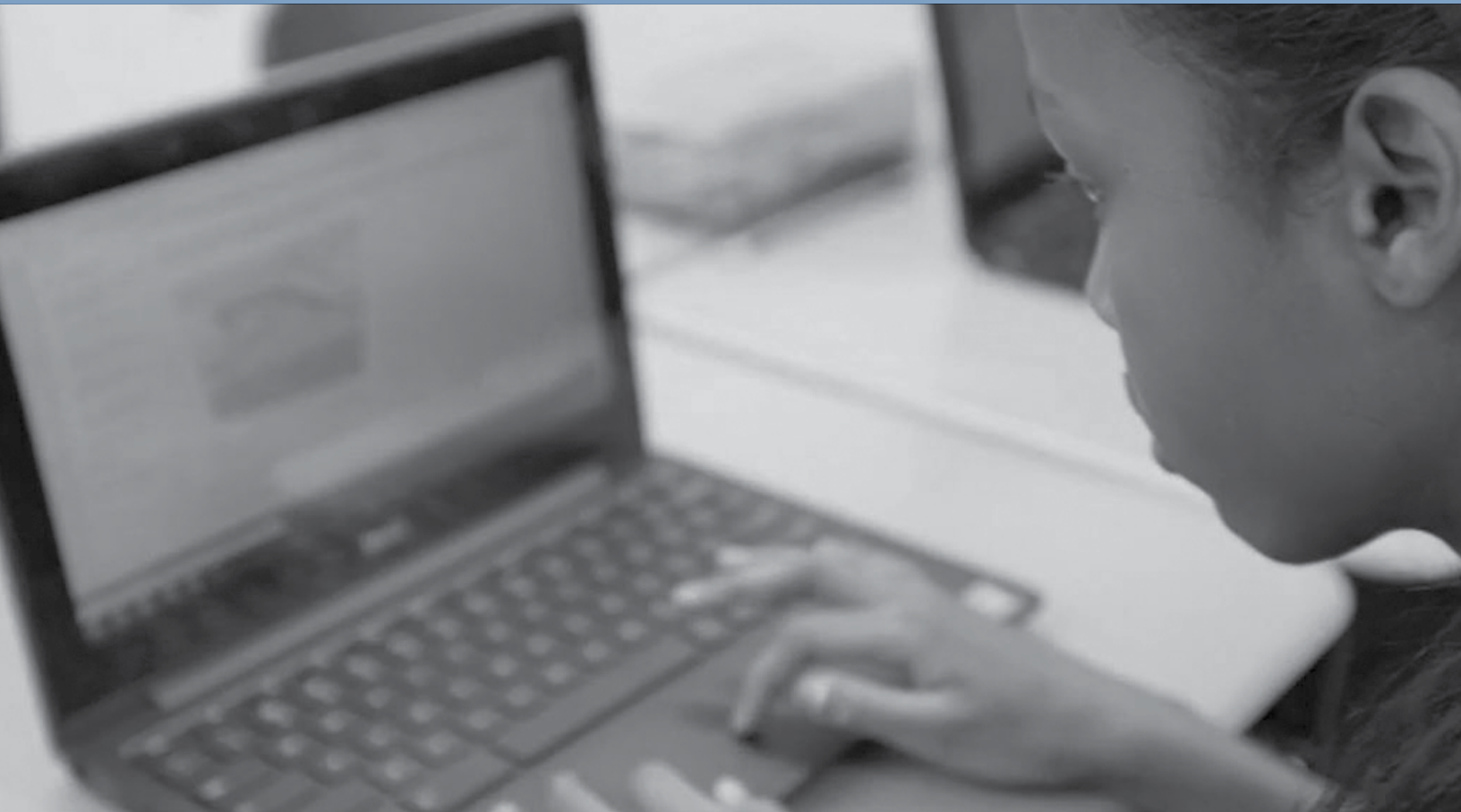# Evaluating Global Digital Education:
Student Outcomes Framework

By Marjorie B. Tiven and Ester R. Fuchs
with Anissa Bazari and Ashley MacQuarrie

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Executive Summary

Global Digital Education: Ready for Evaluation

The powerful force of economic and cultural interdependence among nations called globalization, with all its strengths and drawbacks, is here to stay. How can the next generation of students be prepared for the challenges they will face?

Recognizing that students should develop global competency at a young age, K-12 schools today offer more global education opportunities than ever before. These include well-developed curricula, strategies for teaching tolerance and cultural understanding, and resources for internationalizing instruction. But how can the complex learning needed for a global education best be made accessible to students in the classroom? And how can educators know that students are developing the knowledge, skills, attitudes, and behaviors that ensure they will become globally competent adults?

Global digital exchange is an innovative approach connecting students directly with peers around the world online. Its essence is linking students across national borders, so they can learn from one another to acquire global competency. By taking advantage of student interest in digital technology and peer communication, global digital exchange also supports general academic learning. As technology and internet connectivity become cheaper and more widely available in schools, digital exchange can also make global education more inclusive of students from low-income and isolated communities.

Global Cities, Inc., a Program of Bloomberg Philanthropies, created and operates the Global Scholars digital exchange program for students ages 10 to 13. An indicator of the program's success is its increasing enrollment over the last five years—cumulatively totaling over 35,000 students— which reflects its low dropout rates, high levels of student assignment completion, and program reenrollment.

The Global Scholars Program Model

Students communicate directly in Global Scholars e-classrooms with peers across the globe. This educational environment, enhanced by multimedia communication, is designed to provide opportunities for 10-to-13-year-old public school students to build the global and general learning competencies explicated in the framework. The posts and projects of international peers serve as primary texts through which students learn about other cities, the common global topic they are studying, and the skills needed to solve a global problem. In 2017-18, the program partnered with 576 teachers in 64 cities in 29 countries, enrolling 13,756 students in 602 classes— 90 percent of which were in public schools. The program charges no fees to participating schools.

The Global Scholars program was deliberately designed to make the complex subject matter of global competency accessible to students and teachers. Classroom teachers lead students through a nine-month curriculum that is project-based, technology integrated, and interdisciplinary. The curriculum guides students to investigate global issues, discuss their learning with international peers, and create solutions in their communities. Students enthusiastically explore their own city's culture and environment, an essential step in understanding the perspectives of others. Curricula are specifically designed to develop the global and general student learning outcomes by teaching knowledge, skills, attitudes, and behaviors codified in the evaluation framework.

Students create and share original content in e-classroom discussion boards— and other students respond. In this context, "discussion" refers to the full experience of completing assignments, posting original work, completing a follow-up activity to deepen understanding, reviewing posts from other cities, responding to international peers and checking back for responses to one's own work. The curriculum is structured around this full cycle of engagement.

An authentic international audience is a powerful motivator, particularly at this developmental stage. To ensure that students have the opportunity to hear multiple perspectives from varied locations and cultures, each e-classroom includes representation from several

cities and countries.

After five years, there are early indications of Global Scholars' success based on a variety of data sources. Foremost is participation data— enrollment, retention, assignment completion, and teacher participation in professional development— as well as student and teacher pre- and post-program surveys and educator discussions. There is also qualitative data from student work in the e-classroom— digital projects and discussion board threads— where indicators of student learning outcomes can be observed. Developing the evaluation framework was necessary to make formal evaluation of Global Scholars and other global education programs possible. The next phase is adapting and testing metrics that can demonstrate progress over time in student achievement of learning outcomes.

Purpose and Process

In addition to its role as a practitioner, Global Cities understood from the outset that the value of Global Scholars, and other international digital exchange programs more broadly, could only be realized by demonstrating and measuring impact on student learning. In exploring designs for formal evaluation, Global Cities did not find in the literature sufficiently articulated student learning outcomes that could be used for the assessment of global digital exchange programs. With the input of the Global Scholars worldwide educator network as a starting point, Global Cities undertook the process of systematically identifying these outcomes and developing a framework for evaluation of global education programs.

The framework identifies four **global learning outcomes**—appreciation for diversity, cultural understanding, global knowledge, and global engagement—and five **general learning outcomes**— digital literacy, language communication, self-efficacy, academic engagement, and critical thinking. Together these outcomes provide a definition of global competency for K-12 students and constitute standards for assessing global digital exchange programs.

There are several advantages to this framework for

evaluation. Grounded in both the world of practice and the literature of education and the social sciences, it has the rigor and empirical base that formal program evaluation requires. It defines each of the learning outcomes and explicitly links them to empirical indicators across the developmental competency areas of knowledge, skills, attitudes, and behaviors. These indicators can then be used to formulate metrics that consider student growth, progress, or improvement.

The framework distinguishes between global and general learning outcomes, allowing evaluators to capture evidence of specific general learning outcomes separate from global learning outcomes, while recognizing the relationship between them. Most discussions of global education conflate general with global learning outcomes. General learning outcomes are necessary for learning across disciplines, and to varying degrees are taught in all subject areas. However, they are neither unique to nor sufficient for global learning. Distinguishing between general and global learning outcomes is necessary for evaluators to better identify outcomes distinctive to global learning, as well as discrete changes in both general and global learning outcomes.

The paper derives its evidence from a review of academic literature combined with data from Global Scholars. Its worldwide educator network supplied significant insight through surveys, live professional development, reflection sessions, and site visits. Using a broad range of empirical indicators, the framework delineates what global learning looks like in the classroom, helping educators and evaluators recognize results in their own schools.

The Global Education Literature and Evaluation

The literature on global education makes the case for teaching students about international issues and how to work with people from other countries and cultures. One school of thought contends that nation-state interest in global education arises from complex problems that cannot be resolved without understanding conditions beyond borders, such as climate change, ethnic and religious conflicts, and mass migration. Other global

education proponents address the political backlash against globalization, arguing that global education can help students resist leaders who stoke fears of the "other" and promote anti-immigrant sentiments and xenophobia.

While providing an important rationale for including global education in K-12 curricula, the literature is less useful for evaluation. It offers limited applied guidance in identifying measurable student outcomes or developing approaches to rigorously assessing digital exchange. Indeed, scholarly research reinforces the need for a framework to evaluate student learning outcomes.

An Analytic Program Model: Facilitating Replication

One goal in developing an evaluation framework was to identify common elements of global digital exchange and to enhance knowledge about how program design can support global learning outcomes. Based on the Global Scholars program, as well as Global Cities' review of 51 global education initiatives that referenced digital exchange, Global Cities developed a general analytic model that characterizes the core elements of program design shared by all global digital exchanges. The analytic model connects broad program goals and desired outcomes to effective program offerings. Designers can use this model to translate their missions into functional programs. It is also a useful tool for educators and school district leaders to determine which approach to digital exchange best meets their needs.

What are the elements of the analytic model that all digital exchange programs share, and how do they work together? Key features of the analytic program model include outreach, participation requirements, a digital platform, curriculum, professional development, monitoring and evaluation, and student learning outcomes. The model indicates that each feature of program design should be informed by intended student learning outcomes.

An effective global digital exchange program requires an outreach strategy that ensures appropriate enrollment and explains the program's benefits to potential partners. This is necessary because all global digital exchange programs are premised on the idea that students will encounter different perspectives through communication with peers beyond

their own communities. As a participation requirement, students and teachers must be proficient in a common language and have access to digital technology. In selecting a digital platform, designers should consider program goals. To connect multiple locations for sustained communication, asynchronous communication in e-classrooms works best. For short-term live experiences, videoconferences have the benefit of allowing real-time conversation.

The curriculum should guide students in different countries to complete the same activities and consider the same questions so that they gain shared knowledge on common topics. Online peer interaction motivates students to complete assignments, enabling them to talk about themselves and their perspectives. Professional development inspires and equips educators to succeed in leading this work. The content of professional development includes educator feedback about program implementation, training in digital tools, and discussion of teaching strategies to promote the program's intended student learning outcomes. Making data collection an integral part of program design from the outset is critical to ensure that the data used in monitoring and evaluation is valid and reliable. The starting point is participation data— student retention, assignment completion, and reenrollment.

Foundational to all elements of the analytic model are the intended student learning outcomes. Program designers must prioritize outcomes to specify what their programs are trying to accomplish. They can then use the indicators in this framework to create curricula and assess progress.

Learning What Works: Identifying, Defining, and Measuring Student Global Competency

The key to evaluating a global education program is pinpointing rigorous student learning outcomes that are explicit, measurable, and developmentally appropriate. This evaluation framework provides the foundational global and general learning outcomes and empirical indicators that are necessary for high-quality program implementation, as well as for any evaluation that measures impact on student global learning.

The framework begins by identifying learning outcomes necessary for an effective digital exchange program and a working definition of global competency. An effective global digital exchange program will produce growth in global learning outcomes, including appreciation for diversity, cultural understanding, global knowledge, and global engagement. Students will also show growth in general learning outcomes that support global learning, including digital literacy, language communication, self-efficacy, academic engagement, and critical thinking. The development of these learning outcomes constitutes a definition of global competency for K-12 students.

Each outcome is defined and explicitly linked to empirical indicators, while relevant student-centered measurement approaches are identified. Importantly, the relationship between each student learning outcome and selected indicators is discussed in the context of the broad literatures of global education, developmental psychology, and education evaluation.

Significantly, the framework distinguishes between global and general learning outcomes, while recognizing how they are connected. This is essential for evaluation. The subject matter of global learning outcomes is not taught across the curriculum, while general learning outcomes are taught across subject areas. In fact, students ages 10 to 13 may never have been exposed to global learning outcomes in the classroom. Educators note that student engagement in global learning activities accelerates growth in these general learning outcomes. The framework allows evaluators and educators to consider discrete changes in both global and general learning outcomes for students participating in global digital exchange programs.

The Global Learning Outcomes

The first global learning outcome, **appreciation for diversity**, is defined in the framework as demonstrated understanding of the ways in which individuals and groups can be considered different, as well as the attitudes and behaviors that show tolerance, respect, and acceptance of those different from oneself, both locally and globally. Appreciation for diversity begins with investigating and defining one's own identity and culture, as well as wider group identities and the factors that influence these identities. Appreciation for diversity develops gradually.

This age group is the first time most students are developmentally capable of learning about diversity and embracing the attitudes and skills that will allow them to accept others. Their abstract thinking has advanced enough to move beyond simple group identifications to more complex ones.

Like appreciation for diversity, **cultural understanding**, the second global learning outcome, is an abstract, high-level learning outcome that demonstrates recognition of the norms, characteristics, and values that shape how we interpret the world, as well as the application of this understanding when communicating and collaborating with others. Ages 10 to 13 are ideal to begin exposing students to environments and expectations that will foster cultural understanding. At this age, students can learn to integrate diverse cultural knowledge into their assignments and can use language that indicates sensitivity toward the views and values of others.

Global knowledge includes historical and current knowledge from multiple domains—geography, culture, politics, economics, and science. Global knowledge starts as a framework for understanding the world—how it is connected and divided, the people who occupy it, and the challenges they face. Global knowledge is necessary for students to understand that global issues are borderless and require solutions that are complex, interdisciplinary, and adaptable. It prepares students to become global citizens who share and exchange information and build relationships with others outside their local communities. Students ages 10 to 13 are developmentally open to the relational and abstract learning needed to build global knowledge.

Global engagement, the final global learning outcome, is defined in the framework as interest in learning about the world, communicating and collaborating with diverse communities, and finding solutions to global problems. Globally engaged students seek opportunities to connect with the global community and demonstrate cultural understanding in their interactions. The ability to recognize the connections between one's own community and the larger world is fundamental to global engagement. This developmental stage is ideal for beginning targeted exposure to global engagement, as students are prepared to tackle the intellectual and emotional challenges of unfamiliar social environments.

The General Learning Outcomes that Support Global Learning

The first general learning outcome, **digital literacy**, is knowledge of technology and its responsible use for creating content and communicating locally and globally. The basic components of digital literacy are information literacy and digital communication skills. It involves as well the ability to use digital tools to gather and present information and to integrate these skills into academic and non-academic activities. Digital literacy greatly enriches student learning as it presents opportunities to share and interpret not just words or symbols, but complex, multimedia messages representing diverse perspectives from across the globe.

In today's interconnected world, students must exercise communication skills across multiple media and be able to detect and respond to the nuances of changing language and meaning. The second general learning outcome, **language communication**, is the ability to speak, write, and present information, ideas, and opinions to diverse communities. Students must be able to apply global knowledge and cultural understanding to adapt language for both local and global audiences. They must also be able to read and comprehend a variety of texts in order to understand and respond to information, narratives, and perspectives from around the world. In global digital exchange, language communication also has a social dimension. Students must develop proficiency and confidence in using a common language to articulate ideas, share responsibility, and make compromises in order to communicate and collaborate.

To be successful in the knowledge-based economy that dominates the early twenty-first century, students will need skills that include self-motivation and independence. **Self-efficacy** is the ability and motivation to learn, adapt, take action, and put forth one's best effort, particularly in demanding situations. Developing self-efficacy in an educational setting requires students to question and explore their own sense of identity and direction. Global learning provides increased opportunities for students to develop self-efficacy through exposure to unfamiliar situations, problems, and viewpoints. In this context, self-efficacy encompasses both the desire to address new problems and create solutions, and a sense of empowerment to

do so. Self-efficacious students take responsibility for their actions and impact on others in their classrooms, communities, and the world.

Academic engagement, which involves student appreciation for learning new information and skills and doing well in school, supports global learning and is accelerated by global digital exchange. Academically engaged students are able to undertake self-directed work and reflection, and to see that their learning is connected across subjects, to real-world issues, and to their future lives and careers. Global learning extends these connections by allowing students to utilize their knowledge and skills to collaborate with diverse peer groups and address global problems.

The last general learning outcome, **critical thinking**, is often cited by educators as a top priority in preparing students for a globalized world. Critical thinking is the ability to analyze complex topics and situations, and to develop original ideas and opinions based on evidence. Problem solving is an aspect of critical thinking that enables students to systematically propose multi-step solutions to shared problems. In the context of global learning, critical thinking also requires students to make sense of and apply logic to the world around them, and to appreciate, evaluate, and integrate ideas and perspectives from diverse sources. Students must be able to think critically to determine the validity and reliability of information, to identify its important aspects, and to determine what other critical data might be required. These skills are particularly important in the context of today's world of unfiltered online information.

Student Learning Outcomes: The Basis of Program Design and Evaluation

Student learning outcomes are the key to successful global digital exchange. And while no single evaluation design will be appropriate for every global digital exchange program, student learning outcomes should be the basis of both design and evaluation. Different learning outcomes require multiple methods of measurement. This is particularly important for students ages 10 to 13, who are just beginning to develop and demonstrate global student learning outcomes and may show growth in different ways and at different rates. Therefore, evaluations of global digital exchange should focus on growth in student learning outcomes, rather than on end-proficiency. For example, evaluations of many of these outcomes should rely on a combination of instructor observations, student reflections, and authentic, mastery-based assessments to capture individual student progress. The discussion of measurement approaches for each student learning outcome provides the starting point for creating new metrics or adapting metrics from related fields.

The utility of these learning outcomes for global digital exchange, and global education more broadly, extends beyond program evaluation. These outcomes should inform all aspects of program design, regardless of variation in model, and provide guidance for developing curricula and teacher training. By defining global competency, focusing on growth in student learning outcomes, and identifying indicators that can be used to measure this growth, the framework positions all global education stakeholders to expand research and spur greater investment from the public and private sectors in developing student global competency worldwide.

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Introduction

As the pace and extent of globalization have increased, a new urgency has emerged among educators and policymakers to include global education in K-12 core curricula.

Students today must acquire the knowledge, skills, and mindsets to live and work with individuals whose cultures and values differ from their own. Global education that begins before college is essential in a world that has become increasingly challenged by interconnected economic, political, and environmental problems. International conflicts, transnational migration, the consequences of climate change, and the expansion of information technology all point to the necessity of equipping young learners with the knowledge and skills they will use throughout their lives to address complex problems requiring cross-national solutions. The challenge for educators is to prepare students to deal effectively with the pervasive impacts of globalization when they become adults.

Global digital exchange is an innovative educational approach that responds to this challenge. Its unique feature is that learning occurs through the direct online connection of students with their peers in other countries. This paper addresses all stakeholders who are essential to making global education and digital exchange priorities in K-12 education—classroom teachers, school leaders, district leaders, program designers and evaluators, government officials, education advocates and policymakers, philanthropists, and researchers.

The purpose of this paper is to explain how global digital exchange works, to define what students should learn through this approach, and to introduce an evaluation framework for digital exchange programs based on student learning outcomes. The paper presents the work of Global Cities, Inc., a Program of Bloomberg Philanthropies (Global Cities), which created and operates the digital exchange program Global Scholars. Through this program, students ages 10 to 13 communicate directly in e-classrooms with peers across the globe. This educational environment, enhanced by multimedia communication, creates opportunities for students to build important global and general learning competencies. The posts and projects of international peers are primary texts for them to learn about other cities, the common global topic they are studying, and the skills needed to solve a global problem. After five years, there are early indicators of Global Scholars' success. Partner schools have a low dropout rate and high levels of program reenrollment. There is cumulative enrollment of over 35,000 students,[1] and participating classes have a high level of assignment completion. There is more demand than the program can currently accommodate.

1 All program data provided by Global Cities, Inc.

In addition to its role as a practitioner, Global Cities understood from the outset that the value of Global Scholars, and other international digital exchange programs more broadly, could only be realized by demonstrating and measuring impact on student learning. It monitored the implementation of Global Scholars through extensive input from its worldwide educator network and engaged in an iterative process of feedback and program improvement. Global Cities explored designs for formal evaluation that considered the central questions: what kind of learning can realistically be expected from participation in such programs; how is that learning discussed in the literature; and how can that learning be measured in terms of student outcomes. Not finding sufficiently articulated student learning outcomes for the assessment of global digital exchange programs in evaluation literature, and with the input of the Global Scholars worldwide educator network as a starting point, Global Cities undertook the process of systematically identifying these outcomes.

The product of that work is the evaluation framework presented in this paper. The framework includes four global and five general learning outcomes, as well as indicators of knowledge, skills, attitudes, and behaviors that will make it possible to measure these outcomes in the future. Together these outcomes provide a definition of global competency for K-12 students and constitute standards for assessing global digital exchange programs.

This framework provides the foundational outcomes and indicators for any evaluation that measures impact on student global learning. We do not suggest that the framework includes all elements of an evaluation plan needed to assess a particular global education or global digital exchange program. Evaluators will need to prioritize specific indicators and develop metrics to measure them. The framework is intended to inform the work of a wide range of stakeholders engaged in global education: classroom teachers assessing student progress; peer organizations designing and refining programs; public school districts setting priorities for global education; and education researchers conducting formal evaluations. Global Cities is using the student learning outcomes and indicators to refine the Global Scholars program model and evaluation designs.

Overview

The paper begins with a review of the complex, multidisciplinary literature on global education, including both its history and current developments.

The literature provides compelling arguments for the importance of global education, and recent work aims to define the characteristics of global competency. However, it offers limited guidance in operationalizing concepts, identifying measurable student outcomes, or developing approaches to measurement for global digital exchange. This examination of the literature reinforces the need to develop a framework for evaluating student learning outcomes for global digital exchange and global education more broadly.

Next, we describe the subfield of global digital exchange, which is particularly suited to address several of today's pressing educational challenges. These include xenophobia, educational inequity, digital literacy assessing the reliability of online resources, and effective use of technology in the classroom.

We present a general analytic model that identifies core elements of any global digital exchange program and links these elements to student learning outcomes. This model was extrapolated from the Global Scholars program, as well as from Global Cities' examination of other digital exchanges.

We then consider an operating program in order to shed light on how teachers lead and how students learn in this digital environment. We focus on the Global Scholars e-classroom and curriculum, the two elements that most directly influence student outcomes. This discussion of Global Scholars shows how the analytic model applies to an existing global digital exchange.

Next, we explain how the student learning outcomes identified in the framework are rooted in the Global Scholars program and Global Cities' preparation for formal evaluation. We discuss how feedback from Global Scholars' educator network served as the primary source in developing and refining these student learning outcomes.

We then discuss the evaluation framework and situate our analysis in the broad interdisciplinary literature on global education, developmental psychology, and education evaluation. The framework identifies and defines the specific outcomes for both global learning and general learning that should be the focus of digital exchange programs. For each outcome, we articulate indicators which are placed within the four developmental competency areas of knowledge, skills, attitudes, and behaviors. Where developmentally appropriate, these indicators can apply beyond the 10-to-13-year-old age group.

We also discuss assessment strategies developed and applied in social science and education research that can be used to measure growth in these or similar outcomes. With few exceptions, these measurement strategies have not yet been applied to the emerging field of global digital exchange. Nevertheless, our examination of how these assessment strategies have been applied in other areas of research provides the basis for developing metrics for global digital exchange.

The evaluation framework identifies the student learning outcomes that must be the focus of an effective global education program, and recommends how to assess programs that are designed to achieve these learning outcomes. We conclude that an effective global digital exchange program for students ages 10 to 13 will show growth in the development of global learning outcomes—appreciation for diversity, cultural understanding, global knowledge, and global engagement—and in the general learning outcomes that both support and are developed through global learning—digital literacy, language communication, self-efficacy, academic engagement, and critical thinking. These learning outcomes constitute a definition of global competency for K-12 students.

I.

Global
Education

To provide context for the emergence and impact of programs like Global Scholars, we now briefly examine the complex, interdisciplinary literature on global education and competency and the recent history of K-12 global education in the United States.[2]

Current literature reflects the growing importance of this field and provides compelling arguments for including global learning in core curricula for students ages 10 to 13.

Several schools of thought consider the value of global education. One group of academics and organizations views global education as necessary for personal and national success. They argue that nation-states need to provide a global education because complex challenges like climate change, ethnic and religious conflicts, and mass migration cannot be resolved without recognizing conditions that extend beyond national boundaries.[3] Young people will need to use their knowledge and skills to work together as adult citizens if their nations are to function effectively in a globalized world. Additionally, to successfully compete in the twenty-first-century economy, individuals need skills and attributes that address the challenges and opportunities of globalization—creativity, digital literacy, critical thinking, collaboration, flexibility, and adaptability.[4]

Other global education proponents address the political backlash against globalization. They argue that global education can help students resist political leaders who stoke fears of the "other" and promote anti-immigrant sentiments and xenophobia. They also see it as a defense against nationalist movements that foster isolationism, as well as extremist groups that encourage intolerance and violence. Global education proponents advocate for curricula that promote the skills and attitudes that counteract these messages and can support what is often identified as global citizenship. These include skills required to "recognize, articulate, and apply an understanding of different perspectives" (World Savvy, 2014) and attitudes that encourage "a positive disposition toward cultural difference" (Reimers, 2009a, p. 184) and "an understanding of multiple levels of identity" (UNESCO, 2014, p. 9).

2 This section focuses primarily on transformations in public school education in the United States. We recognize that this same debate occurred simultaneously in other countries, but the United States' experience garnered the broadest attention from educators and policymakers internationally.

3 See, for example: Sisk, 2010; Reimers, 2009a; Reimers, 2009b; Reimers, 2009c; Reimers, 2009d; UNESCO, 2014.

4 See, for example: Partnership for 21st Century Learning, 2007; Parks, 2012; Bellanca & Brandt, 2010; Casner-Lotto & Barrington, 2006; Wagner, 2014; Dwyer, Hogan, & Stewart, 2014; Greiff, et al., 2014; Griffin, 2017; Kivunja, 2014; Pink, 2012.

Finally, many advocates of global education and competency emphasize the values of active citizenship. They consider individuals to be globally competent if they will "improve the collective well-being" (OECD, 2016, p. 4), contribute "to a better world through informed, ethical, and peaceful action" (UNESCO, 2015, p. 24), and have "the capacity and disposition to understand and act on issues of global significance" (Boix Mansilla & Jackson, 2012, p. xiii).

Much of this literature has informed global education curricula and is critical in advocacy work that will ensure that global education is part of core programming in K-12 schools. We rely on some of this work in conceptualizing global learning outcomes, but it is less useful for translating expansive goals into specific empirical indicators that can be measured in evaluations of global digital exchange programs.

Recent History of K-12 Global Education

Global education first became a standard feature of K-12 core curricula in the United States as part of the public education reform movement of the 1980s.[5]

With the Cold War winding down, teachers and academics recognized the importance of having students learn about the histories and cultures of other countries as well as their own. It was projected that the then-current generation of learners would have more global exposure than previous generations, and that future generations would experience even more exposure (Quigley, 1999; Soule, 2001). Discussions of realignment of social studies curricula in middle and high school explicitly included current international affairs, international history, civics, and economics (Porter, 1994; National Commission on Excellence in Education, 1983).

Developments in international relations, including the fall of the Iron Curtain in Europe and the signing of the North American Free Trade Agreement, led to a further shift toward global education. Cross-border migration from culturally different countries surged, and local communities and classrooms confronted levels of diversity never seen before (Cabello & Burstein, 1995; Burstein & Cabello, 1989). At the same time, educational policy shifted focus to teacher quality and preparation (United States Department of Education, 2002). In addition to teaching about other cultures and countries, global education focused on ensuring that instructors were equipped for growing classroom diversity. Global education included instructional techniques designed to teach communication skills and promote tolerance (Levstik, 2008). This period marked the beginning of global education's emphasis on competencies.

5 See, for example: Ravitch, 1995; Popham, 1987; O'Day & Smith, 1993.

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Global digital exchange is unique; learning occurs through the direct online connection of students with their peers in other countries.

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Changes in the education field again influenced global learning in the early 2000s. There was growing consensus among policymakers, educators, and business leaders that K-12 learning needed to better prepare students for secondary education and the global economy (Brown, 2003). New standards asked that students leave primary school with twenty-first-century skills that would allow them to be competitive in a globalized world (Dwyer, Hogan, & Stewart, 2014; Kivunja, 2014; Wagner, 2014). These included the use of technology for communication and content creation, creative thinking and problem solving, and the ability to work and communicate as members of a diverse group with multiple intelligences and learning styles (Pink, 2012; Bertram, 2016). Mainstream curricular reform placed new emphasis on these and other noncognitive learning goals. This led to the creation of enrichment programs designed to offer students opportunities for global learning and active membership in the global community (Tucker, 2014; Zuffianò et al., 2013).

Today, there are more global education opportunities than ever before. Global Cities' examination of global education providers found that most specialize primarily in one of five categories: curricula about global issues; professional development for educators; global digital exchange programs; study abroad; and exchanges of cultural artifacts, writing, or art.[6] In this landscape, global digital exchange has garnered attention for addressing key educational needs while capitalizing on the appeal of social media, technology, and peer communication.

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6 See Global Cities, Inc., 2017.

II.

Global
Digital
Exchange

Over the past two decades, digital exchange has emerged as an innovative subfield of global education.[7]

This approach harnesses technology to educate children and young adults to be successful citizens in a globalized world. The unique feature of global digital exchange is that learning occurs through the direct online connection of students with their peers in other countries.

Educators participating in digital exchange report that sharing work internationally is an incomparable incentive for student engagement. The importance of peer influence for students in this age group is well-documented.[8] Interaction with peers in other countries intensifies the appeal. Student communication is authentic; peer interaction and recognition motivate students to complete assignments so that they can talk about themselves, their countries, and their perspectives.

Many imaginative programs that connect distant classrooms online have been developed and hold great promise. They vary in their goals, audiences, and the extent to which they provide curricula and professional development. Programs vary as well in duration and whether they rely primarily on synchronous video conferences or asynchronous communication through written messages and multimedia shared in e-classrooms. This range of models is valuable because it allows school districts to match their specific needs to available programs.

Today's Challenges and Opportunities

The educational value of global digital exchange is not limited to student engagement.

This approach has the potential to address several of today's pressing education challenges, including **xenophobia**, **unequal access to global education**, **digital literacy,** including assessing the reliability of online information, and use of **technology in the classroom**.

There is no question that xenophobia is on the rise in nations around the world. Global leaders are recognizing the need to combat cultural ignorance and the fear and intolerance it brings (Anderson & Bhattacharya, 2017; Bloomberg, 2016). Students in global digital exchange programs are genuinely enthusiastic to share their worlds with peers and, through their interactions, learn they have much in common. Such opportunities help break down stereotypes and help prepare students to function effectively as adults in a globalized world (Doney & Wegerif, 2017).

7 Digital exchange, also known as virtual exchange, was defined in 2011 as "technology-enabled, sustained, people-to-people education programs" (Virtual Exchange Coalition, 2011).

8 See, for example: Epstein & Karweit, 1983; Padilla-Walker & Carlo, 2016; Lynch, Lerner, & Leventhal, 2012; Graham, Munniksma, & Juvonen, 2013; Furrer & Skinner, 2003; and Wentzel, Barry, & Caldwell, 2004.

> **Digital exchange models can extend the reach of global education and focus its purpose on student learning outcomes.**

As technology becomes less expensive and more broadly available, global education can be more inclusive of students from low-income and otherwise isolated communities. Digital models have the potential to equalize international learning opportunities for groups excluded from in-person exchange programs, which are available to only a small fraction of students. By contrast, global digital exchange can be accessible to public school districts serving low-income students as well as to geographically isolated locales that are without frequent cross-cultural contact.

A digitally connected world requires different forms of literacy. Today, people are exposed to an array of communication styles and formats, including text messages, 280-character tweets, informal business emails, and multimedia. Although traditional writing instruction remains essential, by itself it is insufficient to prepare students to successfully communicate in school, the workplace, and daily life. To meet the requirements of contemporary literacy, educators must address new questions concerning online student safety and the reliability of information. The internet is increasingly a primary source of information about contemporary social and political issues, particularly for young students, but online sources vary widely in their credibility. Students must develop the skills to identify accurate and reliable information online. Global digital exchange programs provide the opportunity to practice appropriate online behavior and develop digital skills constructively in an academic setting.

More classrooms than ever before have technology, including internet connectivity and hardware. However, there is a lack of academically rigorous, technology-integrated curricula. The Global Scholars program is an example of rich, relevant content that uses the technology many schools already have in place. Like most global digital exchanges, it requires only a computer or tablet with adequate internet connection.

The Role of Digital Exchange in Teaching Global Competency

International digital exchange programs have gained the attention of educators, policymakers, and civic leaders by offering global experiences to children in their own classrooms.

These programs draw on expanded use of new technologies, the ubiquitous nature of the internet, and the appeal of social media for both students and teachers. Digital exchange models have created an important opportunity to extend the reach of global education and focus its purpose on student learning outcomes.

Effective programs incorporate elements from the expansive literature on what it means to be globally competent and take advantage of cutting-edge and widely accessible technology. This combination of global education and technology can create an immersive learning environment that accelerates student development.

Global education programs that promote interdisciplinary, project-based learning are particularly effective in developing key competencies that support general learning goals such as critical thinking and technology expertise. The flexible and collaborative structure of this form of learning promotes the development of essential non-cognitive skills that students need to be successful both in the classroom and in other areas of their lives (Walker, Leary, Hmelo-Silver, & Ertmer, 2015).

Engaging in immersive, authentic learning empowers students as individual learners and allows them to see value in their academic efforts and performance (Lee, Lee, & Bong, 2014). At the same time, through collaborative, inquiry-based learning and international exchanges, students learn how to work and learn as members of a team (Piperopoulos & Dimov, 2014). This type of learning has been shown to improve student performance and learning outcomes within global learning programs, as well as across disciplines and beyond individual units or programs (Tucker, 2014).

By using technology, global digital exchange programs have the potential to bring the benefits of interdisciplinary and project-based learning to students around the world. However, a successful program requires more than technology. In the next section, we discuss a general analytic program model, which identifies the elements that contribute to the success of these programs.

III.

Analytic
Program
Model
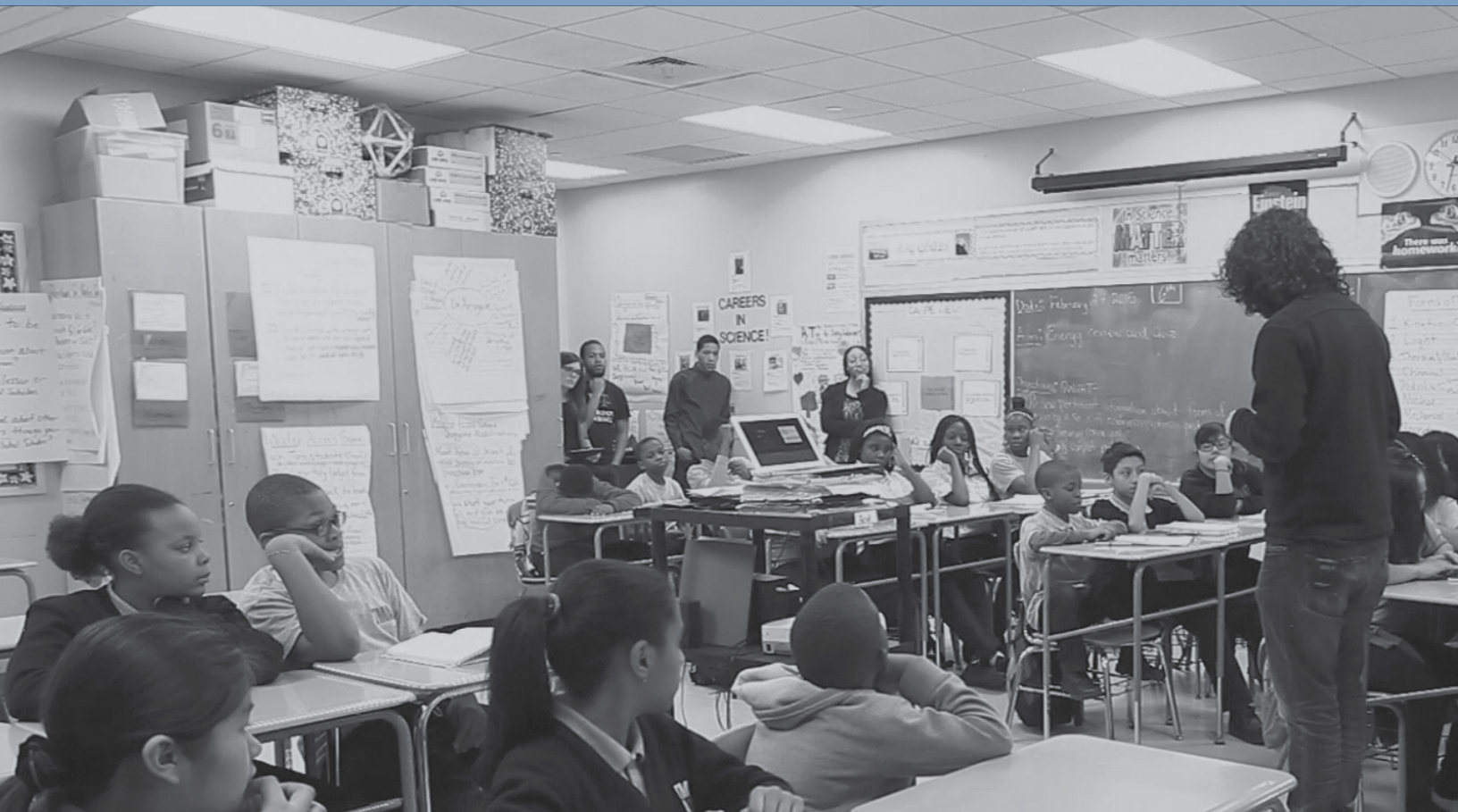
Global digital exchange programs vary by their goals, duration, age of students, curricula, means of communication, and professional development.

After examining 51 global digital exchanges, Global Cities developed a typology of these programs based on variation in means of communication, duration of program, and curricula. Three major program types emerged: short-term e-classroom work in preparation for a live videoconference about a global topic; asynchronous communication in an e-classroom with multiple locales using a common curriculum over an extended period; and matching teachers to develop projects that include digital communication between classes.

From this examination, and the elements of the Global Scholars program, Global Cities developed a general analytic model. It identifies the core elements of program design that all global digital exchange programs share, as illustrated in **Figure 1**. Key features of the analytic program model include: outreach; participation requirements; a digital platform; curriculum; professional development; student learning outcomes; and monitoring and evaluation.

We discuss how program design should be informed by intended student learning outcomes. Specifically, we address both opportunities to produce intended student learning outcomes and opportunities to gather data on these outcomes.

> **"...program design should be informed by intended student learning outcomes."**

FIGURE 1

ANALYTIC PROGRAM MODEL

This analytic program model was developed by Global Cities, Inc. based on the Global Scholars program and an examination of 51 global digital exchange programs. It identifies the core elements that all global digital exchanges share, and the expected student learning outcomes for such programs.

DESIGN ELEMENTS

| Outreach | Participation Requirements | Digital Platform | Curriculum | Professional Development |

GLOBAL LEARNING OUTCOMES

| Appreciation for Diversity | Cultural Understanding | Global Engagement | Global Knowledge |

GENERAL LEARNING OUTCOMES

| Digital Literacy | Language Communication | Self-Efficacy | Academic Engagement | Critical Thinking |

MONITORING AND EVALUATION

Elements of the Program Model

Outreach

All global digital exchange programs are premised on the idea that students will encounter different perspectives through communication with peers in communities and countries other than their own. This requires an outreach strategy that supports the program's design and intended student learning outcomes. For example, a program meant to include students in regions of conflict requires outreach that targets countries experiencing conflict. Programs that prioritize appreciation for diversity must target multiple countries, regions, and cities. Without the right outreach strategy, a global digital exchange cannot achieve its mission.

Ensuring that enrollment is sufficient and appropriate for the program's mission is not the only purpose of outreach. Outreach provides an opportunity to explain the benefits of this new educational approach. Outreach meetings also can begin partnerships with district leaders, principals, and teachers. These partnerships are important because successful program implementation requires ongoing conversation to determine the best approach to integrating global digital curricula and resolving operational problems.

Participation Requirements

There are two essential participation requirements for every global digital exchange: proficiency in a common language and access to digital technology. First, teacher fluency must be sufficient to teach the curriculum in that language and participate in professional development. Students must also have the requisite skills in the language of the program's curriculum and platform. The second essential participation requirement is technology. While technology is viewed as increasingly common in public schools, the availability of this technology in the classroom varies significantly. Scheduling priorities and technical issues can impact teachers' access to hardware and to a consistently reliable internet connection.

Beyond a common language and adequate technology, additional requirements may be appropriate in order to better set program expectations for effective participation and feedback. Some requirements, such as participant age and amount of time dedicated to program activities, help establish optimal conditions to produce student learning outcomes. Certain participation requirements can also ensure that sufficient data is collected for successful program implementation, monitoring, and evaluation. These may include requirements for survey completion and teacher participation in professional development. Without such requirements, successful monitoring and evaluation and other program goals will be challenging to accomplish.

Digital Platform

In order for students to create and share original content and engage in meaningful conversation, it is necessary to have an appropriately equipped and accessible online environment. While some digital exchange programs use more than one platform, most rely primarily on asynchronous communication in e-classrooms or live videoconferences. The choice is largely dependent on program duration, number of locations being connected, and intended learning outcomes. e-Classroom platforms work best to connect multiple locations and to sustain communication among students in different time zones. They also have the potential to support multimedia, enabling exchange of writing, photos, videos, and other digital projects. This affords opportunities to develop digital literacy and communication skills. Videoconferences, which provide real-time conversation and a greater sense of immediacy, are well-suited for short-term programs or the ongoing connection of two parties. They also allow students to practice oral conversation and presentation skills. Approaches can be combined. Global Scholars uses an e-classroom platform and also encourages classroom teachers to arrange Skype calls so students can experience the immediacy of live communication. Program designers have the option of creating their own platforms or renting space on an existing platform. For either choice, a primary consideration is user experience. It should be anticipated that desirable platform features may change as enrollment grows and programs evolve. The capacity to collect data using the digital platform for monitoring and evaluation should also be considered, as well as the immediate and long-term costs of platform development and maintenance.

Curriculum

A curriculum is necessary to provide a substantive basis for student communication in the digital classroom. Successful curricula develop age-appropriate learning outcomes, take full advantage of technology, and enable students to share ideas and information with their international peers. By completing the same activities and considering the same questions, classes in different countries gain shared knowledge and experiences and are able to discuss different perspectives on common topics. Most programs either provide fully developed curricula, including teacher and student materials, or facilitate international partnerships for teacher-developed projects. Curricula vary in length, from a full school year to a one-time experience.

Designers of effective digital exchange curricula should begin by identifying program objectives and linking them to related student learning outcomes. They can then develop content, structure, and pedagogy that support these objectives and outcomes. For example, a program emphasizing language communication and cultural understanding might structure its curriculum around weekly exchanges of writing about local experiences and traditions.

Project-based learning is a model of pedagogy in which students work independently or collaboratively to analyze and address a problem or challenge over an extended period of time and produce an end product or presentation.

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Student-centered learning is a pedagogical approach in which learners take an active role in what and how they learn. This approach to pedagogy considers individual students' prior knowledge, learning styles, and abilities. It often emphasizes how learning is relevant to students' ongoing development, as well as their goals and future aspirations.

In developing curricula, designers should also consider the structure of the digital platform. Videoconferences require preparation of conversation topics and questions, while e-classroom assignments should include structured opportunities for posting of original work and responding to international peers.

Professional Development

Many teachers have limited experience using technology in the classroom and may be new to teaching global subject matter. Digital exchange programs should provide teachers with training to inspire and equip them to succeed in leading this work. It is essential to create a common understanding of the program's goals and how to achieve them. The content of professional development should provide both background knowledge and teaching strategies to promote the program's intended student learning outcomes. Professional development can also provide training in digital tools, time for discussion of pedagogy such as project-based and student-centered learning, and the opportunity for educators to offer feedback about program implementation.

One approach to professional development is provision of informational videos or written guides supplemented by discussion boards for teachers and program staff. Another is interactive videoconferences. The live experience has the advantage of building community through peer consultation. It is also an opportunity for program staff to troubleshoot challenges in real time, and to reinforce program priorities and the importance of focusing on intended student learning outcomes.

Monitoring and Evaluation

Monitoring and evaluation are necessary for fiduciary reporting and program administration, for tracking program implementation and student progress, and for determining program impact. Each goal requires different data collection strategies and methods. While data collection can be implemented at any time, there are advantages to establishing what to collect and why before the program launch. For example, an e-classroom platform may be selected based on what analytics are offered. A monitoring system may be established to document participation. Pre- and post-program surveys may be instituted to collect data on student learning outcomes. If data is to be used effectively to determine what students are learning and guide program improvement, it must be collected at regular intervals from students, teachers, and other stakeholders.

The most basic way of determining if a program is successfully implemented is to monitor participation.[9] How many students, classes, or schools are completing the program? Who is dropping out and why? Who is coming back? What are students actually doing in the classroom? Participation is an important indicator of engagement and interest in a program. High levels of participation increase the probability of students learning in the classroom. If participants are not completing the program or not reenrolling, there is a problem with program design or implementation. All programs should collect data on three accepted measures of participation: retention for the full program period; assignment completion; and reenrollment for the following year. The level of participation in the program must be determined before assessing the impact of the program on student learning outcomes. If students are not participating as indicated by attendance or assignment completion, it is less likely that they are learning in the program. Other critical monitoring questions include: Are the program designers providing what they were expected to provide? Are partners implementing the program as the designers intended?

A different set of questions address program outcomes—what students are learning. Before program designers and evaluators can answer these questions, or even ask the right ones, they need to know what these programs are trying to accomplish. Student learning outcomes, the key feature of the evaluation framework, are identified in the analytic program model (see **Figure 1**) and discussed in Section V. Both global and general learning outcomes are critical because they identify what students should be learning.

Global digital exchange programs can use a variety of quantitative and qualitative data collection strategies at different stages of implementation. These include surveys, site visits, reflection sessions, digital platform observations, and analysis of data analytics. For each of the student learning outcomes, Section V discusses approaches to measurement that have been used in other areas of education and social science research to evaluate these outcomes. Making data collection an integral part of program design at the outset is critical for ensuring that the data used in evaluation is valid and reliable.

From Design to Practice The analytic model described in this section is meant to connect broad program goals and desired outcomes to effective program offerings. It should therefore be useful to program designers working to translate their missions into functioning programs. It is also a tool for educators and school district leaders to determine which digital exchanges best meet their curricular and pedagogical needs. To better understand the impact of program design on student experience and learning outcomes, in the next section we consider how this works in the Global Scholars program.

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9 Participation data can be collected at the school, class, or student level depending on the program model.

IV.

**The Global
Scholars
Program**
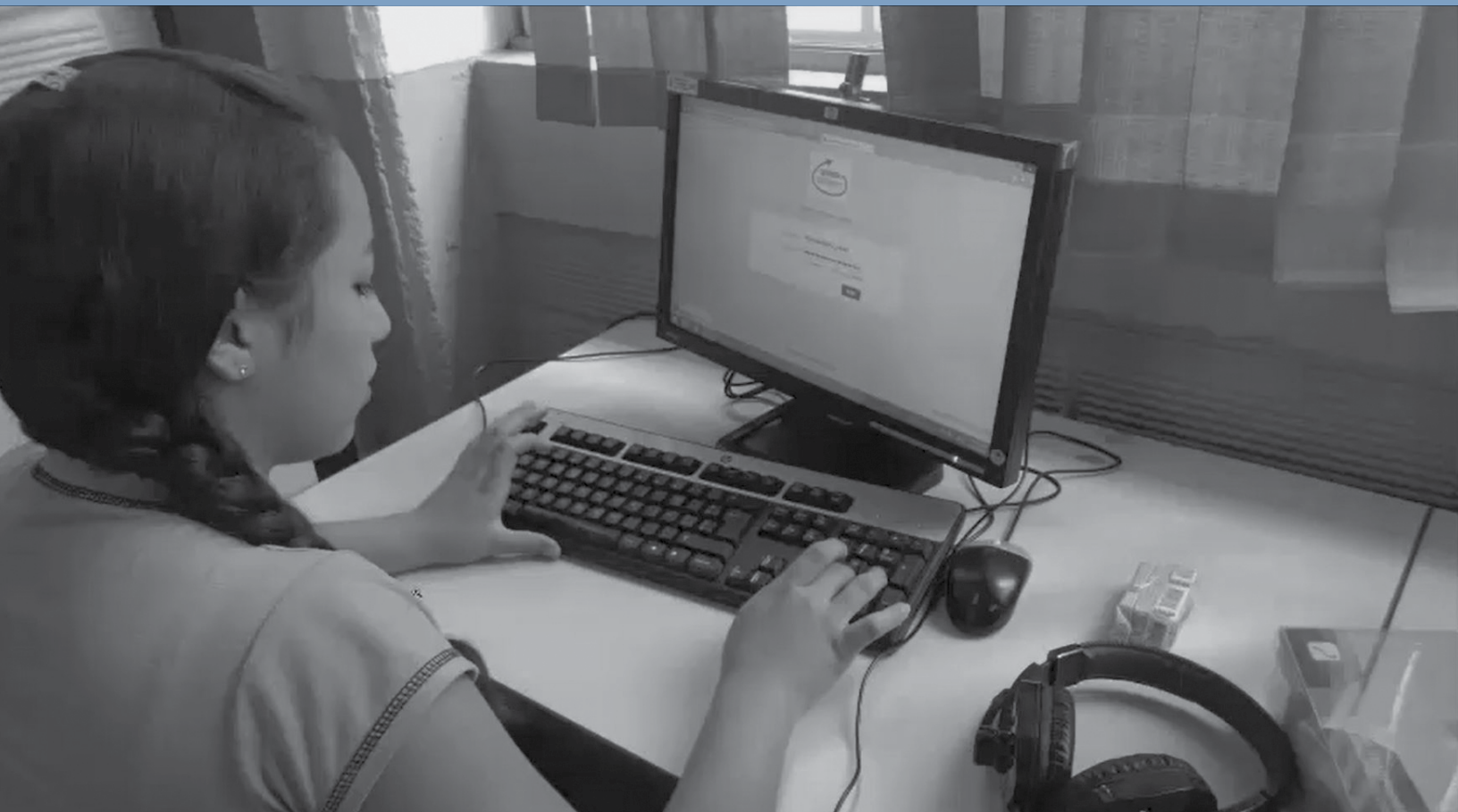
Global Scholars connects students from diverse geographic areas in e-classrooms to learn from one another about an important global topic.

In 2017-18, its fifth year of operation, in partnership with 564 classroom teachers worldwide, the Global Scholars program served 13,554 students.[10] They represented 610 classes at 306 schools in 63 cities in 29 countries. Public school districts in the United States accounted for 5,663 students, while 7,891 students came from other countries. Global Scholars targets students ages 10 to 13 in urban public schools. Participating schools pay no fees.

Global Scholars Enrollment, 2017-18

The 610 classes were located in 63 cities. The majority of classes were concentrated in hub cities where district leaders promote the program and support implementation.

Participation Requirements: The two essential requirements for participation in Global Scholars are teacher and student proficiency in English, and access to technology. Global Cities further delineates roles and responsibilities for participation. The program provides: access to the e-classroom; the curriculum; and live professional development. Schools provide: one computer or tablet with a reliable internet connection for every two students; two hours a week minimum for Global Scholars activities; an educator to lead program activities; teacher participation in five professional development sessions over the course of the school year; and completion of student and teacher pre- and post-program surveys.

10 All 2017-18 Global Scholars enrollment data is current as of December 18, 2017.

Feedback from Global Scholars participants brings this experience to life. A student from Mumbai wrote, "I still cannot cease to be amazed by the diversity of thinking among people and the millions of ways of interpreting a simple sentence." In London, a teacher saw his students sprinting down the hallway so as not to be late for an international Skype chat. In Boston, a teacher was astonished that students asked for Global Scholars homework over the weekend. In Warsaw, students requested classroom keys to stay late and finish their projects. To understand this level of excitement, we will look at two elements of Global Scholars that most directly impact student and teacher experience—the e-classroom and the curriculum.[11]

Digital Platform: The e-Classroom

Promoting Discussion. Students create and share original content in Global Scholars e-classroom discussion boards—and other students respond. The exchange below grew out of a Global Scholars assignment about city life in the digital age. A Warsaw student examined her city government's website to see if she could improve it:

Warsaw Nov 16, 2016, 03:24 pm

> Subject: Apps
>
> Hi everyone, I would make an app or page about places where teens can go in their spare time. I think this topic is helpful, because people will know what are the most interesting places to visit nearby. I would include information about famous places in my city or country, location and why it's worth going there. Sincerely, Wiktoria

"Students create and share original content on Global Scholars e-classroom discussion boards—and other students respond."

She posted her app idea to that week's discussion board alongside proposals by students in other cities. Checking for replies during her next class, she found several from students in New York City:

11 For more information about the Global Scholars program see the Global Cities website: https://www.globalcities.org/global-scholars/

NYC Nov 18, 2016; 12:11 pm

Hi Wiktoria,

Your idea for an app to show places to spend free time was interesting because I think a lot of New York City residents don't do enough exploring, myself included. This idea would be helpful in my city because New Yorkers would be able to find new favorite places and new favorite things to do.

Sincerely,
Isadora

NYC Nov 18, 2016; 12:19 pm

Hi Wiktoria,

Your idea for an app where teens can go in their spare time was interesting because it would inspire somebody to explore their local area and try new things that they never realized that were so close to them. This idea would be helpful in my city because someone who is bored can check this app and find a place to pass time or you can learn more about the history of the city you live in.

Sincerely,
August

Wiktoria responded in turn:

Warsaw Nov 20, 2016; 07:08 am

Dears!

Thank you so much for your comments. It's really nice when you see that your post is interesting and helpful for other people. I think that many people didn't see all the places in their countries or cities so that's why I came up with this idea.

Sincerely,
Wiktoria

> **Discussion board posts and projects are primary texts for students to learn about other cities and the global topic they are studying.**

For every Global Scholars assignment, students post in this kind of discussion thread. Each discussion board can receive hundreds of posts. "Discussion" in the e-classroom refers to the full experience of completing assignments, posting original work, completing a follow-up activity to deepen understanding, reviewing posts from other cities, responding to international peers, and checking back for responses to one's own work. The curriculum is structured around this full cycle of engagement, which takes a minimum of two hours per week. Completing an assignment without posting in the e-classroom misses the essential step of input from international peers. Their posts and projects serve as primary texts for students to learn about other cities and the global topic they are studying. Teachers are encouraged to review posts from other cities to use in their classroom conversations.

The e-classroom communication style emphasizes content, vocabulary, and grammar, while accepting some of the informality of online communication. Global Scholars encourages teachers from all subject areas to prioritize depth of thought over perfect grammar; the aim is to build students' confidence in expressing their ideas and opinions in the discussion boards and other settings. This approach has directly shaped Global Cities' student learning outcomes, particularly digital literacy and language communication. For example, indicators for the language communication outcome distinguish between formal and informal, and between digital and nondigital communication.

Using Multimedia A post in an e-classroom discussion board might consist solely of written opinions or observations about the assignment. However, students also have the opportunity to embed multimedia directly within the discussion, ranging from a single photograph to a documentary video or 3D design project. This capacity is an essential feature of the Global Scholars platform, and impacts both engagement and student learning outcomes. Analysis of discussion threads shows that the digital classroom rewards student use of multimedia. Posts with even a single photograph generally result in more responses, deeper thoughts, and longer discussion threads. Teachers report that multimedia communication is so engaging that it motivates even hard-to-reach students. Using digital tools with purpose, rather than simply learning how they work, is foundational to building digital literacy. Therefore, for the student learning outcome of digital literacy, the indicators go beyond the usual definition of hardware and software skills to encompass use of these tools to learn, present, and create content.

Designing for Multiple Perspectives In Global Scholars e-classrooms, the objective is for students to hear multiple perspectives from varied locations and cultures, a core component of appreciation for diversity and cultural understanding. Each e-classroom is constructed to include representation from several cities and countries. Global Cities had two concerns in determining the optimal size of an e-classroom—enough students to create meaningful, sustained interaction and an appealing number of cities to engage student interest. The group needs to be large enough to continue

conversation despite inevitable disruptions to participation—varying school schedules, technology interruptions, teacher strikes, and natural disasters. However, too large a group undermines the shared endeavor by producing a difficult-to-navigate volume of posts. Students are intrigued to learn about their international peers' cities, but there is a limit to how many cities they can learn about at one time. The Global Scholars team determined that an e-classroom of approximately 350 students is optimal to sustain conversation, while eight to ten cities creates sufficient diversity to inspire curiosity among students ages 10 to 13. In 2017-18, the 13,554 students were divided into 43 e-classrooms.

Creating a Secure Environment The e-classroom is safe, secure, and password-protected; it does not link to other websites. It provides a supervised space for students to develop and practice the online communication skills they need now and for their future careers. Each student and teacher uses a unique account to enter. Classroom teachers are responsible for supervising their students' posts. Global Scholars staff and graduate student interns monitor discussion boards for appropriateness, curriculum progress, and exemplary work. This data provides important insights that inform curriculum development and teacher training.

"Discussion" in the e-classroom refers to a six-step process.

1 Complete assignments guided by workbook

2 Post original work

3 Complete follow up activity to deepen understanding

4 Review posts from other cities using workbook prompts

5 Respond to international peers

6 Check back for responses to one's own work

> **Students learn that global issues are complex and…affect everyone…**

Curriculum

The goal of the Global Scholars curriculum is to translate student excitement about international communication into constructive conversation.

To focus e-classroom learning, Global Scholars designs an original curriculum mapped to the global and general student learning outcomes and indicators presented in this paper, and with a pedagogy that is project-based, technology-integrated, and interdisciplinary. The topic changes each year—examples include environmental sustainability, water conservation, and food security—but the curriculum structure remains the same. A core pedagogical objective is enabling students to teach one another. In addition to readings, websites, and videos, Global Scholars assignments require communication in discussion boards as a key source of information and ideas. Discussing the topic with peers around the world provides the opportunity for students to identify different perspectives on shared problems. Students learn that global issues are complex, that they affect everyone, and that their solutions are complex and interdisciplinary. Students also learn about the geography and culture of each others' cities, particularly as they relate to that year's topic.

Curriculum Structure Curricula follow a five-unit design, with each unit lasting five to eight weeks. The duration of the program is nine months, from late September through June (with an alternate schedule for southern-hemisphere schools). The first unit introduces students to the e-classroom, their international peers, and the cross-cultural communication skills they will use throughout the year. Units two, three, and four present the concepts and vocabulary necessary to understand the global topic. For example, in a curriculum about water, units two, three, and four focused on pollution, conservation, and water access. The fifth unit is a community action project. Students develop, implement, and document a plan to address the global issue at the local community level. For many students in this age group, the community action project is their first time with this kind of responsibility and an audience to hear their ideas.

Project-Based Learning An essential feature of the Global Scholars curriculum is its project-based learning pedagogy. It guides students to learn by doing, connecting them to real-world issues that reach beyond their classroom walls. Students use traditional academic skills like writing and mathematics to tackle actual challenges and propose solutions. For example, they might survey members of their school community about possible improvements for their school building, and then invent a product or service to address this need. Project-based learning is particularly effective in developing critical thinking, collaboration, and digital literacy. Every unit culminates in a digital project that uses these skills. All projects require classes to use the engineering design process to identify a need, brainstorm, plan, create, test, revise, share work in the e-classroom and provide feedback to international peers. The process—especially getting feedback, sharing mistakes, and revising—is as important as

the end product. While the primary audience is their international peers, many classes also seek local audiences. Students have shared projects and proposals with mayors, city councils, local businesses, and other community members.

Technology Integration Another key feature of the Global Scholars curriculum is directly incorporating technology into academic assignments, as opposed to simply teaching students how to operate hardware and software. While most students are interested in digital tools, few have used them in school settings outside a technology class. In the first section of every unit, students learn essential content through online research using multiple digital media, such as news and magazine articles, videos, and websites. They learn how to assess online sources for relevance and accuracy, skills that are particularly essential in today's world of limitless and unfiltered information. In the second section of every unit, students use digital tools to create and share an idea or solution. For example, in the school technology class described above, students used the 3D design tool Tinkercad to present their inventions. Over the course of the curriculum, students practice a variety of digital skills such as video editing, web design, and graphic design. In 2017-18, teachers led students in using Adobe Spark to create interactive web pages, Piktochart to design infographics, and a narrated slideshow tool, VoiceThread, to create virtual tours.

Interdisciplinary Approach Regardless of topic, the Global Scholars curriculum always builds content knowledge and skills relevant to multiple academic subjects. Each year, the topic is a major global issue, which by definition is complex. Assignments emphasize that the solutions are also complex. Students learn that, to address these issues, cities draw on resources from both the public and private sectors, and that solutions require knowledge from multiple disciplines. For example, in a curriculum focused on environmental sustainability, students studied the science of climate change. They used mathematics to calculate their carbon footprints. They drew on social studies to examine the last century's trend of urbanization. They used language arts to write proposals to reduce the environmental impact of city buildings. By allowing students to see that learning is connected across subject areas, this approach supports general learning outcomes such as critical thinking and academic engagement.

Guides for Teachers and Students Global Scholars provides an educator guide, digital student workbook, and an online Teachers' Lounge library with resources focused on both content and pedagogy. The educator guide includes the objectives, schedule, and detailed lesson plans for every unit. The digital student workbook includes critical vocabulary, background information, and directions for each activity. Students use the workbook to draft writing, record research, and plan projects. These curriculum materials are developed every year by the Global Scholars team, all experienced classroom teachers. Every year approximately ten Global Scholars teachers worldwide review the draft curriculum's overall structure, as well as the proposed activities and assignments. The designers also seek input from content experts and museum educators to ensure that curricula reflect current science and research.

> **They learn…skills that are particularly essential in today's world of limitless and unfiltered information.**

Feedback Loop The primary purpose of the Global Scholars curriculum is to direct meaningful e-classroom conversation. Based on observations and educator feedback, staff continually review and modify the curriculum content and structure to promote frequency and depth of student communication in the e-classroom. For example, staff examined e-classroom posts and analytics in order to increase the types of assignments that elicited the most robust discussion. As a result, staff added more assignments that ask students to share experiences from their own cities, as well as assignments that incorporate multimedia, student opinions, and debate.

In another instance, the curriculum schedule was modified to deepen the level of conversation. Staff found that some students posted their own thoughts but did not respond to others despite workbook prompts to do so. Classroom teachers advised that one contributing factor was their lack of time to complete the work as instructed. Accordingly, the designers lengthened the amount of time students spend in each discussion board from one to two weeks. The first week is now devoted to the initial assignment and post; the second week includes an activity to deepen knowledge, followed by time to read and reply to peers.

Another set of modifications was made to promote differentiated instruction, allowing students of varying grade, proficiency, and ability levels to discuss the shared content. There are now two versions of the digital student workbook. In one, writing templates offer structure for students at earlier stages of developing English-language skills. The other provides open writing space to encourage creativity of expression. Teachers may choose one format for an entire class or provide different versions based on students' language proficiency. Additionally, all resources in the Teachers' Lounge (articles, videos, and websites) are labeled by reading and comprehension level, so teachers can select those appropriate for their students.

Professional Development The key to ensuring that hundreds of educators around the world are able to implement the Global Scholars curriculum successfully is live professional development. Global Scholars professional development has two goals: to inspire and equip educators worldwide to use the curriculum effectively in their classrooms; and to build community among this diverse network. Teachers participate in professional development sessions by videoconference five times per year as a program requirement. The sessions are designed and led by Global Scholars staff, and focus on curriculum content, pedagogy, and relevant digital tools. In 2016-17, 82 percent of the 546 participating classroom teachers attended three or more sessions. Each videoconference includes approximately ten classroom teachers. Since registration is random, every time they participate they exchange ideas with new colleagues from around the world. Peer communication is as engaging for educators as it is for students; teachers report that they benefit from the opportunity to discuss and share practices for implementing digital exchange and project-based learning. Importantly, these sessions also provide Global Scholars staff with the opportunity for extensive feedback about the curriculum and program implementation.

Curriculum Integration Global Scholars classes worldwide complete the same set of learning activities at approximately the same time. How these activities are integrated into curricula in each school varies significantly. Some schools integrate Global Scholars into a core subject, such as science, social studies, or language arts. Some integrate it across multiple subjects by matching various elements of the Global Scholars curriculum to their pre-existing curricula. Other schools use it in elective courses, such as civics, research, critical thinking, technology, or social justice. A small number have adopted it for academically oriented afterschool programs.

Decisions regarding curriculum integration are most effective when they consider both district and school-based perspectives. High-level district leaders—with their knowledge of national, regional, and local curricula and a comprehensive view of their districts—play an important role in identifying possible opportunities for integration and potential obstacles. Both before and throughout program implementation, Global Scholars staff works with these leaders to plan for and support use of the Global Scholars curriculum. Before the program begins, staff advises district leaders on mapping the Global Scholars curriculum to existing district standards. After program launch, Global Scholars staff provides ongoing updates directly to district leaders, which allow them to assist individual schools with problems and highlight effective practices for all participating schools. Despite their importance, it is not enough to talk only to these leaders. Principals and teachers know the particular needs of their students and faculty, and are generally the ones who determine the best fit in terms of both subject area and grade level.

At the school level, Global Scholars staff works closely with teachers to adapt the curriculum to their subject areas. For example, staff might provide additional prompts for English teachers to prioritize writing assignments, or help technology teachers adapt project timelines to allow further practice of digital skills. Such guidance ranges from one-on-one coaching to group professional development via videoconference. Insights from these conversations are part of the feedback loop that continuously informs improvements to the Global Scholars curriculum. Ongoing conversation with district leaders, administrators, and classroom teachers shaped the student learning outcomes that we present in the next section.

V.

An Evaluation Framework For Student Global Competency

📖

Formative assessments
are used to track program
or student progress in order
to make improvements in
program design or instruction.
Formative assessments
may take many forms (e.g.,
observations, surveys).

"

**…global learning
outcomes and empirical
indicators ensure a
shared language and
set of standards for
all global education
stakeholders.**

"

"

**An important source
of information about
student learning
outcomes came from
the Global Scholars
educator network.**

"

In this section, we present the evaluation framework developed by Global Cities for student global learning through digital exchange.

We begin by explaining why Global Cities focused on the student learning outcomes included in this framework and how this focus is linked to the broader field of evaluation.

Developing the Global Cities Student Learning Outcomes Framework

Despite its great potential, widespread adoption of global digital exchange by school districts and education ministries is unlikely without formal, rigorous third-party evaluation to demonstrate program outcomes. To determine the value and effectiveness of Global Scholars and make its work sustainable, Global Cities undertook several activities to improve the program and assess its educational impact.

In its initial years, Global Cities emphasized improving the Global Scholars curriculum and e-classroom, as well as collecting feedback from educators. During this time, Global Cities engaged an independent evaluation firm to provide a formative assessment, which focused on improving the program model and classroom implementation.

Global Cities convened superintendents and chief academic officers from more than 20 large U.S. school districts for a symposium on the value, purpose, and impact of global digital exchange programs (Tiven, 2016). There was consensus about the need for global learning and the potential effectiveness of global digital exchange. The discussion also emphasized the complexity of the learning goals for these programs, particularly the importance of the relationship between global learning outcomes and general learning outcomes.

Global Cities also reviewed the literature of the multidisciplinary field of global education, which provides theoretical justifications for bringing global education into the classroom. However, there was limited delineation of student outcomes or evaluation of the subfield of global digital exchange. Global Cities examined organizations that identified themselves as using technology for global education activities for K-12 students. This provided understanding of the variation in global digital exchange models, their missions, and their scale of operation. Global Cities found a limited number of examples of clearly formulated learning outcomes or assessment strategies for global digital exchange.[12]

12 See Veiga, 2016; Duckworth & Yeager, 2015; Mottet & Beebe, 2002; and Griffin, 2017 for a complete discussion of multiple competency areas.

At the same time, in preparing for formal evaluation of the Global Scholars program, Global Cities worked with a statistical survey research organization to articulate a theory of change and consider various evaluation designs. Global Cities concluded that the evaluation should focus on student learning outcomes. In the absence of sufficiently delineated outcomes and indicators for global digital exchange, Global Cities decided to systematically develop these before embarking on a formal evaluation of Global Scholars.

The goal was to develop a framework that would provide field standards for assessing any global digital exchange program and that would also be valuable to the broader field of global education. To make the framework broadly useful to program designers, evaluators, educators, and policymakers, Global Cities intentionally included a wide range of relevant indicators for each outcome. Not all indicators will be a primary focus for every global digital exchange model or every global education curriculum. Most importantly, the global learning outcomes and empirical indicators ensure that there is a shared language and set of standards for all global education stakeholders.

An important source of information about student learning outcomes came from the Global Scholars educator network. There were continuous opportunities for input through professional development and reflection sessions, site visits, and surveys. The feedback loop expanded as enrollment grew. Not only were there more classroom teachers and principals in more locations, but there were additional education administrators providing insights into program impact, ranging from field supervisors to high-level district and ministry leaders. Working more closely with district leaders allowed Global Cities to shift its focus from program implementation in individual classrooms to student learning outcomes across school districts and the entire Global Scholars network.

With these sources as a starting point, Global Cities program designers developed the student learning outcomes presented in this paper. Additional contributors were academics and consultants in evaluation research and social science. Teachers, principals, and district administrators from ten Global Scholars cities and a peer organization reviewed drafts of the full framework.

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> **We are presenting a new and expansive framework that identifies both global and general student learning outcomes… central to global digital exchange.**
>
> **"**

Standards-based assessments determine if students meet a predetermined standard for a specific stage of their education. These are a sub-category of criterion-referenced assessments, distinguished by the fact that the pre-determined standards are typically set by a recognized governing body.

The Need for an Evaluation Framework

The literature considers evaluation to be an essential part of educational program design and implementation.

Program evaluation can have a variety of goals and structures, including: needs assessments, which determine the needs of a specific population, provide recommendations to address these needs, and set the parameters necessary for program implementation; process evaluations, which determine if program implementation is aligned with program expectations and where implementation can be adjusted to improve this alignment; and outcome evaluations, which determine if the program is achieving its goals for student learning. All three evaluation types are important to understanding what a program is accomplishing and how outcomes can be enhanced and strengthened (MEERA, n.d.).[13]

In considering the general challenges of designing program evaluation, two are particularly relevant to global digital exchange. First, as in any emerging field, evaluations tend to focus on process and program improvement rather than student learning outcomes. This is especially true in a field as complex as global education, where student learning outcomes, indicators, and measures are only beginning to be systematically identified.[14]

The second challenge comes from the continuing preference in the broader field of education for using standards-based assessment, as opposed to assessing growth in student learning outcomes. There has been some recent movement in the latter direction. Of particular importance is increased adoption of student-centered learning, which has focused both instruction and assessment on individual motivation, progress, and growth.[15] Additional progress is needed, however, before evaluation of student learning outcomes becomes the prevalent practice.

Understandably, the literature and research on evaluating student learning outcomes for global digital exchange is sparse and does not offer field standards or a conceptual framework for evaluation. The goal of our work is to address this gap. We are presenting a new and expansive framework that identifies both global and general student learning outcomes that are central to global digital exchange. Global Cities developed these outcomes based on both the Global Scholars program objectives and feedback from its worldwide educator network. Importantly, it was also informed by the rich literature about the value and importance of global education and global competency discussed earlier in this report. The identification of intended outcomes will help educators and school districts assess global education offerings and will allow program developers to plan systematically for design, implementation, and evaluation. By using the student learning outcomes as a basis for program design, it is possible to identify specific indicators of developmental competency that can be measured over the duration of a global learning program.

13 MEERA identifies a fourth category, impact evaluation. Most evaluators consider this a type of outcome evaluation. In our formulation, we accept that view. For more on impact evaluation, see OECD, n.d.

14 Deardorff provides an early articulation of the need for student learning outcome assessment in her seminal work on intercultural competence (Deardorff, 2009). See also for example Boix Mansilla & Jackson, 2011; UNESCO, 2014; World Savvy, 2014; British Council, 2015; and OECD, 2016.

15 See, for example: Singhal, 2017; Bishop, Caston & King, 2014; Hannafin, Hill, Land, & Lee, 2013; Parkay, Anctil, & Hass, 2014; Lee & Hannafin, 2016; and Crumly, Dietz, & d'Angelo, 2014.

Global Competency for K-12 Students An effective global digital exchange program for students ages 10 to 13 will show growth in the development of global learning outcomes that include appreciation for diversity, cultural understanding, global knowledge, and global engagement. Students will also show growth in the development of general learning outcomes that support global learning. These include digital literacy, language communication, self-efficacy, academic engagement, and critical thinking. The development of these learning outcomes constitutes a definition of global competency for K-12 students.

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Our approach uses multiple methods to focus on student growth in these outcome areas.

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16 See Veiga, 2016; Duckworth & Yeager, 2015; Mottet & Beebe, 2002; and Griffin, 2017 for a complete discussion of multiple competency areas.

Conceptualizing and Defining Global Learning and Competency

'Global Cities' evaluation framework addresses three needs: to identify student learning outcomes for global digital education and the general learning outcomes that support global learning; to make these outcomes both explicit and measurable by identifying indicators across developmental competency areas; and to identify measurement approaches that are developmentally appropriate for students ages 10 to 13.

The conceptual framework identifies two sets of outcomes for students—global learning outcomes and the general learning outcomes that support global learning and other academic subjects. Taken together, these constitute a definition of global competency.

The following discussion considers the importance of each outcome and situates it within the literature on global education, global competency, and developmental psychology. First, we define each outcome. Then we identify empirical indicators consistent with the developmental competencies of children ages 10 to 13. The outcomes and indicators, where developmentally appropriate, can apply beyond this age group.

The indicators for each outcome are identified within the developmental competency areas of knowledge, skills, attitudes and behaviors.[16] The concentration of indicators within these areas varies by outcome. Global Cities identified a total of 112 indicators across the nine outcome areas. This approach intentionally included a wide range of indicators. These empirical indicators provide guidance to educators and evaluators to observe evidence of these outcomes in the classroom.

For each outcome, our discussion focuses on select indicators. These were chosen for two reasons: their presence in the literature, and their importance to global digital exchange. The full list of indicators for each outcome appears in the margin. We recognize that some outcomes and indicators are referred to differently in the literature. For this reason, we also identify cognate indicators and outcomes. The indicators can be used to formulate metrics that consider students' growth, progress, or improvement in developmental competencies that lay the groundwork for students to become globally competent adults.

Summative assessments determine the extent of a learner's success in meeting intended learning outcomes. They are normally used at the end of a curriculum unit or program.

We propose an approach to evaluation that uses multiple methods to focus on student growth in these outcome areas. The measurement approaches and tools we discuss will have applicability for different purposes. Some will be appropriate for summative assessment of overall program accomplishments. Others will be useful for measuring individual student progress and adjusting resources and instruction to address student needs. We consider assessment approaches identified in the broader education literature that relate to each student learning outcome. With few exceptions, these measurement approaches have not yet been used for global digital exchange. Nonetheless, discussion of how these approaches have been applied in the social sciences and other areas of education evaluation will be useful in developing metrics for evaluating global digital exchange. The goal of the following discussion is to explicate the framework.

Student Global Learning Outcomes

Our conceptualization of student global learning outcomes and specific empirical indicators, which are categorized within developmental competency areas, is summarized in *Table 1*.

Global learning outcomes are complex and present particular challenges for evaluation. This is especially the case for evaluations focused on students ages 10 to 13, who are just beginning to develop the abstract thinking required for global learning.

The student global learning outcomes and indicators were developed based on the Global Scholars program, as well as the literature on global education, global competency, developmental psychology, and other social sciences. These empirical indicators address a need in the field of global education, and particularly in the subfield of global digital exchange. We define each learning outcome but note that some are closely linked. We identify indicators across developmental competency areas for the global learning outcomes. We place each indicator in only one outcome area, while recognizing that some may overlap multiple outcome areas.

The discussion of measurement approaches for these outcomes considers how each has been studied in the social sciences and other areas of education. These approaches have been applied in a limited way to global education, and with few exceptions have not yet been applied to global digital exchange. In order to develop age-appropriate evaluation tools, we suggest building on existing research by adapting metrics that have been developed in cognate fields. This framework offers a common vocabulary and set of standards for using these learning outcomes in an evaluation.

The Global Learning Outcomes Grid (Table 1)
Global Learning Student Outcomes with Indicators

Developmental Competency Area	Appreciation for Diversity	Cultural Understanding
Knowledge Indicators	– Awareness of how one's life and the lives of others are influenced by broader cultural and historical contexts **1-AD** – Awareness of one's culture (behaviors, identity, beliefs) **2-AD** – Awareness of one's city and how it relates to other cities around the world **3-AD** – Awareness of different cultures within one's school, city, region, country, and world **4-AD** – Awareness of one's identity as a citizen of one's city **5-AD**	– Understanding how one's life and the lives of others are influenced by broader cultural and historical contexts **18-CU** – Understanding of one's culture (behaviors, identity, beliefs) **19-CU** – Understanding of one's city and how it relates to other cities around the world **20-CU** – Understanding of different cultures within one's school, city, region, country, and world **21-CU** – Understanding that problems may be solved differently depending on cultural factors **22-CU**
Skill Indicators	– Ability to identify and critically reflect on stereotypes in thinking about others **6-AD** – Ability to listen to others and discuss issues in a respectful and unbiased way **7-AD** – Ability to ask questions when encountering different perspectives **8-AD** – Ability to identify and critically reflect on intolerant behavior online and in-person **9-AD**	– Ability to adapt language and content of writing to meet the needs of diverse audiences **23-CU** – Ability to recognize different perspectives on specific global issues **24-CU**
Attitudinal Indicators	– Positive attitude toward one's own culture **10-AD** – Tolerance for differences **11-AD** – Responding to differences with openness and positivity, not fear **12-AD** – Willingness to interact with peers and adults of different backgrounds respectfully **13-AD** – Willingness to work collaboratively with peers and adults of different backgrounds to achieve shared goals **14-AD**	– Recognition of different perspectives as legitimate **25-CU** – Positive attitude toward other cultures **26-CU**
Behavioral Indicators	– Interacting with people of different backgrounds positively and respectfully **15-AD** – Working collaboratively with people of different backgrounds to achieve shared goals **16-AD** – Intervening against intolerant behavior online and in-person **17-AD**	

Based on *Evaluating Global Digital Education: Student Outcomes Framework (Global Cities, Inc., a Program of Bloomberg Philanthropies, 2017)*.

Key

Numbering denotes unique identifiers.

AD Appreciation for Diversity   **CU** Cultural Understanding   **GK** Global Knowledge   **GE** Global Engagement

Developmental Competency Area	Global Knowledge	Global Engagement
Knowledge Indicators	– Knowledge of local and world geography **27-GK** – Knowledge of global issues and their local impact **28-GK** – Knowledge of economics and politics and their impact **29-GK** – Knowledge of one's city government and differences among city governments around the world **30-GK** – Understanding that global issues are borderless and affect everyone **31-GK** – Understanding that global issues are complex **32-GK** – Understanding that differences in access to information, technology, and resources affect quality of life and perspectives **33-GK** – Understanding that problems may be solved differently depending on socioeconomic status, natural resources, government policy and political differences **34-GK**	
Skill Indicators	– Ability to apply research skills (finding, selecting, and applying information from multiple sources) to global issues **35-GK** – Ability to find information about global issues using credible sources from around the world **36-GK** – Ability to synthesize different perspectives on the same topic to draw conclusions about global issues **37-GK**	– Ability to engage in inclusive problem solving **41-GE**
Attitudinal Indicators	– Recognition of the importance of learning about other cities and countries **38-GK** – Recognition of the importance of learning about global issues that affect us all **39-GK** – Recognition of the importance of analyzing multiple perspectives **40-GK**	– Interest in the larger world, particularly unfamiliar people and places **42-GE** – Interest in global issues **43-GE** – Recognition of the value of inclusive problem solving **44-GE** – Recognition of one's capacity to advocate for and contribute to local, regional, or global improvement **45-GE** – Appreciation of language learning as a means of communicating and collaborating with people around the world **46-GE** – Willingness to take action to address global issues **47-GE**
Behavioral Indicators		– Using digital tools to learn from and communicate with students from cities around the world **48-GE** – Seeking opportunities to communicate with people in other cities and cultures, as well as in one's own **49-GE** – Seeking opportunities to interact and collaborate with people of different cultures and backgrounds **50-GE** – Gathering and interpreting information from people in one's own city and culture **51-GE** – Gathering and interpreting information from people in other cities and cultures **52-GE** – Presenting information, formally and informally, to people in one's own city and culture **53-GE** – Presenting information, formally and informally, to people in other cities and cultures **54-GE** – Working to contribute to local, regional, or global improvement **55-GE**

Appreciation for diversity is demonstrated understanding of the ways in which individuals and groups can be considered different (e.g., gender, nationality, race, ethnicity, religion), as well as the attitudes and behaviors that show tolerance, respect, and acceptance of those different than oneself, both locally and globally. Appreciation for diversity begins with investigating and defining one's own identity and culture, as well as wider group identities and the factors that influence these identities. As appreciation for diversity grows, students become aware of implicit and explicit societal biases and how these biases can interfere with acceptance of diversity. Students are also more likely to interact and collaborate positively and effectively with people of different backgrounds.

Appreciation for Diversity

Defining the Outcome Appreciation for Diversity

Appreciation for diversity is considered an essential component of global competency for students ages 10 to 13. The ability to appreciate diversity is fundamental to preparing K-12 students for higher education and careers in which they will have to work, learn, and live alongside peers from different backgrounds and countries. Global learning experiences present an important opportunity for classes to learn about diversity.

Appreciation for diversity involves knowledge, skills, attitudes, and behaviors that students develop over time and through experience. Most people continue to develop, refine, and deepen their appreciation for diversity over the course of their lifetimes, making it a high-level and long-term learning and development goal (Tichnor-Wagner, Parkhouse, Glazier, & Cain, 2016). Importantly, middle school[17] is the first time when students are developmentally capable of learning about diversity, and developing the attitudes and skills that will allow them to accept others as adults (Juvonen, Kogachi, & Graham, 2017).

Research shows that children can arrive at school with negative attitudes toward and misconceptions about different racial and ethnic groups (Aboud, 2008). It is therefore important that learning to appreciate diversity and tolerate differences are incorporated into the curriculum as soon as students reach a developmental stage when they are able to handle complex and abstract concepts. In this way, students develop their awareness of diversity at the same time as they are developing self and group identities. Even for students in earlier developmental stages, educators are designing curricula to teach appreciation for diversity based on the similarities and differences students already notice between themselves and others (Melliou, 2015).

One of the first steps toward building appreciation for diversity is creating learning opportunities for students ages 10 to 13 to develop awareness of individual and shared concepts of identity. At this level, students' abstract and compound thinking abilities have advanced enough to be able to move beyond simple and literal self and group identifications to more complex ones. Middle school students should be able to explore and reflect on how they identify themselves based on their family backgrounds, likes and dislikes, communication and learning styles, and other identifiers, and be able to trace them to a community or group that shares these attributes (Roeser, Eccles, & Sameroff, 2000).

Students should also be able to identify themselves and others as being part of multiple groups at the same time. These unique configurations of group identity play a core role in each person's self-identity. Moving beyond self-identity, students should then be able to investigate and develop awareness of

17 The term "middle school" is used by many U.S. education researchers in reference to schools that serve students ages 10 to 13.

group identities through knowledge of history and current affairs. Students recognize that this sense of group identity is driven by social differentiators including nationality, race, ethnicity, social class, and religion. Students should be able to participate in discussion and debate in the classroom about the nature and interactions of different groups and what unique attributes drive group identity (Kubal, Meyler, Stone, & Mauney, 2003).

Other important foundational elements of appreciating diversity are attitudes that reject biases and associate differences positively, rather than negatively. To fully recognize and value diversity, students must gain awareness of how earlier experiences may have conditioned them to act, think, and view others in particular ways. This conditioning can lead to unbalanced evaluation or prejudgment of individuals and groups (Banks, 2016). For students to develop an appreciation for diversity, they must first be made aware of psychosocial conditioning for assigning positive value judgments to individuals and groups viewed as similar to themselves and negative judgments to those viewed as different (Berger, Benatov, Abu-Raiya, & Tadmor, 2016). Making students aware of how they assign value judgments is best accomplished through discussion and collaboration in the classroom. The classroom culture should challenge students to question the value of these constructs and consider alternative judgments.

When students understand how they make positive and negative associations, they can also recognize biases resulting from homogeneity in their own life experiences. An important developmental step for students is identifying the vocabulary and understanding the causes of biases and recognizing how they are manifested. Examples include invisibility, imbalance, stereotyping, and fragmentation (Banks, 2016). From there, students must have the opportunity to reflect on how they themselves may knowingly or unknowingly think and act based on biases, developing a greater awareness of associated causes and effects (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

Appreciation for Diversity Indicators

Knowledge Indicators
Awareness of how one's life and the lives of others are influenced by broader cultural and historical contexts **1-AD**

Awareness of one's culture (behaviors, identity, beliefs) **2-AD**

Awareness of one's city and how it relates to other cities around the world **3-AD**

Awareness of different cultures within one's school, city, region, country and world **4-AD**

Awareness of one's identity as a citizen of one's city **5-AD**

Skill Indicators
Ability to identify and critically reflect on stereotypes in thinking about others **6-AD**

Ability to listen to others and discuss issues in a respectful and unbiased way **7-AD**

Ability to ask questions when encountering different perspectives **8-AD**

Ability to identify and critically reflect on intolerant behavior online and in-person **9-AD**

18 Alphanumeric codes in bold refer to indicators in *Table 1.*

An additional foundational element for learning to appreciate diversity is an understanding of pluralist societies and the importance of tolerance. Students can learn how twenty-first-century technology and mobility have impacted where people can live and work. This mobility tends to increase diversity, which has implications for students in their own schools and communities, as well as the wider world. Students ages 10 to 13 are equipped to learn about tolerance as an attitude necessary to be successful in a pluralist society and globalized workforce. Instead of gravitating toward peers who are most similar to themselves, a robust curriculum can provide students with learning opportunities to collaborate with a more diverse peer group. Such opportunities are accelerated by global digital exchange programs. Curricula can also provide opportunities to reflect and discuss how work and learning is enhanced by diversity and the importance of practicing tolerance on a day-to-day basis (Thomas, Tran, & Dawson, 2010).

Outcome Indicators for Appreciation for Diversity

The developmental state of students ages 10 to 13 presents particular challenges for identifying specific indicators of appreciation for diversity. To fully understand the concept of diversity and its implications, students must be capable of abstract thinking, formulating broad social constructs, and self-reflection. Middle school students are only beginning to demonstrate the capacity for this type of thought (Juvonen et al., 2017). It is therefore not likely that instructors and evaluators will observe behavioral indicators of appreciation for diversity. We determined that the appropriate developmental focus for this age group is on attitudinal and knowledge indicators that point to initial awareness and positive perceptions of diversity and demonstrations of tolerance in academic and social settings.

In the early stages of a unit that integrates appreciation for diversity, student ability to demonstrate familiarity with cultural and other identifiers is among the first key indicators. Their ability to recognize the cultural and historical components that make up their own identities and those of their peers is the foundation for appreciating different cultures and identities. In an academic setting, this ability should be developed through historical and current affairs research activities. This experience should provide students with broader knowledge of different cultures and identities in their immediate communities, as well as globally (Kumashiro, 2015). An additional indicator is students' ability to ask clarifying questions appropriately when they engage in exchanges with and about students of different cultural identities and backgrounds (Banks, 2016). These early indicators are important not only in themselves, but also as part of establishing general classroom expectations. They include: awareness of one's culture (**2-AD**[18]); awareness of different cultures within one's school, city, region, country, and world (**4-AD**); and the ability to ask questions when encountering different perspectives (**8-AD**).

Appreciation For Diversity Indicators

Attitudinal Indicators
Positive attitude toward one's own culture **10-AD**

Tolerance for differences **11-AD**

Responding to differences with openness and positivity, not fear **12-AD**

Willingness to interact with peers and adults of different backgrounds respectfully **13-AD**

Willingness to work collaboratively with peers and adults of different backgrounds to achieve shared goals **14-AD**

Behavioral Indicators
Interacting with people of different backgrounds positively and respectfully **15-AD**

Working collaboratively with people of different backgrounds to achieve shared goals **16-AD**

Intervening against intolerant behavior online and in-person **17-AD**

With increased exposure to global issues and people different from themselves, progress in appreciation for diversity should be indicated by students' increased awareness of bias and attempts to confront biases and negative attitudes, of which they may or may not have been previously aware (Roeser et al., 2000). At this age, students are being asked for the first time to regularly incorporate complex and abstract thinking into school work and discussions. Such thinking requires a progression from gathering information based on a "what is" construct to doing so based on a "what is absent" or "what should not be included" construct (Hassard & Dias, 2009). This level of thinking requires students to recognize the possibility of bias in their own understanding of identity, and that individuals and groups can misunderstand and misrepresent other identities.

While appreciation for diversity is a complex learning goal, the initial exposure and the related cognitive shift can be indicated in classrooms through students' understanding of and reflection on reactions to diversity. This includes negative behaviors, such as stereotyping, exclusion, and bullying, and the demonstration of open and positive behaviors, such as inclusion and collaboration (Pashby, 2008). Indicators of these cognitive and behavioral shifts include: the ability to identify and critically reflect on stereotypes in thinking about others (**6-AD**); the ability to identify and critically reflect on intolerant behavior online and in-person (**9-AD**); and responding to differences with openness and positivity, not fear (**12-AD**).

The last set of early indicators of appreciation for diversity requires the use of abstract thinking and connective reasoning to demonstrate understanding of how diversity impacts issues and what it means for students' futures. For students ages 10 to 13, core curricula often integrate world geography and global history in social science courses. This is done with an expectation that students will develop their ability to make connections across subjects when they learn about history, geography, and modern communities and cultures (Juvonen et al., 2017). Most K-12 educational pedagogy reflects the shift toward preparing students for a twenty-first-century world by including the skills and knowledge needed to work and live in highly diverse settings. This requires fostering a learning environment in which students are asked to apply their understanding of the importance of diversity to positive behavioral choices that indicate tolerance and willingness to engage and interact with a highly diverse peer group (Banks, 2016). Related indicators include: awareness of how one's life and the lives of others are influenced by broader cultural and historical contexts (**1-AD**); tolerance of differences (**11-AD**); interacting with people of different backgrounds positively and respectfully, and working collaboratively with them to achieve shared goals (**15-16-AD**).

Ipsative assessments
measure students against their
own prior performance, rather
than set criteria.

Assessment Models and Evaluation Tools for Appreciation for Diversity

Appreciation for diversity is a core student learning outcome for any global education program (or global digital exchange) and is considered a twenty-first-century skill by many educators (Kubal et al., 2003). While it is challenging to assess and is typically viewed as a long-term learning goal, developing the appropriate assessment tools to measure progress in a student's appreciation for diversity is essential (Banks & Banks, 2016).

Many of the previously discussed early indicators relating to appreciation for diversity emphasize knowledge building and attitudinal shifts. In considering assessments for these indicators, it is important to recognize that while knowledge building and attitudinal shifts require different forms of assessment to accurately capture progress and growth, appropriate assessments are inherently linked to where students are developmentally in their learning cycle. As such, these assessments should reflect student work and progress (Hattie, Masters, & Birch, 2016).

Assessment of awareness and knowledge is often done through standard pre- and post-program assessments. These assessments can be designed as simple inventories or as a battery of survey questions in which a student recognizes and identifies concepts. Inventories can be used for tracking overall knowledge within a subject area, as well as itemizing what a student does and does not recognize at the beginning and end of a program. They can also be administered at more frequent intervals throughout the duration of a program for formative purposes. Pre- and post-program assessments can also be made more complex by integrating either authentic or ipsative elements. Authentic assessments allow students to demonstrate their knowledge and awareness skills by applying them to real-world scenarios. Ipsative assessments, which measure students against their own prior work, provide opportunities for students to demonstrate and reflect on their own developmental growth (Burden, 2017).

The attitudinal shifts and subsequent behavioral changes associated with increased appreciation for diversity are best assessed through a combination of instructor observation and student reflection. These approaches to assessment recognize that for increased knowledge to change students' attitudes or behaviors, students must first be cognizant of their attitudes and behaviors. This is based on the assumption that the learning process is meant to disrupt prior attitudes and behaviors, enacted consciously or subconsciously, and condition new ones in their place (Lee & Bertera, 2007).

Global education programs can develop an evaluation of student learning outcomes that assumes the cohort will be cognizant of attitudinal and behavioral shifts. Students can, with prompting, reflect on their thoughts, attitudes, and behaviors. They can do this either in response to direct learning

Reflective assessments
require students to assess their own learning, consider the process by which they learn, and determine how they can improve. These assessments may take the form of written responses or discussions with instructors or peers and can be supplemented with instructor observations.

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Cultural understanding
is demonstrated recognition of the norms, characteristics, and values that shape how we interpret the world, and the application of this understanding when communicating and collaborating with others. Students must first gain cultural knowledge, grapple with its complexity, and use it to understand different perspectives. They are then able to alter their thinking and actions in ways that show tolerance and sensitivity to others who do not share their culture.

prompts, a survey, or peer and group dynamics. As the program continues, instructors can guide reflections to address individual and group progress toward more complex and integrated attitudinal and behavioral shifts (Caine, Caine, McClintic, & Klimek, 2009). These reflective assessments can be done as frequently as instructors deem useful, keeping in mind that development in children 10 to 13 years old can often present as nonlinear growth.

The advantage of reflective assessments is the rich insight they provide into students' attitudinal and behavioral shifts; however, these assessments have limitations. It is important to note that discrete learning styles and differences in academic and personal growth of individual students mean that not all students who experience shifts in their attitudes and behaviors are cognizant of them or can adequately express them through a reflective exercise. One way to overcome this limitation is to augment reflective assessments with instructor observations. This has the added benefit of allowing instructors to tie observational data to curriculum content, both by observing progress over the duration of the curriculum and providing opportunities for authentic demonstration of mastery. In these instances, instructors should ensure that discussions include modeling of desired behaviors. Instructors can then create observational inventories for when, how, and how often individual students and groups demonstrate associated behaviors and attitudinal responses to peers and prompts (Merrell & Peacock, 2016).

Appreciation for diversity is generally a long-term learning outcome that begins with knowledge acquired and understood, which can subsequently impact students' skills, attitudes, and behaviors. Measuring progress toward appreciation for diversity is best done through a combination of pre- and post-program, reflective, and observational assessment tools. These assessments consider the complexity of the concept and can measure student knowledge and skill acquisition over the duration of a specific program. At the same time, reflective and observational data provide insight into the process of student attitudinal and behavioral growth, reflecting the incremental and nonlinear development of students ages 10 to 13.

Cultural Understanding

Defining the Outcome Cultural Understanding

The classroom is often the first place where students are exposed to cultural, ethnic, religious, or other social differences within their peer group. The classroom can also be a vital place for students to find commonalities, build relationships, and practice a form of global citizenship. Cultural understanding allows students to recognize the cultures and values of those who are different

from themselves, respect the right of others to hold and honor their unique cultural identities and heritage, and reject negative or exclusionary views and actions aimed at different cultures. Through cultural understanding, students see the diversity of their classrooms and communities as necessary to more fully engage with local and global issues and as an advantage in attempting to solve global problems at any level (Grisham-Brown & Hemmeter, 2017). Digital exchange programs provide the opportunity for students to engage with peers from different cultural backgrounds, which is especially important for classrooms with limited cultural diversity.

Cultural understanding, like appreciation for diversity, is a high-level learning outcome that is abstract and lacks a single definition. Culture as a concept is more difficult to differentiate than other components of diversity such as gender, religion, or ethnicity; it is an intangible representation of norms, characteristics, and values that shape how individuals interpret the world around them and how they communicate with others (Banks, 2016). Cultural understanding, therefore, first requires that individuals can define their own cultures and see them in relation to different cultures. For individuals to practice cultural understanding, they must engage in a combination of self awareness, thinking, acting, and interacting while accessing historical and current social, political, and cultural contexts (Reimers, 2013). Therefore, as a learning outcome, cultural understanding must be viewed as the integration of multiple skill sets that challenge learners based on their own learning styles and profiles. We can expect learners to arrive at understanding at different times (Hattie et al., 2016).

Middle school is an ideal time to begin exposing students to learning environments and expectations that will foster cultural understanding. At this age, students can make the learning shift toward cultural understanding by

integrating diverse cultural knowledge into the content they create and modifying the nature, tone, and language of this content to appeal to a broader cultural base (Gay, 2013). Students are introduced to written and oral communication standards in earlier grade levels; however, they are not generally expected to tailor content and delivery to appeal to different audiences. Language arts and literacy curricula are where students ages 10 to 13 are typically introduced to writing and speaking differently to inform, explain, or persuade using both fact and opinion. This is also when they first learn to select different vocabulary and message-framing for various audiences (Townsend, 2014). At this point, students should be able to source and select material for their written and oral communications that is indicative of a broader knowledge of cultures. Students are also capable of making language choices that indicate an awareness of sensitivity toward the views and values of other cultures.

The integration of cultural understanding at this learning level should be supported by the expectation that students will demonstrate learning by making connections between subject learning and authentic situations. Through this process of constructing meaning, students develop cultural understanding and begin to see cities, countries, and cultures as a web of connections and interactions, which should influence how they speak, write, and present in the classroom and beyond (Edwards & Mercer, 2014).

The next level in a student's progression toward cultural understanding is the application of their knowledge of cultural differences to problem solving. Moving beyond simply recognizing different cultural viewpoints, students must be able to use these viewpoints in academic exercises to understand how cultural differences affect approaches to problem solving. In this way, students can take information, opinions, and contexts derived from cultural learning and use them to understand different perspectives on problems and to develop solutions within and outside academic settings. This is a critical developmental stage that allows students to learn about topics of greater intricacy and participate in authentic assessments (Condon, 2015).

One additional foundational element of cultural understanding is rejection of prejudice. Students must first understand cultural information and experiences and then use them positively in the learning environment, and finally, when confronted with prejudicial behavior in any sphere of their lives, reject it as incompatible with their educational and personal values (Hollins, 2015). Global learning curricula can address cultural and social prejudices from a historical point of view and provide opportunities in the classroom for students to explore and discuss the prejudices they may encounter in their schools and communities. Students must be able to articulate why prejudices should be rejected, and be able to participate in building social contracts regarding what is expected when they encounter prejudices against themselves or others. This proactive behavior demonstrates cultural understanding, and signals that students are able to both conceptualize cultural understanding and apply it in a positive way (Aboud, 2008).

Outcome Indicators for Cultural Understanding

Students continually develop and increase their cultural understanding over an extended period, both in school and other social settings. The first time students are asked to use concepts as complex as cultural understanding is likely to occur in middle school. At this level, indicators of learning outcomes such as cultural understanding are framed around knowledge and exhibited behaviors that demonstrate students' responsiveness to concept exposure and preliminary changes in behavior and learning practices (Caine et al., 2009).

A learning program aiming to increase cultural understanding for its students must identify areas of knowledge, skills, and behaviors that support cultural understanding. This allows evaluators to determine whether the program is successfully exposing students to these learning goals and providing opportunities for students to develop the associated knowledge and skills (Tye, 2014). One of the first indications that students are responding to cultural information and processing it in academic and social contexts, is their awareness of how cultures relate to each other. Developing an understanding of different cultures involves being able to differentiate cultures and identify how they may be connected through common elements. Students ages 10 to 13 can take information that is presented to them or that they have researched on one topic and build connections to related topics. They should therefore be able to indicate their recognition of a person, group, place, or event in terms of how it compares to others. This means that students will be able to learn about different cultures and be able to draw comparisons among them (Milner IV, 2010).

In addition, students should be able to recognize language choices and communication styles that can help or hinder message delivery to a culturally diverse or homogeneous audience (Hollins, 2015). This is an important indication that students are developing a sense of cultural understanding. Global digital exchange provides enhanced opportunities for both teaching and assessing these abilities by placing students in direct communication with an authentic, culturally diverse group. The outcome indicators in this framework directly reflect these developments, including understanding of one's city and how it relates to other cities around the world (**20-CU**); and the ability to adapt language and content of writing to meet the needs of diverse audiences (**23-CU**).

Additionally, students should show increased and proactive use of cultural knowledge in problem solving. They should understand how different experiences and viewpoints can impact potential solutions to local and global problems. Students ages 10 to 13 are developing the cognitive abilities needed to consider a problem from more than one perspective, and there is an added expectation that this process should yield more than one solution. Being able to use cultural knowledge in problem solving indicates a shift in

Cultural Understanding Indicators

Skill Indicators
Ability to adapt language and content of writing to meet the needs of diverse audiences **23-CU**

Ability to recognize different perspectives on specific global issues **24-CU**

Attitudinal Indicators
Recognition of different perspectives as legitimate **25-CU**

Positive attitude toward other cultures **26-CU**

Behavioral Indicators
Not applicable

both comprehension and attitude, which is key to students reaching an advanced level of cultural understanding (Gay, 2013). Such indicators include understanding that problems may be solved differently depending on cultural factors (**22-CU**); and the ability to recognize different perspectives on specific global issues (**24-CU**).

Additional attitudinal changes relate to students' interactions with peers. Global education aims to create citizens who are capable of thinking, acting, and interacting within a diverse peer group around global issues. This stems from students recognizing, tolerating, and valuing cultural diversity. While these models of thinking and acting develop over an extended period, students at the middle school level who are being exposed to global learning should show that they are processing cultural learning and connecting it with how they approach people and situations in school and in social settings (Kumashiro, 2015).

As students acquire cultural understanding they should also be able to demonstrate positive attitudes toward inclusiveness and confront or reject negative and prejudiced attitudes and actions. They accomplish this through communication, reflection, and decision-making. These indicators are closely linked to appreciation for diversity and are essential to the success of a global digital exchange program, as they both establish the foundation for students to build cultural understanding and set expectations for safe and positive learning environments. Relevant indicators of cultural understanding include understanding of different cultures within one's school, city, region, country, and world (**21-CU**), and recognition of different perspectives as legitimate (**25-CU**).

Assessment Models and Evaluation Tools for Cultural Understanding

Cultural understanding builds on cultural knowledge and other curricular content but goes beyond acquisition to include how students think about and apply this knowledge. Assessments must therefore allow students to articulate their thought processes in different ways and should ideally provide mechanisms for them to reflect on their thinking.

Evaluating the extent to which an individual student develops cultural understanding in an academic setting has some challenges. Cultural understanding requires students to translate their learning into attitudes and behaviors over the long term. This kind of social cognition takes place at different points in time and at different rates for individual learners who are part of the same peer group and exposed to the same content and learning environment (Midgley, 2002). Consequently, programs that wish to assess individual student growth can best do so by benchmarking each student's progress over the course of that program, rather than using linear growth models.

Authentic assessments
ask students to apply
knowledge and skills learned
in the classroom to real-world
scenarios. They are open-
ended and are often problem-
or inquiry-based.

There are additional challenges in developing metrics for "understanding." As a learning construct, understanding requires the acquisition of knowledge, coupled with a demonstration of how the knowledge connects to and applies in a given academic or social setting (Edwards & Mercer, 2014). For these reasons, to accurately assess understanding, its acquisition must be independently verified. This is particularly important at the middle school level when students are only just learning how to apply presented information in multiple or indirect ways (Caine et al., 2009). While an instructor may use simple identification to ascertain whether students have successfully retained information, this is not sufficient for assessing their understanding.

Among the key indicators for cultural understanding are students' ability to draw connections among different cultures and groupings, and to identify and adopt different cultural perspectives in the learning environment. These types of indicators are often measured through authentic assessments because their open-ended nature allows sufficient flexibility for students to demonstrate their ability to identify and relate concepts to each other. Specifically, the best authentic assessments of cultural understanding are those with synoptic design. A synoptic design will ensure that students are demonstrating their ability to reach a conclusion by synthesizing content from multiple disciplines or subject areas (Freeman et al., 2014).

Students progress toward cultural understanding at different rates, and authentic assessments can capture this variation. Those students who are experiencing more rapid progress can demonstrate this through the nature of the connections they draw, the depth of their explanations, and content creation. Those students who experience a slower rate of progress are also able to demonstrate their abilities without requiring any direct comparison to their peers. Authentic assessments can be done individually or in small groups, provided there is opportunity for identification of individual contributions or reflections. They are most successful when delivered as problem-based or inquiry-based prompts that allow students to deliver their responses using multiple modes of presentation, such as papers, oral presentations, or modeling (Hibbard, 2000).

The remaining indicators for cultural understanding involve attitudes and thought processes. The challenge in assessing these indicators comes from the need to isolate what students are doing with their learning, rather than assessing what they have learned against a standard (Edwards & Mercer, 2014). This can be done through the combined use of reflective and ipsative assessments. Student reflections, administered at intervals or after an activity or program, have been consistently shown to be one of the best ways to assess student process. These reflections provide instructors with a breakdown of how a student arrives at an outcome, and how, under different circumstances or in the future, they might take a different approach (Hattie et al., 2016). Reflections combined with ipsative assessments provide the opportunity for students to evaluate themselves based on effort and results compared to their own sense of prior work or proficiency. Through these

Global knowledge includes historical and current knowledge from multiple domains—geography, culture, politics, economics, and science. Global knowledge starts as a framework for understanding the world—how it is connected and divided, the people who occupy it, and the challenges they face. Students gain and demonstrate global knowledge through effective research and their understanding of perspectives from around the world. Global knowledge is necessary for students to understand that global issues are borderless and require solutions that are complex, interdisciplinary, and adaptable to different settings. Global knowledge is also necessary for students to become global citizens who share and exchange information, and build relationships with others outside of their local communities.

assessments, students may reflect on how they modify speech or behavior to be culturally appropriate, or recognize and legitimize different cultural viewpoints, as indicators of cultural understanding.

At ages 10 to 13, it cannot be expected that the results of students' processing will always yield a result easily identified as fully culturally competent and sensitive. So, both to determine program effectiveness through student outcomes and to support individual growth, assessments should focus on students' attempts and ability to process information and ideas. Reflective assessments provide this opportunity, as well as feedback for continual growth (Wentzel & Ramani, 2016).

Global Knowledge

Defining the Outcome Global Knowledge

Industry and higher education increasingly emphasize global knowledge and thinking as essential twenty-first-century skills that are not sufficiently represented in many standards-based curricula (Farris, 2012). Educators agree that new information and skills are needed for young adults to forge successful futures in "a world gone global" (Bertram, 2016). Education professionals often refer to the need for students to become global citizens and develop the ability to "think globally and act locally." However, there is still a significant divergence between the articulation of these needs and an agreed-upon methodology for building such advanced learning skills in K-12 students. What is widely agreed upon in pedagogy is that all of the "compound globals" (global awareness, global thinking, global citizenry, global engagement) require a strong foundation in global knowledge (Mok & Cheng, 2000).

Ages 10 to 13 are an ideal time to accelerate the acquisition of global knowledge. Core curricula in social studies, English, and science classes can easily integrate global knowledge, and students are developmentally at a stage where relational and abstract learning is possible and impactful (Meyer, Kamens, & Benavot, 2017).

One of the most accessible elements of global knowledge for most students is identifying place and space. Learning about global geography, countries, boundaries, and environments is where most students begin their awareness. The literal representation of what global means, combined with quantitative parameters like distance, area, and population, help students to expand their sense of the world and people in it beyond the immediacy of family, friends, and community. Once students can reliably identify broader geography and

boundaries, they can add to their global knowledge by exploring how these different locations can be identified functionally (i.e., climate and natural environments, political systems, trade, simple economic structures) (OECD, 2016). Students ages 10 to 13 are also learning to encounter this kind of new information through comparison and differentiation with what they already know. This leads to added spatial and locational knowledge as students begin to recognize discrete points on their own and as they relate to others (Farris, 2012).

Physical and structural knowledge naturally progress to social and cultural knowledge. Once a student has begun learning about discrete locations and what makes them physically and functionally unique, the next logical step is to explore the people and groups who inhabit different global locations. Students 10 to 13 years old are also beginning to learn about world history in their social studies courses. The course content provides the opportunity for them to learn about different civilizations, religions, and how they have migrated and interacted with one another (Hashweh, 2015).

One reason for introducing this content to students in this age group is that they have reached a developmental stage in which they are capable of social cognition, or processing and applying how other people appear to think and act in social situations. This is often developed as an extension of what students observe others doing and saying. Ultimately, students can consider how what others might think or feel leads them to their visible behaviors (Midgley, 2002). This psychosocial leap allows students to interpret historical and current cultural information, and begins the process of developing tolerance and understanding. This enhances their knowledge of people throughout the world who practice different religions or have different cultural norms and values than those with which they are familiar. They are able to reflect on how different cultures may relate to their own and can intellectually and emotionally process viewpoints that may differ from their own (Mok & Cheng, 2000).

19 Knowledge by definition is not a
behavior; therefore, we have not
included behavioral indicators for
global knowledge.

The most advanced aspects of global knowledge involve learning about problems and creating solutions. To do this, students must be able to comprehend both the unique and the universal aspects of global issues. Part of the core curricular work of middle school social studies focuses on historical and current conflicts within geographic, political, and social contexts (Balistreri, Di Giacomo, Noisette, & Ptak, 2012). Science curricula may also focus on environmental and health issues with both unique and universal elements (O'Connor & Hite, 2017). Both curricular areas support learning through content focused on problem solving, diplomacy, and collaboration.

As students explore global issues, such as environmental sustainability, food security, or flu epidemics, they are challenged to understand the elements of these problems that are universal and those elements that are particular to a specific place or culture. They are further challenged to generate and evaluate solutions with either specific or global applicability. A global/local view of problems and solutions is an essential part of being an active, informed twenty-first-century global citizen, and a critical aspect of all global knowledge to which students will be exposed as they continue their education (OECD, 2016).

Outcome Indicators for Global Knowledge

Global knowledge indicators[19] can be assessed across all disciplines by considering both student acquisition and retention. Students' individual interests and extracurricular learning will typically lead to different levels of global knowledge acquisition and retention. At the same time, common indicators of global knowledge should be present for all students participating in the same program.

Initial indicators of global knowledge focus on the acquisition of discrete information. As students are exposed to discipline-specific geospatial or political concepts, their ability to recall information is a fundamental indication that they are gaining global knowledge. As part of basic recall, students at the middle school level should also be able to differentiate and articulate simple comparisons between data points. According to studies in student learning and development, using information in an applied, relational way is correlated with increased long-term retention and greater depth of understanding, not just increased knowledge acquisition (Reimers, 2009a).

An important goal of programs like Global Scholars is to expose students to global knowledge and promote global citizenship, while laying the groundwork for continued global engagement. Thus, indicators for global knowledge not only identify information gains, but also relate to attitudes, skills, and behaviors that promote long-term learning. Indicators include knowledge of economics and politics and their impact (**29-GK**); the ability to apply research skills (finding, selecting, and applying information from multiple sources) to

Global Knowledge Indicators

Skill Indicators
Ability to apply research skills (finding, selecting, and applying information from multiple sources) to global issues **35-GK**

Ability to find information about global issues using credible sources from around the world **36-GK**

Ability to synthesize different perspectives on the same topic to draw conclusions about global issues **37-GK**

Attitudinal Indicators
Recognition of the importance of learning about other cities and countries **38-GK**

Recognition of the importance of learning about global issues that affect us all **39-GK**

Recognition of the importance of analyzing multiple perspectives **40-GK**

Behavioral Indicators
Not applicable

global issues (**35-GK**); recognition of the importance of learning about other cities and countries (**38-GK**); and recognition of the importance of learning about global issues that affect us all (**39-GK**).

Global knowledge indicators in several competency areas incorporate social awareness and understanding. In understanding their own and others' identities, it is not enough for students to simply think in terms of culture or ethnicity; they must work to understand why groups of people live, behave, and adopt the worldviews they do. Students ages 10 to 13 are developing cognitive abilities that allow them to attempt to see not just differing viewpoints, but the factors that contribute to the development of these viewpoints. As they gain global knowledge, students should be able to articulate and present their understanding of these factors as part of an academic exercise (Atabey & Topcu, 2017). Indicators include: understanding that differences in access to information, technology, and resources affect quality of life and perspectives (**33-GK**); the ability to synthesize different perspectives on the same topic to draw conclusions about global issues (**37-GK**); and recognition of the importance of analyzing multiple perspectives (**40-GK**).

The most complex global knowledge indicators are those involving global issues and problem solving. As students learn about local and global problems, they are expected to use their knowledge to frame and articulate the impact of these problems in their immediate community and more broadly. In earlier grades, students are generally introduced to problem solving as a process and a learning tool; it is unlikely that they have explored the broader impact of a global problem or presented a solution. By this age, and with the added support of a global learning program, students can demonstrate progress in their problem identification, framing, and articulation abilities through the integration of their global knowledge (Wagner, 2014).

In a project-based program like Global Scholars, problem solving is an essential part of student learning. Students are asked to conduct research and develop original solutions to complex global issues. Relevant problem solving indicators include: understanding that global issues are borderless and affect everyone (**31-GK**); understanding that problems may be solved differently depending on socioeconomic status, natural resources, government policy, and political differences (**34-GK**); and recognition of the importance of learning about global issues that affect us all (**39-GK**).

Assessment Models and Evaluation Tools for Global Knowledge

Indicators for global knowledge are found within multiple core academic areas and can be assessed discretely within each. However, because global knowledge represents a body of knowledge meant to encompass many distinct content areas taken together, effective assessment of global

knowledge should take place in an interdisciplinary environment or should integrate assessments from several academic areas. It is important for assessment design to factor this in, since global knowledge as a learning outcome is not subject-specific and has indicators that involve the use of knowledge across disciplines (Mok & Cheng, 2000).

To comprehensively assess global knowledge gains, it is typically best to start with a framework built around pre- and post-program assessments. This is important for several reasons. First, as the learning goal has a built-in expectation of gains in knowledge over the course of a program, assessments must benchmark the level of working knowledge of individual students at the start of the program. The pre-test allows instructors to calibrate instructional content to meet either a standardized end-proficiency level or a personalized learning plan. Regardless of approach, progress can be measured through a similarly constructed post-program assessment. Assessment of students' prior knowledge of concepts can be part of both formative and summative evaluation plans. A formative approach helps tailor lesson and assessment planning while providing enhanced opportunities for students to share or contribute based on their previous work (OECD, 2016). To achieve this, assessments should ideally be given once at the very start of the course or program, at designated intervals throughout the program, and as part of the final demonstration of learning and mastery. The nature of these assessments can vary from basic inventories or close-ended surveys to more in-depth qualitative short answers or essays. What is important is that programs identify intended knowledge gains and assess students' ability to identify and apply this knowledge similarly in pre- and post-program assessments.

As with cultural understanding, more advanced applications of global knowledge are best measured through assessments that are both authentic and synoptic. Authentic assessments are typically inquiry-based, allowing students to demonstrate global knowledge gains related to articulating problems and defining and applying concepts. Ensuring that these authentic assessments are synoptic, meaning that they draw on different concepts, topics, and subjects, gives students the opportunity to integrate portions of global knowledge into one open-ended assessment (Walker et al., 2015). These types of assessments afford the greatest opportunity for capturing the cross-curricular nature of global knowledge and student ability to synthesize its different elements.

Students may be developing aspects of global knowledge in different curricular areas. As a consequence, the assessment process can consider their ability to make connections organically among discrete aspects of coursework, and to see them all as global knowledge (Reimers, 2009d). This is also the first time developmentally when students can engage in authentic assessments that require the relational thinking and perspective taking essential to a global mindset. Prior to this age, students may recognize differing views, but lack the social cognition to employ cause-and-effect mindsets that allow an open-ended assessment of the application of global knowledge (Meyer et al., 2017).

Global engagement is interest in learning about the world, communicating and collaborating with diverse communities, and finding solutions to global problems. Globally engaged students seek opportunities to connect with the global community and demonstrate cultural understanding in their interactions. They use their global knowledge to problem solve by considering and including diverse contributors and perspectives.

Assessing global knowledge can be relatively straightforward, or more complex, depending on the student population and the expectations of growth and proficiency by the end of the program. It is essential, however, that assessments measure individual growth, not just grade level or standardized proficiency. Although elements of global knowledge are already included in some grade-specific standards for core curricula, global digital exchange programs aim for greater growth in and usage of this knowledge. Assessments can evaluate student ability to acquire and integrate global knowledge and learning both within the program and across the curriculum.

Global Engagement

Defining the Outcome Global Engagement

Part of the shift in primary education to a twenty-first-century pedagogy involves teaching students to recognize how their lives and communities connect to the larger world. This kind of active seeing, interacting, sharing, and collaborating means a student is globally engaged (ASCD, 2017). Global engagement may start at home, in the classroom, in a social or cultural group, or in the community. Students who experience the positive impact of global engagement typically continue and expand the scope of their engagement until it becomes a lifelong habit of mind and a core value (Cook, Smith, Lan, & Carpenter, 2016).

Global engagement encompasses receptivity to unfamiliar people, cultures, and groups without prejudgment. Globally engaged learners seek to build bridges by utilizing their cultural competency. Knowledge of global subject matter, cultural understanding, and social-emotional skills such as empathy all contribute to students' ability to successfully engage globally, and to recognize the value and importance of doing so (OECD, 2016).

For students to be able to globally engage, they must first develop these social-emotional skills. When students reach the 10-to-13-year-old age group, there should be a shift in the design of the learning environment and curriculum to support the development of these skills at a level not previously possible. A great deal of the developmental literature points to the importance of early adolescence, because students experience critical inflection points in their psychological, emotional, and moral development that allow them to think, act, and construct meaning outwardly and in a group-centric framework (Maslow, 1943; Piaget, 1977; Erikson, 1997). This period of personal growth is ideal for beginning targeted exposure to global engagement, as students are developmentally prepared to tackle the intellectual and emotional challenges of unfamiliar social environments, alongside a learning environment that promotes global interactions (Boix Mansilla & Jackson, 2011).

Global engagement is often introduced to students by using their existing intellectual curiosities and burgeoning sense of efficacy to foster global interests. By the time students reach ages 10 to 13, most are able to articulate personal interest in academic subjects and other topics. It is expected that as part of adolescent development, students differentiate their likes and dislikes and exhibit motivation to pursue knowledge and skills they view as related to expanding their interests (Lawson & Lawson, 2013). This readily applies to global engagement. Students are inclined to research, discuss, and build knowledge on global topics or the global implications of subjects of interest. The learning environment and curriculum can encourage and support this self-directed exploration. At the same time, instructors can frame classes around increasing students' sense of empowerment and self-efficacy to contribute positively to their own and other broader communities (Harkavy, Hartley, Hodges, & Weeks, 2016).

Another way to foster students' global engagement is through targeting interpersonal and communication skill development in a global context. Global engagement is fundamentally interactional, which means that for students to successfully engage and strengthen their engagements over time, culturally sensitive and tolerant ways of communicating and relationship building are key (Hopper, 2014). Students ages 10 to 13 are forming advanced social groups and experimenting with various forms of communication and relationship building on a daily basis as part of their psychosocial development. Learning to globally engage requires students to explore these dynamics in the face of greater diversity and lack of familiarity. Students must be able to use their growing global knowledge and cultural understanding to develop language and techniques for communicating and interacting in a way that allows them to globally engage (Johnson, Boyer, & Brown, 2011).

Once students learn how to communicate and forge relationships in a global learning environment, they can deepen and strengthen those relationships through collaboration. Developmental and organizational research now points to collaboration and inclusive problem solving as essential twenty-first-century skills that students need if they are to solve complex problems as adults (Green & Johnson, 2014).

Students ages 10 to 13 must develop interpersonal skills that allow them to practice active listening, share ideas and opinions, and respond appropriately to peers. These skills permit students to share knowledge and work toward common goals (Caligiuri & Lundby, 2014). Continued participation in group interactions builds trust and lays a foundation for approaching new peer groups with openness. The experience of collaborating with diverse peer groups as part of the learning and problem-solving processes equips students to initiate and value global engagement as they move forward in learning and life (Tichnor-Wagner et al., 2016).

Global Engagement Indicators

Knowledge Indicators
Not applicable

Skill Indicators
Ability to engage in inclusive
problem solving **41-GE**

Attitudinal Indicators
Interest in the larger world,
particularly unfamiliar people and
places **42-GE**

Interest in global issues **43-GE**

Recognition of the value of inclusive
problem solving **44-GE**

Recognition of one's capacity to
advocate for and contribute to local,
regional, or global improvement
45-GE

Appreciation of language learning
as a means of communicating and
collaborating with people around
the world **46-GE**

Willingness to take action to
address global issues **47-GE**

Outcome Indicators for Global Engagement

Global engagement for students ages 10 to 13 is indicated through their interest in and awareness of global issues, as well as their development of skills necessary to communicate and collaborate with a diverse peer group. Many related indicators of knowledge, skills, attitudes, and behaviors are also developed as part of other learning outcomes. However, students demonstrate global engagement when they show interest in and apply these competencies to participate in a global community, address global issues, or engage in inclusive problem solving.

Increased global engagement is a long-term learning outcome; consequently, indicators are generally measured along a continuum that shows progress in use and understanding. Students can demonstrate their growing understanding and abilities across a wide range of indicators that point toward increased global engagement (United States Department of Education, 2012).

Early indicators of students' global engagement will show the extent of their awareness of and interest in global topics. Students can do this in several ways: questions and answers during instruction or discussion; informal sharing of their learning; formal presentations; and independent or guided reflection. A student's level of awareness and interest are indicated by willingness to engage in these activities, degree of effort and persistence, and quality of output (Siczek & Engel, 2017).

It is also important to note that students ages 10 to 13 increasingly define their interests and demonstrate areas of increased awareness by selecting topics that they view as relevant to themselves. At earlier learning levels, students passively identify areas of interest, but as they individualize and develop a sense of self-efficacy, they tend to revisit and redefine their interests based on activities in which they are or could be involved. These processes signal potential for global engagement because, taken together, they constitute the learners' receptiveness to global subject matter and the sense that they have an active part to play (Nicaise, Gibney, & Crane, 2000). Indicators include interest in global issues (**43-GE**) and recognition of one's capacity to advocate for and contribute to local, regional, or global improvement (**45-GE**).

As with more developmentally advanced levels of any global learning outcome, demonstrations of global engagement overlap with other learning areas. For example, global engagement requires and supports development of language communication skills, which are also essential to English Language Arts curricula (Anduiza, Jensen, & Jorba, 2012). These skills play an important role in any project-based learning model. Global engagement is distinguished from other communication skills by emphasizing the appropriate tone, vocabulary, and content for engaging with globally diverse groups. Communication indicators relevant to global engagement include appreciation of language learning as a means of communicating and collaborating with people around the world (**46-GE**); and presenting information, formally and informally, to people in other cities and cultures (**54-GE**).

Global Engagement Indicators

Behavioral Indicators
Using digital tools to learn from and communicate with students from cities around the world **48-GE**

Seeking opportunities to communicate with people in other cities and cultures, as well as in one's own **49-GE**

Seeking opportunities to interact and collaborate with people of different cultures and backgrounds **50-GE**

Gathering and interpreting information from people in one's own city and culture **51-GE**

Gathering and interpreting information from people in other cities and cultures **52-GE**

Presenting information, formally and informally, to people in one's own city and culture **53-GE**

Presenting information, formally and informally, to people in other cities and cultures **54-GE**

Working to contribute to local, regional, or global improvement **55-GE**

As students gain experience interacting with a global peer group, they should be able to identify the challenges of the media available for communication and the difficulties in overcoming potential language barriers (Commander, Zhao, Gallagher, & You, 2016). Beyond language skills, students should be able to use digital tools to communicate with global peers and recognize how these tools make international communication possible. While this is relevant to indicators of cultural understanding (**23-CU**) and the general learning outcome digital literacy (**64-DL**), global engagement specifically relates to using digital tools to learn from and communicate with students from cities around the world (**48-GE**).

Finally, some indicators of global engagement focus on the interpersonal skills students need to communicate and collaborate with a global peer group. At its core, global engagement is about students engaging with a broader community to share information and ideas. First, students must use their communication skills, interests, and knowledge to work as a group to more completely understand problems, design solutions, and suggest changes (Tichnor-Wagner et al., 2016). Students should also be able to explain why solutions proposed by their global peers may not be appropriate for their immediate environment. Programs that engage students in project- and inquiry-based learning provide students with significant opportunities to build such skills. Examples of these indicators include the ability to engage in inclusive problem solving (**41-GE**); gathering and interpreting information from people in one's own city and culture, as well as from people in other cities and cultures (**51-52-GE**); and sharing and presenting information with people in one's own city and culture, as well as with people in other cities and cultures (**53-54-GE**).

Assessment Models and Evaluation Tools for Global Engagement

Global engagement is developmentally the most difficult global learning outcome for students to achieve. Assessments of student global engagement must particularly target thought processes and behaviors by which students synthesize global learning and general learning to interact effectively with a highly diverse peer group, as well as to understand and act on global issues. Global engagement is often demonstrated concurrently with other learning outcomes, such as cultural understanding, digital literacy, or language communication. Assessment of global engagement is therefore best done in a cross-disciplinary setting, which for students ages 10 to 13 is most typically found in social studies and science core courses, or in project-based electives.

Students may demonstrate the various indicators of global engagement in unique ways and in discrete timeframes. Assessments should therefore be iterative, rather than pre- and post- program, in order to capture skill

development and consistency of use. Assessments should not compare students to one another. Instead, they should focus on individual learners, their progress, and areas of strength and weakness (Boix Mansilla & Jackson, 2011).

Questionnaires, including simple inventories and surveys, can be used to assess preliminary attitudes toward global engagement and students' current involvement in globally oriented activities (OECD, 2016). Surveys can also ask students to assess their own ability to contribute to local or global change. In addition, knowledge-based assessments may be used to measure a student's knowledge of local and international advocacy institutions and civic mechanisms they can engage in to contribute to improvement (National Assessment Governing Board, 2014; Schulz, Ainley, Fraillon, Losito, & Agrusti, 2016). In a global learning context, questionnaires and inventories can be administered pre- and post-program to track changes in interest in, and knowledge of, global issues.

More comprehensive assessments of global engagement use student reflections alongside dynamic assessments, which measure student ability to acquire new knowledge and skills in a previously unfamiliar topic. This approach makes it possible both to track students' progress and gain insight into how they arrive at specific choices or behaviors. These types of assessments often overlap with those used in civic engagement and civic literacy courses. One example of a dynamic assessment is a guided inquiry performance, in which students learn about a global issue by gathering and interpreting information from multiple sources. Students then reflect on their learning process, the new insights they gained, and their remaining questions. Reflections can be open-ended or guided by prompts. Students can use their reflections to determine how they can further engage with the global topic (Epstein, 2014).

Through self-reflection, students also become more aware of their thought processes and how they might modify them in the future. Individual learning goals and strategies can be identified through a feedback loop between the instructor and the student. Instructors can offer specific techniques for growth based on students' learning profiles and chart their overall growth using global competency or citizenship scales (Harshman, Augustine, & Merryfield, 2015; Morais & Ogden, 2010). When dynamic assessments are used over time, they show change in student ability to synthesize multiple concepts or content areas. They are designed to provide feedback on growth and development for individual students over short intervals. These tools supplement an assessment framework built on regular and individualized monitoring and feedback of indicators that demonstrate global engagement (Johnson et al., 2011).

Opportunities for students to demonstrate global engagement can be built into curricula. Project-based assignments that ask students to propose solutions to a global issue can be used to assess knowledge and skills needed to globally engage as well as students' recognition of their ability to contribute to positive change. For example, students may be asked to create a persuasive piece of media, such as a letter or video, to advocate for a particular solution. Students can be assessed on the strength of their argument, sources of information, and ability to respond to criticism. This process can also be used to measure a student's ability to engage in collaborative problem solving by requiring students to work in small groups to present shared solutions. Formative feedback, coupled with clearly articulated criteria, should be given routinely to guide student work (Epstein, 2014).

Authentic assessments requiring student research and analysis can also be used to assess global engagement. Students can be asked specifically to gather information from individuals and sources in their city or beyond, using digital and nondigital means. Submitted portfolios can be assessed to determine the degree to which students relied on multiple and diverse sources and engaged with others to put forth proposals (OECD, 2016; Soland, Hamilton, & Stecher, 2013). Global digital exchange programs may use culminating projects to assess students' ability to synthesize information learned from global peers over the course of the program to develop local and global solutions. Students should also be able to explain why solutions put forth by their global peers may not be appropriate for their immediate environment.

The assessments described above can be applied on an individual or group basis. The collaborative nature of global engagement makes group assessment particularly relevant, but carries specific challenges. Students' ability to interact with peers and work toward shared outcomes is typically assessed at a basic level by the quality of the final product that the partnership or group produces (Nicaise et al., 2000). This has some use in assessing the effectiveness of the combined work, particularly if the assessments are deliberately designed so that individual members must contribute discrete or unique elements. However, particularly at a middle school level, when students' sense of scholastic ownership and team accountability are still developing, there is limited utility in using only the final product or performance to assess each student's collaboration and interpersonal skills (Green & Johnson, 2014).

Additional insights into group interactions can be gained by supplementing these assessments with peer feedback. Traditionally, student peer reviews take place at the culmination of a course or program. However, recent research in middle and high school learning shows that peer evaluation and feedback throughout the course of a unit or project contributes to increased positive habits of mind and study for a broad cross-section of students (Lawson & Lawson, 2013). Students ages 10 to 13 may be new to peer work and peer evaluation, so instructor modeling and feedback on peer evaluation is critical to achieving increased positive outcomes for most students.

Assessing global engagement in an academic setting is challenging due to the need for regular developmental feedback on student performance. Longitudinal learning outcomes like global engagement need to be assessed on their long-term demonstration, requiring comprehensive qualitative assessment data measured over time (Cook et al., 2016). Students' capacity for and receptiveness to global engagement can be tracked over time through authentic and project-based assessments with self-reflective elements. Taken over the course of a project or unit, the collection of peer feedback also provides a robust indication of how each student is progressing within the context of the group (Caligiuri & Lundby, 2014). When students are working in groups, regular peer evaluation provides insight into individual progress and collaboration skills. Incremental assessment-feedback-reassessment cycles combined with final deliverable quality and performance evaluation, are highly effective for tracking both discrete indicators and overall level of global engagement.

General Learning Outcomes that Support Global Learning

The general learning outcomes that support global learning are identified in *Table 2*. General learning outcomes are those that are addressed across academic subjects. This framework includes five general learning outcomes based on direct feedback from Global Scholars educators, who noted accelerated growth in these outcomes as a result of program participation. School district leaders also reported that they are best able to implement global learning programs that are designed to align with elements of general learning and core curricula.

Consequently, the framework includes the general learning outcomes that support and are further developed through global learning: digital literacy, language communication, self-efficacy, academic engagement, and critical thinking. While we understand that growth in these outcomes may occur as a result of other educational activities, educators observed a connection between these student learning outcomes and participation in the Global Scholars program (Tiven, 2016).

In this section, we consider the importance of each general learning outcome and situate it within the education and developmental psychology literature. We provide a definition for each general learning outcome and relate it to global education. We identify specific empirical indicators within developmental competency areas for these general learning outcomes. We highlight those indicators that are particularly relevant to global digital exchange (see *Table 2*). Our framework includes many indicators for each outcome. We do not discuss all of these, but instead address selected indicators based on their presence in the education literature, as well as their centrality to digital exchange. Last, we offer examples of assessment strategies that can be adapted for evaluating the general learning outcomes that support global learning.

The General Learning Outcomes Grid (Table 2)
General Learning Student Outcomes with Indicators

Developmental Competency Area	Digital Literacy	Language Communication
Knowledge Indicators	– Knowledge of basic hardware, software, and online tools **56-DL** – Knowledge of different methods to access online information **57-DL** – Understanding of internet security and safety **58-DL** – Understanding of online communication etiquette **59-DL**	– Understanding how to adapt language and vocabulary for adult and student audiences (e.g. formal letters, presentations, e-classroom posts) **68-LC**
Skill Indicators	– Ability to use digital tools to research and learn information **60-DL** – Ability to use digital tools to create original content **61-DL** – Ability to use digital tools to present information **62-DL** – Ability to select appropriate digital tools for different purposes and audiences **63-DL**	– Ability to use the English language in formal and informal written communication **69-LC** – Ability to use the English language in digital and nondigital written communication **70-LC** – Ability to use the English language in oral communication **71-LC** – Ability to articulate and discuss opinions **72-LC** – Ability to communicate effectively with diverse audiences using appropriate language, verbal and nonverbal behavior, and strategies **73-LC** – Ability to understand a variety of English language texts (e.g. fiction, nonfiction, articles, websites, video and audio) **74-LC**
Attitudinal Indicators	– Appreciation for digital tools as a means of communicating with varying audiences and encountering different perspectives **64-DL**	– Appreciation of language learning as a means of communicating and collaborating with diverse audiences **75-LC** – Appreciation of the importance of effective speaking and writing skills **76-LC**
Behavioral Indicators	– Using digital tools to research and learn information in academic and social activities **65-DL** – Using digital tools to present information in academic and social activities **66-DL** – Using digital tools to create original content in academic and social activities **67-DL**	

Based on *Evaluating Global Digital Education: Student Outcomes Framework (Global Cities, Inc., a Program of Bloomberg Philanthropies, 2017).*

Key

Blue identifies general learning indicators essential to global learning outcomes.

Numbering denotes unique identifiers.

DL Digital Literacy   **LC** Language Communication   **SE** Self-Efficacy   **AE** Academic Engagement   **CT** Critical Thinking

Developmental Competency Area	Self-Efficacy	Academic Engagement	Critical Thinking
Knowledge Indicators		– Understanding that learning in different subject areas is connected **85-AE** – Understanding that academic learning is connected to real-world issues **86-AE** – Understanding that current learning and experiences are connected to specific careers **87-AE**	– Understanding how to ask clarifying questions **98-CT** – Understanding how to evaluate the validity of information from online, multimedia, and print sources **99-CT** – Understanding how to cite evidence to support arguments **100-CT** – Understanding how to organize information **101-CT** – Understanding the difference between information and opinion **102-CT**
Skill Indicators	– Ability to learn in new situations **77-SE** – Ability to learn in challenging situations **78-SE** – Ability to take initiative when working with others **79-SE**	– Ability to engage in self-directed work independently **88-AE** – Ability to engage in self-directed work collaboratively **89-AE**	– Ability to analyze causes and effects **103-CT** – Ability to analyze similarities and differences **104-CT** – Ability to evaluate pros and cons **105-CT** – Ability to synthesize multiple perspectives **106-CT** – Ability to develop and explain original opinions based on evidence **107-CT** – Ability to develop solutions to problems independently or collaboratively **108-CT** – Ability to understand the impact of actions taken **109-CT**
Attitudinal Indicators	– Appreciation of the importance of actively participating and putting forth one's best effort **80-SE** – Interest in trying new things and addressing new challenges **81-SE** – Sense of empowerment to create solutions **82-SE** – Willingness to adapt to and take action in challenging situations **83-SE** – Willingness to take responsibility for one's actions **84-SE**	– Pride in one's academic work **90-AE** – Interest in presenting work to peer audiences **91-AE** – Appreciation of the importance of acquiring new knowledge and skills **92-AE** – Appreciation of the importance of doing well in school **93-AE**	– Willingness to approach problems critically **110-CT**
Behavioral Indicators		– Working effectively alone **94-AE** – Working effectively in collaboration with others **95-AE** – Applying academic learning beyond the classroom **96-AE** – Critically reflecting on one's work **97-AE**	– Proposing multi-step solutions to complex problems **111-CT** – Engaging in inclusive problem solving **112-CT**

Digital literacy, developed through global learning, is knowledge of technology and its responsible use for creating content and communicating, both locally and globally. Digital literacy begins with the understanding of digital terminology and tools, as well as methods for online navigation, research, and communication. It progresses to the ability to use digital tools to gather and present information and integrate these skills into academic and non-academic activities. Students engaged in global learning gain appreciation for these digital tools as means to engage with international peers and share work and ideas on a global scale.

Digital Literacy

Defining the Outcome Digital Literacy

As technology has become more advanced and ubiquitous, educators have recognized the need to include digital literacy skills in K-12 education. Today, most schools cite technology skills, digital literacy, advanced communication, and team-building among the attributes of a successful student-learner profile (Pink, 2012; Dwyer et al., 2014). By framing technological proficiency as a form of literacy, educators are saying that students must build an understanding of the technological lexicon and develop the skills needed to become effective users of technology. This will allow them to master new digital tools as they move forward in their personal and professional lives (Cabezudo et al., 2008).

The basic components of digital literacy are information literacy and digital communication skills. Information literacy is defined in many middle school curricula as understanding how information is stored and shared, and being able to read and navigate digital text in an efficient and effective manner (Parks, 2012). Digital communication includes the ability to generate clear text and content using digital programs, as well as use of these tools to engage with others on digital platforms (Wood, 2012).

The need for digital literacy is supported by trends in education and the economy. Student-centered learning and the growth of technology- and knowledge-based economies have pushed education to evolve its core curricular offerings, and augment them with content and skills supporting success in high-tech work (Wagner, 2014; Dwyer et al., 2014). At the same time, a great deal of recent educational research expresses the need for

Digital Literacy Indicators

Knowledge Indicators
Knowledge of basic hardware, software, and online tools **56-DL**

Knowledge of different methods to access online information **57-DL**

Understanding of internet security and safety **58-DL**

Understanding of online communication etiquette **59-DL**

Skill Indicators
Ability to use digital tools to research and learn information **60-DL**

Ability to use digital tools to create original content **61-DL**

Ability to use digital tools to present information **62-DL**

Ability to select appropriate digital tools for different purposes and audiences **63-DL**

Attitudinal Indicators
Appreciation for digital tools as a means of communicating with varying audiences and encountering different perspectives **64-DL**

Behavioral Indicators
Using digital tools to research and learn information in academic and social activities **65-DL**

Using digital tools to present information in academic and social activities **66-DL**

Using digital tools to create original content in academic and social activities **67-DL**

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20 Alphanumeric codes in bold refer to indicators in *Table 2*.

curricula and standards in primary level disciplines to be taught and assessed in ways that are interdisciplinary and resemble the "real world" (Partnership for 21st Century Learning [P21], 2007). Over the past decade, digital usage, skills, and tools expected of robust curricula have expanded and grown more complex, with the greatest skill gains expected in the two to three years prior to high school (International ICT Literacy Panel, 2007).

The context of global digital exchange can provide opportunities for students to access, use, and generate multimedia content, such as audio, video, and graphics. Digital literacy greatly enriches global education as it presents opportunities to explore, share, and interpret not just words or symbols, but whole complex messages representing diverse points of view, beliefs, and values (Cabezudo et al., 2008).

Outcome Indicators for Digital Literacy

As a student learning outcome, digital literacy exists on a spectrum ranging from basic understanding and passive use to more complex engagement and creation. While traditional definitions focus on knowledge and use of hardware and software, global digital exchange expands the scope of digital literacy to include the use of digital tools and platforms to engage with and present original content to an international audience. The initial indicators of digital literacy are knowledge-based and relate to recognizing and using digital terminology, as well as using online platforms to search for and access relevant and reliable information (Information Technology Association of America, 2000). These indicators include knowledge of basic hardware, software, and online tools (**56-DL**[20]); knowledge of different methods to access online information (**57-DL**); and the ability to use digital tools to research and learn information (**60-DL**).

As students progress toward more complex and dynamic levels of digital literacy, indicators focus on skills and behavior. Students engaging in digital exchange learn the capacity and limitations of digital platforms as they use these platforms to communicate with other students internationally. Examples of these indicators include the ability to use digital tools to present information (**62-DL**); appreciation for digital tools as a means of communicating with varying audiences and encountering different perspectives (**64-DL**); and using digital tools to present information in academic and social activities (**66-DL**).

The optimum level of digital literacy includes the mastery of specific capabilities such as creating original content, utilizing multiple tools and sources to express ideas and opinions, integrating learning from earlier activities, and recognizing the wider role of technology, media, and digital exchange platforms in society (Flanigan, 2014). Examples of specific indicators for this last and most complex level of digital literacy include: the ability to use digital tools to create original content (**61-DL**); the ability to select appropriate digital tools for different purposes and audiences (**63-DL**); and using digital tools to create original content in academic and social activities (**67-DL**).

Assessment Models and Evaluation Tools for Digital Literacy

Digital literacy as a learning outcome is a progression of identifying, understanding, and doing in the classroom. Students build toward a complex and integrated capacity to use and understand technology, combined with a capacity to continue to expand knowledge and skills in future classes and outside the classroom setting (Crossman, 2017). Initial indicators, such as demonstrations of vocabulary comprehension and use of discrete skills, are typically "scaffolded" and assessed in technology and core subject classes. This is done through a combination of formative assessments, which track student progress for the purpose of providing feedback, and ipsative assessments, which measure this progress against prior performance (Mandinach, 2005).

Students are likely to start programs with some recognition of digital terminology and experience with technology. However, their levels of skill and knowledge will likely vary significantly due to different levels of exposure outside of the classroom (Wohlsen, 2014). For this reason, while a growing number of education systems are developing grade-level standards for digital literacy, assessment is most effective when it focuses on individual growth. Use of initial student self-inventories, combined with authentic and task-based assessments, will help educators or evaluators create individual student learning profiles. These profiles identify areas of existing competency and potential growth, as well as effective learning strategies to achieve specific curriculum outcomes (Hicks, Turner, & Fink 2013). Progress is then best tracked through scheduled benchmark assessments in small group, peer, or student-teacher settings, in which tasks and processes can be demonstrated and use of vocabulary can be checked against prior progress or mastery level. Using benchmark assessment, students can be given regular and real-time feedback, as well as additional instruction to progress toward higher demonstrated levels of mastery (Stone, 2014).

Language Communication

Defining the Outcome Language Communication

The exponential growth of technology and digital connectivity across the globe has changed many of the skills associated with literacy. This includes how students read, write, and speak to convey information, express opinions, share thoughts and feelings, persuade, and motivate. Traditional education models have always emphasized strong communication skills through exposure and skill development (Partnership for 21st Century Learning, 2007). However, research suggests that students still struggle to master both foundational and more advanced communication skills, and have difficulty applying these skills beyond the classroom (Casner-Lotto & Barrington, 2005). In our interconnected

Language communication, in the context of global learning, is the ability to speak, write, and present information, ideas, and opinions to diverse communities. Students must be able to apply global knowledge and cultural understanding to adapt language for both local and global audiences. Language communication also refers to the ability to read and comprehend a variety of print and digital texts, including multimedia, in order to understand and respond to information, narratives, and perspectives from around the world. As students develop these skills, they learn to value language as a means to exchange ideas, collaborate, and problem solve with people of different backgrounds.

world, students must have command of communication skills across multiple media and be able to detect and respond to the nuances of changing language and meaning.

The first language communication concepts introduced at elementary school levels are reading for content and with increased fluency, using correct speech, and writing clearly (Jacobs, 2015). These concepts are revisited each new school year with added content and complexity, so that when students are preparing to enter high school, they can read different informational and literary texts for meaning; construct text using academic and formal language; and identify the purpose, structure, and vocabulary choices of text and speech (Warschauer & Kern, 2005).
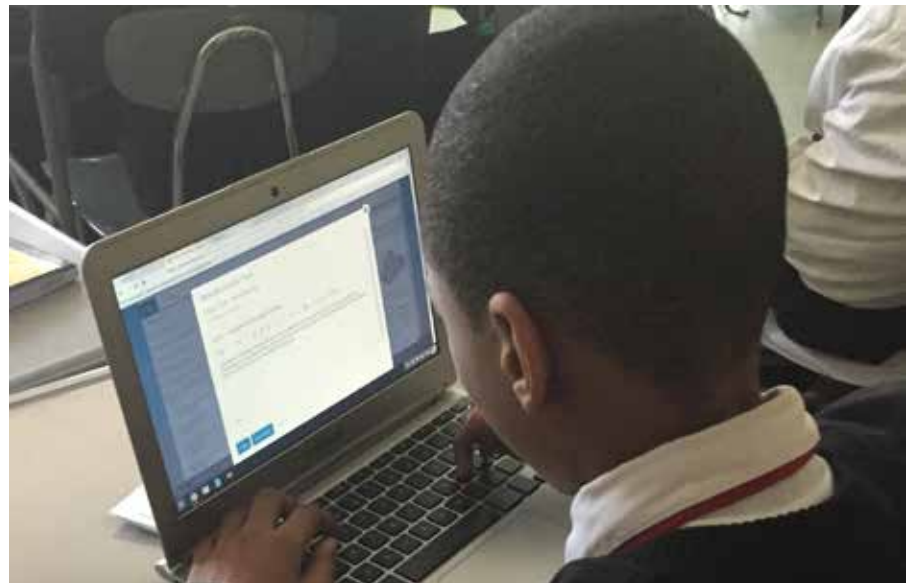
Students ages 10 to 13 are at a critical juncture for language communication development. During this time, students are introduced to the construct of writing and speaking for varied audiences and purposes (TESOL International Association, 2013). This makes it necessary for students to continue to expand and refine their vocabulary and sentence construction skills, while at the same time beginning to differentiate these skills for various contexts. English Language Arts curricula must include digital media (e.g., blogs, social media, videos, traditional press) aligned with a discussion of the purposes of these media, as well as the language choice and content structure that best serve students' intentions as authors and presenters (Widdowson, 2011).

Finally, language communication, particularly in a global classroom, has a social dimension. Students must develop proficiency and confidence in using a common language to articulate ideas, share responsibility, and make compromises in order to communicate and collaborate. Developing a common language is critical to successfully engaging a diverse group of students from around the world in problem solving and project completion (Bellanca & Brandt, 2010).

Language Communication Indicators

Knowledge Indicators
Understanding how to adapt language and vocabulary for adult and student audiences (e.g. formal letters, presentations, e-classroom posts) **68-LC**

Skill Indicators
Ability to use the English language in formal and informal written communication **69-LC**

Ability to use the English language in digital and nondigital written communication **70-LC**

Ability to use the English language in oral communication **71-LC**

Ability to articulate and discuss opinions **72-LC**

Ability to communicate effectively with diverse audiences using appropriate language, verbal and nonverbal behavior, and strategies **73-LC**

Ability to understand a variety of English language texts (e.g. fiction, nonfiction, articles, websites, video and audio) **74-LC**

Attitudinal Indicators
Appreciation of language learning as a means of communicating and collaborating with diverse audiences **75-LC**

Appreciation of the importance of effective speaking and writing skills **76-LC**

Behavioral Indicators
Not applicable

Outcome Indicators for Language Communication

While language communication is considered a critical general learning outcome at the elementary school level, the continued acquisition and deepening of language communication skills is an important part of robust pedagogy at all levels (Ntelioglou, Fannin, Montanera, & Cummins, 2014). This is particularly the case when there is any form of multilingual or language-immersion teaching (Wagner, 2014). Skill indicators in our framework reference the English language, but these indicators are also appropriate for students participating in digital exchange programs implemented in other languages. Such programs provide opportunities for language communication practice for both native speakers and language learners.

There is an expectation that students 10 to 13 years old will have already developed the basic mechanics of language, and that their learning should focus on ease and appropriate use of language across the curriculum. Initial indicators relate to the ability to use language as a means of building personal and shared knowledge in the classroom (Kucer, 2014). An example of this is the ability to understand a variety of English language texts (e.g., fiction, nonfiction, articles, websites, video, audio) (**74-LC**).

More advanced indicators are skill-based and relate to student ability to use language communication to share knowledge with peers, instructors, and other outside parties. These indicators involve students conveying something they have studied, learned, thought, or felt with others, using language that clearly illustrates their points and takes into account the setting and audience (Asselin, 2017). Digital exchange provides robust opportunities to practice adapting writing and speech for diverse contexts. Within the evaluation framework, this type of language communication is indicated through demonstration of formal and informal, and digital and nondigital writing, and speaking skills (**69-71-LC**). It is also indicated by the ability to communicate effectively with diverse audiences using appropriate language, verbal and nonverbal behavior, and strategies (**73-LC**).

The improvement of language skills is demonstrated through the use of communication to transfer knowledge. Project-based learning is particularly effective in facilitating this process. Students develop language communication skills by interacting with peers both in person and on digital platforms, conveying what they know or think in a way that increases understanding. At the same time, they begin to become aware of the importance of these exchanges and the role language and communication skills play in making them possible (Venville & Dawson, 2013). Indicators of this level of language communication can be assessed across subject areas. Relevant indicators include the ability to articulate and discuss opinions (**72-LC**); appreciation of language learning as a means of communicating and collaborating with diverse audiences (**75-LC**); and appreciation of effective speaking and writing skills (**76-LC**).

Dynamic assessments introduce new material during the assessment in order to measure student ability to acquire new knowledge and skills in a previously unfamiliar field or topic. Dynamic assessments are typically used to determine how students learn.

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Criterion-referenced assessments measure students' achievement against specific stated criteria. They are not designed to take into account a student's prior performance or compare students with one another.

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Synoptic assessments require students to draw from multiple academic disciplines in order to demonstrate both their cumulative knowledge and understanding, and their ability to make such connections.

Assessment Models and Evaluation Tools for Language Communication

Language communication indicators are often articulated and assessed in the most detail in curricula for language arts and literacy. However, there is increased cross-disciplinary work at the middle school level and above and, consequently, modes of assessment can reflect multiple disciplines. This is particularly relevant to language communication because in these grades, in all subjects, the demonstration of mastery shifts toward communication and presentation-based models (e.g., essays, oral and digital presentations) (Wagner, 2014).

In an English Language Arts course, language communication skills are typically assessed through formative, summative, and knowledge-specific assessment models. At the beginning of the course, instructors will likely administer a diagnostic assessment, which may take the form of an inventory or survey (Grossman et al., 2010). A dynamic assessment may be substituted to identify how students learn and modify instruction accordingly. This is particularly important in a multimodal learning environment in which students are offered several approaches to learning. Diagnostic assessments allow identification of baseline levels for both individuals and the whole group. In these instances, initial assessments are used to determine the level of complexity of instructional materials and future assessments, as well as the pace at which new and more complex content may be introduced. As the units progress, criterion-referenced assessments can be employed at regular intervals to determine whether students have individually acquired and can sufficiently demonstrate mastery of particular English Language Arts standards relating to communication (Cooper, Robinson, Slansky, & Kiger, 2015).

Diagnostic assessments for language communication are not typically used in other subject areas or in interdisciplinary, project-based learning environments. An instructor may access diagnostic assessments from English Language Arts courses, but more often assessments in subjects other than language arts will be authentic and/or synoptic and require students to utilize language communication skills in connection with other subject matter. The expectation is that these skills are developing simultaneously in multiple courses and are an anticipated outcome of engaging with the broader material, rather than through isolated demonstration and practice. In these settings, the effective use of language communication is viewed as an essential part of demonstration of mastery, and instructors will gauge a student's individual and group use of language communication through written materials, oral presentations, and multimedia compositions (Jacobs, 2015).

Instructional goals are key to determining if an evaluation will focus on growth over time or measure end-proficiency. In an English Language Arts setting, language communication skills are assessed according to a progress model

Self-efficacy is the ability and motivation to learn, adapt, take action, and put forth one's best effort, particularly in challenging situations. Global learning provides increased opportunities for students to develop self-efficacy through exposure to unfamiliar situations, problems, and viewpoints. In this context, self-efficacy encompasses both the desire to address new problems and create solutions, and a sense of empowerment to do so. Self-efficacious students take responsibility for their actions and their impact on others in their classrooms, communities, or the world.

where continual growth over time is the primary instructional goal. In other settings, regardless of starting competency, each student's successful and appropriate end-proficiency in language communication skills is the only major instructional concern (Kunnan, 2015). A global digital exchange may select either of these approaches depending on the centrality of language communication to its specific program objectives. Assessment approaches will also need to take into account whether students are native speakers or language learners.

Self-Efficacy

Defining the Outcome Self-Efficacy

Knowledge-based jobs will be an increasing part of the twenty-first-century global economy. Research indicates that the current generation of K-12 students and beyond will have the highest-ever percentage of those working and seeking advanced degrees in knowledge-based industries. And the trend is expected to continue (Tucker, 2014). To be successful in these jobs, students will need character skills that include self-motivation and independence. These skills are now seen as vital indicators of, and necessary tools for, future success. Their importance to student development has been a common theme in education discussions (Wang, Shannon, & Ross, 2013). Self-efficacy is the foundation of these character skills. Self-efficacy is an active state of being in which individuals develop a clear understanding of themselves and view themselves as empowered to grow, reach goals, and achieve success through their choices, actions, and interactions with others (Piperopoulos & Dimov, 2014).

To develop self-efficacy in the classroom, students must first question and explore self-identity and self-direction. The earliest psychosocial definition of self-efficacy is built around an individual's choices, effort, and ability to persevere (Bandura, 1977). To make productive choices—including putting forth one's best effort and choosing to persevere through difficulties and setbacks—students must first have the opportunity to develop a sense of themselves. Students must learn to define themselves as individuals, learners, members of their immediate family and community, and members of larger communities. This includes what they reasonably understand to be their strengths and weaknesses in each of these capacities, and their goals, expectations, and sense of purpose (Saks & Leijen, 2014).

It is only once students have begun to grapple with these questions of self-identity and to formulate answers through self-assessment and reflection (with support from instructors and peers), that they can build the foundation for self-direction. Once students become self-directed, they begin to hold

themselves accountable for their own academic and other learning needs. They can then actively seek out appropriate resources for continued learning, make connections among areas of learning, as well as with personal or shared experiences, and transfer learning from one domain to another (Jansen, Scherer, & Schroeders, 2015).

As students develop self-identity and self-direction, they can progress toward more complex elements of self-efficacy such as accountability, adaptability, and interpersonal and collaboration skills. Accountability and adaptability are the building blocks of motivation, persistence, and continual growth. When students practice self-efficacy, they are able to hold themselves accountable, rather than simply waiting for accountability to be imposed externally. Adaptability allows students to begin to comprehend more complex constructs of success and failure and to work in an environment of changing priorities. Students demonstrate self-efficacy in setting, reaching, and recalibrating goals based on new learning and advancement, practicing active problem solving, and making adjustments in order to reach a goal or outcome if it is not immediately achieved (Partnership for 21st Century Learning, n.d.).

The self-moderating and motivating components of self-efficacy allow students to establish productive interpersonal skills. Students who are developing self-efficacy use personal control skills to engage in productive teamwork and leadership, as well as to access a greater sense of social responsibility. Students practicing self-efficacy use the previously discussed attributes to accept and adapt to a variety of roles in different settings, access their own feelings of empathy and respect for diverse experiences and viewpoints when working with groups, and ultimately guide their actions in making choices.

Outcome Indicators for Self-Efficacy

Recent literature on effective educational pedagogy for middle school and above has consistently identified self-efficacy, or some related form of self-empowerment or self-actualization, as a critical psychosocial development for twenty-first-century learners (Zuffianò et al., 2013). Research points to indicators for student self-efficacy that do not focus on what students produce or demonstrate, but instead focus on how they produce and share work and engage with others in the learning environment (Høigaard, Kovač, Øverby, & Haugen, 2015).

Having only recently achieved the requisite levels of developmental and intellectual growth, students begin to develop self-efficacy during their middle school years (Schunk & Pajares, 2002). Consequently, indicators of self-efficacy must target onset and development, rather than fully actualized behavior. In the classroom, this is evidenced by students taking greater ownership of and active roles in their education because they see its value for their present and future selves.

Some of the preliminary indicators for self-efficacy in students ages 10 to 13 include self-regulation and motivation to learn and act. Prior to this age, students rely on more extensive regulation of behaviors and interactions through instructor's active monitoring, structuring of activities, and delineation of rules. In this age group, there is less direct regulation; instead, instructors create opportunities that encourage greater self-efficacy from students. Students express self-efficacy through interest not just in school subjects, but also in acquiring new and more advanced skills and knowledge on academic topics (Gaskill & Hoy, 2002). In a project-based learning environment, these early indicators are particularly important to overall growth. These indicators include the ability to learn in new and challenging situations (**77-78-SE**), and willingness to take responsibility for one's actions (**84-SE**).

As individual students progress beyond the initial development of self-efficacy, their sense of ownership over their educational futures should grow. Students will assert their own learning process and positions on academic and non-academic subjects with more frequency and confidence; at the same time, instructors will recognize the onset of "learning and working smart," over just "working hard" (Midgley, 2002). This last concept is key. When students gain a greater sense of ownership over their education, teachers will often see an attitudinal shift regarding schoolwork. Students will begin to appreciate not just completing the task, but how well they are able to complete it, and how effectively (Madjar & Chohat, 2016). These shifts are indicated by appreciation of the importance of actively participating and putting forth one's best effort (**80-SE**), interest in trying new things and addressing new challenges (**81-SE**), and a sense of empowerment to create solutions (**82-SE**). Global digital exchanges provide opportunities for students to develop self-efficacy in the context of new and challenging situations that require active learning and collaboration.

Assessment Models and Evaluation Tools for Self-Efficacy

Self-efficacy presents a challenge for assessment because its onset and progress are unique to each individual and cannot be tied to any curriculum or project. This requires assessments to be less formal and more reflective in nature. However, concepts that provide foundational elements for developing self-efficacy can be introduced through curricula and framed for assessment as part of classroom expectations and goals.

The ultimate goal is for all students to reach a level of self-efficacy. However, it is not realistic to target all students to demonstrate the same pattern of behavior or achieve a defined amount of development within a set period of time. Therefore, assessments of progress toward self-efficacy in the classroom must be responsive to, and reflective of, individual overall growth and behavior (Bruning, Dempsey, Kauffman, McKim, & Zumbrunn, 2013).

Most often, reflective assessments are accomplished by having students document their activities and progress in a class or project and asking them to reflect on their choices, actions, and feelings. Another widely used self-reflection tool is Bandura's self-efficacy scales, which in their original form allow students to self-reflect on their level of confidence in performing tasks across a range of settings. These scales are adaptable to particular learning environments (Bandura, 1977) and can be used in the context of a global education program for evaluating student outcomes.

Additionally, small group, peer, or student-teacher guided reflection sessions are effective in assessing self-efficacy. These sessions should focus on student choices, motives, and mindsets. In this model, the peer or instructor documents a student's progress and provides targeted feedback for future scenarios in which the student might have the opportunity to make different choices or better access feelings and motivations that can lead to improved outcomes, both in school and outside of it (Komarraju & Nadler, 2013).

A combination of self-reflection and guided sessions can help assess moments and areas in which students demonstrate progress toward becoming more self-efficacious. Essential to the success of this form of assessment is the development, by the instructor, class, or individual student, of learning and behavior goals that students can clearly identify and articulate, as well as the path through which these goals can be achieved. All of this must be framed around individual students' thinking, choices, and behaviors so that student choices and behaviors—rather than external factors—are assessed (Lee et al., 2014).

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Academic engagement is students' appreciation for learning new information and skills, and for doing well in school. Academically engaged students are able to undertake self-directed work and reflection, and to see that their learning is connected across subjects, to real-world issues, and to their future lives and careers. Global learning extends these connections by allowing students to utilize their knowledge and skills to collaborate with diverse peer groups and address global problems.

Academic Engagement

Defining the Outcome Academic Engagement

Although all global economic trends indicate that educational success is more important than ever (National Research Council, 2012), getting students to engage meaningfully in academic work in middle school and high school remains a challenge. Educational pedagogy has only recently come to view repetition and memorization as minimally effective learning strategies (Hattie, Fisher, & Frey, 2017) that tend to promote disengagement and passivity in student learning. Twentieth-century education and measures of intelligence were largely rooted in conceptions of a static or fixed mindset. This meant that each student possessed a finite intelligence or ability, often framed around IQ scores. Once that level of learning and performance had been achieved, there would be no additional gains (Dweck, 2000). Academic tracking, remediation, and educational exit counseling were part of this approach to education, which resulted in many students viewing their academic journeys and progress passively, and as only directed toward endpoints and exits. More recent educational research has shown the severe limitations and negative impact of this framing, and growth mindset is now widely viewed as imperative to successful learning (Ricci, 2015).

To prepare students for today's evolving workplaces, which value creativity, collaboration, and innovation, academic work must engage students to view learning as lifelong, interconnected, complex, and highly relevant to their lives. For students to actively seek out learning and academic work, they must first adopt a growth or perpetual-learning mindset. A growth mindset is the belief that all individuals are capable of infinite personal growth and improvement if they are prepared to put themselves in challenging learning situations and persist. In the classroom, growth mindset in both students and teachers results in an instructional shift away from simply mastering standards and toward continued

progress and subsequent adjustment of benchmarks. A student who has a growth mindset will approach each new learning opportunity with equal effort and engagement because the goal is to achieve a new level of progress, complexity, or ability.

As an extension of growth mindset, student ability to engage in self-reflection and abstract thinking further increases engagement in academic work. When students reflect on their own learning, they question and contemplate progress, ability, and importance. Many studies have shown that when an instructor provides a purpose or implication for a concept or activity, students are less likely to retain what they have learned after the class has ended, as compared to students engaging in self-reflection and meaning-making for their own learning experiences (Mezirow, 2003). The reason is two-fold: first, when students are asked to self-reflect, they have an increased sense of ownership of their learning; second, self-reflection activates the abstract thinking portions of the brain, which neuroscience points toward being associated with increased long-term learning and retention (Kuhlthau, Maniotes, & Caspari, 2015).

Finally, much educational research indicates increased engagement in academic work when activities involve elements of authentic and interpersonal learning. The impact of learning increases when students are afforded the opportunity to connect what they are learning to the "real world" they inhabit (Hattie et al., 2017). Today's students are more aware of and concerned with their own futures and the futures of their communities. When students can connect what they are learning in their classrooms to situations and challenges that they, and people or groups with whom they identify, are facing, they are better able to demonstrate complex thinking and mastery. They are also more likely to continue to demonstrate mastery in settings removed from the immediate place of learning (Herrington, 1997). Furthermore, when learning activities involve group work, or some other peer social interaction, students are found to have higher levels of engagement (Brundiers & Wiek, 2017).

Outcome Indicators for Academic Engagement

Engagement in academic work as a learning outcome is continuous across all subjects and learning environments. At ages 10 to 13, students are at the first critical juncture at which they are expected to manage their academic work through self-motivation. They begin to recognize their own progress and the continuity of academic work across disciplines and academic years (Turner, Christensen, Kackar-Cam, Trucano, & Fulmer, 2014).

Academic Engagement Indicators

Knowledge Indicators
Understanding that learning in different subject areas is connected **85-AE**

Understanding that academic learning is connected to real-world issues **86-AE**

Understanding that current learning and experiences are connected to specific careers **87-AE**

Skill Indicators
Ability to engage in self-directed work independently **88-AE**

Ability to engage in self-directed work collaboratively **89-AE**

Attitudinal Indicators
Pride in one's academic work **90-AE**

Interest in presenting work to peer audiences **91-AE**

Appreciation of the importance of acquiring new knowledge and skills **92-AE**

Appreciation of the importance of doing well in school **93-AE**

Behavioral Indicators
Working effectively alone **94-AE**

Working effectively in collaboration with others **95-AE**

Applying academic learning beyond the classroom **96-AE**

Critically reflecting on one's work **97-AE**

The basic indicators of students taking on added responsibility in their learning environment and building a more long-range view of academic work are their active and productive presence in school; demonstration of effort toward accomplishing work; and motivation to complete work and perform well (Turner, Christensen, & Meyer, 2009). These indicators signal a shift to internal regulation. Rather than simply being responsive to the learning environment, they are choosing to be present and active learners. Indicators in our framework that pertain to these shifts include: the ability to engage in self-directed work independently (**88-AE**); pride in one's academic work (**90-AE**); and appreciation of the importance of doing well in school (**93-AE**). These indicators signal student readiness to advance to more complex engagement in academic work as a response to the learning environment and its challenges, and to internal motivations (Cupita, 2016).

More advanced indicators for student engagement in academic work focus on students taking an active role in determining their academic progress and pace. This higher and more active level of engagement is indicated by students' use of a growth mindset to set goals for themselves, as well as to independently make connections between disciplines and from their educational experiences to the outside world (Sah et al., 2016). Students adopt an attitude toward learning and school that is connective instead of siloed, motivating them to set goals toward long-term growth and skill development. Students also use complex thinking and expanded worldviews to understand how concepts they have learned in class are related to other classes and the world outside of the classroom (Dweck, 2000). Global digital exchange enhances academic engagement by making these connections explicit, allowing students to apply knowledge and skills from across academic subjects to authentic conversations with international peers. Examples of these indicators in our framework include: understanding that learning in different subject areas is connected (**85-AE**); understanding that academic learning is connected to real-world issues (**86-AE**); appreciation of the importance of acquiring new knowledge and skills (**92-AE**); and applying academic learning beyond the classroom (**96-AE**).

Assessment Models and Evaluation Tools for Academic Engagement

Engagement in academic work requires students to be actively involved in their learning through goal-setting, self-motivation, and collaboration. Through abstract and authentic learning, students make connections between concepts and to the real world. Multiple types of assessment are required to effectively capture academic engagement as a learning outcome (Hattie et al., 2017).

The simpler aspects of engagement in academic work, such as a student's active and productive presence and effort, are behaviorally based. These types of indicators lend themselves to qualitative observational data collection and regular progress charting for each individual student. These assessments can accurately chart student behaviors in terms of frequency and consistency over time, which is essential to assessing any behaviorally based change in a classroom setting (Crone, Hawken, & Horner, 2015). This kind of data collection can range from basic (e.g., the number of times a student is observed to be "off task" during a lesson) to more comprehensive detailing of observations of individual moods, focus, and attitudes toward various lessons and activities.

Other indicators have both behavioral and attitudinal components, such as student motivation, goal-setting, and progress charting. These are best assessed through reflective practices and ipsative assessments. Ipsative assessments afford students and instructors the opportunity to assess the quality of work or effort on a particular task compared to their prior attempts. The feedback loop created by performance-assessment-performance has been found to support increased student effort as it relates to progress and mastery in the classroom (Hughes, 2014). Documented self-reflection, or reflection with others, produces qualitative data on how individual students think and feel about themselves, their progress and goals, and the learning process. This data can be collected and used comparatively over time to establish both patterns of behavior and change or growth in mindset (Midgley, 2002).

Abstract and connective thinking, two types of higher order thinking, are generally not directly taught, but rather demonstrated indirectly through open-ended assignments (Walker et al., 2015). Authentic assessments that require students to apply learning from multiple subject areas are typically most effective in capturing this type of thinking. Further, these assessments most closely resemble real-world situations in which the problems and tasks generally require critically and creatively combining information and skills across multiple content areas (Herrington, 1997). These types of assessments can afford learners opportunities to work in collaboration with one or more of their peers, presenting additional challenges of managing individual contributions to achieve the best outcome for the group. These aspects can be assessed through qualitative and quantitative measures of the final product, as well as personal and group dynamic reflection exercises (Cohen, 2014).

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Critical thinking is the ability to analyze complex topics and situations, and to develop original ideas and opinions based on evidence. Problem solving is an aspect of critical thinking that requires students to systematically propose multi-step solutions to shared problems. In the context of global learning, critical thinking requires students to make sense of and apply logic to the world around them and to appreciate, evaluate, and integrate ideas and perspectives from diverse sources.

Critical Thinking

Defining the Outcome Critical Thinking

When teachers are asked about changes that must happen in the classroom for students to thrive in a twenty-first-century global world, critical thinking and problem solving repeatedly appear at the top of the list (Kivunja, 2014). Critical thinking and problem solving are not new learning concepts, but the emphasis on these skills, and the need to integrate them into student learning across curricula from an early age, are relatively new. Students engaged in global learning, as with other complex, integrated learning models, must develop the skills and mindsets to move beyond content knowledge to the use of that knowledge for integration, disruption, and creation in order to make meaning and solve problems in and outside of the classroom (Pink, 2012).

Students must develop reasoning and analytic skills before they can become critical thinkers. Much of academic and personal growth relates to the ability to make sense of, and apply logic to, the wider world. As students' worlds expand and grow more complex, their observation, analysis, and logic-seeking skills must develop as well. To promote critical thinking in the classroom, the learning process must encourage students to explore the difference between observations, opinions, and feelings; how different viewpoints impact thinking and understanding; and how to identify and apply logical sequences and connections among concepts (Kong, 2014).

Reasoning and analysis must also be driven by constant questioning. Students developing their abilities to reason and analyze must start by questioning what they observe and what is presented to them, and continue

this process as problems become more complex. They begin making informed judgments and choices through gathering and evaluating information. This is enabled by the willingness and persistence to ask questions of themselves, peers, instructors, and the learning environment itself (Dwyer et al., 2014).

Critical thinking is the basis for developing problem-solving skills and engaging in problem- or inquiry-based learning models. Problem solving is a process of thinking and action rooted in the traditional scientific method. A student who uses problem solving as a learning process can identify and describe a central problem or question; generate potential solutions based on various criteria or contexts; implement a solution; and monitor, evaluate, and reflect on the success and effectiveness of its implementation. Within that process are such other important twenty-first-century learning skills as creativity, flexibility, system thinking, and design thinking (Greiff et al., 2014).

Students ages 10 to 13 are beginning to develop their abstract and complex thinking abilities along with other competencies, making this an important time to focus on developing problem-solving skills (Ikayanti, Suratno, & Wahyuni, 2017). Students are building the research skills necessary to find and evaluate sources in order to understand problems and formulate solutions. Students are also developing the psychosocial skills required to participate in problem- or inquiry-based learning and draw on the different perspectives and abilities of peers to evaluate and execute solutions (Cabezudo et al., 2008).

Outcome Indicators for Critical Thinking and Problem Solving

Middle school is generally the first time students are introduced to critical thinking and problem solving as skill sets that can be applied in different curricular areas. At the same time, students are at the beginning stages of developing the skills and modes of processing information required for critical thinking, which are developed from more basic proficiency levels and habits-of-use. As students have more exposure and opportunity to cultivate these skills and mindsets, their applications will become more complex, as will the indicators (Walker et al., 2015).

As with other learning outcomes, the initial critical thinking and problem-solving indicators relate to the capacity to access and assess information. Students can access information in many formats (i.e., scenarios, texts, multimedia) and from a wide variety of sources. Students must be able to think critically about this information to efficiently determine its validity and reliability, to identify its most important aspects, and to determine what other critical information might be required (Kong, 2014). These skills are particularly important in the context of global digital exchange, as students access and assess information and perspectives from around the world. In our framework,

Critical Thinking Indicators

Knowledge Indicators
Understanding how to ask
clarifying questions **98-CT**

Understanding how to evaluate the
validity of information from online,
multimedia, and print sources
99-CT

Understanding how to cite
evidence to support arguments
100-CT

Understanding how to organize
information **101-CT**

Understanding the difference
between information and opinion
102-CT

Skill Indicators
Ability to analyze causes and
effects **103-CT**

Ability to analyze similarities and
differences **104-CT**

Ability to evaluate pros and cons
105-CT

Ability to synthesize multiple
perspectives **106-CT**

Ability to develop and explain
original opinions based on
evidence **107-CT**

Ability to develop solutions
to problems independently or
collaboratively **108-CT**

Ability to understand the impact of
actions taken 1**09-CT**

Attitudinal Indicators
Willingness to approach problems
critically **110-CT**

Proposing multi-step solutions to
complex problems **111-CT**

Behavioral Indicators
Engaging in inclusive problem
solving **112-CT**

indicators that refer to these skills include: understanding how to ask clarifying questions (**98-CT**); understanding how to evaluate the validity of information from online, multimedia, and print sources (**99-CT**); understanding how to organize information (**101-CT**); and demonstrating a willingness to approach problems critically (**110-CT**).

The next level of critical thinking indicators relates to the ability to approach a potential scenario or problem by developing perspectives, recognizing patterns, and identifying causal relationships. These indicators reflect active engagement with the given task and the ability to identify and articulate these relationships and perspectives, and their connection to the larger goal or outcome (Haridza & Irving, 2017). Relevant indicators in our framework include: understanding the difference between information and opinion (**102-CT**); ability to analyze cause and effect (**103-CT**); ability to evaluate pros and cons (**105-CT**); ability to synthesize multiple perspectives (**106-CT**); and ability to understand the impact of actions taken (**109-CT**).

The most advanced critical thinking indicators focus on abilities to conceptualize, develop, and implement one or more solutions to a given problem or challenge based on results of processes discussed above. For students to use their critical thinking and problem-solving skills at the highest levels, they must be able to identify both problems and potential solutions and see the steps that must be taken to effectively link the two (Hibbard, 2000). Both individually and as part of a group, students must be able to develop solutions that have a foundation in prior knowledge, research, and the creative application of skills and information. Students must be able to recognize the complex nature of problems and be able to adapt their solutions by incorporating multiple viewpoints, feedback, and reflection from iterative trials (Griffin, 2017). Project-based global learning programs accelerate the development of critical thinking and problem solving, coupled with academic focus and perseverance. Associated indicators in our framework include the ability to develop and explain original opinions based on evidence (**107-CT**); the ability to develop solutions to problems independently or collaboratively (**108-CT**); proposing multi-step solutions to complex problems (**111-CT**); and engaging in inclusive problem solving (**112-CT**).

Assessment Models and Evaluation Tools for Critical Thinking and Problem Solving

Critical thinking and problem solving are student learning outcomes with cross-curricular applications. At any level of education, a student's ability to demonstrate the associated skills and mindsets of critical thinking comes from connecting learning elements from multiple disciplines (Dwyer et al., 2014). For students ages 10 to 13, the primary sources of exposure to, and application of, problem solving occur in mathematics and science courses. Most students in this age group are introduced to the scientific method as a multi-step

approach to problems or questions in these classes. The shift to algebraic skills introduces students to quantitative causal relationships and to pattern recognition and manipulation as a means of problem solving (Ikayanti et al., 2017).

Assessment models for critical thinking and problem solving vary greatly, perhaps more than other outcomes. They include many formative and summative approaches and may be subject-specific or cut across the general curriculum. Since this learning outcome is complex, it presents challenges for standards-based assessment. In the learning environment, individual students will comprehend or struggle with different components of the critical thinking process. The ability to understand and apply each component of the process will determine if the student can demonstrate mastery (Dixson & Worrell, 2016). Pre- and post-assessments of concept comprehension can be used to determine which components individual students and groups struggle with or comprehend (Hibbard, 2000). These assessments can also be used to evaluate student end-proficiency and to target instructional support. However, they present challenges for in-depth evaluation of student development of critical thinking and problem solving.

Authentic and synoptic assessments are better suited to these challenges because they can fully evaluate student ability to engage in each component of the problem-solving process, as well as their ability to integrate individual components to produce an outcome that matches set criteria (Greiff et al., 2014). By measuring student ability to apply knowledge from multiple subjects to real-world scenarios, authentic and synoptic assessments maximize the opportunity to demonstrate the process and products of critical thinking and problem solving. These assessments are most effective in project- or inquiry-based learning models.

VI.

Conclusion

The economic, political, and scientific transformations of the twenty-first century have created new challenges and opportunities for the education community.

Globalization is at the center of all these changes. There is no longer a debate within the education world about the need for students to develop global competency beginning at a young age. There are more global education offerings than ever, including well-developed curricula about global issues, strategies for teaching tolerance and cultural understanding, and other resources for schools to internationalize their instruction. Among these, global digital exchange has garnered attention for addressing key educational needs while taking advantage of recent technological advancements and capitalizing on the appeal of social media, digital tools, and direct peer communication. The essence of this approach is connecting students across national borders to learn from one another in an online environment for the purpose of developing global competency. A range of programs adopts this relatively new approach, using varied curricula and pedagogies to deal with its complex subject matter.

Global Cities, Inc., a Program of Bloomberg Philanthropies, has operated the Global Scholars digital exchange program continuously and with increasing enrollment for five years, and it has shown some early indications of success. Participating schools have a low dropout rate and high levels of program reenrollment, showing that educators value the program. Students have a high level of assignment completion, demonstrating sustained interest and a greater probability that they are learning in the classroom. There is also more demand than the program can accommodate.

Global Cities recognized that formal evaluation to determine what students learn through global digital exchange programs like Global Scholars would accelerate their widespread adoption. Given the range of practice models and the complexity of the subject matter for both global digital exchange and global education more generally, Global Cities identified the need to elaborate this subfield, and to establish a shared language and set of standards for all stakeholders.

To prepare for an evaluation of Global Scholars, Global Cities developed student learning outcomes and empirical indicators for global digital exchange and the broader field of global education. The resulting evaluation framework includes four global learning outcomes—appreciation for diversity, cultural understanding, global knowledge, and global engagement. Global Cities also identified an equally important cluster of general learning outcomes that support global learning and continued growth across academic subjects. These general learning outcomes are digital literacy, language communication, self-efficacy, academic engagement, and critical thinking. An effective global digital exchange program should show growth in these nine outcomes, which taken together define global competency for K-12 students.

The strength of this evaluation framework is its grounding in both the world of practice, and in the academic literature of education, developmental psychology, and other social sciences. The evidence we present in this paper comes from a review and analysis of this literature, as well as Global Cities' experience in the field. This includes qualitative and quantitative data from the Global Scholars program, which in 2017-18 partnered with 564 teachers in 63 cities in 29 countries, enrolling 13,554 students.

Insights about what students are learning, provided by the Global Scholars worldwide educator network, were the starting point to articulate the student learning outcomes and indicators central to this evaluation framework. These educators provided significant insight through surveys, live professional development, reflection sessions, and site visits. The distinction between global learning and the general learning outcomes that support global learning came from these educators, as well as from the 2016 Global Cities symposium of 20 large U.S. school districts (Tiven, 2016).

Distinguishing between general and global learning outcomes is necessary for evaluation. Some discussions of global education conflate general learning outcomes with global learning outcomes. General learning outcomes are necessary for learning across disciplines and to varying degrees are taught and used in all subject areas. They are neither unique to nor sufficient for global learning. By differentiating global from general learning outcomes, evaluators can better identify outcomes unique to global learning, as well as discrete changes in both general and global learning outcomes. One of the advantages of this framework is the ability to capture evidence of specific general learning outcomes separate from global learning outcomes, while recognizing the relationship between them.

Equally important, this framework is grounded in academic literature from education, developmental psychology, and other social sciences. The literature on global education and global competence provides essential justifications for bringing global education into the classroom. However, Global Cities found few formal evaluations of global education, and even fewer evaluations of global digital exchange. For this reason, in seeking measurement approaches for the student learning outcomes, Global Cities expanded its inquiry to the broader evaluation literature. They found alignment between student learning outcomes and indicators with the measurement approaches discussed in education and social science subfields, such as project-based learning, social and emotional learning, technology in the classroom, and civic engagement. These and other cognate fields were essential to the development of the outcomes and provide a basis for new approaches to measurement for digital exchange.

In explicating the framework, Global Cities defined the outcomes and identified specific empirical indicators within the four developmental competency areas of knowledge, skills, attitudes, and behaviors. Indicators were considered based on their relevance to students ages 10 to 13,

recognizing that not all indicators are observable in every classroom or program. By including a broad range of empirical indicators across developmental competencies, the framework summarizes what global learning looks like in the classroom. This empowers educators and evaluators to look for evidence of global learning. As more research is undertaken, we anticipate that some indicators will emerge as more important than others for understanding and assessing global learning in the classroom.

It is clear that no single evaluation design will be appropriate for every global digital exchange program. We recommend, however, that all programs base both design and evaluation on student learning outcomes. We found that different learning outcomes require different measurement approaches and, as a result, an effective evaluation requires multiple methods of measurement. This is especially important in the distinction between global and general learning outcomes. We also found that use of multiple methods is particularly important for students ages 10 to 13 who are at the beginning stages of developing global competencies, and who may show growth in different ways and at different times. Therefore, we also recommend that evaluations of global digital exchange focus on growth in student learning outcomes, rather than on end-proficiency. Evaluators can build on existing research by adapting metrics developed in cognate fields.

The utility of these student learning outcomes for global digital exchange extends beyond program evaluation. They should inform all aspects of program design regardless of variations in the model. Based on our review of global education programs and the literature, as well as deep knowledge of the Global Scholars model, we identified the general characteristics of an analytic model that makes this framework accessible to others. To demonstrate the application of the analytic model to an operating program, we describe in detail the key elements of Global Scholars that most directly impact student learning, the e-classroom, and the curriculum.

We recommend that these student learning outcomes guide global education efforts ranging from individual student assessment to setting district-wide priorities. The outcomes provide guidance for developing classroom lessons and activities, curriculum design, and professional development. We hope that our efforts to define global competency, by focusing on growth in student learning outcomes, and by identifying indicators that can be used to measure this growth, inform the global education community, and spur further discussion of what it means to develop global competency in students worldwide.

VII.

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Appendix A: Student Learning Outcomes Definitions

Global Competency: An effective global digital exchange program for students ages 10 to 13 will show growth in the development of global learning outcomes that include appreciation for diversity, cultural understanding, global knowledge, and global engagement. Students will also show growth in the development of general learning outcomes that support global learning. These include digital literacy, language communication, self-efficacy, academic engagement, and critical thinking. The development of these learning outcomes constitutes a definition of global competency for K-12 students.

Global Learning Outcomes

Appreciation for Diversity: Appreciation for diversity is demonstrated understanding of the ways in which individuals and groups can be considered different (e.g., gender, nationality, race, ethnicity, religion), as well as the attitudes and behaviors that show tolerance, respect, and acceptance of those different than oneself, both locally and globally. Appreciation for diversity begins with investigating and defining one's own identity and culture, as well as wider group identities and the factors that influence these identities. As appreciation for diversity grows, students become aware of implicit and explicit societal biases and how these biases can interfere with acceptance of diversity. Students are also more likely to interact and collaborate positively and effectively with people of different backgrounds.

Cultural Understanding: Cultural understanding is demonstrated recognition of the norms, characteristics, and values that shape how we interpret the world, and the application of this understanding when communicating and collaborating with others. Students must first gain cultural knowledge, grapple with its complexity, and use it to understand different perspectives. They are then able to alter their thinking and actions in ways that show tolerance and sensitivity to others who do not share their culture.

Global Knowledge: Global knowledge includes historical and current knowledge from multiple domains—geography, culture, politics, economics and science. Global knowledge starts as a framework for understanding the world—how it is connected and divided, the people who occupy it, and the challenges they face. Students gain and demonstrate global knowledge through effective research and their understanding of perspectives from around the world. Global knowledge is necessary for students to understand that global issues are borderless and require solutions that are complex, interdisciplinary, and adaptable to different settings. Global knowledge is also necessary for students to become global citizens who share and exchange information and build relationships with others outside of their local communities.

Global Engagement: Global engagement is interest in learning about the world, communicating and collaborating with diverse communities, and finding solutions to global problems. Globally engaged students seek opportunities to connect with the global community and demonstrate cultural understanding in their interactions. They use their global knowledge to problem solve by considering and including diverse contributors and perspectives.

General Learning Outcomes

Digital Literacy: Digital literacy, developed through global learning, is knowledge of technology and its responsible use for creating content and communicating, both locally and globally. Digital literacy begins with the understanding of digital terminology and tools, as well as methods for online navigation, research, and communication. It progresses to the ability to use digital tools to gather and present information and integrate these skills into academic and non-academic activities. Students engaged in global learning gain appreciation for these digital tools as means to engage with international peers and share work and ideas on a global scale.

Language Communication: Language communication, in the context of global learning, is the ability to speak, write, and present information, ideas, and opinions to diverse communities. Students must be able to apply global knowledge and cultural understanding to adapt language for both local and global audiences. Language communication also refers to the ability to read and comprehend a variety of print and digital texts, including multimedia, in order to understand and respond to information, narratives, and perspectives from around the world. As students develop these skills, they learn to value language as a means to exchange ideas, collaborate, and problem solve with people of different backgrounds.

Self-Efficacy: Self-efficacy is the ability and motivation to learn, adapt, take action and put forth one's best effort, particularly in challenging situations. Global learning provides increased opportunities for students to develop self-efficacy through exposure to unfamiliar situations, problems, and viewpoints. In this context, self-efficacy encompasses both the desire to address new problems and create solutions, and a sense of empowerment to do so. Self-efficacious students take responsibility for their actions and their impact on others in their classrooms, communities, or the world.

Academic Engagement: Academic engagement is students' appreciation for learning new information and skills, and for doing well in school. Academically engaged students are able to undertake self-directed work and reflection, and to see that their learning is connected across subjects, to real-world issues, and to their future lives and careers. Global learning extends these connections by allowing students to utilize their knowledge and skills to collaborate with diverse peer groups and address global problems.

Critical Thinking: Critical thinking is the ability to analyze complex topics and situations, and to develop original ideas and opinions based on evidence. Problem solving is an aspect of critical thinking that requires students to systematically propose multi-step solutions to shared problems. In the context of global learning, critical thinking requires students to make sense of and apply logic to the world around them and to appreciate, evaluate, and integrate ideas and perspectives from diverse sources.

Appendix B: Glossary of Terms

Term	Definition	Sources
Authentic Assessment	Authentic assessments ask students to apply knowledge and skills learned in the classroom to real-world scenarios. They are open-ended and are often problem- or inquiry-based.	Condon, J. (2015). Language, culture, and intercultural communication. In J. M. Bennett (Ed.), *The SAGE encyclopedia of intercultural competence* (pp. 578–580). Thousand Oaks, CA: SAGE Publications, Inc. doi:10.4135/9781483346267.n188 Herrington, J. A. (1997). *Authentic learning in interactive multimedia environments.* Retrieved from http://ro.ecu.edu. au/cgi/viewcontent.cgi?article=2479&context=theses Mueller, J. (2016). *What is authentic assessment?* Retrieved from http://jfmueller.faculty.noctrl.edu/toolbox/whatisit.htm
Benchmark Assessment	Benchmark assessments are administered at key points throughout a curriculum and may be used to inform changes in curricula or instruction. They are used to periodically measure and track student advancement toward stated long-term learning goals.	Herman, J. L., Osmundson, E., & Dietel, R. (2010). *Benchmark assessments for improved learning* (AACC Policy Brief). Los Angeles, CA: University of California. Stone, J. (2014, March 28). LAUSD board member visits Southeast Middle School, students demonstrate digital literacy knowledge. *South Gate Lynnwood Patch.* Retrieved from http://patch.com/california/southgatelynnwood/ lausd-board-member-visits-southeast-middle-school- studentsdemonstrate- digital-literacy-knowledge)
Criterion-Referenced Assessment	Criterion-referenced assessments measure students' achievement against specific stated criteria. They are not designed to take into account a student's prior performance or compare students with one another.	Cooper, J. D., Robinson, M. D., Slansky, J. A., & Kiger, N. D. (2015). Literacy: *Helping students construct meaning.* Boston, MA: Cengage Learning. University of Exeter. (n.d.). *Principles of assessment.* Retrieved from http://www.exeter.ac.uk/staff/development/ academic/resources/assessment/principles/types/
Diagnostic Assessment	Diagnostic assessments are used before instruction begins to assess students' prior knowledge and skills and identify areas where they may experience difficulties.	University of Exeter. (n.d.). *Principles of assessment.* Retrieved from http://www.exeter.ac.uk/staff/development/ academic/resources/assessment/principles/types/
Dynamic Assessment	Dynamic assessments introduce new material during the assessment in order to measure student ability to acquire new knowledge and skills in a previously unfamiliar field or topic. Dynamic assessments are typically used to determine how students learn.	Cohen, E. G. (2014). *Designing groupwork: Strategies for the heterogeneous classroom.* New York, NY: Teachers College Press. Leaders Project. (2012, November 26). *Understanding assessment: Applying dynamic assessment.* Retrieved from https://www.leadersproject.org/2012/11/26/applying- dynamic-assessment/ Schwartz, D. L. & Arena, D. (2013). *Measuring what matters most: Choice-based assessments for the digital age.* Cambridge, MA: MIT Press. Retrieved from https://www. bookdepository.com/Measuring-What-Matters-Most-Daniel- L-Schwartz/9780262518376 University of Exeter. (n.d.). *Principles of assessment.* Retrieved from http://www.exeter.ac.uk/staff/development/ academic/resources/assessment/principles/types/
English Language Arts	English Language Arts is a term specific to public education in the United States. It refers to curricula and instruction focused on developing knowledge and skills needed to read, write, speak, listen, and use language effectively in a variety of settings. English Language Arts standards may also be applied across subjects including social studies, science, and technical subjects.	Anduiza, E., Jensen, M. J., & Jorba, L. (Eds.). (2012). *Digital media and political engagement worldwide: A comparative study.* New York, NY: Cambridge University Press. Common Core State Standards Initiative. (2018). *English Language Arts Standards.* Retrieved from http://www. corestandards.org/ELA-Literacy/

Term	Definition	Sources
Formative Assessment	Formative assessments are used to track program or student progress in order to make improvements in program design or instruction. Formative assessments may take many forms (e.g., observations, surveys).	Dixson, D. D., & Worrell, F. C. (2016). Formative and summative assessment in the classroom. *Theory Into Practice,* 55(2), 153-159. doi:10.1080/00405841.2016.1148989 University of Exeter. (n.d.). *Principles of assessment.* Retrieved from http://www.exeter.ac.uk/staff/development/academic/resources/assessment/principles/types/
Inquiry-Based Learning	Inquiry-based learning asks students to develop and test hypotheses in response to a question or challenge. This style of learning emphasizes active participation and experimentation and is often self-directed.	Pedaste, M., Mäeots, M., Siiman, L. A., Jong, T. D., Riesen, S. A., Kamp, E. T., . . . Tsourlidaki, E. (2015). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review,* 14, 47–61. doi:10.1016/j.edurev.2015.02.003 Piperopoulos, P., & Dimov, D. (2014). Burst bubbles or build steam? Entrepreneurship education, entrepreneurial self-efficacy, and entrepreneurial intentions. *Journal of Small Business Management,* 53(4), 970–985. doi:10.1111/jsbm.12116
Interpersonal Learning	Interpersonal learning refers to learning that takes place between two or more individuals through reciprocal engagement.	York, C. S., & Richardson, J. C. (2012). Interpersonal interaction in online learning: Experienced online instructors' perceptions of influencing factors. *Online Learning,* 16(4). doi:10.24059/olj.v16i4.229
Ipsative Assessment	Ipsative assessments measure students against their own prior performance, rather than set criteria.	Burden, P. R. (2017). *Classroom management: Creating a successful K-12 learning community.* Hoboken, NJ: Wiley Global Education. Hughes, G. (2014). *Ipsative assessment: Motivation through marking progress.* Basingstoke, UK: Palgrave Macmillan. University of Exeter. (n.d.). *Principles of assessment.* Retrieved from http://www.exeter.ac.uk/staff/development/academic/resources/assessment/principles/types/
Learning Environment	Learning environment refers to the physical space and culture of an educational setting. It includes observable characteristics such as classroom arrangement and materials used for instruction, as well as interactions among learners and instructors.	Boix Mansilla, V., & Jackson, A. (2009). *Educating for global competence: Preparing our youth to engage the world.* New York, NY: Asia Society. Retrieved from https://asiasociety.org/files/book-globalcompetence.pdf Frenzel, A. C., Pekrun, R., & Goetz, T. (2007). Perceived learning environment and students' emotional experiences: A multilevel analysis of mathematics classrooms. *Learning and Instruction,* 17(5), 478-493. doi:10.1016/j.learninstruc.2007.09.001 Hannafin, M. J., Hill, J. R., Land, S. M., & Lee, E. (2013). Student-centered, open learning environments: research, theory, and practice. *Handbook of Research on Educational Communications and Technology,* 641-651. doi:10.1007/978-1-4614-3185-5_51
Open-Ended Assessment	Open-ended assessments do not limit students to specific choices or responses and allow them to apply knowledge in new contexts. They can be used to measure student ability to make connections between multiple concepts.	Badger, E., & Thomas, B. (1992). Open-ended questions in reading. *Practical Assessment, Research & Evaluation,* 3(4). Retrieved from http://pareonline.net/getvn.asp?v=3&n=4 Meyer, J. W., Kamens, D. H., & Benavot, A. (2017). *School knowledge for the masses: World models and national primary curricular categories in the twentieth century.* New York, NY: Routledge.

Term	Definition	Sources
Outcome Evaluation	Outcome evaluations determine whether a program or academic intervention is achieving its goals for student learning. A subset of outcome evaluations, impact evaluations measure the specific impact of an academic intervention on students' learning as compared to those who did not participate.	MEERA. (n.d.). *Evaluation: What is it and why do it?* Retrieved from http://meera.snre.umich.edu/evaluation-what-it-and-why-do-it OECD. (n.d.). *Outline of principles of impact evaluation.* Retrieved from http://www.oecd.org/dac/evaluation/dcdndep/37671602.pdf
Pre- and Post-Assessment	Pre- and post- assessments are used to determine a student's progress towards a learning outcome, for example, comparing baseline- and end-proficiency or attitudinal change.	Skidmore College. (n.d.). Value-added assessment (pre- and post-testing). Retrieved from http://www.skidmore.edu/assessment/archived/pre-or-post-assessment.php University of Kentucky. (n.d.). *Pre/post assessment.* Retrieved from http://www.uky.edu/ie/content/prepost-assessment
Project-Based Learning	Project-based learning is a model of pedagogy in which students work independently or collaboratively to analyze and address a problem or challenge over an extended period of time and produce an end product or presentation.	Buck Institute for Education. (n.d.). *What is PBL?* Retrieved from https://www.bie.org/about/what_pbl Hopper, S. B. (2014). Bringing the world to the classroom through videoconferencing and project-based learning. *TechTrends, 58*(3), 78-89. doi:10.1007/s11528-014-0755-4
Reflective Assessment	Reflective assessments require students to assess their own learning, consider the process by which they learn, and determine how they can improve. These assessments may take the form of written responses or discussions with instructors or peers and can be supplemented with instructor observations.	Bond, J. B., Denton, D. W., & Ellis, A. K. (2015). Impact of reflective assessment on student learning: Best-evidence synthesis from ten quantitative studies. *International Dialogues on Education: Past and Present* 2(2). Retrieved from http://www.ide-journal.org/article/2015-volume-2-number-2-impact-of-reflective-assessment-on-student-learning-best-evidence-synthesis-from-ten-quantitative-studies/ Evans, L. E. (2016). The Case for Reflective Assessment. I*ndependent School Magazine.* Retrieved from https://www.nais.org/magazine/independent-school/winter-2016/the-case-for-reflective-assessment/ Komarraju, M., & Nadler, D. (2013). Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter? *Learning and Individual Differences, 25,* 67–72. doi:10.1016/j.lindif.2013.01.005 Leijen, A., Allas, R., Toom, A., Husu, J., Marcos, J. M., Meijer, P., ... Krull, E. (2014). Guided reflection for supporting the development of student teachers' practical knowledge. *Procedia - Social and Behavioral Sciences, 112,* 314–322. doi:10.1016/j.sbspro.2014.01.1170
Standards-Based Assessment	Standards-based assessments determine if students meet a predetermined standard for a specific stage of their education. These are a sub-category of criterion-referenced assessments, distinguished by the fact that the pre-determined standards are typically set by a recognized governing body.	Goertz, M.E. (2007, June). *Standards-based reform: Lessons from the past, directions for the future.* Paper presented at Clio at the Table: A Conference on the Uses of History to Inform and Improve Education Policy, Brown University, Providence, RI. Great Schools Partnership. (2017, November 09). *Standards-based.* Retrieved from http://edglossary.org/standards-based/ Wolfe, R. E., Steinberg, A., & Hoffman, N., (Eds.). (2013). Anytime, anywhere: student-centered learning for schools and teachers. *Harvard Education Press.* doi:10.5860/choice.51-3966
Student-Centered Learning	Student-centered learning is a pedagogical approach in which learners take an active role in what and how they learn. This approach to pedagogy considers individual students' prior knowledge, learning styles, and abilities. It often emphasizes how learning is relevant to students' ongoing development, as well as their goals and future aspirations.	Lee, E., & Hannafin, M. J. (2016). A design framework for enhancing engagement in student-centered learning: Own it, learn it, and share it. *Educational Technology Research and Development, 64*(4), 707–734. doi:10.1007/s11423-015-9422-5

Term	Definition	Sources
Summative Assessment	Summative assessments determine the extent of a learner's success in meeting intended learning outcomes. They are normally used at the end of a curriculum unit or program.	Dixson, D. D., & Worrell, F. C. (2016). Formative and summative assessment in the classroom. *Theory Into Practice, 55*(2), 153–159. doi:10.1080/00405841.2016.1148989 University of Exeter. (n.d.). *Principles of assessment*. Retrieved from http://www.exeter.ac.uk/staff/development/academic/resources/assessment/principles/types/
Synoptic Assessment	Synoptic assessments require students to draw from multiple academic disciplines in order to demonstrate both their cumulative knowledge and understanding and their ability to make such connections.	Greiff, S., Wüstenberg, S., Csapó, B., Demetriou, A., Hautamäki, J., Graesser, A. C., & Martin, R. (2014). Domain-general problem solving skills and education in the 21st century. *Educational Research Review, 12,* 74–83. doi:10.1016/j.edurev.2014.10.002 University of Exeter. (n.d.). Principles of assessment. Retrieved from http://www.exeter.ac.uk/staff/development/academic/resources/assessment/principles/types/
Twenty-First-Century Skills	Twenty-first-century skills are the competencies students need to be successful in today's social engagements, economic activities, and political life. These include critical thinking, collaboration, communication, problem-solving, and technology skills.	Ananiadou, K., & Claro, M. (2009). 21st century skills and competences for new millennium learners in OECD countries. *OECD Education Working Papers, No. 41.* doi:10.1787/218525261154 Dwyer, C. P., Hogan, M. J., & Stewart, I. (2014). An integrated critical thinking framework for the 21st century. *Thinking Skills and Creativity,* 12, 43–52. doi:10.1016/j.tsc.2013.12.004 Kivunja, C. (2014). Do you want your students to be job-ready with 21st century skills? Change pedagogies: A pedagogical paradigm shift from Vygotskyian social constructivism to critical thinking, problem solving and Siemens' digital connectivism. *International Journal of Higher Education,* 3(3), 81–91. doi:10.5430/ijhe.v3n3p81

About the Authors

Marjorie B. Tiven is the founder and president of Global Cities, Inc., a Program of Bloomberg Philanthropies.

Ester R. Fuchs is a professor of international and public affairs and political science at Columbia University's School of International and Public Affairs (SIPA).

Anissa Bazari is a Global Scholars education program manager at Global Cities, Inc., a Program of Bloomberg Philanthropies.

Ashley MacQuarrie is a Ph.D. student at Teachers College, Columbia University.

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A PROGRAM OF BLOOMBERG PHILANTHROPIES

One Rockefeller Plaza
Suite 1134
New York, NY 10020
(01) (212) 618-6345

info@globalcities.org

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