Educating for Sustainable Development

Perspectives of U.S. and Global Educators

Smithsonian
Science Education Center

About the Smithsonian Science Education Center

The Smithsonian Science Education Center is transforming *K-12 Education Through Science* in collaboration with communities across the globe. The Center is nationally and internationally recognized for the quality of its programs and its impact on K-12 science education. Visit the Smithsonian Science Education Center website and Smithsonian Science for Global Goals and follow the Smithsonian Science Education Center on Twitter and Facebook.

About the Smithsonian Institution

The Smithsonian Institution is the world's largest museum, education and research complex, with 21 museums, nine research centers, five education units and centers, and the National Zoo — shaping the future by preserving heritage, discovering new knowledge and sharing our resources with the world.

The Institution was founded in 1846 with funds from the Englishman James Smithson (1765-1829), according to his wishes, "under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge."

About the InterAcademy Partnership

Under the umbrella of the InterAcademy Partnership (IAP), more than 140 national, regional and global member academies of sciences, engineering and medicine work together to support the vital role of science in seeking evidence-based solutions to the world's most challenging problems. In particular, IAP harnesses the expertise of the world's scientific, medical and engineering leaders to advance sound policies, improve public health, promote excellence in science education and achieve other critical development goals. See www.interacademies.org and follow IAP on Twitter and YouTube.

About Gallup

For over 85 years, Gallup has been researching topics that matter most to the world and helping shape the future of education. Gallup is committed to improving high-quality educational experiences and student success.

This survey and report are funded by the Gordon and Betty Moore Foundation through Grant GBMF11240 to the Smithsonian Science Education Center.

Table of Contents

A Letter From the Director

The Smithsonian Institution is the world's largest museum, education and research complex, with 21 museums, nine research centers, five education units and centers, and the National Zoo, shaping Our Shared Future by preserving heritage, sharing resources, and discovering new knowledge that addresses many of the world's most pressing challenges. Smithsonian scientists and educators work in more than 140 countries, engaging in conversations with students, scholars, scientists, communities and decision-makers about how to create a more sustainable planet. Through Our Shared Future: *Life on a Sustainable Planet,* the Smithsonian envisions a future where humanity lives in balance with the natural world. The Smithsonian will activate our research, collections, partnerships and public outreach to foster sustainable communities, improve social justice, slow and reverse climate change, and conserve Earth's ecosystems, biodiversity and benefits to humanity. In concert with our global partners, *Life on a Sustainable Planet* advances and inspires innovative science and discovery to further our collective understanding of how nature and human communities interact in pursuit of nature-based solutions to make Earth more sustainable for all.

Smithsonian educators bring these scientific efforts to the global public by directly discussing climate change solutions with youth and partnering with historically marginalized groups to make sustainability decisions that also promote equity. These are just a few ways Smithsonian scientists and educators collaborate to advance the *Life on a Sustainable Planet* Initiative.

The Smithsonian Science Education Center is the only organization of the Smithsonian Institution dedicated to transforming *K-12 Education Through Science* in collaboration with communities across the globe. The Smithsonian Science Education Center has three goals: to promote innovation, inclusion and sustainable development[1] through transdisciplinary science, technology, engineering, arts and mathematics (STEM/STEAM) education.[2]

In 2016, after the release of the United Nations Sustainable Development Goals (SDGs), the Smithsonian Science Education Center, in collaboration with the InterAcademy Partnership — which represents national academies from 143 regions of the world — began developing *Smithsonian Science for Global Goals*.[3] These free community research guides for youth, ages 8 to 17, are based on science-related SDGs. They assist educators in guiding young people as they discover, understand and act on the world's most pressing socio-scientific issues and opportunities of our time — including climate action, climate resilience, biodiversity, food security, ocean health, sustainable communities and environmental justice. Through the guides, students discover the connections between themselves, their communities and global issues, which they investigate using their communities as their laboratories. Students also use scientific and socio-scientific approaches to gather data relevant to their communities, and then apply their new knowledge to drive social improvements. This innovative approach centers young people in leading their scientific learning and casts science educators as co-learners and facilitators in that process.

While millions of students and tens of thousands of teachers around the world are using these free materials in nearly 100 countries, the Smithsonian wanted to know more about teachers' perspectives on teaching topics aligned with the SDGs, and whether perspectives varied across countries. The Smithsonian contracted with Gallup, an expert in conducting global surveys, to understand what was driving (or impeding) implementation of SDGs in schools globally, and to assess the prevalence of science-based SDGs in each country's school curriculum. Moreover, we wanted to know what resources educators needed to support the implementation of the SDGs in schools.

The findings from this survey are for everyone. Why? Because at the heart of the Smithsonian Science Education Center's work is a commitment to the idea that all youth — regardless of gender, sexual orientation, geography, race, native language, ability or socioeconomic status — should be given opportunities to learn about the socio-scientific problems their communities face and encourage their fellow youth and educators to help solve them.

> We hope this survey provides a high-level assessment of the barriers and opportunities for Educating for Sustainable Development in the U.S. and beyond.

Dr. Carol L. O'Donnell
Director, Smithsonian Science Education Center

1 UNESCO (n.d.). *Sustainable Development*. Unesco.org. Retrieved August 1, 2023, from https://www.unesco.org/en/sustainable-development

2 O'Donnell, C. & Day, K. J. (2022). *Teaching About Real-World, Transdisciplinary Problems and Phenomena through Convergence Education. Smithsonian Magazine.* Retrieved August 1, 2023, from https://www.smithsonianmag.com/blogs/smithsonian-education/2022/07/25/teaching-about-real-world-transdisciplinary-problems-and-phenomena-through-convergence-education/

3 Smithsonian Science Education Center (n.d.). *Smithsonian Science for Global Goals.* Retrieved August 1, 2023, from https://ssec.si.edu/global-goals

Introduction

In spring 2023, the Smithsonian Science Education Center contracted with Gallup to conduct a study of U.S. K-12 teachers and school administrators, as well as teachers of students in comparable grade levels in four peer countries: Brazil, Canada, France and India. The goal was to gauge attitudes toward, and demand for, education and resources related to sustainable development. In the United States, educational resources exist within school and district curricula, which must adhere to state standards. Internationally, however, different countries and provinces often have a National Curriculum, typically directed by their Ministries of Education. This study was an outgrowth of the Smithsonian Science Education Center's Smithsonian Science for Global Goals project, which aims to improve STEM Education for Sustainable Development[4] for youth around the world.

Sustainable development, as defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO), is "a resolution to meet the needs of the present without compromising the future."[5] The UN has developed 17 goals related to sustainable development that inform a "shared blueprint for peace and prosperity for people and the planet, now and into the future."[6] The Smithsonian-Gallup survey explored 11 of those goals as a sample of the Smithsonian Science Education Center's work.

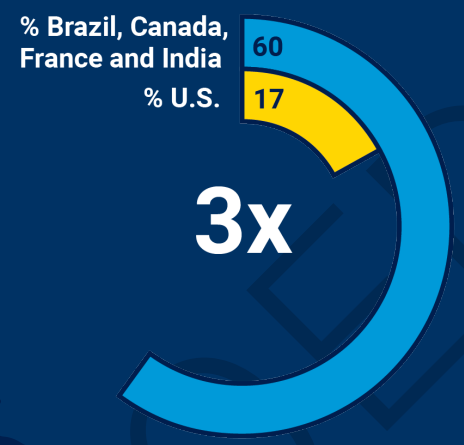
Measuring progress in this *Educating for Sustainable Development* report is an important step toward the inclusion of sustainable development in U.S. K-12 education and beyond.

4 Pahnke, J., O'Donnell, C. & Bascopé, M. (2019). Using Science to Do Social Good: STEM Education for Sustainable Development. Position paper developed in preparation for the second "International Dialogue on STEM Education" (IDoS) in Berlin, December 5–6, 2019. Retrieved August 1, 2023, from https://www.haus-der-kleinen-forscher.de/en/international-dialogue-on-stem-education/idos2019/position-paper

5 UNESCO (n.d.). *Sustainable Development.* Unesco.org. Retrieved August 1, 2023, from https://www.unesco.org/en/sustainable-development

6 United Nations (n.d.). *Department of Economic and Social Affairs - The 17 Goals.* Retrieved August 1, 2023, from https://sdgs.un.org/goals

Key Findings



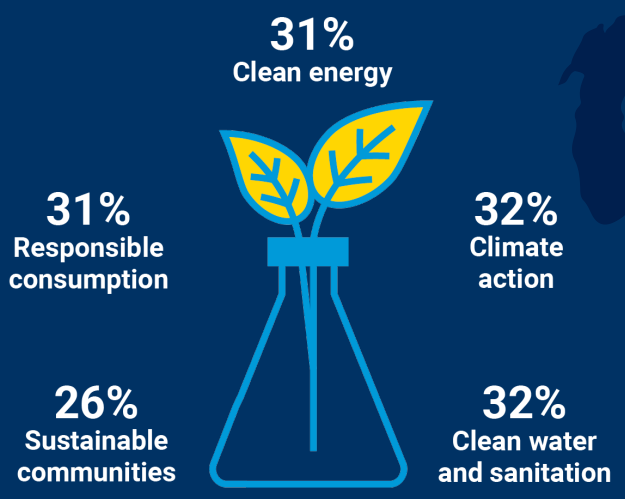
1 Compared with teachers in Brazil, Canada, France and India, U.S. teachers report having less support, time and expertise to incorporate sustainable development[7] into their curriculum.[8]

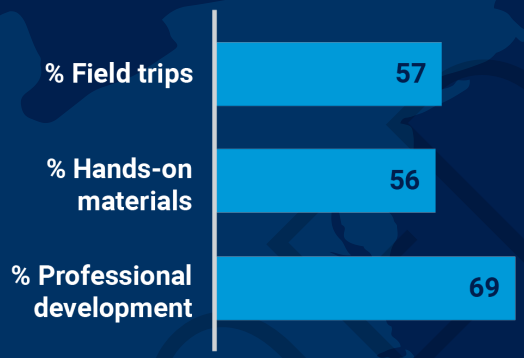
On average, **teachers in these four countries are more than three times as likely as U.S. teachers to say they have the necessary support** to incorporate sustainable development topics into other subjects (60% vs. 17%).

- Administrators perceive the support more positively than teachers in the U.S., as 36% agree there is sufficient support (compared with 17% of teachers).
- Ninety percent of U.S. teachers say a lack of time poses a great deal or some challenge, and more than seven in 10 say the same about a lack of instruction materials (76%) and expertise on the subject (74%).

7 Definitions for sustainable development and sustainability were embedded within the survey.

8 Curriculum is the academic lessons and content taught in classrooms.





2 Sustainable development — especially socio-scientific topics — is largely missing from U.S. curriculum, especially compared with Brazil, Canada, France and India.

For example, 31% of U.S. teachers say clean energy is a dedicated part of curriculum, compared with 78% of those in Brazil.

- **Content with socio-scientific topics — such as sustainable communities (26%), responsible consumption (31%), clean energy (31%), climate action (32%), and clean water and sanitation (32%) — are among the sustainable development topics least likely to be found in U.S. curricula.**
- Nearly half (49%) of U.S. teachers say these topics receive too little attention, on average.
- Most U.S. teachers (65%) say sustainability does not fit within the topics they teach, including a majority (59%) of those who teach science.

3 U.S. teachers and administrators believe teaching about sustainable development is important and want to incorporate it into their lessons.

Most teachers see the benefits of teaching about sustainability, such as having a positive impact on the world (83%) and local community (79%), making learning about science more accessible to students (73%), increasing students' interest in STEM/STEAM topics (71%), increasing students' interest in current events (73%), and supporting students' personal resilience (67%).

- **U.S. teachers say direct experiences — such as field trips (57%) and hands-on materials (56%) — and professional development on sustainability topics (69%) would be most helpful for teaching about sustainability.**

Detailed Findings

1 Raising the Teacher's Voice on Sustainable Development

2 Confronting the Lack of K-12 Curriculum on Sustainable Development

3 Unleashing Potential in U.S. Schools

1 Raising the Teacher's Voice on Sustainable Development

Just 17% of U.S. teachers say they have the necessary support to incorporate sustainable development topics, significantly lagging the support teachers in Brazil, Canada, France and India report.

Three barriers stand out for U.S. teachers when it comes to teaching about sustainability: support from other stakeholders, sufficient time for instruction and the right instructional materials.

Only one in six U.S. teachers (17%) agree they have the necessary support from parents, school boards and other stakeholders to incorporate sustainability into the curriculum. U.S. administrators are more likely than teachers to say there is sufficient support (36% vs. 17%).

Teachers in Brazil, Canada, France and India report much higher rates of support from education stakeholders to incorporate sustainability into their teaching subjects. On average, teachers in these four countries are more than three times as likely as U.S. teachers to say they have the necessary support (60% vs. 17%).

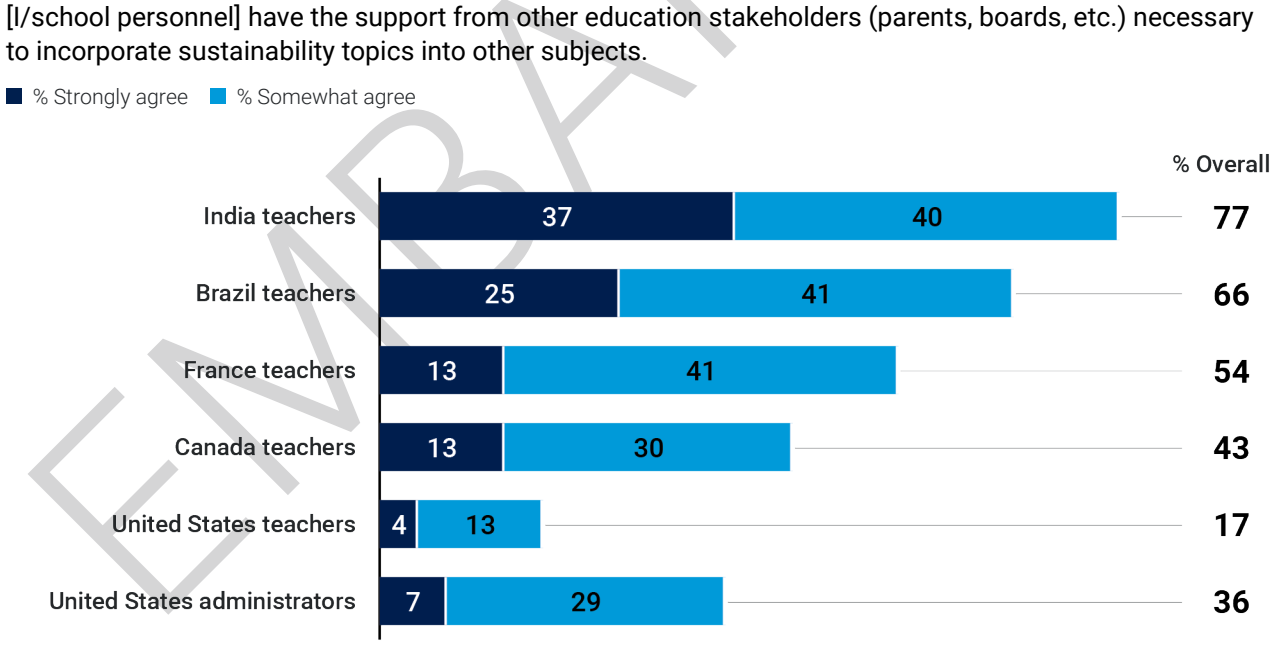
77% vs. 17%

India's teachers report the most support, and are over four times more likely than those in the U.S. to agree they have the necessary support.

CHART 1

Teachers' and U.S. Administrators' Views of the Support They Receive to Incorporate Sustainability Topics

[I/school personnel] have the support from other education stakeholders (parents, boards, etc.) necessary to incorporate sustainability topics into other subjects.



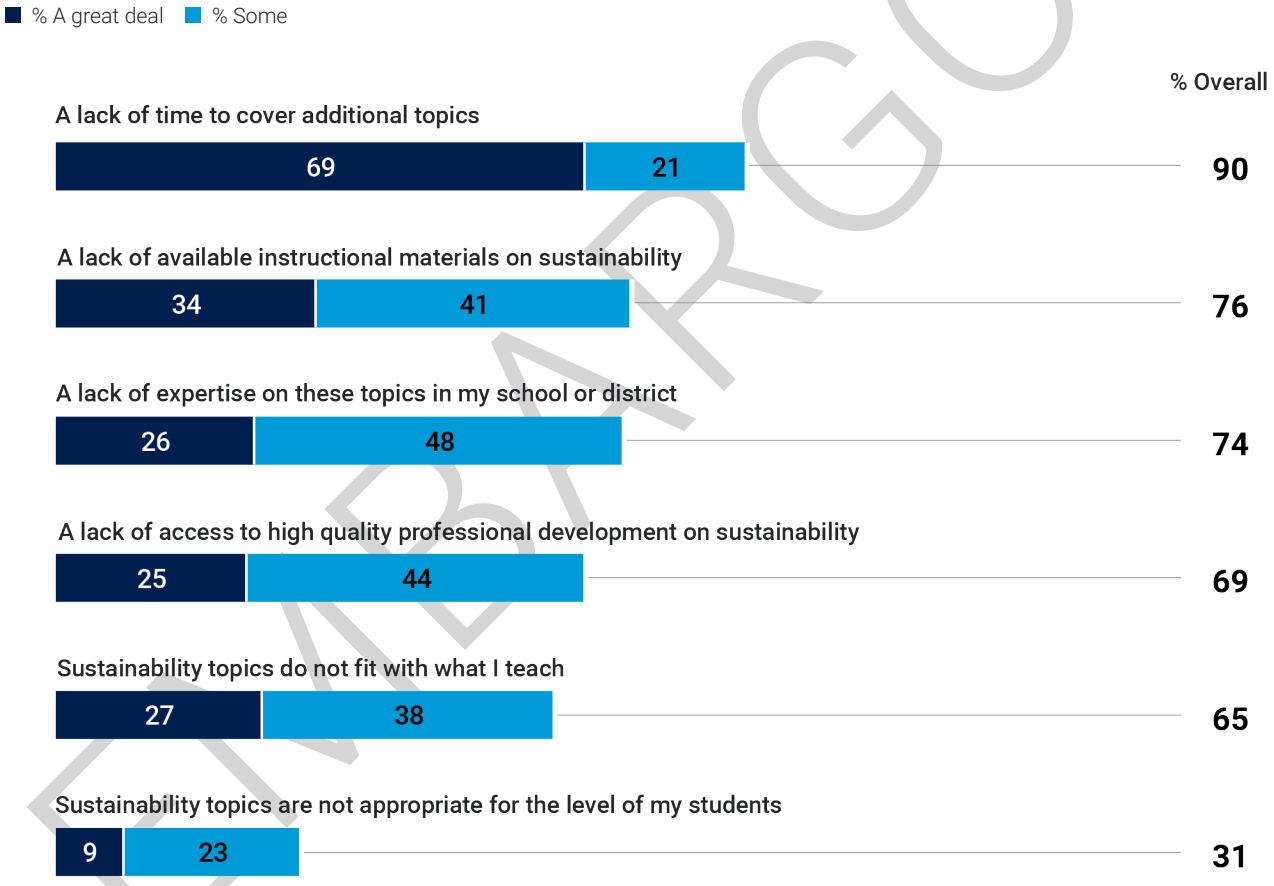
From a list of six possible challenges to teaching about sustainability, U.S. teachers most frequently say that a lack of time poses a great deal of a challenge or some challenge (90%). More than seven in 10 U.S. teachers also say a lack of instructional materials (76%), expertise (74%) and professional development (69%) pose a challenge. Many teachers (65%) report that sustainability topics do not fit within what they teach. Only one-third of teachers (32%) say sustainability topics are not appropriate for the level of their students, indicating that most teachers do not think these topics are too complex for students to learn.

32%
Only *one-third of teachers* say sustainability topics are not appropriate for the level of their students.

CHART 2

Greatest Challenges to Incorporating Sustainability-Related Topics, Among U.S. Teachers

Please indicate the extent to which each of the following poses a challenge to incorporating sustainability-related topics in your curriculum.



Note: Due to rounding, segments may sum to the total shown, +/-1.

2 Confronting the Lack of K-12 Curriculum on Sustainable Development

Socio-scientific topics are the least likely sustainable development topics to be included in U.S. curriculum standards, greatly lagging France, Canada, India and Brazil.

The Smithsonian-Gallup survey asked respondents about 11 sustainable development topics, five of which are related to socio-scientific topics (e.g., climate action) and six describe societal topics (e.g., global citizenry). In eight of the 11 sustainable development topics included in the survey, the U.S. ranks last behind Brazil, Canada, France and India in its incorporation of those topics in K-12 curriculum.

The U.S. is particularly behind its global cohort in the inclusion of socio-scientific topics, including climate action, sustainable communities, responsible consumption, clean energy, and clean water and sanitation.

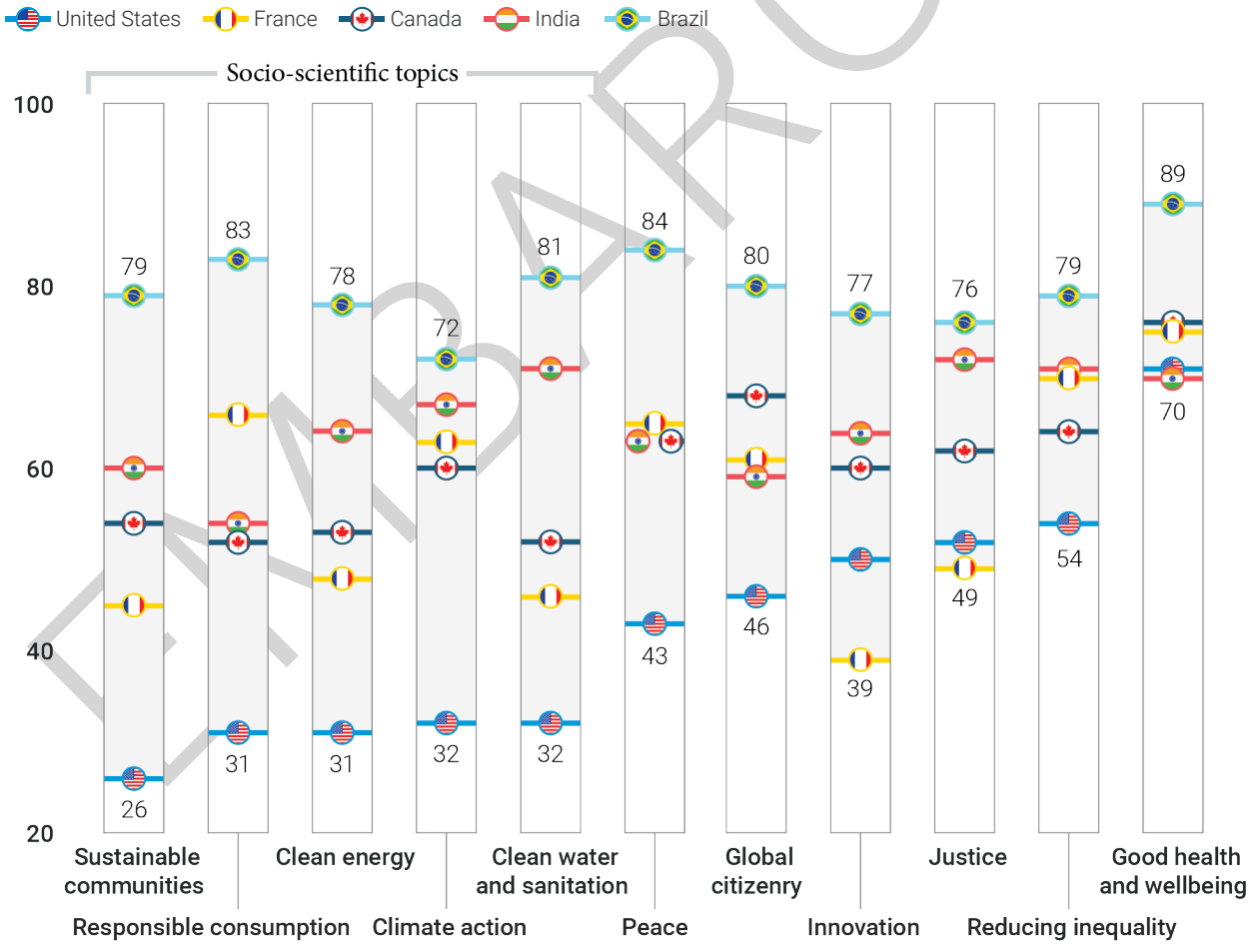
The U.S. is closer to the other nations when it comes to educational content on societal topics, such as good health and wellbeing.

CHART 3

Inclusion of Sustainable Development Topics in Curricula Across Five Countries

Please indicate the extent to which each of the following is included in your school or district curriculum.

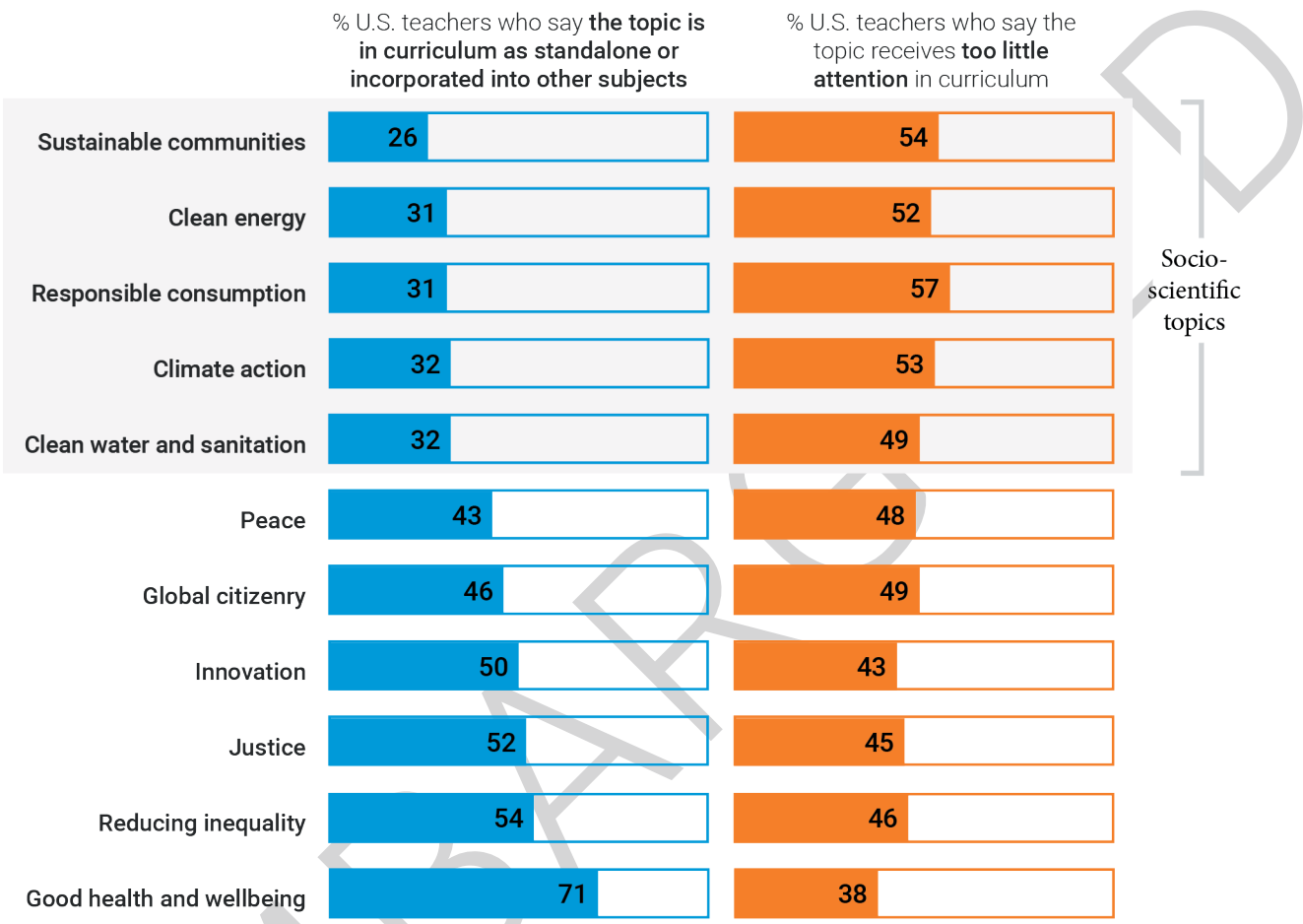
% It is standalone (independent lessons or units explore this topic directly) or incorporated into other subjects, among teachers



While socio-scientific topics are the least likely to be included in curriculum standards in the U.S., teachers say they receive too little attention.

CHART 4

U.S. Teachers' Perspectives on the Inclusion of Sustainable Development Topics in Curricula



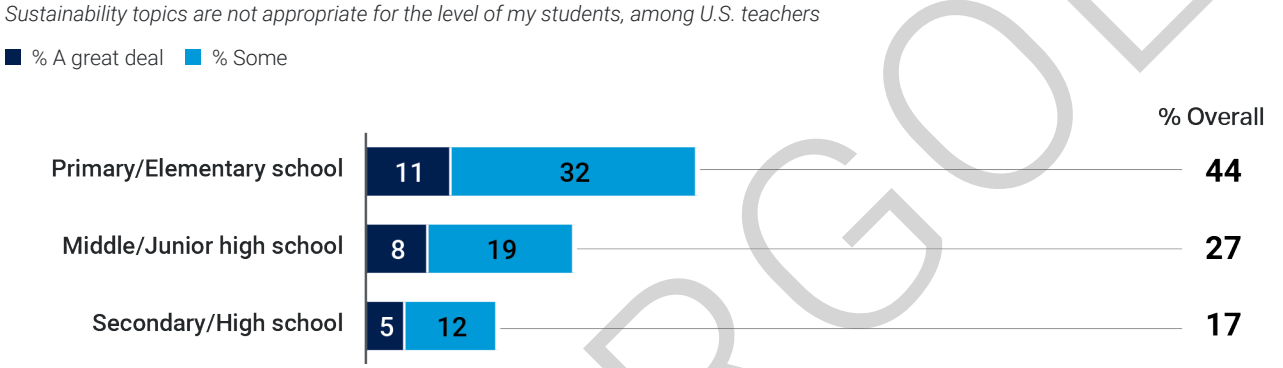
Many primary/elementary school teachers in the U.S. (44%) don't see sustainable development as appropriate for the grade level they teach, which they say poses a great deal of a challenge or some challenge to incorporating sustainability-related topics into the curriculum they teach. However, fewer middle/junior high school teachers (27%) and secondary/high school teachers (17%) share this perspective. This indicates that most teachers at all levels — including more than 80% of secondary/high school teachers, over 70% of middle/junior high school teachers and more than 50% of primary/elementary teachers — see sustainability topics as appropriate for the level of their students.

CHART 5

U.S. Teachers' Perspectives on the Appropriate Grade Level for Sustainability Topics, by Teachers' Grade Level

Please indicate the extent to which each of the following poses a challenge to incorporating sustainability-related topics in your curriculum.

Sustainability topics are not appropriate for the level of my students, among U.S. teachers



Due to rounding, segments may sum to the totals shown, +/-1.

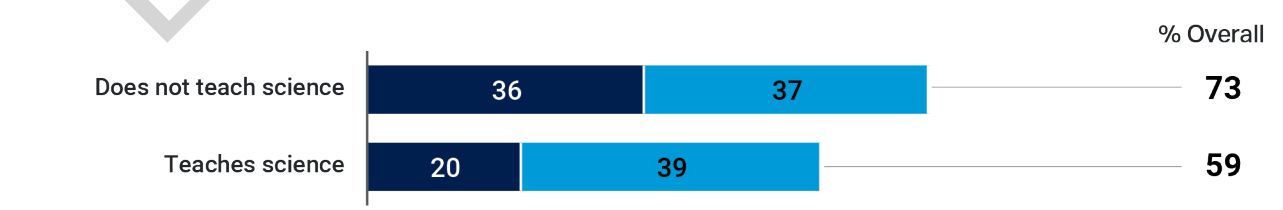
> Non-science teachers in the U.S. are also more likely than science teachers to say sustainability does not fit into what they teach (73% vs. 59%).

CHART 6

U.S. Science Teachers and Non-Science Teachers on Whether Sustainability Topics Fit With Their Content

Please indicate the extent to which each of the following poses a challenge to incorporating sustainability-related topics in your curriculum.

Sustainability topics do not fit with what I teach, among U.S. teachers



3 Unleashing Potential in U.S. Schools

Four in five U.S. teachers (81%) agree teaching about sustainability is important, but just one in five (20%) have the time to do so.

U.S. teachers are about as likely as their international peers to believe sustainability is important to teach, but are less likely to say they have the knowledge and time to do so. While about four in five U.S. teachers (81%) strongly or somewhat agree teaching about sustainability is important, just one in five (20%) strongly or somewhat agree they are able to allocate time to incorporate it, and only about one-third (37%) report they have the knowledge to do so.

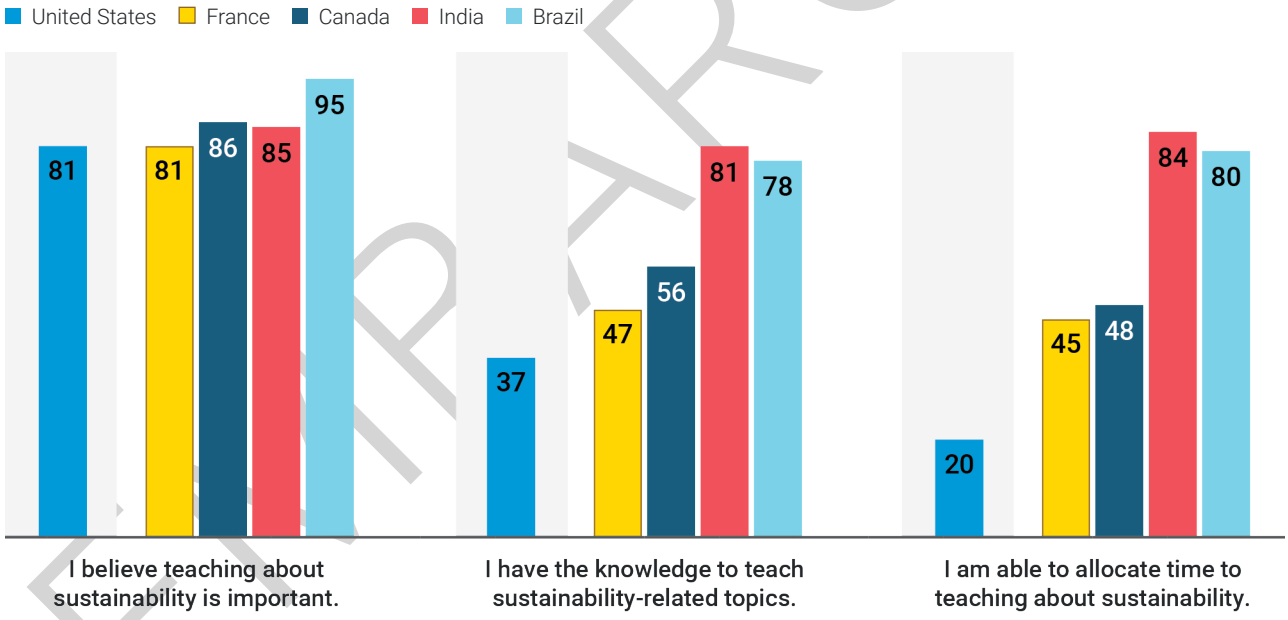
Overcoming these barriers could help educators teach the sustainability topics they believe to be important.

CHART 7

Sustainability Teaching Importance, Knowledge and Time Across Countries

Please indicate the extent to which you agree or disagree with each of the following statements.

% Strongly agree or Somewhat agree, among teachers

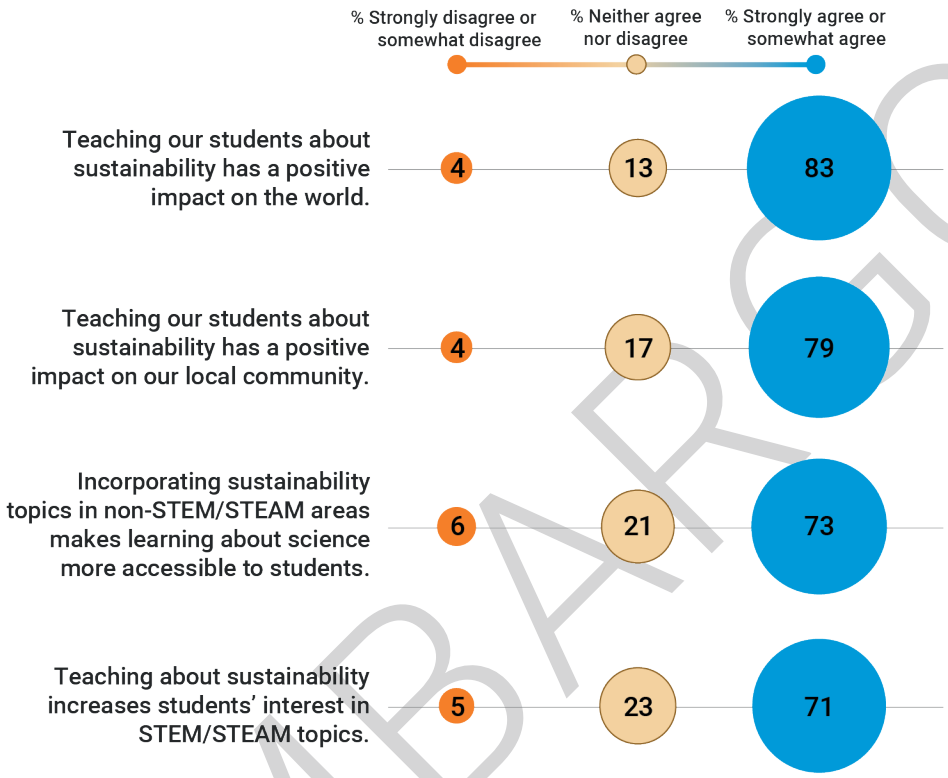


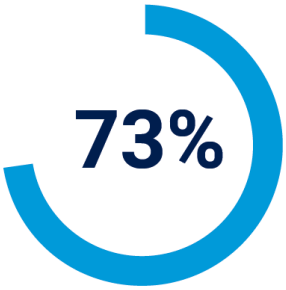
Most U.S. teachers see important benefits to teaching about sustainability, and strongly or somewhat agree teaching about it has a positive impact on the world (83%) and local community (79%). These benefits extend beyond science education, as most teachers also strongly or somewhat agree that incorporating sustainability topics in non-STEM/STEAM areas makes learning about science more accessible to students (73%) and increases students' interest in STEM/STEAM topics (71%).

CHART 8

U.S. Teachers' Views of the Impacts of Teaching About Sustainability

Please indicate the extent to which you agree or disagree with each of the following statements:





of teachers strongly or somewhat agree that including sustainability topics **increases students' interest in current events.**

of teachers strongly or somewhat agree that including sustainability topics in the curriculum **supports students' resilience.**

Learning about sustainability may also affect students in other ways. Most U.S. teachers strongly or somewhat agree that including sustainability topics increases students' interest in current events (73%) and supports students' personal resilience (67%).[9]

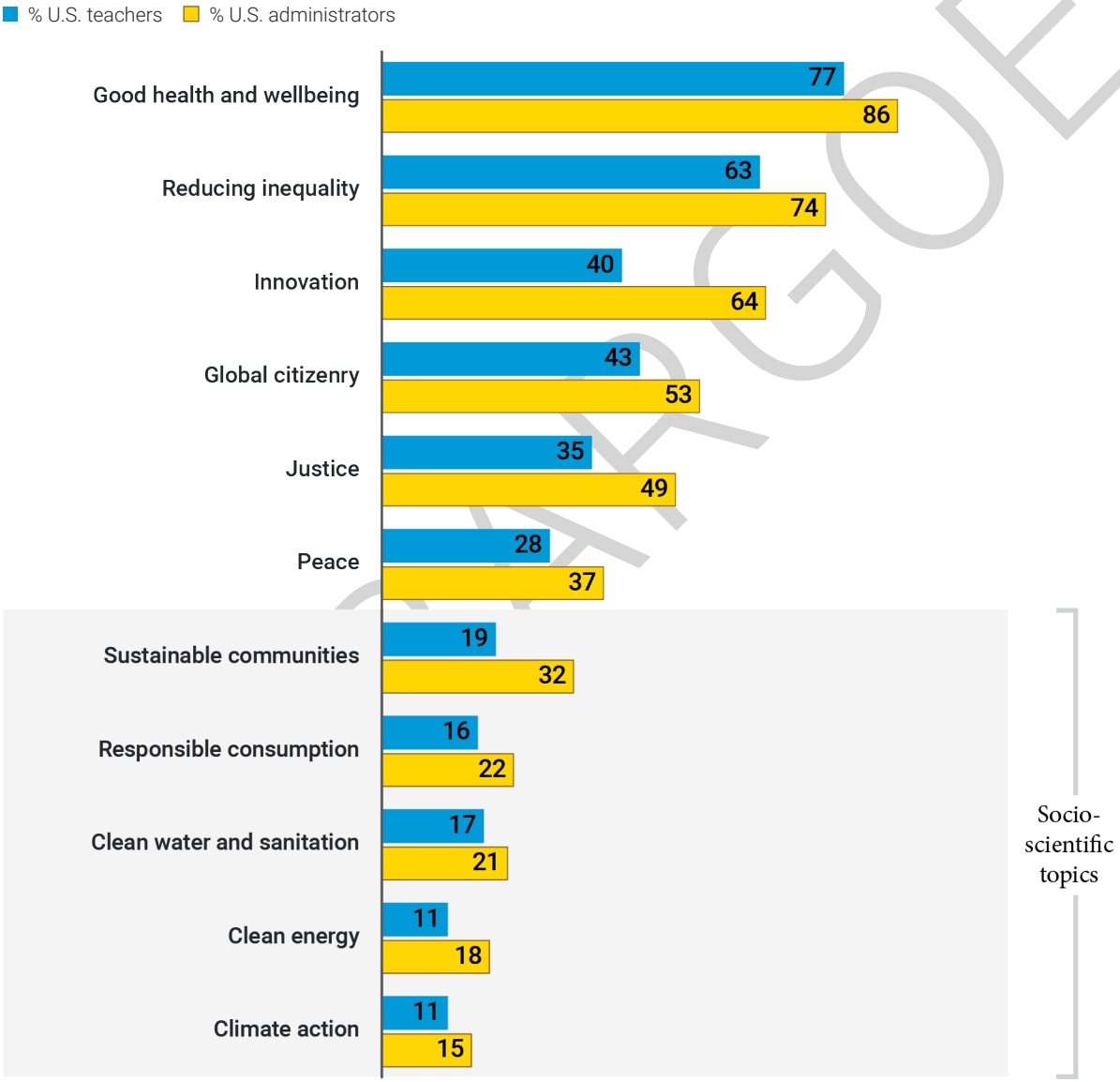
9 Resilience was defined for survey respondents as "The ability of an ecosystem, organization, community or individual to thrive in the face of change."

From educators' perspectives, many of the values and principles of sustainable development education already appear to be a good fit for U.S. schools. Administrators are especially likely to see them as well-aligned. At least half of administrators see societal topics, such as good health and wellbeing, reducing inequality, innovation, global citizenry and justice, as aligned with their school goals. However, there is less alignment when it comes to socio-scientific topics, such as clean water and sanitation, climate action, and clean energy.

CHART 9

U.S. Teachers' and Administrators' Views of Alignment Between Sustainable Development Topics and Their School or District Goals

Please indicate which of the following values or principles align with your school or district goals. Select all that apply.



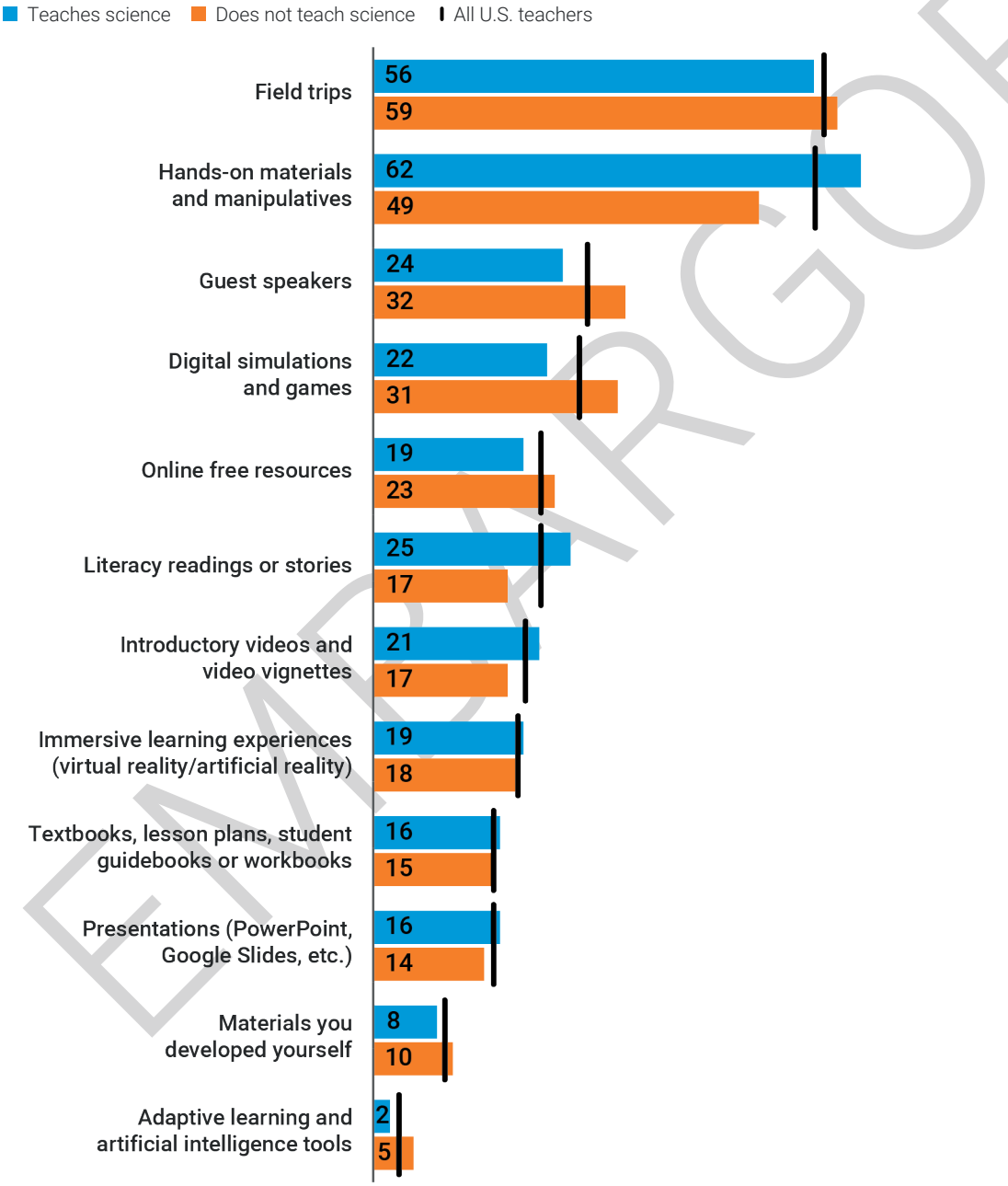
U.S. teachers have a clear preference for the materials they would most like to use to teach about sustainability. Field trips and hands-on materials top the list, as 57% and 56%, respectively, of all U.S. teachers say they prefer these types of resources. In some cases, non-science teachers are more likely than science teachers to prefer third-party support, such as guest speakers (32% vs. 24%) and digital simulations and games (31% vs. 21%).

CHART 10

Materials U.S. Teachers Most Prefer for Teaching About Sustainability

Select the materials you would prefer to use to teach about sustainability. Select up to three.

% Selected



In addition to these sustainability-related materials and activities, most U.S. teachers (63% to 76%) believe they would benefit from professional development related to all sustainable development topics, including topics related to socio-scientific topics.

TABLE 1

Proportion of U.S. Teachers Who Say They Would Benefit From Professional Development on Select Sustainable Development Topics

Sustainable Development Topic	% Teachers who say they would benefit from professional development on the topic "A great deal" or "Some"
Innovation	76
Global citizenry	72
Reducing inequality	72
Good health and wellbeing	71
Justice	70
Sustainable communities	**70**
Responsible consumption	**70**
Peace	67
Clean energy	**65**
Clean water and sanitation	**63**
Climate action	**63**

Note: Socio-scientific questions are outlined.

Conclusion

U.S. teachers and administrators believe teaching about sustainable development is important and a majority see wide-ranging benefits for students. Yet, when it comes to education, the U.S. still lags Brazil, Canada, France and India in its inclusion of sustainable development in curriculum standards.

This lack of inclusion is particularly stark for sustainability topics related to socio-scientific topics, such as climate action, responsible consumption, sustainable development, clean energy, and clean water and sanitation. This is despite a decade of exposure to the most recent set of multistate science education standards, released in 2013, which include standards related to climate change,[10] humans' impact on[11] and use of natural resources,[12] and/or sustainability of human populations[13] in elementary, middle school and high school standards. While education on sustainable development is not the same as a country's actual state of sustainable development, it is one indicator of progress toward that development. For example, although Brazil and India are teaching sustainable development topics more, that does not mean their environmental conditions are better than other countries' in the world.

10 Next Generation Science Standards (2015). *ESS3D: Global Climate Change.* Nextgenscience.org. Retrieved August 1, 2023, from https://www.nextgenscience.org/disciplinary-core-idea/ess3d-global-climate-change?page=0

11 Next Generation Science Standards (2015). *ESS3C: Human Impacts on Earth Systems.* Nextgenscience.org. Retrieved August 1, 2023, from https://www.nextgenscience.org/disciplinary-core-idea/ess3c-human-impacts-earth-systems

12 Next Generation Science Standards (2015). *ESS3A: Natural Resources.* Nextgenscience.org. Retrieved August 1, 2023, from https://www.nextgenscience.org/disciplinary-core-idea/ess3a-natural-resources

13 Next Generation Science Standards (2015). *HS-ESS3 Earth and Human Activity*. Nextgenscience.org. Retrieved August 1, 2023, from https://www.nextgenscience.org/dci-arrangement/hs-ess3-earth-and-human-activity

U.S. teachers' difficulty incorporating sustainable development topics may be due to low knowledge about what sustainable development includes and how current science standards relate to it,[14] as most teachers — including those who teach science — say sustainability doesn't fit in with what they teach. Some curriculum materials used by schools or districts may also be less likely to incorporate sustainability topics in meaningful ways. The right instructional materials, like those provided by Smithsonian Science for Global Goals, may help teachers across the globe integrate sustainable development into STEAM/STEM-related courses.

Clear opportunities exist to close this education gap in the United States. Field trips and hands-on materials top the list of resources that U.S. teachers would prefer to use to teach about sustainability, particularly STEM teachers. Resources that address teachers' needs, such as transdisciplinary[15] integration with other topics (e.g., good health and wellbeing, engineering solutions to problems, history, math and reading) and providing students with direct experiences, might help teachers dedicate more instructional time to sustainability topics. Professional development — which more than six in 10 (63%-76%) of those surveyed say they would like to have — could help teachers recognize the relevance of sustainability to content they already cover, along with providing the expertise many desire. Using both by aligning professional development with high-quality instructional materials may help the U.S. advance its inclusion of sustainable development topics within STEM education. This is particularly important for junior/middle and secondary/high school science teachers, who are the most likely to report that teaching about sustainability is appropriate for their students.

Teachers in every country studied, including in the U.S., believe teaching about sustainability is important and say they want to incorporate it into their teaching. Teachers also see the benefits of teaching about sustainability, such as having a positive impact on the world and local community, making learning about science more accessible to students, increasing students' interest in STEM/STEAM topics, increasing students' interest in current events, and supporting students' personal resilience. The strong interest in educating for sustainable development reflected in this report reveals a compelling opportunity to close the gap between the U.S. and its global peers.

The strong interest in sustainability education reflected in this report reveals a compelling opportunity to close the gap between the U.S. and its global peers.

14 Charnley, J., Olson, J., Morrison, D. L., & Norris, J. (2023, May 1). *Think globally, act locally: Promote the Sustainable Development Goals (SDGs) through community-centered learning.* STEMteachingtools.org. Retrieved August 1, 2023, from https://stemteachingtools.org/brief/93

15 O'Donnell, C. & Day, K. J. (2022). Teaching About Real-World, Transdisciplinary Problems and Phenomena through Convergence Education. Smithsonian Magazine. Retrieved August 1, 2023, from hhttps://www.smithsonianmag.com/blogs/smithsonian-education/2022/07/25/teaching-about-real-world-transdisciplinary-problems-and-phenomena-through-convergence-education/

Methodology

Gallup collected survey data online between April 21 and May 18, 2023. Surveys were written in U.S. English, and then translated into Portuguese, Canadian French, French and Hindi. Educators, including teachers, administrators and educational staff from the United States, Brazil, Canada, France and India were invited via email to take a web survey. Teachers from the U.S. were sampled from the Gallup Panel, a probability-based panel which uses address-based sampling and some random-digit dialing to recruit respondents. These teachers self-identified as having a current teaching role. Samples for teachers from Brazil, Canada, France and India, as well as administrators in the U.S., were obtained from third-party sample providers. While teachers were targeted in recruitment, some teachers in international contexts also reported having administration roles. Survey data are a reflection of the perspectives and experiences of the respondents. As such, findings are not a direct measurement of the academic content taught in classrooms, nor do findings reflect the quality of education.

Survey responses were weighted by school grade level, geography and urbanicity to adjust for differential nonresponse and frame-related coverage error. The margin of error (MOE) for all 2,580 respondents is ±2.3 % at the 95% confidence level. The margins of error for smaller subgroups are listed below. All MOEs reported are adjusted for the design effect, which is a measure of the impact of sampling design on the overall precision of the population estimate.

TABLE 2

Sample Sizes by Country

	Sample Size	Design Effect	Adjusted MOE
Overall	**2,580**	**1.4**	**±2.3%**
Teachers			
Canada	200	1.0	±7.0%
Brazil	200	1.3	±8.0%
France	200	1.2	±7.5%
India	300	1.8	±7.6%
United States	1,237	1.4	±3.3%
Administrators			
United States	443	1.1	±4.9%

Smithsonian
Science Education Center