subject taught was Engineering. There were 13 interview participants. The interview participants' subject areas consisted of 4 Science, 2 Engineering, 2 Fine Arts, 2 Mathematics, 1 Technology, and 2 taught combinations of STEAM areas.

Ethical Considerations

The researchers completed the Protection of Human Subjects: Social-Behavioral-Educational Researchers Course as part of the Collaborative Institutional Training Initiative (CITI) Program. The research context, methods, consent efforts, data procedures (collection, storage, and protection), and survey methods were reviewed and approved by an Institutional Review Board (IRB).

Results

GC Implementation Rates

To address the first research question and gain insight on how GC is implemented in each STEAM subject, the results of the GC in the STEAM Fields Survey were analyzed by first generating a cumulatve value called the integration score. This score is made by assigning values to each Likert scale-based question of the survey. For example, if a participant selected “almost never” to a survey prompt, that would contribute 1 point to their integration score, and if they selected “almost daily,” that would contribute 5 points, with other answers filling the values in between. Out of 11 Likert scale questions, the highest possible integration score value could be 55, and the lowest could be 11. The cumulative integration score data provided an interval scale in which the GC implementation rate, or extent, could be perceived. This data point is representative of how often instructors feel they are implementing GC into their curriculum, providing a comparison between each STEAM subject to support RQ1. A one-way ANOVA compared the integration scores for each main subject area taught $F(4, 71) = 6.23$, $p < .001$, $\eta^2 = 0.26$. Means and standard deviations are provided in Table 3.

Table 3

Integration Score Comparisons by Subject Area

Subject Area	N	Mean	SD	Min	Max
Science	32	27.34	10.00	12.00	49.00
Technology	5	31.20	10.71	20.00	43.00
Engineering	12	20.58	3.78	14.00	26.00
Arts	25	34.40	9.01	17.00	49.00
Mathematics	2	16.50	2.12	15.00	18.00
Total	76	28.57	10.11	12.00	49.00

The high standard deviation values for subject areas that have higher N values show that greater populations provide greater variance in integration score values. A Bonferroni Post Hoc test compared the average integration scores between each subject area. These comparisons are provided in Table 4. The test showed statistically significant relationships between the Arts and Science integration scores and Arts and Engineering integration scores, as shown in Table 4. This indicates that instructors of Fine Arts classes had significantly higher integration scores when compared to the scores of the Science and Engineering instructors.

Table 4

Integration Score Comparisons by Subject Area

Subject Area (I)	Subject Area (J)	Mean Difference (I-J)	Std. Error	Sig.
Science	Technology	-3.86	4.30	1.00
	Engineering	6.76	3.02	0.29
	Arts	-7.06*	2.39	0.04
	Mathematics	10.84	6.51	1.00
Technology	Science	3.86	4.30	1.00
	Engineering	10.62	4.76	0.29
	Arts	-3.20	4.38	1.00
	Mathematics	14.70	7.48	0.53
Engineering	Science	-6.76	3.02	0.29
	Technology	-10.62	4.76	0.29
	Arts	-13.82*	3.12	<.001
	Mathematics	4.08	6.83	1.00
Arts	Science	7.06*	2.39	0.04
	Technology	3.20	4.38	1.00
	Engineering	13.82*	3.14	<.001
	Mathematics	17.90	6.57	0.81
Mathematics	Science	-10.84	6.51	1.00
	Technology	-14.70	7.48	0.53
	Engineering	-4.08	6.82	1.00
	Arts	-17.90	6.57	0.81

* The mean difference is significant at the 0.05 level.

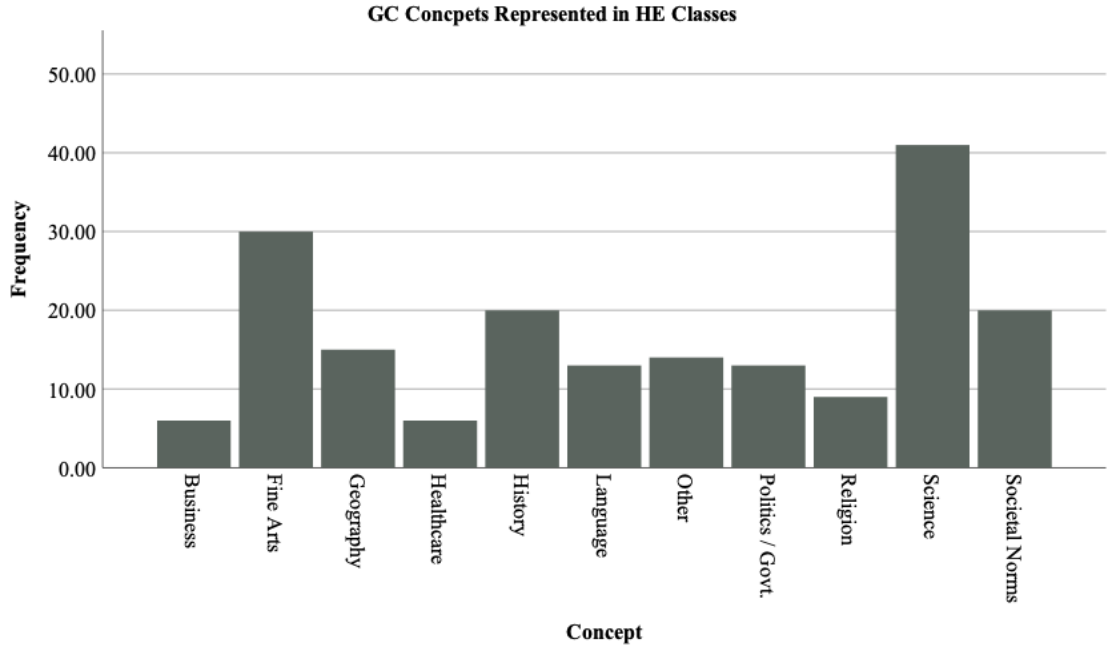
Qualitative data from participant interviews was analyzed using open coding as a first-cycle coding method. This method allowed data trends to emerge without preconceived codes targeting specific concepts. Evaluation coding was chosen as a second-cycle coding method due to the focus on patterned observations of characteristics, activities, and outcomes of initiatives that evaluation coding provides (Saldaña, 2015). This qualitative analysis revealed that the implementation of GC varies greatly from institution to institution. 9 out of 13 interview participants shared that while GC is not formally in their curriculum, it is considered in their curriculum design and instruction choices. In some cases, implementation varies within departments. Participant 8 shared that it is not "a standardized curricula [sic], but it's something that I do to increase the competence of my students." Participant 7 stated that GC "is peppered throughout" their course. Participant 4 described GC implementation as a "case-by-case situation," and Participant 2 described it as "widely, widely varied." Participant 3 stated that the degree of implementation also relied on student reception, saying, "It's on a one-to-one basis, depending on how the student wants to take it rather than something that's actively guided, encouraged, and followed up on." Participant 10 was an outlier and shared that their institution requires faculty to show evidence of implementation of GC, among other strategic plan elements, during program assessment.

GC Concepts in HE

To address the second research question and measure which aspects of GC are most present in HE classrooms, survey participants used a checklist to select concepts. This checklist was created by utilizing the PISA framework and the CG concepts listed in Table 1. The concepts most often selected were Science (41) and Fine Arts (30), and the concepts least often selected were Business (6) and Healthcare (6) (See Figure 2).

Figure 2

Frequency of GC Concepts Represented in HE Classes



History and Geography emerged as frequent concepts within qualitative data analysis, particularly in Science and Mathematics. For example, Participant 4, a Mathematics instructor, spoke about including the history and creation of Algebra in the Turkish region and how it has "influenced and changed a lot of the ways we think today." In teaching Agricultural Science, one participant referenced how farmers in Costa Rica, who have difficult slopes to plant on, also have higher corn yields than midwestern American farmers working on flat land. In discussing incorporating these concepts, participants explicitly referenced creating a mindset that values and embraces non-Western practices and thought processes. One concept that came up in 6 out of 13 interviews was how participants connected their subject matter to Diversity, Equity, Inclusion, and Belonging (DEIB) work. For many participants, GC concepts are associated with a DEIB-based framework. Participant 1 shared they felt the idea of GC is "a general part of our diversity, equity, and inclusion initiatives" while Participant 8 stated that "one of the aspects of diversity is also international multicultural diversity".

The individual Likert scale survey items used to generate the integration score also provided insight on which GC concepts are present in STEAM subjects. When instructors were surveyed on what concepts are present in their curriculum, the items that had the lowest, or least agreed with, responses were "Geography of other cultures" (M = 1.83, SD = 1.20) and "Able to assess skills global connections" (M = 1.96, SD = 1.12). The statements that had the highest, or most agreed with, responses were "International theories" (M = 3.58, SD = 1.26) and "Useful to other cultures" (M = 3.18, SD = 1.30). Due to the relatively low SD values, this provided insight on the commonalities between STEAM subjects regarding overaching trends of the main GC concepts integrated.

Aspects of successful GC curricular integration shared in interviews were identified as exchange programs, virtual international collaboration, structuring role-playing and conflict-resolution activities, prioritizing diversity in faculty and student populations, including and celebrating non-western curricular materials, and providing cultural and historical background information on concepts. Successful GC instructional practices shared in interviews included using non-verbal communication, bringing in guest speakers (including Zoom), allowing and welcoming discourse about course content, welcoming students to bring their expertise on their culture, including opportunities for student group work, and randomizing student work groups. Some participants indicated that diversity in faculty and staff populations lent itself to an increase in the presence of GC in the classroom.

Barriers of Implementation

Barriers to implementation identified by participants include lack of training and resources, political perspectives, lack of implementation accountability, and misunderstandings of GC. At the beginning of the interview, participants were asked to review this study's definition of GC and then were asked if the definition corresponds with their previous knowledge or experience of the concept. Participants felt the definition of GC exemplified their understanding of the concept but shared that they were using different terminology, such as global learning, global citizenship, and transferable skills.

Some participants also spoke of the lack of access to study abroad programs, citing a lack of opportunities applicable to their subject area as well as the financial difficulty it presents to students. This contrasted the programs that utilized study abroad and described it as their most impactful integration strategy. Commenting on the misunderstanding of the meaning and intention of GC, Participant 9 said:

> I think that it's still presented as a way that we, as people in the United States, can help people in other communities who are less developed, less fortunate, [have] less access to resources, education, etc., rather than a collaborative way of how we can benefit from *their* expertise and work together towards a common goal, which I think is more the idea of global competency rather than just serving other people.

Observation and concern with this "fix it" attitude were expressed by multiple participants. When speaking about the lack of institutional accountability of implementation after GC initiatives are initially communicated, Participant 2 shared:

> I can ignore all that if I want. I can skip faculty meetings. I can not read the newsletters. I can never look at the University web page. I just do my own stuff. And since I'm not evaluated and whether I read the newsletters, I'm not evaluated on whether I'm doing these things. I'm evaluated on "Do I teach effectively?".

Other participants echoed these concerns about accountability and consistency, particularly as faculty members move or retire. 2 out of 13 interview participants shared that they have to show evidence of GC implementation in their curriculum.

Discussion

To satisfy RQ1, data was collected to create a composite integration score and participant interviews were conducted. This data shows that though every participating institution featured GC in their mission statement or strategic plan, this integration is largely done on a case-by-case basis. In most institutions, instructors do not have to provide evidence of accountability to the institution. From a statistical standpoint, the consistent trend of greater standard deviation values for larger groups of participants indicates that all subjects face inconsistent rates of implementation. These results show the importance of and disconnect within the interpretation and implementation of the language and concepts included in institution-wide initiatives. Despite the variety in implementation, common trends emerged among subject area implementation. The Arts instructors surveyed had statistically significantly higher implementation rates when compared to Engineering and Mathematics instructors. Though survey and interview results showed a wide range of implementation, notable polar outliers include participants who could not identify any implementation or institutional initiative, as well as a participant who designed a curriculum for STEM students that is entirely based on GC.

A wide variety of GC aspects were identified by survey and interview participants to satisfy RQ2. These aspects presented themselves in C&I in each of the 3 main tiers of Alkin's framework (See Figure 1). An unanticipated result of this research was the strong connection participants expressed between GC and DEIB work. Multiple participants cited American students conveying attitudes or beliefs that the American approach to a problem is the highest standard and most efficient of approaches. This was identified by interview participants to be in direct conflict of the

components of GC, as displayed in the attitudes section of Table 1 of the PISA framework. This set of values also connects to the pillars of Critical Race Theory (CRT). Prior research on CRT in education has shown the importance of social justice-oriented education and epistemologies (Ledesma & Calderón, 2015). Because of this identified link, future researchers may consider utilizing CRT, a DEIB-based framework, or another social justice framework.

As past research supports, this study shows a lack of standardization in GC terminology and implementation (Carter, 2020). A barrier to GC implementation identified through this research is the accessibility of study abroad opportunities, which was based on both student finances and subject area opportunities. Though the definition of GC chosen for this research does not require or insinuate the necessity of travel, many felt that study abroad opportunities are a foundational and impactful element of GC integration. This is consistent with prior research, as study abroad programs have been scrutinized in terms of accessibility and equitability (Chandir & Gorur, 2021).

Implications

Some of the barriers identified by interview participants can be addressed by creating accountability in GC integration. During the interview, a participant stated that they have to show evidence of GC integration and other strategic plan initiatives during program assessment. Creating accountability of integration would provide evidence for the accuracy of including the language highlighting GC included in mission statements and strategic plans. Administrators can provide more professional development on GC, as some interview participants shared they lack adequate training on integration. Administrators, curriculum designers, and instructors can collaborate with other institutions to learn about how GC is being integrated in similar fields and departments. Faculty members in different STEAM fields can consider the integration strategies from this study and apply any appropriate methods to their curricula or instruction practices.

One participant in this study created and implemented a program specifically designed to integrate GC into STEM subjects. Another such program in a different region of the United States was discussed. This program addressed all 4 main components of GC. The course addressed knowedge and skills by the curricular content, resources, and activities. The course addressed attitudes and behaviors by implementing activities that made use of non-verbal communication, teamwork, and problem solving. As students continued through the courses, they consistently practiced these 4 components in the context of their STEM fields. As awareness of inconsistencies are noted and successful integration programs and practices are shared, perhaps more institutions will follow suit in creating specific positions or programs to standardize a uniform GC approach throughout STEM or STEAM curriculum. This must start on a program or institutional level and as multiple participants shared, accountability must be present for GC integration to be a consistent expectation.

Before implementation consistencies are possible throughout a region or even a single institution, there is a need for standardized language around GC. Due to the many different terms used to describe the concept of GC, implications of this research can also include the standardization of a single term to streamline the understanding of this concept

from institution to institution. Institutions may consider looking at language used at similar institutions or field-related research and using that context to consider their selected terminology. Reflecting on the language around GC, as well as the other actionable items listed, can also build a commitment to the standardization of GC in education.

Limitations

Although every effort was made to structure the most accurate research possible, this study contains limitations. Survey and interview data collection consisted of only instructors who wanted to participate, which may mean that the majority of participants had a previous interest in GC. This may cause data to be skewed. All of the survey and interview data was self-identified by participants, which, by nature, is a limitation.

Another limitation is the scope of this study, which focused on gathering responses from STEAM instructors in the midwestern United States. The sample size, particularly the 2 instructors with Mathematics as their main subject, was a limitation of this study. The sample size of interview participants was limited compared to survey participants because a smaller group was accessible. Despite these limitations, the validity of this study remains substantial. To overcome the challenges of a smaller sample size, over 4700 instructors were emailed to participate in the survey and interview. The mixed methods design of this study and the triangulation of quantitative and qualitative data contribute to the effort to overcome the above limitations.

Areas of Future Research

Future research may focus on instructor motivation for GC integration. Multiple motivating factors were reported in this qualitative data, such as promoting career readiness, institutional mandate, or personal ethical/moral value. Another area of future research may include the terminology used for GC. Interview participants listed alternate terms that they felt were suitable to convey the same concept as GC, indicating a need for a common language. Research into motivation and terminology may further contribute to the standardization of GC in HE. Since some interview participants shared that they felt that diversity in student and faculty populations lends itself to an increase in GC, a future study might investigate this claim. A study with a different regional focus or a country-wide scope would also be recommended.

Conclusion

This study utilized Likert-scale data from surveys and qualitative data from instructor interviews to generate an integration score and craft a narrative around GC integration in higher education. In doing so, it was identified that despite the wide mention of GC concepts in higher education mission statements and strategic plans, there is very little evidence of consistent integration. In most cases, the degree of integration of GC is left up to the instructor, and the institution does not hold the instructor accountable for upholding any level of integration. The common GC elements integrated into curriculum and instruction included a commitment to diversifying curriculum and institutional populations and differentiating instruction to appeal to different types of learning and problem-solving. The

implications of this study include institutions structuring a system of accountability for GC integration, support at the faculty level with implementation strategies, and the standardization of language around GC. Limitations of this study include the small sample size and the geographical scope of the research. It is recommended that future research studies consider these limitations, as well as address wide variance in GC terminology and the impact of diverse populations on GC integration.

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Appendix A

Global Competency in STEAM Fields Survey

Global Competency in STEAM Fields Survey

* Required

Consent to Participate

Global Competency Integration in STEAM Fields in Higher Education

Lori Bushey from Rockhurst University is inviting you to participate in this research study. You must be over 18 years old and an instructor of a university-level STEAM field (Science, Technology, Engineering, Arts, Math) to participate.

Purpose of the Study: The purpose of the research is to identify the extent to which Global Competency is implemented in STEAM fields higher education curricula, as well as identifying implementation methods. The results of this research will potentially inform higher education curriculum development and analysis, as well as promote a standardization of Global Competency integration in education.

Procedures: Your participation in this study will involve multiple choice and short answer survey responses. Your participation will take approximately 7 minutes. If you choose to participate in the optional Zoom interview, the interview will take approximately 30 minutes and includes questions that allow participants to elaborate on their experiences with Global Competency integration.

Risks: Although there are no foreseeable risks associated with participation in this study, there is a minimal risk of a breach in confidentiality. There is a slight risk that some of the questions in the survey could make you feel uncomfortable, but you are free to skip any questions if this were to occur. While every effort will be made to keep all of the information you complete and share confidential, it cannot be absolutely guaranteed. Individuals from Rockhurst University Institutional Review Board (a committee that reviews and approves research studies), Research Protections Program, and Federal regulatory agencies may look at records related to this study for quality improvement and regulatory functions. If you have any questions about the study in which you are participating, you are encouraged to call Dr. [redacted] the primary investigator, at [redacted] Although it is not the University's policy to compensate or provide medical treatment for persons who participate in studies, if you have questions or feel your rights have been violated as a result of participating in this study, please contact the IRB chair, [redacted]

Data Storage: Data (including survey responses, interview video and audio, and interview transcriptions) will be stored on a password protected drive. Data from participants who would like to be contacted for an interview will be de-identified promptly after the interview takes place. De-identified interview transcriptions will be created immediately following the conclusion of each interview and stored on a

password protected drive. The video and audio files from interviews will be deleted upon transcription creation. De-identified survey responses and interview transcriptions may be used in future presentations of this research. De-identified data will be kept for a minimum of 3 years after today and/or 3 years after any publication using this data, whichever is longer. The principal investigator and student researcher will have access to this data.

Benefit: Although there is no direct benefit for participation in this study, the results can add knowledge to the development of STEAM field curricula.

Compensation: There is no compensation for this study.

Sources of Support: This study is not funded.

Voluntary Consent Statement: Your participation is voluntary. If you decide not to participate, there will not be a penalty to you or loss of any benefits to which you are otherwise entitled. You may withdraw from this study at any time. Any information collected prior to withdrawal will not be used in data analysis.

Summary of Results: If you would like a copy of the results, please contact

1. Researcher Contact Information: If you have questions about this study you can

Do you understand and agree to participate in this study?

*

- ◯ Yes
- ◯ No

Global Competency in STEAM Fields Survey

Please review this study's definition of **Global Competency**:

"Global Competence is the capacity of an individual to understand that we learn, work and live in an international, interconnected and interdependent society and the capability to use that knowledge to inform one's dispositions, behaviours and actions when navigating, interacting, communicating and participating in a variety of roles and international contexts as a reflective individual" (Schleicher, 2014, p. 9).

2. Select which STEAM subject(s) you currently teach:

- [ ] Science
- [ ] Technology
- [ ] Engineering
- [ ] Fine Arts
- [ ] Math

3. In your teaching, how often have you asked students to do the following

	Almost never	A few times a semester	1-3 times per month	1-3 times per week	Almost daily
a. Study information	○	○	○	○	○

	Almost never	A few times a semester	1-3 times per month	1-3 times per week	Almost daily
about other countries or cultures?					
b. Use information or ideas that come from people in other countries or cultures?	○	○	○	○	○
c. Discuss issues related to global interdependency (for example, global environment trends, global market economy)?	○	○	○	○	○
d. Understand the life experiences of people in cultures besides their own?	○	○	○	○	○
e. Study the geography of distant countries?	○	○	○	○	○
f. Reflect on how their own experiences	○	○	○	○	○

	Almost never	A few times a semester	1-3 times per month	1-3 times per week	Almost daily
and local issues are connected to global issues?					

4. To what extent do you agree with these statements?

	Not really	To a minor extent	To a moderate extent	To a great extent	To a very great extent
a. I have tried to develop students' skills in making global connections.	◯	◯	◯	◯	◯
b. Most students have learned to make global connections while in my class.	◯	◯	◯	◯	◯
c. I have been able to effectively assess students' skills in making global connections.	◯	◯	◯	◯	◯
d. I know the internationall y accepted	◯	◯	◯	◯	◯

	Not really	To a minor extent	To a moderate extent	To a great extent	To a very great extent
theories and schools of thought in my field of study or profession.					
e. My students consider themselves valuable to their countries and societies.	○	○	○	○	○

5. In your class, what global cultural aspect(s) are your students exposed to the most?

- [ ] Language
- [ ] Religion
- [ ] Societal Norms
- [ ] Politics / Government
- [ ] Business
- [ ] Fine Arts
- [ ] History
- [ ] Geography
- [ ] Healthcare

- [ ] Science
- [ ] Other / Not Listed

6. Do you assess students' levels of Global Competency?
   - ◯ Yes
   - ◯ No

7. Is the implementation of Global Competency discussed among your institution's faculty and/or administrators?
   - ◯ Yes
   - ◯ No

8. From your understanding, how does your institution prioritize Global Competency integration?
   - ◯ High priority - discussed at institution **and** department level
   - ◯ Moderate priority - discussed at institution **or** department level
   - ◯ Low priority - **rarely** discussed at institution or department level

9. Would you be willing to participate in a brief video interview with the researcher to provide further information on Global Competency integration? If so, please type your email address in the field below.

   Enter your answer

Appendix B

Global Competency in STEAM Fields Interview Script

Rationale:

“I am conducting this research to learn more about the role that Global Competency plays in your classroom. I am interested in you sharing examples and stories with me. I will ask you questions like the ones in the survey you just completed. Do you have any questions?”

Safety and Consideration: “Your participation in this research is completely voluntary. You can choose to answer or not answer questions when they are asked without any worries. You can stop answering questions any time you want. Do I have your permission to record this interview?”

GC Definition:

"Global Competence is the capacity of an individual to understand that we learn, work and live in an international, interconnected and interdependent society and the capability to use that knowledge to inform one’s dispositions, behaviours and actions when navigating, interacting, communicating and participating in a variety of roles and international contexts as a reflective individual" (Schleicher, 2014, p. 9).

Sample Questions:

1. How do you assess your students’ Global Competency?
2. In what context is Global Competency discussed in your institution?
3. Does the definition of Global Competency used in this study coincide with how Global Competency is being understood at your institution?
4. How were you made aware of your institution’s commitment to Global Competency?
5. Can you elaborate on how Global Competency is integrated into your daily teaching practices?
6. Can you elaborate on how Global Competency is integrated into student projects or assignments?
7. Do you discuss Global Competency outright with your students, or is it more of a framework you use in your teaching/curriculum planning?
8. Do you feel your level of priority of global competency integration is consistent with that of other faculty members in your institution, or is it varied degrees of implementation?
9. Please describe a specific unit or lesson that implemented global competency.

End:

Is there anything else about your experience with global competency integration that you’d like to share with me?

Thank you so much for your time and for sharing your experiences with me.

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Conflict of Interest: The author declares there are no conflicts of interest to disclose.

Data Availability Statement: The participants of this study did not provide written consent for their data to be shared publicly, so supporting data is not available.

Ethics Statement: The Rockhurst University Institutional Review Board approved the research study "Global Competency Integration in STEAM Fields in Higher Education" on April 19, 2023. The reference number for this study is 2023-16. Written informed consent was obtained from the participants of the study. All participant data has been de-identified.

Author Contributions: -

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