



2022

Results from the Global Teacher Survey

The first ABE Global Teacher Survey was administered in May–June 2022 to all teachers at 19 sites in the 12 countries active at that time. Responses from 531 teachers (32% response rate) provided insights into their experiences with and the effectiveness of the ABE program around the world. See additional information about the survey respondents at the end of this report.

ABE is a unique and valued program

We asked teachers to share in their own words if and why ABE is a unique and valuable program. What makes ABE valuable to teachers? While it is no surprise that what teachers reported as most valuable about ABE was the access to research-grade equipment and resources, teachers also made it clear that the value of ABE went beyond the box of equipment. Many teachers stated that **ABE provided access to an experience that they, and more critically their students, would not be able to have otherwise.** Teachers described the experience as one that provides students with hands-on learning opportunities, addresses advanced science content, and illuminates difficult biotechnology concepts.

ABE has significantly changed the dynamics of teaching and learning in my Biotech classroom! My students find the lab sequence engaging, and are enthusiastic about working in the Biotech lab and applying all the concepts we learn about in class to the real-life lab environment!

— ABE Teacher, Rhode Island



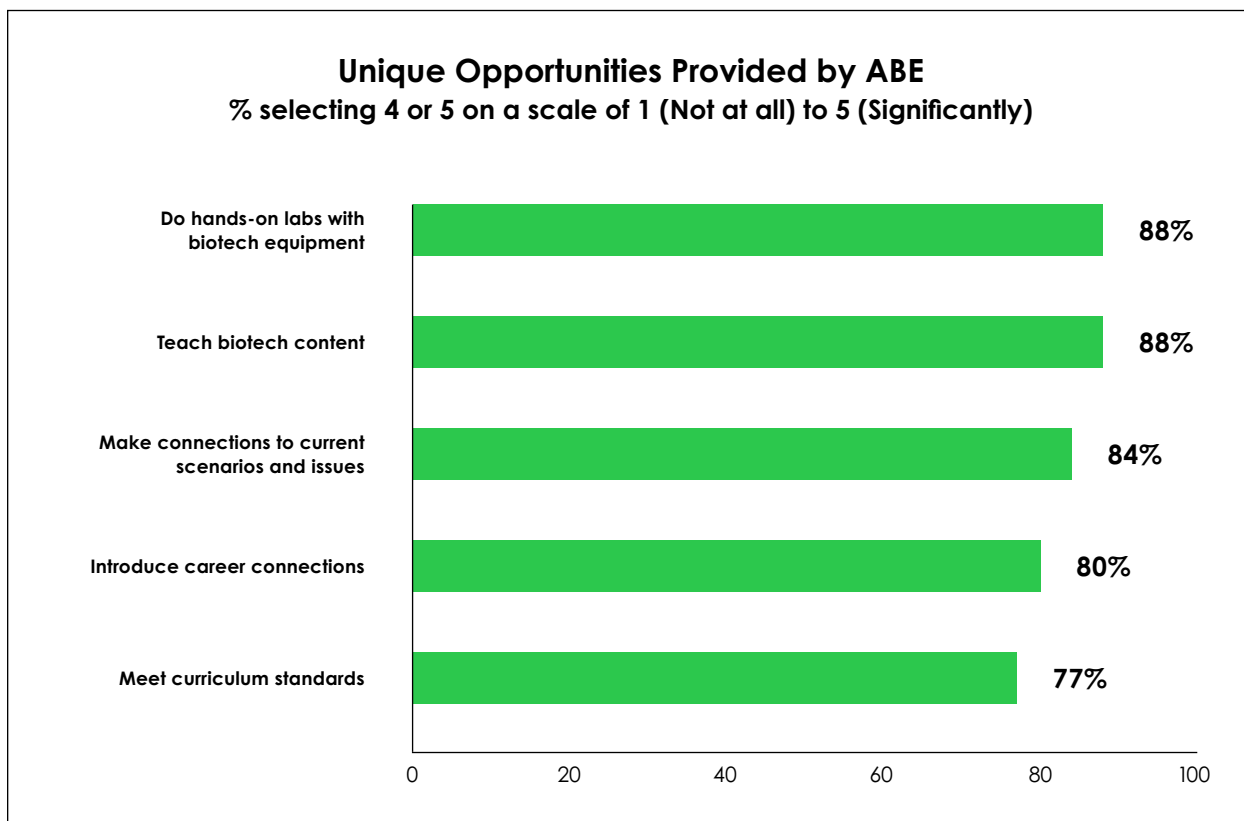
Teachers reported that the ease of ABE—receiving a kit with everything prepared and clearly organized and having access to a wide range of curriculum and teaching materials—**allowed them to focus on teaching.** For many teachers, that enabled them to build confidence in doing hands-on activities with students and teaching complex concepts, energized their teaching, and improved their perception of the value of doing hands-on science.

Many of the aspects of ABE that teachers described as valuable were also what they reported as making ABE unique. Teachers repeatedly cited that **the high quality of ABE was both valuable and unique.** In detailing what made ABE high quality, teachers described ABE as:

- **Comprehensive:** Includes everything a teacher needs and is well-organized
- **Relevant:** Engages students through storylines that connect with real-world issues
- **Authentic:** Includes current, cutting-edge techniques that allow students to be scientists
- **Accessible:** Offers easy-to-follow protocols and materials for teachers and students
- **Flexible:** Designed so that teachers can adapt ABE for use with different classes

We also asked teachers to indicate the extent to which ABE provided unique opportunities in their classroom teaching experience when compared to their usual classroom lessons. Teachers rated aspects of ABE on a scale of 1 to 5, 1 indicating “not at all” unique and 5 indicating “significantly” unique. Overall, teachers found ABE to be a unique experience in their classrooms, with more than three-quarters of teachers rating each item as either 4 or 5.

Figure 1. Teacher report on the extent to which ABE provides unique opportunities (N=458)



Teachers' experiences with professional learning

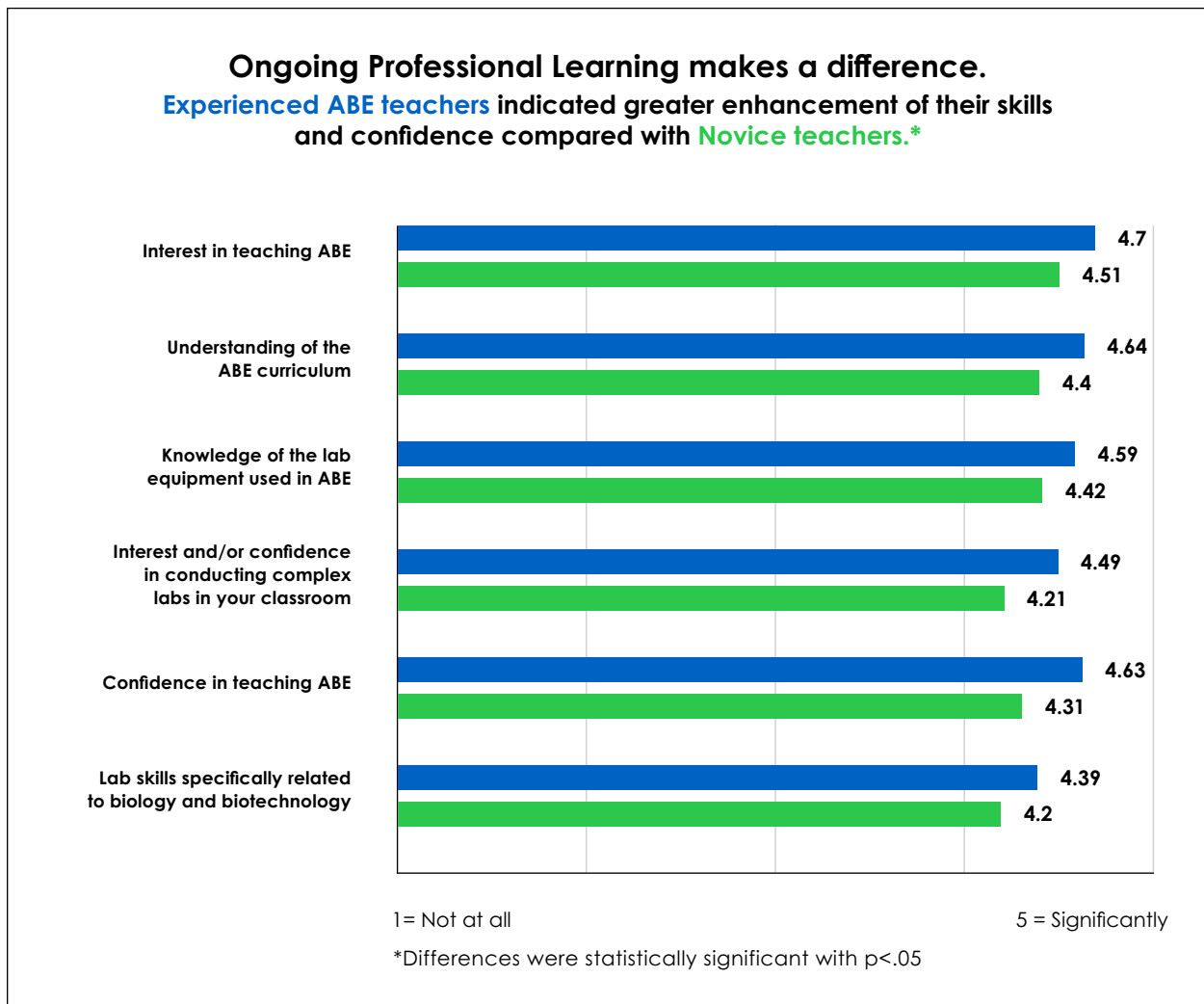
Teachers reported that **ABE professional learning was high quality and provided them with the skills and information needed to implement ABE in their classrooms.** Teachers also found value in continued engagement in professional learning activities. More than half of experienced teachers (teachers who have taught in-person ABE labs for more than 1 year) reported that they attended ongoing trainings, with over 20% indicating that they have attended a training almost every year that one was available. Experienced teachers participated in additional training to learn how to implement new or additional ABE labs (71%) and to continue building their skills and knowledge (74%).

[ABE] undoubtedly stimulated my interest and made me understand the possibility of bringing experiments into the classroom (laboratory) that had never been put into practice until now ... a personal enrichment that becomes a benefit for the school community!

— ABE Teacher, Italy



Figure 2. Comparison of experienced (N=378) and novice (N=153) teacher skill development through participation in ABE



Differences in context across sites

As with any large, global education program, the context for implementation of ABE varies greatly. Some key elements that can influence implementation are described below.

- **Teacher experience:** The majority of ABE teachers were experienced science teachers. Most teachers (71%) had more than 10 years of experience teaching science, and only 2% had less than 2 years of experience teaching science. Fifty percent had been teaching ABE for 4 years or more at the time of the survey.
- **School involvement:** Forty-two percent (42%) responded that they were the only teacher at their school doing ABE, whereas 45% had one or two other teachers at school doing ABE. Only 13% of teachers had several colleagues or whole departments at their school participating.
- **Lab space:** Most teachers (91%) reported having access to lab space for implementing ABE either in their classroom (61%) or in a shared lab space (33%).
- **Lab technicians:** Thirty-seven percent (37%) of teachers reported that their school had lab technicians that supported ABE. Sites where lab technicians were common included Australia, Canada, France, Hong Kong, Italy, Singapore, The Netherlands, and the United Kingdom.

Data from this survey also illustrated variations in the frequency of lab-based science activities in the classroom across sites. These differences likely reflect the different contexts, education systems, and approaches of ABE sites around the globe. For example, most teachers in France reported that, outside of ABE, they did lab-based activities almost every week. In contrast, most teachers in Germany, Hong Kong, Puerto Rico, the Netherlands, and Türkiye reported that they did lab-based activities every few months or less. Some specific variations included:

- Teachers from France indicated that doing hands-on labs with biotech equipment was not unique for them, whereas teachers from Germany all indicated that this was significantly unique for them. This most likely reflects the differences in approaches to biology education in Germany (low frequency of doing hands-on labs) and the attributes of the schools participating in ABE in France (a large number of technical schools).
- Teachers from Puerto Rico responded most frequently of feeling that ABE was unique, illustrating how special ABE is in the context of their community.

Teacher experiences implementing ABE

Teachers indicated that they felt well supported by their sites when it came to implementing ABE in their classrooms. The vast majority of teachers indicated that they received enough support from their ABE program site and felt confident that they could effectively implement ABE with their students. In addition, teachers reported knowing where to find additional support and guidance when they needed it.

Table 1. Where teachers go for support while implementing ABE

Source of Support	Percent (N= 454)
Consult the guides and manuals provided	85%
Contact someone at my ABE site for assistance	81%
Use online resources from the main ABE website (amgenbiotechexperience.com)	54%
Ask other teachers	40%
Use LabXchange resources	39%
Use online resources from my program site	33%

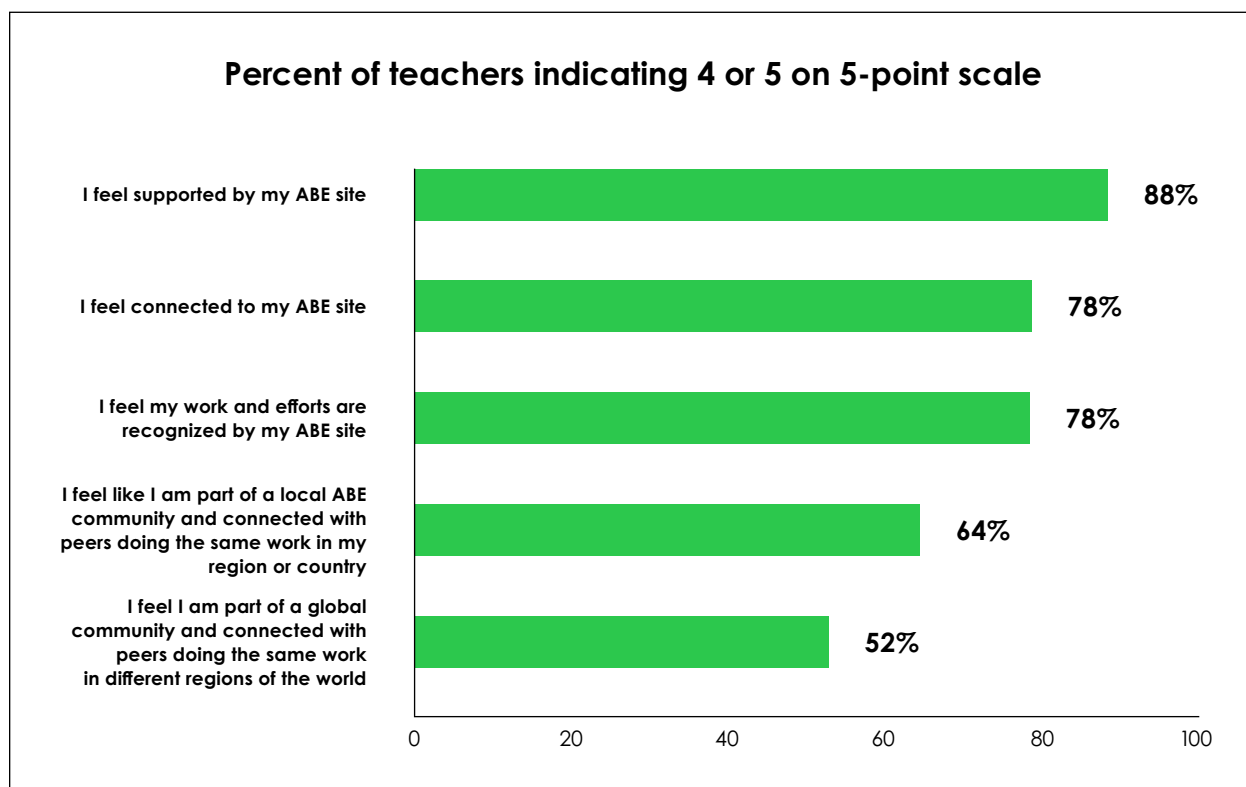
When asked to share challenges that they face when implementing ABE, the **top challenges** that teachers described included:

1. Scheduling class time **(44%)**
2. Differentiating ABE for different learners **(31%)**
3. Not getting expected lab results **(23%)**
4. Fitting in ABE with required curriculum and standards **(22%)**

Teachers' Connections with the ABE program

Overall, teachers indicated feeling connected with and supported by their sites (means >4 on a 5-point scale). The extent to which teachers felt part of a community—locally or globally—is less consistent. However, teachers with longer involvement with ABE indicated greater connection with the program. In open-ended responses, many teachers described the value of their ABE teacher community. As an ABE teacher from Massachusetts described: **At first, the most valuable part was access to the materials, training and curriculum, but now it is the continued support and PD and connections to the people associated with the ABE MA site.**

Figure 3. Teacher indication of their connection to the ABE program and community (N=447)



Teachers' interest in new resources

Teachers were asked about their interest in new resources, including mentoring opportunities and connections with biotech professionals. Potential new resources and opportunities that teachers indicated they would most likely use were:

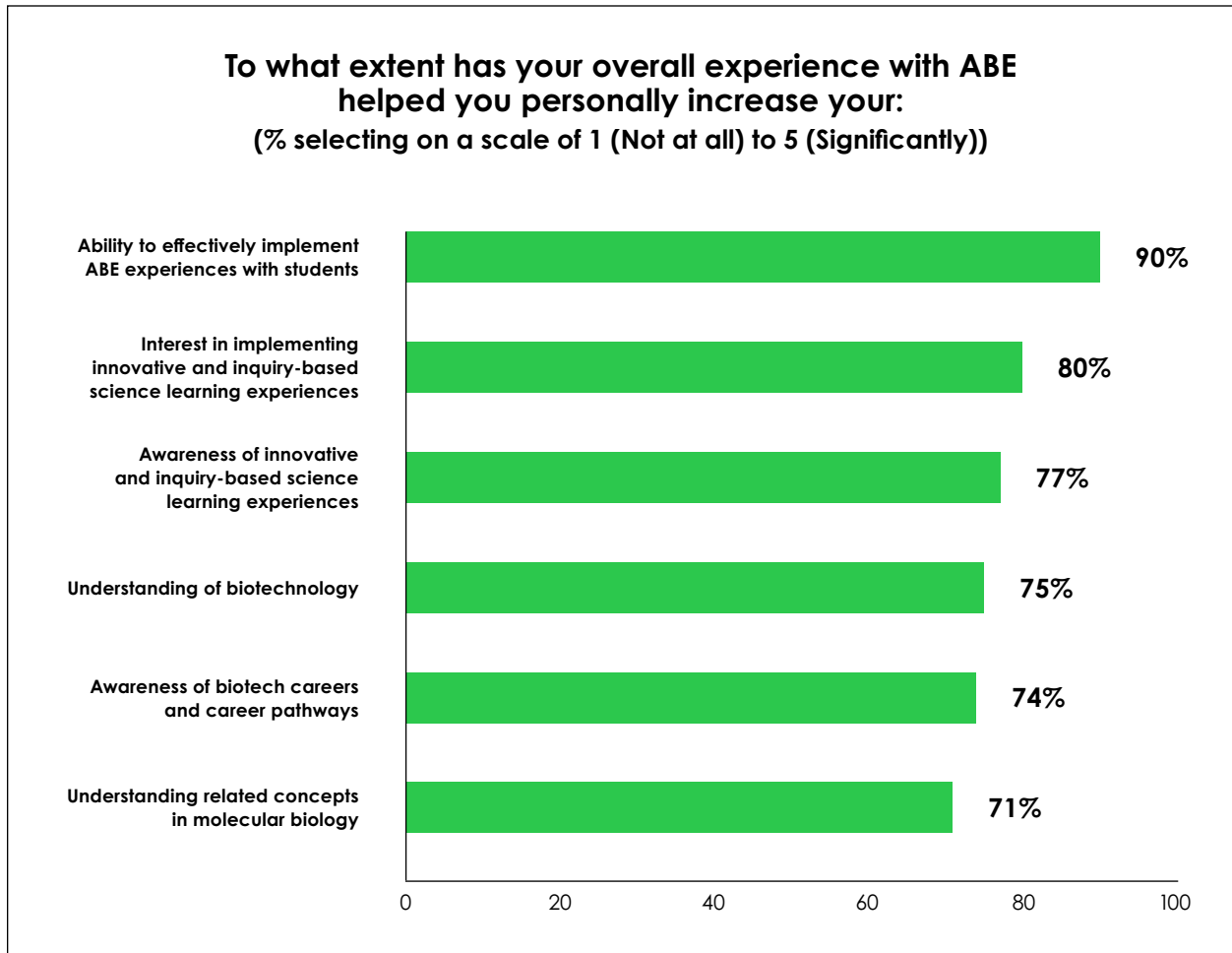
1. Additional biotech curriculum and lab activities (**90%**)
2. Opportunities for their students to connect with biotech professionals (**87%**)
3. Additional professional learning opportunities (**79%**)

Teacher outcomes and benefits

It is no surprise that the strongest, most consistent outcome for teachers was their increased ability to effectively implement ABE with their students (90% of teachers indicating 4 or 5 on a 5-point scale). However, teachers also indicated notable increases in their interest in and awareness of innovative and inquiry-based science activities and understanding of biotechnology and biotech careers, with over 70% indicating 4 or 5 on a 5-point scale.

While teachers were less likely to report increases with respect to their understanding of microbiology, this likely was a reflection of the fact that the ABE teachers who took the survey indicated that they were experienced and knowledgeable. They had less to learn about microbiology in general, and this aligns with the data from teachers on their perceived gains from professional learning. That said, teachers gained more through continued participation in ABE. Teachers who had been participating in ABE more than 5 years indicated greater increases than teachers with less than 5 years of experience in the program.

Figure 4. Teacher report of outcomes from participation in the ABE program (N=450)



With each new ABE experience, I learn more and more and gain more confidence in the program. This makes it easier to break down the content and simplify what students require to aid their understanding.

— ABE Teacher, Canada



Teacher report of student outcomes

Teachers shared their perception of the proportion of students who they saw gain certain outcomes from the program and the extent to which they believed the program offered different experiences for their students. **Teachers indicated that ABE was particularly successful at engaging students in scientific practices and helping students understand how science is practiced.** Teacher responses across the survey re-enforced the finding that the hands-on nature and use of real, high-end equipment is a critical component of ABE. This was a recurring theme throughout the data, from what teachers valued and found unique to what they indicated as making ABE engaging and motivating for students.



[ABE piques] students of all levels. Low, high-risk students are excited to be trusted to work with bacteria and pipettors and high-level students gain a better understanding of biotechnology. I have had students decide to major in Biotech after the lab and the speakers!

— ABE Teacher, Los Angeles



Figure 5. Teacher report of the proportion of students they perceive as gaining knowledge and skills through ABE (N=450)

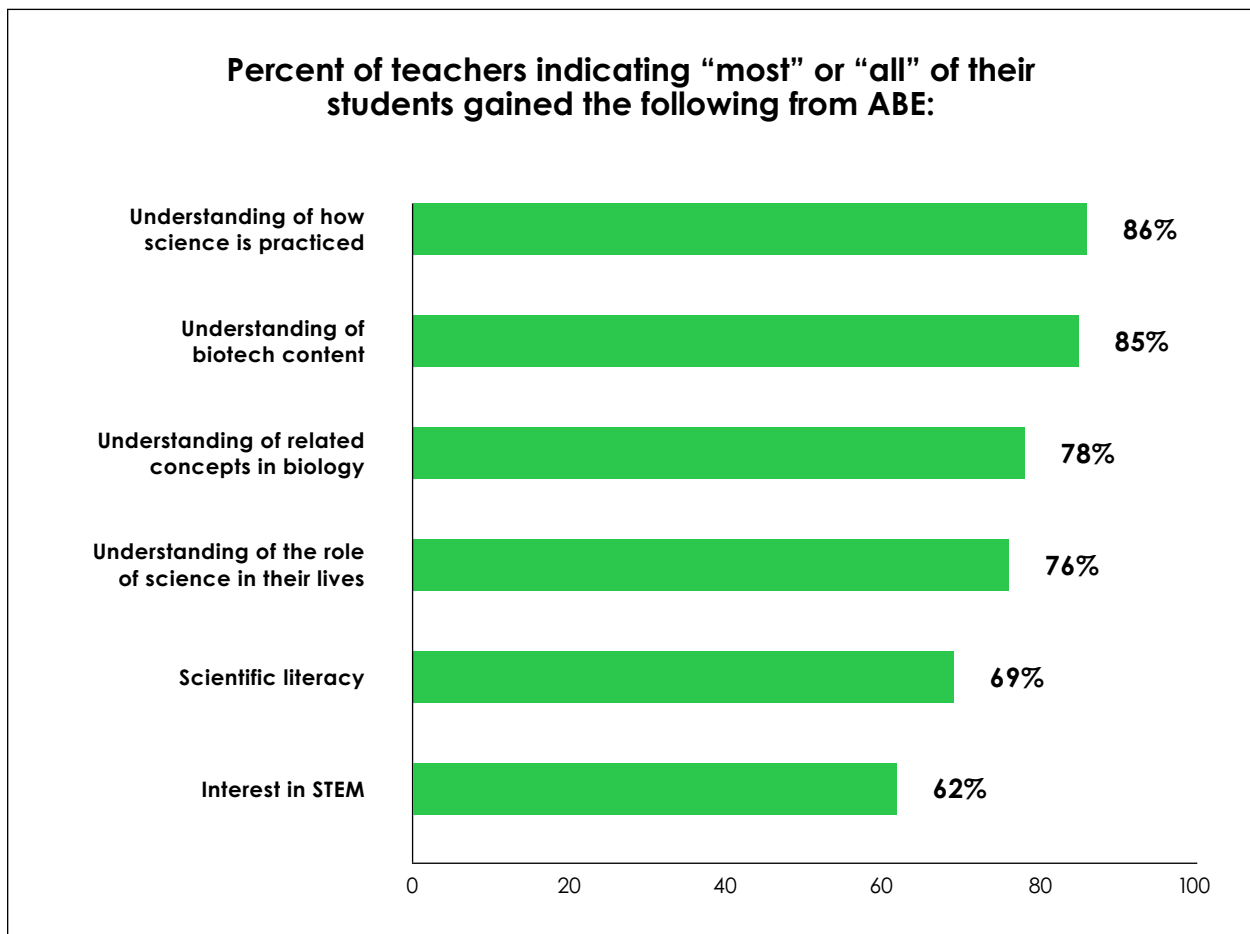
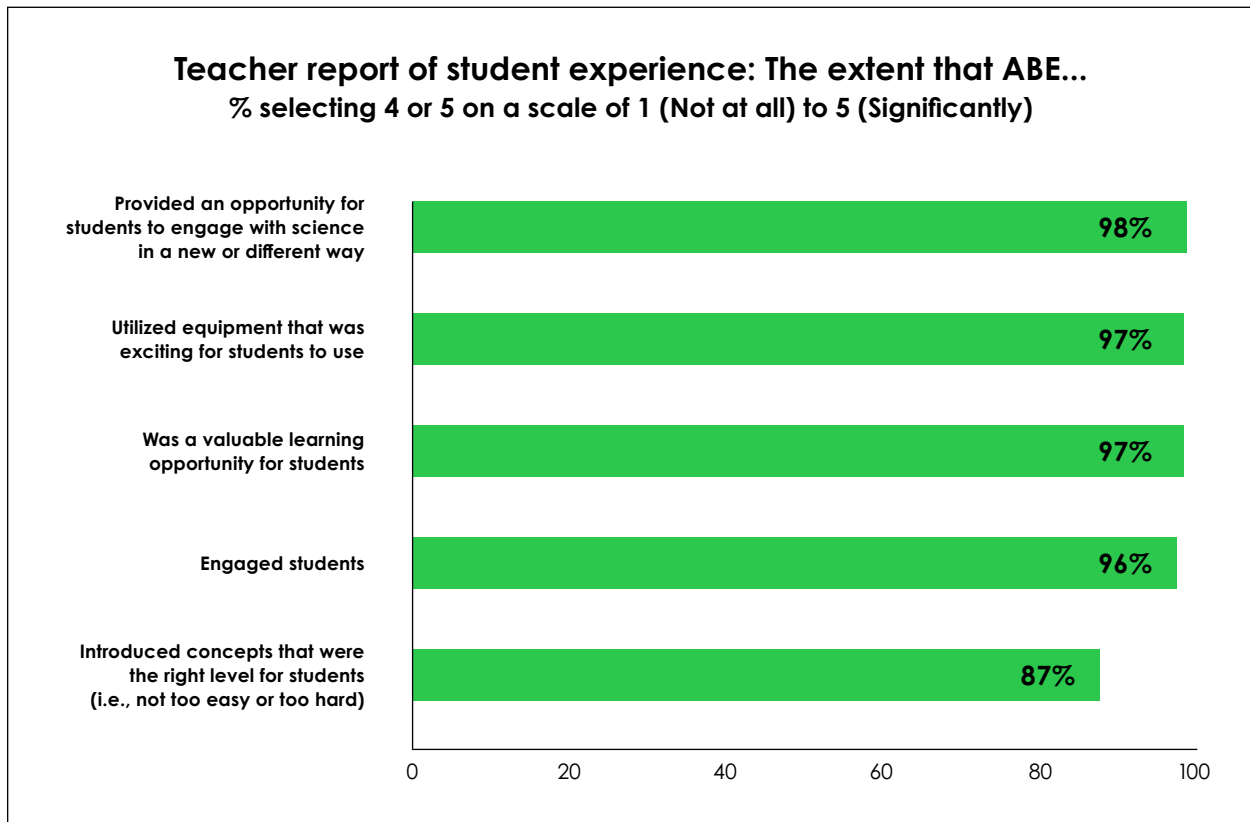


Figure 6. Teacher report of the experience ABE provided to their students (N=449)



About the survey

The survey was administered to teachers at the 19 active ABE sites across 12 countries in May–June 2022. These sites vary greatly with respect to size, geography, and years of operation. Some sites have been in operation for more than 10 years and have established communities of teachers with extensive engagement with ABE. Other sites are newer and have teachers who are just beginning to implement ABE in their classrooms.

Surveys were distributed by ABE site staff to all currently active teachers. We received 531 completed surveys, for an overall response rate of 32%; response rate by site ranged from less than 5% to over 80%.

Table 2. Survey distribution and response rate by site

Site	# Surveys sent	# Responses	Response Rate
Australia	150	34	23%
Canada	44	11	25%
France	76	22	29%
Germany	50	8	16%
Hong Kong	126	29	23%
Ireland	51	16	31%
Italy	170	143	84%
Los Angeles	318	74	23%
Massachusetts	70	45	64%
Puerto Rico	80	33	41%
Rhode Island	35	15	43%
San Diego	73	11	15%
San Francisco	85	29	34%
Singapore	67	3	4%
Tampa	22	5	23%
The Netherlands	80	23	29%
Turkey	30	15	50%
United Kingdom	106	14	13%
Washington DC	30	1	3%
Total	1,663	531	32%

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