FIE 2023: An Aggregate and Statistical Analysis of the Results and Feedback of the ASEE ERM Premier International Conference on Engineering Education

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Hillary Merzdorf, Anna Stepanova, Saira Anwar, Pouneh Abbasian, Tracy Hammond

Abstract

Since COVID-19, 2023 was the first year the IEEE ASEE Frontiers in Education (FIE) conference was in-person in the United States, this year marked an attempt to return to many of the practices that had not occurred in several years, including the return of the New Faculty Fellow Award and the re-inclusion of the ASEE in the formal conference name. Several changes were made for the first time this year, including additional submission support, an updated review process, and additional opportunities for students to present.

Two months post-conference, the organizing committee sent out a survey to participants to gain insight into the successes and challenges of the past conference, as well as suggestions for the future from the broader community. Survey results showed a high satisfaction rate inferred from immediate and prospective indicators. All immediate indicators, such as experience with technical aspects of the conference, satisfaction indicating the benefits of the conference for research, professional development, and teaching; and finally, quality of the conference, showed a high satisfaction rate of participants. The prospective indicator of the conference was based on the intention to return to future FIE conferences. It amounted to more than 60% indicating that the participants were very likely to attend FIE again in the future.

The paper presents statistically analyzed survey results and summarizes suggestions for going forward. This paper aims to provide a public and archival history of FIE 2023 to ensure transparency and public engagement The conference was co-sponsored by two IEEE societies (i.e., Education Society and Computing Society) and the Educational Research and Methods Division (ERM) division of ASEE. We hope this paper starts a trend for future conferences.

1 Introduction

The IEEE ASEE Frontiers in Education (FIE) Conference is a major international conference focusing on educational innovations and engineering and computing education research. The leading-edge science projects in educational approaches and technologies are generated at the FIE annual conference. The 53rd IEEE ASEE Frontiers in Education (FIE) International Conference occurred at Texas A&M University (TAMU) Campus in College Station, TX, USA. The Institute

for Engineering Education & Innovation (IEEI), Texas A&M University's College of Engineering (COE), Texas A&M Engineering Experiment Station (TEES), and Texas A&M University at Qatar (TAMUQ) collaborated to host the annual conference. The FIE 2023 International Conference continues a long tradition of disseminating results in engineering and computing education. The theme for the 2023 meeting was "Engineering Education in a Diverse, Global World".

The FIE conference is a flagship co-sponsored by the IEEE Education Society, IEEE Computing Society, and ASEE Research and Methods Division. In 2023 the conference was held in person in the United States for the first time since 2020, and was distinguished by a record number of abstract and paper submissions and the highest number of attendees. Several changes were made for the first time this year, including the creation of 1) videos to explain the differences between paper categories, 2) distinct detailed rubrics for the variety of different submission types, and 3) streamlined tracks and sub-tracks using the Engineering Education Research (EER) taxonomy [1]. We updated the review process to engage peer reviewers at the abstract review stage rather than wait until the draft paper review stage. We also accepted abstracts with minor revisions and provided them with necessary guidance if needed. We created a poster maniac session, where select rejected or withdrawn papers were allowed to submit their papers as a poster to be presented during the conference in a single poster session. We created a track for student-led panels. Three panels were selected and presented. After the final program was posted, we allowed participants to register for one-day passes to encourage local researchers to get a taste of the conference with the hope that this would provide an opportunity to grow the community.

The FIE Conference received 922 abstracts submitted across work-in-progress and full papers (compared to 649 in 2022 and 700 in 2021). 536 papers were accepted in total. 39 submissions were received for panels, special sessions, and workshops, of which 30 were accepted and presented. Additionally, there were 25 submissions from local faculty to highlight their research in a special poster session. The 2023 FIE conference had 2 Keynotes & 1 Honorable Speaker. 5 posters were presented by the awardees of the New Faculty Fellow Award. FIE 2023 had a total of 637 registered attendees for the full (3-day) conference, 48 registered attendees for a single-day pass, and 80 registered attendees for workshops. The conference had three social events, and a poster session for TAMU faculty to highlight their research. Three fundamental research projects were introduced in a presentation format by their PIs.

It is important to release conference statistics to allow organizers to gather participants' feedback and data on demographics, audience engagement and levels of networking [2]. Although, for the in-person meeting collecting such data may be challenging, but we attempted to create a survey to survey all of these data. These data can be used to improve conferences in the future [2].

Very limited data are available on feedback from participants in educational conferences. A literature review on conference and practices revealed that there is a significant need for robust, published research to improve the quality and effectiveness of conference evaluations [3]. Using the conference evaluation framework [3], in this paper we present the results of success indicators measured through immediate (participant satisfaction and quality ratings of conference deliverables) and prospective (intention to return) indicators [3].

2 Methods

2.1 Survey Instrument

We developed a survey instrument to record conference participants' experiences and recommendations on the 2023 FIE conference. The instrument had a total of 30 questions. Seven questions asked participant demographics of professional title, race and ethnicity, nationality, number of prior attended FIE conferences, requested accessibility and/or dietary restrictions, and organizing committee membership. One question asked for ratings of 8 conference elements (Sessions, Placement and categorization of papers, Paper quality, Reviewer feedback, Workshops, Panels, Special sessions, and Keynote speeches and honorable lectures) on a 5-point Likert scale ranging from Very Low Quality (1) to Very High Quality (5). Thirteen questions asked for experience at conference social events, food options, dietary accommodations, accessibility accommodations, and venue navigation with ratings on a 5-point Likert scale from Extremely Negative (1) to Extremely Positive (5). Four open-ended questions asked for participants to describe how the conference benefited their learning, research, teaching and professional development. Two questions asked participants to describe their impressions of the hosting university before and after attending the conference. Finally, 3 questions asked for an overall rating from 1 to 10, the likelihood of attending future conferences on a 5-point Likert scale from Very Unlikely (1) to Very Likely (5), and any additional comments.

2.2 Data Collection

We distributed the survey through the conference organizing service via email to all attendees, with one reminder email after one week to complete the survey. Eighty-eight participants from the 2023 FIE Conference participated in the post-conference survey. The data was fully anonymous and did not require informed consent, as no sensitive data were collected, researchers obtained an IRB approval (STUDY2024-0050, expiration date 02/07/2027). All questions were voluntary and participants could exit the survey at any time with no negative consequences. Partial responses were included in analysis for reporting responses individually by question.

2.3 Data Analysis

For survey items we report the descriptive statistics of participants who selected each response option by question. For the open ended question we conducted qualitative content analysis and highlight notable comments from participants regarding teaching, learning, research, and professional development.

For categorizing our results, we use the proposed evaluation criteria of the conference evaluation framework [3].

3 Results

The post-conference survey results are divided into three categories: 1) attendance demographics, 2) immediate indicators, and 3) prospective indicators.

Table 1: Participant Demographics

Asian	22%
Black or African American	6%
Hispanic/Latinx	9%
Native Hawaiian/Pacific Islander	3%
White/Caucasian	46%
Other	4%
Prefer not to answer	10%
First time FIE 2023 Attendance	44%

3.1 Attendance Demographics

The attendance demographics included details on participants' ethnicity and how many times they have previously attended the FIE conference.

In response to the question about race and ethnicity, 46% of survey respondents identified themselves as White/Caucasian, followed by 22% as Asians, with no respondents indicating Native American heritage. Table 1 contains the demographics of survey participants.

3.2 Immediate Indicators

The immediate indicators include 1) experience metrics such as experience with technical aspects of the conference and experience with entertainment, food, and event space options. 2) satisfaction metrics indicating the benefits of the conference are research, professional development, and teaching. And 3) quality ratings – indicating the participants' overall experience with the 53rd IEEE ASEE FIE conference.

3.2.1 Experience - Technical aspects of the conference

The ratings of each conference element by the percentage of respondents is shown in Figure 1. All conference elements received a Very High Quality ranking by more than 30% of participants. They were rated as High Quality by 38% - 63% of all participants. Highest-rated conference elements were Sessions (63% High Quality), Paper Quality (60% High Quality, 13% Very High Quality), Placement/Categorization of Papers (53% High Quality), and Keynotes/Lectures (53% High Quality, 27% Very High Quality). Workshops, Panels, and Special Sessions were rated as Neutral, High Quality, or Very High Quality by a similar number of participants (20% - 30%).

3.2.2 Experience - Entertainment, food, and event space options

The conference hosted three social events: a welcome reception, a historic downtown walk, and an outdoor dinner with live music. Participation in social events was relatively high, with 71% of participants having attended at least one social event during the conference. Overall participants had favorable experiences at these social events, with most participants rating all three extremely positively (51% - 56%), or somewhat positively (25% - 34%).

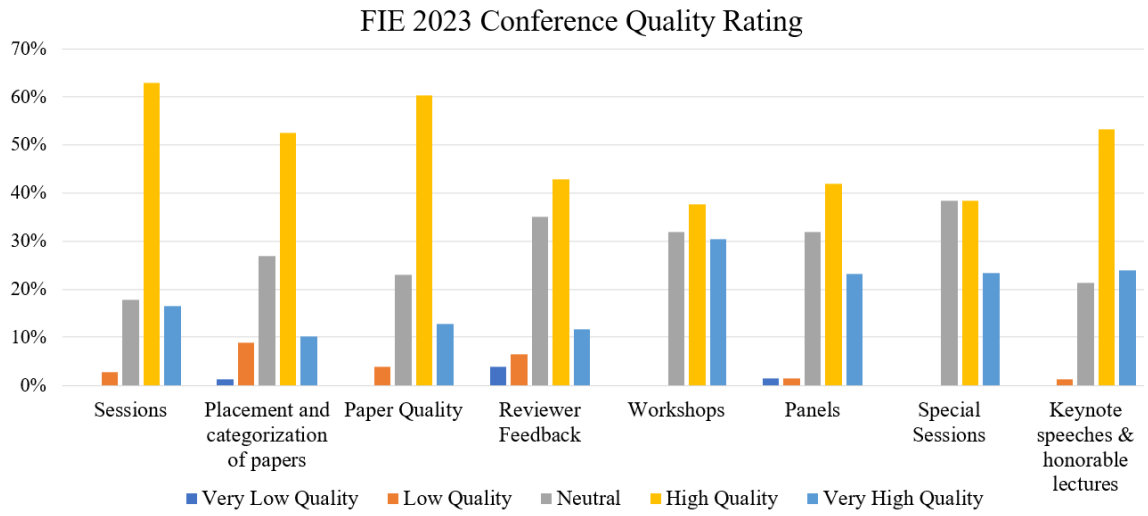

Figure 1: Quality ratings of conference elements by percentage of respondents.

For participants requesting accessibility accommodations, their needs were met extremely well (40%), very well (40%), or moderately well (20%). Food options were extremely satisfactory for 40% of participants and somewhat satisfactory for 25%. Satisfaction with dietary restrictions being met had more mixed responses, with 36% rating accommodations somewhat negatively and 32% rating them extremely positively. Experience with the event space was extremely positive (56%) or somewhat positive (29%), and locating sessions was somewhat easy (45%) or extremely easy (22%).

3.2.3 Satisfaction – Benefits of the conference for research, teaching, and professional development

Of the total 88 respondents, 47 provided at least one comment to the 3 questions about how the conference benefited their research, teaching, or professional development.

Participants reported many benefits to their teaching and research from the conference. One benefit was gaining educational resources for developing assessments and curriculum, gaining research knowledge and ideas from sessions, and learning new methods and research techniques. For example, one participant stated *"It gave me additional tools, examples, and curriculum to use in my teaching and learning outcome / assessment development for my course."* Another participant reported that *"The conference was helpful to get insights on how others structure information and write papers. Moreover, it was a good platform to network and explore new ideas."* A second benefit was the opportunity to network with other professionals and receive feedback. For example, one attendee said *"I learned a lot of new things through the talks and got to know a lot of very nice, helpful people from all around the world, that had different approaches to similar problems."* Another participant stated, *"We receive constructive comments to conclude the corresponding work."* Several participants also reported benefits of informing new projects. For example, one person said that *"The variety of papers offered practical and transferable ideas"*, and another made*"Great contacts who provided excellent suggestions for the direction of my research projects."*

Regarding opportunities for professional networking, most participants reported having many opportunities throughout the conference to connect with others. According to one participant,*"I had many opportunities for networking. Networking was one of the highlights of the conference for me."* Another reported that *"I spent a lot of time with people I knew but had only met online in the past. I also met people during sessions and met up between sessions."* Coffee breaks and time between sessions gave participants time for conversations, including the time before and Q&A afterwards. Participants also reported networking at social events and meals, at workshops, and at vendor tables. These opportunities provided informal and positive networking: *"Gathering with food and music put people at ease and comfortable to visit with most anyone."* However, one participant did not have a positive experience with these events: *"Not enough. The music was loud at the reception making talking difficult. The sessions delivered during breakfast and lunch made networking impossible and uncomfortable."* A small group of participants described the physical layout of the conference venue being conducive to spontaneous conversations; for example, one attendee reported *"I enjoyed the collision spaces of the conference facility. It allowed me to network more than expected."*

Participants intended to apply what they had learned from the conference in many ways. Specific content from individual sessions was referenced in comments, such as K-12 outreach: *"WISE has K-12 outreach programs."*; student identity: *"Group work dynamics based on culture was very useful. Student identity, ways to develop it and the importance of that longterm for students. Those are the top of my mind now, but there was more that I incorporated after I came back."*; engineering storytelling: *"Storytelling in engineering curricula is exciting, useful, and approachable"*, and artificial intelligence: *"How to be more open-minded with new generations, how to use AI and other technologies"* and competency-based learning. Other participants wrote how conference material broadly informed their classroom pedagogy or student engagement strategies: *"I learned useful pedagogical techniques from the workshops and sessions I've worked to integrate into my course."*; *"The accessibility workshop was the most impactful session I attended. It has helped me become more aware of the course content distributed."* A third topic was practical research skills and paper writing: *"I learned how to write a good review and, at the same time, accept others' critical and constructive feedback and comments. At a less priority level, it was a good experience to learn how to organise conferences, workshops, and panel sessions."* Finally, several participants reported making new connections for future contact and collaboration: *"I got an award and made some robotics educator connections"*; *"I spoke with presenters about techniques I will use in my future research and got some contacts for future collaborations."*

3.2.4 Overall quality ratings

When asked to rate the conference overall on a scale of 1 to 10, the majority of participants chose ratings of 8 (approximately 35%) and 9 (approximately (30%). More than 60% of participants were very likely to attend FIE again in the future. Many participants reported challenges in logistics and accommodations, such as scheduling: *"The inflexibility of the conference organization to change sessions"*; the number of sessions: *"Fewer sessions! Have more WIPs presented in a lightning round/poster presentation similar to 2018. I got great feedback on my project then (as that's why I present a WIP paper) and didn't get as much this time since few*

people came to each session"; and time to present: *"Overall, the conference organization was good. But there were two issues that I hope will be addressed in future conferences: 1. The talks I attended were high quality, but speakers did not have enough time to give a full presentation. 15 minutes (including time for questions) is not enough. 2. The special sessions were all scheduled at the same time. This meant that I could only go to one. That was disappointing."*

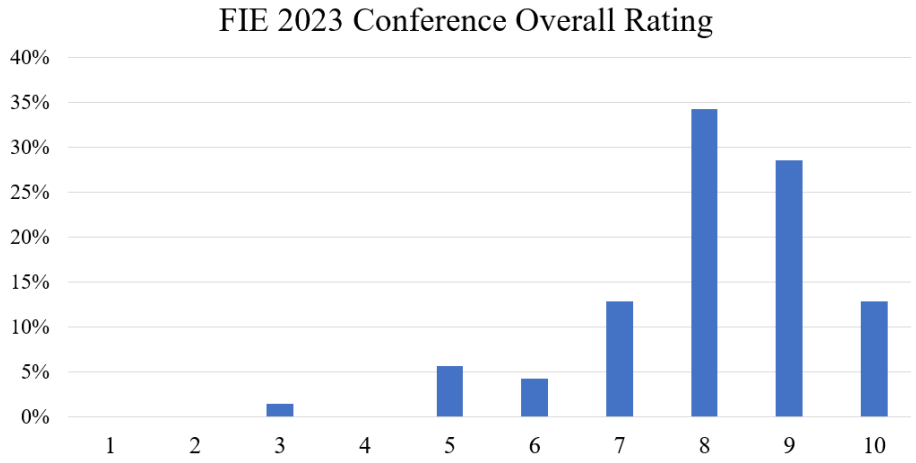

Figure 2: Overall quality rating of the conference by percentage of respondents.

3.2.5 Prospective indicators

The prospective indicators of the conference are measured based on participants' intention to return to future IEEE ASEE Frontiers in Education conferences. More than 60% of participants were very likely to attend FIE again in the future: *"The conference is a great forum of diverse topics and programs. I'd be happy to participate again in this conference!"*

These overall ratings indicate that participants were satisfied with the conference experience enough to provide high ratings despite any negatives and that negative experiences did not affect their intentions to continue attending. Figure 3 provides the summarized results.

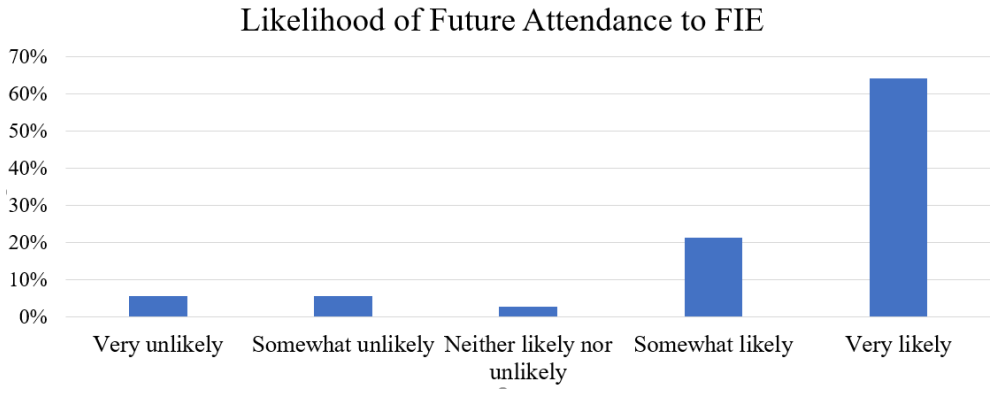

Figure 3: Future attendance to conference by percentage of respondents.

Discussion and Conclusions

In this work we attempt to evaluate the IEEE ASEE FIE 2023 conference using immediate and prospective indicators. We hope it helps in future conference planning and determining its impact on participants' research, teaching, and professional development.

Immediate indicators included: 1) experience metrics, such as experience with technical aspects of the conference; 2) satisfaction metrics indicating the benefits of the conference for research, professional development, and teaching; and finally, 3) quality ratings, indicating the participants' overall experience at the conference.

All immediate indicators showed high satisfaction rate of participants, with 35% rating it as 8 on a scale of 10, 28% rating it as 9, and about 12% rating it as 7 and 10. More than half of the survey participants found the conference beneficial for their professional development, specifically in learning about new educational resources, networking, and learning from the conference in many ways. Finally, the quality ratings indicated that all conference elements received a very high-quality ranking, with more than 30% ranking it as "very high quality" and 38% - 63% as High Quality. We did not receive specific feedback on changes made to the FIE, such as the paper submission process and student panels, but we hope that as part of the FIE experience, they contributed to the overall high satisfaction rate.

The prospective indicators of the conference were evaluated based on participants' intention to return to future IEEE ASEE Frontiers in Education conferences. More than 60% of participants indicated in the post conference survey that they were very likely to attend FIE again in the future. From these indicators, we can support improvements to the FIE conference that will promote continued attendance and satisfaction.

As a practice, we suggest that future educational conferences, including IEEE and ASEE conferences, consider making a public archive of their conferences. While such archives may help examine the conference's success rate, they will also help future organizers understand the improvement needs. As conference organizers, we know that the organizing societies' internal records have reports that outline the details of conference statistics. However, such information are not public, limiting the conceptualization of the need for and effectiveness of such conferences. Such archives may help evaluate the impact of novel and emerging disciplines such as engineering and computing education. In addition to the retrospective mechanism (as used in this paper), we suggest that future archives consider collecting feedback using multiple modes [4, 5]. Specifically, including indicators in near-real-time (i.e., during the conference) may be beneficial in capturing researchers' contextualized experiences while they are attending the conferences and provide interesting insights for future organizers and attendees.

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