

# ROBOFEST 2023 ~ 2024 Annual Assessment Report

August 20, 2024

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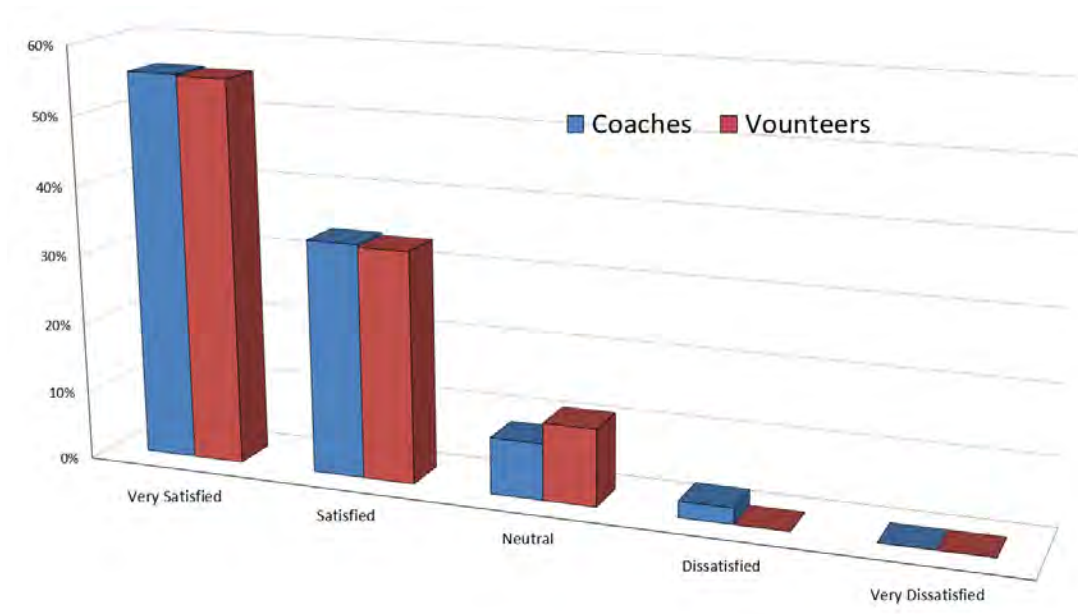
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## 1. Robofest 2024 Coach & Volunteer Survey Results

Anonymous surveys were conducted after World Championship competitions in May - June 2024. 86 coaches, assistant coaches or team mentors participated in the coach survey. 72 volunteers, Judges registered in our RMS system, participated in the volunteer survey. Table 1 shows the satisfaction rate from each survey. Figure 1 displays the table data in a 3D bar graph. There were two “dissatisfied” responses out of 86 coaches this year.

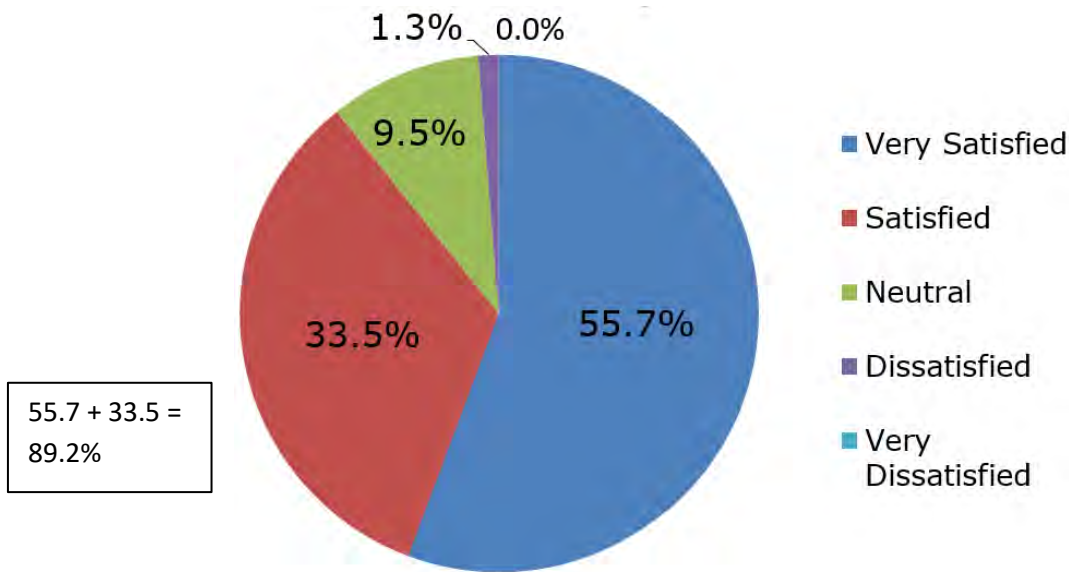
	# Coaches	# Volunteers	Weighted Average %
Very Satisfied	48	40	<b>55.7%</b>
Satisfied	29	24	<b>33.5%</b>
Neutral	7	8	<b>9.5%</b>
Dissatisfied	2	0	<b>1.3%</b>
Very Dissatisfied	0	0	<b>0.0%</b>
Total	86	72	

**(Table 1)** 2024 Satisfaction rate from each of 2 surveys

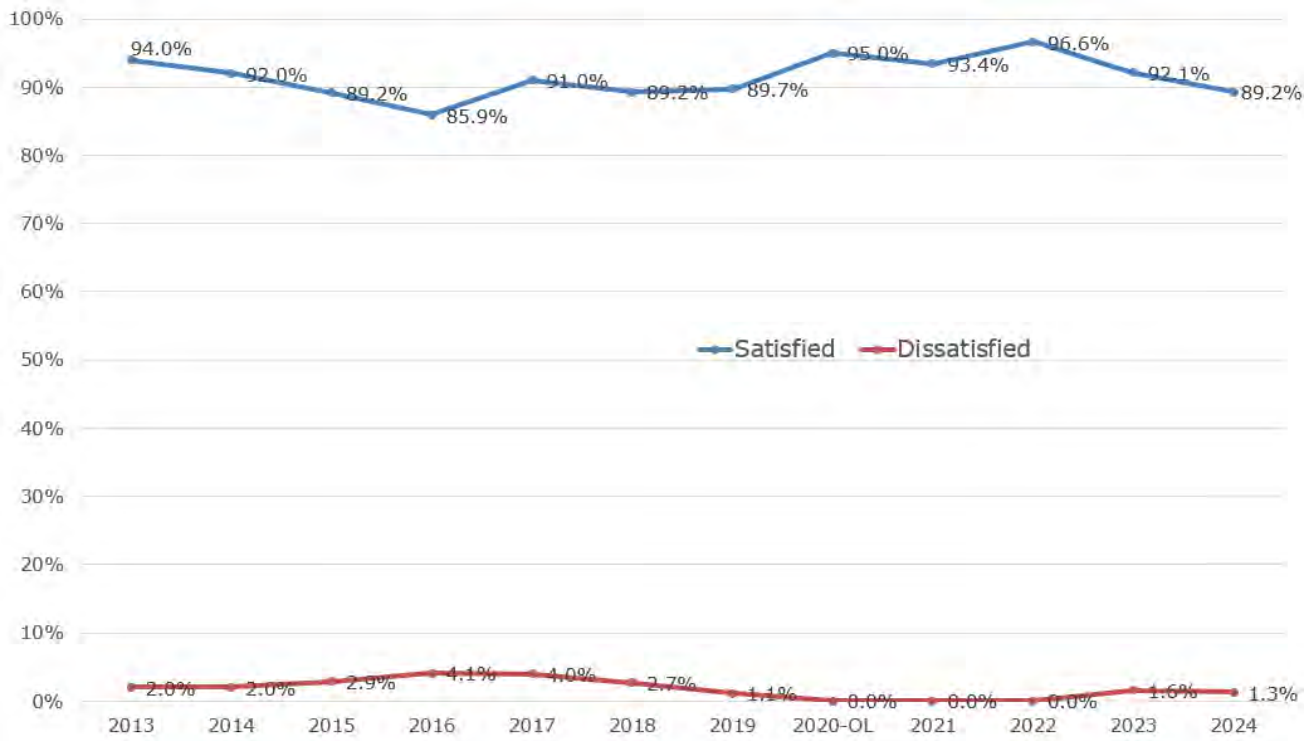


(Figure 1) Satisfaction rate from each of 2 surveys in 2024

Figure 2 shows average satisfaction rate from the 2 surveys. 89.2% (55.7%+33.5%) were satisfied or very satisfied. Considering that, Robofest 2024 was yet another successful year. Figure 3 shows overall coach/volunteer satisfaction rate changes since 2013. Note that it does not show neutral cases.



(Figure 2) 2024 Coach/Volunteer averaged satisfaction rates



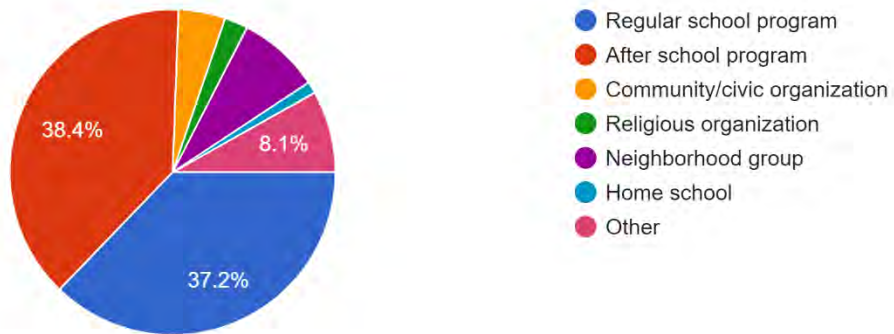
(Figure 3) Overall coach/volunteer satisfaction rate changes since 2013 (2014 year contains only coach data)

## 1.1 Coach Survey Results

The following (Figure 4) shows results of 2024 coach surveys.

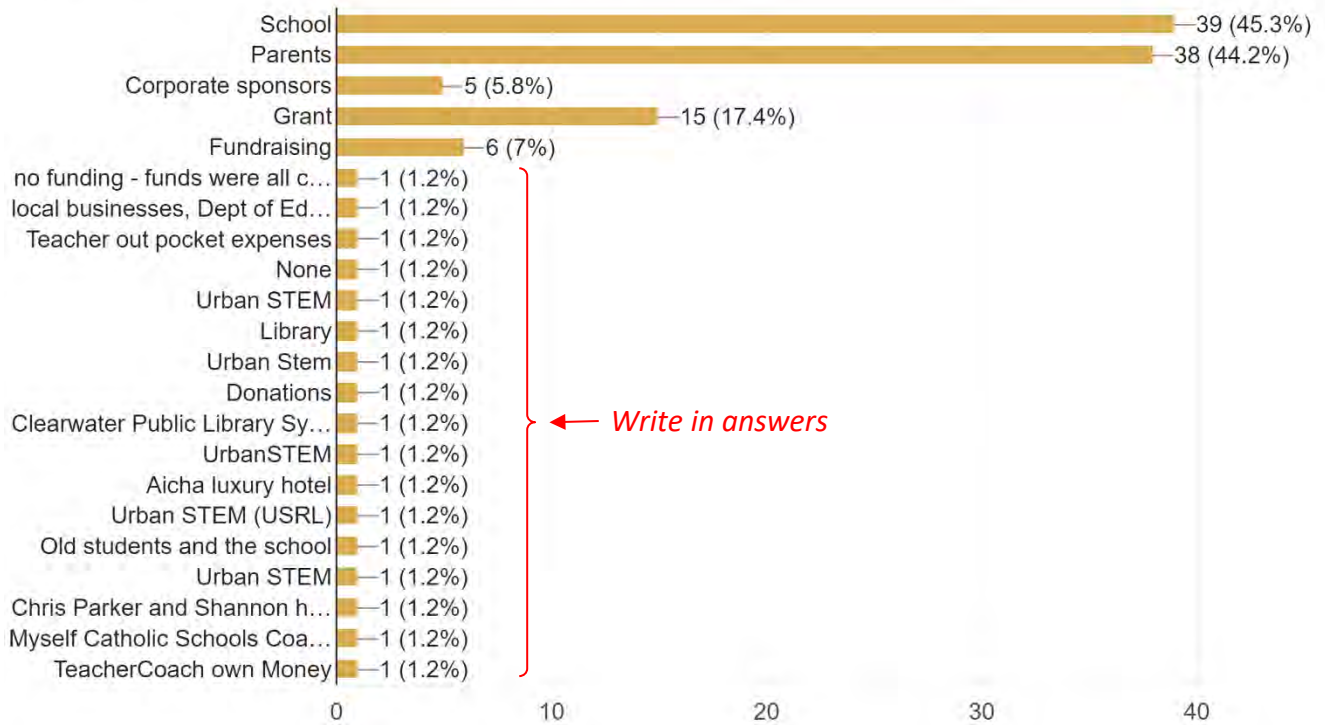
Q2. Your team participated in Robofest 2024 through:

86 responses



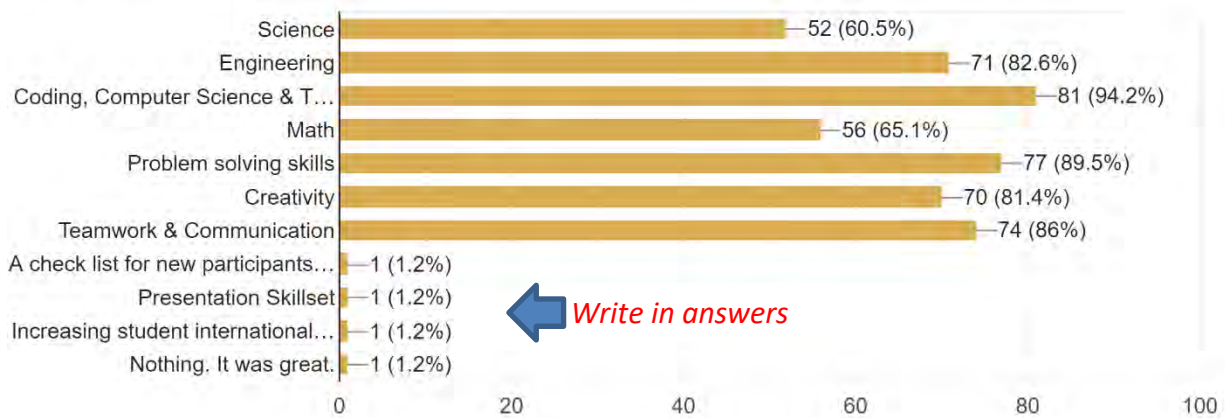
### Q3. From whom did your team receive funding?

86 responses



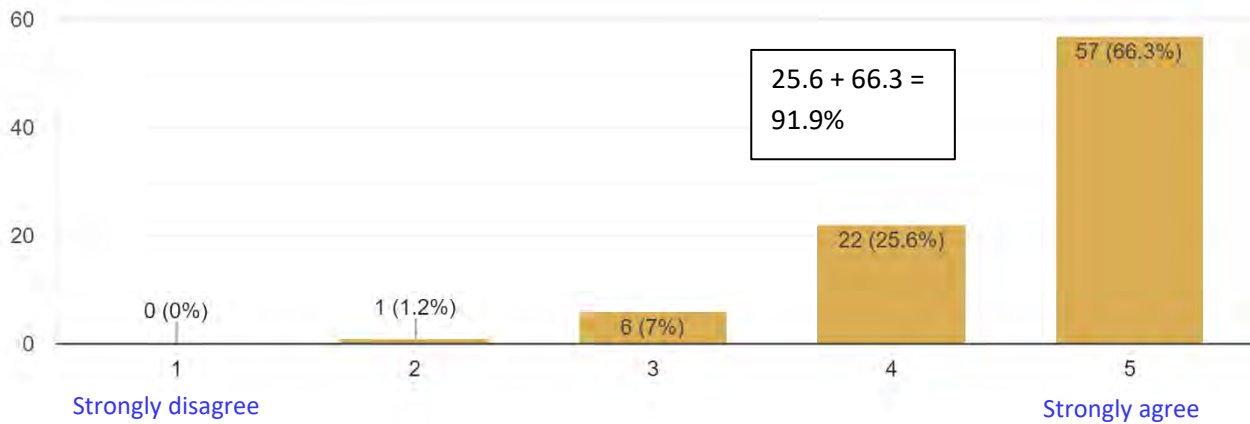
### Q4. What areas do you think are enhanced (or can be enhanced) through Robofest programs?

86 responses



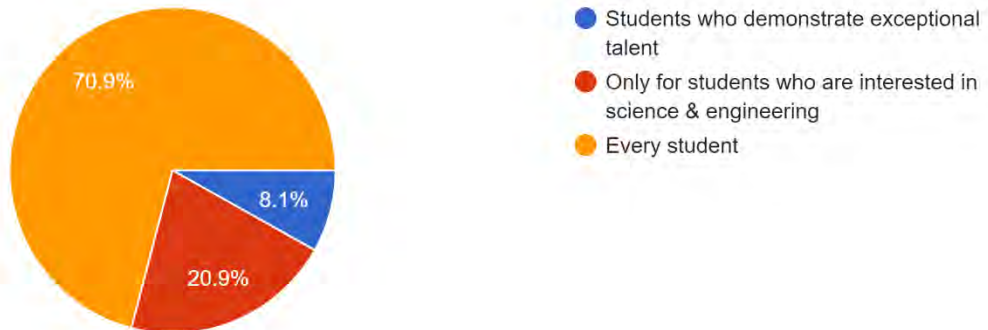
Q5. Do you think your team members learned and improved science, technology, engineering, math, and/or coding knowledge through Robofest 2024 programs?

86 responses



Q6. For whom do you think the Robofest programs should be designed?

86 responses



Q7. How likely are you to participate in Robofest next year?

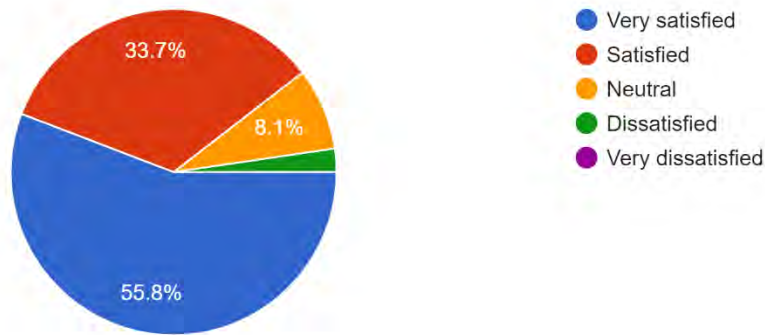
86 responses





Q8. How would you rate your overall Robofest 2024 season experience?

86 responses



Q9. Robofest has not contacted students directly by emails since the inception in 1999. Do you think it is OK for LTU Robofest office to send email... to students for pre- and post-assessment surveys?

86 responses



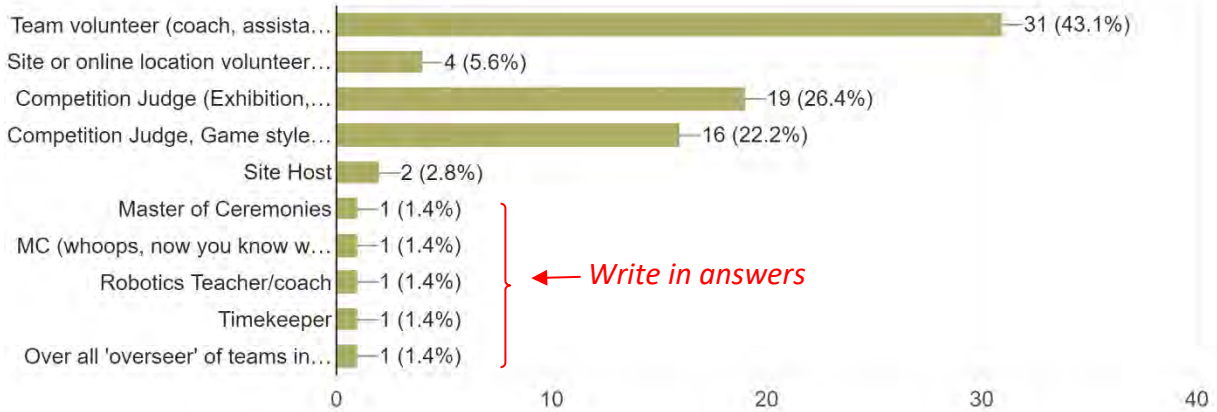
(Figure 4) 2024 Coach Survey results

## 1.2 Volunteer Survey Results

The following (Figure 5) with 5 questions shows the results of 2024 Volunteer/Judge surveys.

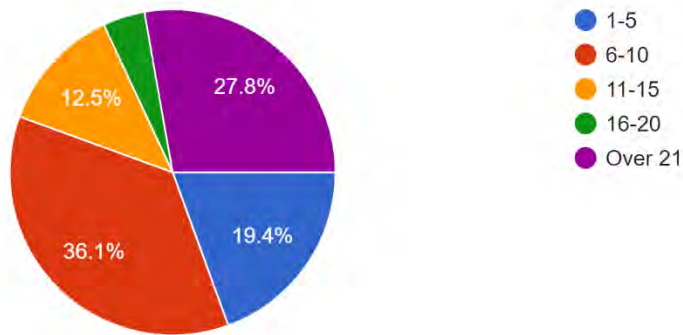
### Q1. What was your role as a volunteer?

72 responses



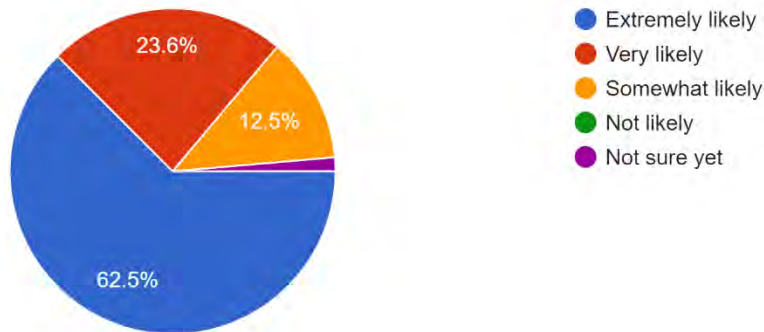
### Q2. How many total number of hours did you volunteer for Robofest competitions this season?

72 responses



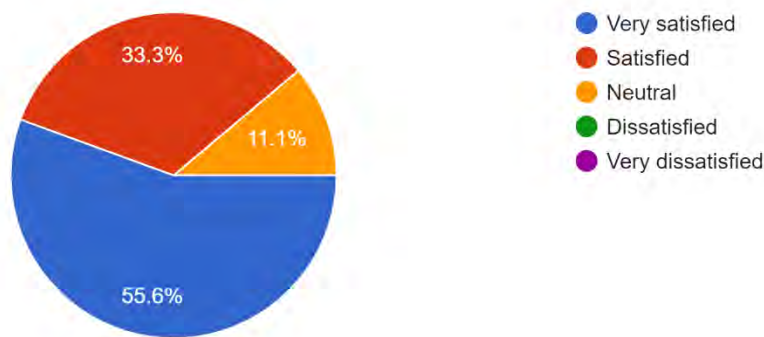
### Q3. How likely are you to participate in Robofest next year?

72 responses



Q4. How would you rate your overall Robofest experience this year?

72 responses



(Figure 5) 2024 Volunteer & Judge survey results

The coach survey included an essay (short answer) question: *Q10. Please write any suggestions, comments, criticism, and encouragement to improve the quality of Robofest.* Comments and corresponding Robofest office's responses/comments can be found in Appendix 1.

The surveys for Volunteers & Judges had an essay question: *Q5. Please provide any suggestions/comments which will help us enhance the quality of Robofest.* Volunteers' comments and corresponding Robofest office's comments can be found in Appendix 2.

We appreciate everyone who participated in the surveys. Please note that the survey was completely anonymous.

## 2. Student Assessment

In order to assess the impact of autonomous robotics competitions in STEM education, Robofest students were asked indirectly through coaches to take online anonymous surveys before and after the competition. Robofest does not contact students directly.

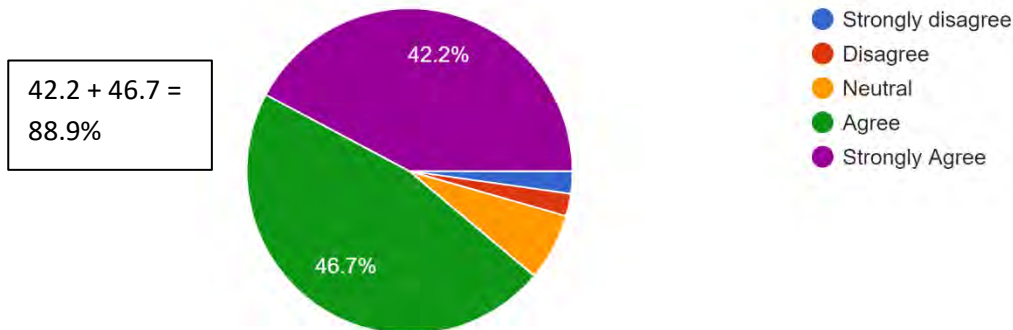
### 2.1 2024 Pre-survey

45 students participated in the pre-assessment survey anonymously when teams were registered before starting Robofest work. 88.9% of the students agreed or strongly agreed that they like STEM and/or coding related classes. 93.3% of the students were very or somewhat interested in careers in STEM fields when the team was registered. See Figure 6.



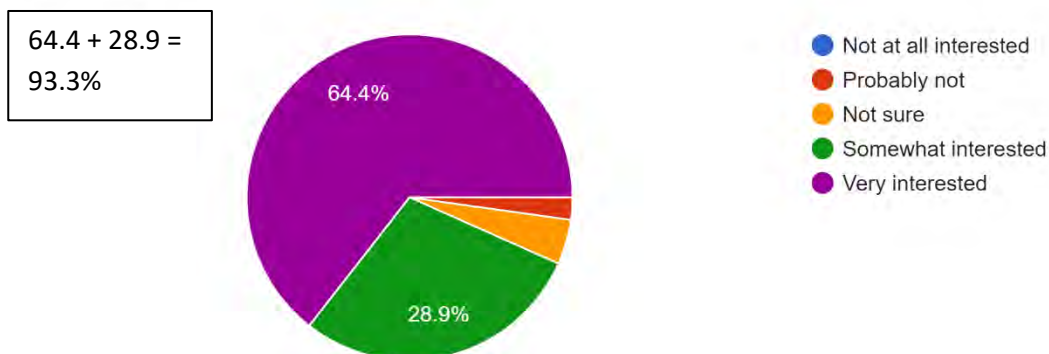
Q4. I like Coding, Science, Technology, Engineering, and Math, and/or coding related classes.

45 responses



Q5. Are you interested in a career involving Coding, Science, Technology, Engineering, or Math?

45 responses



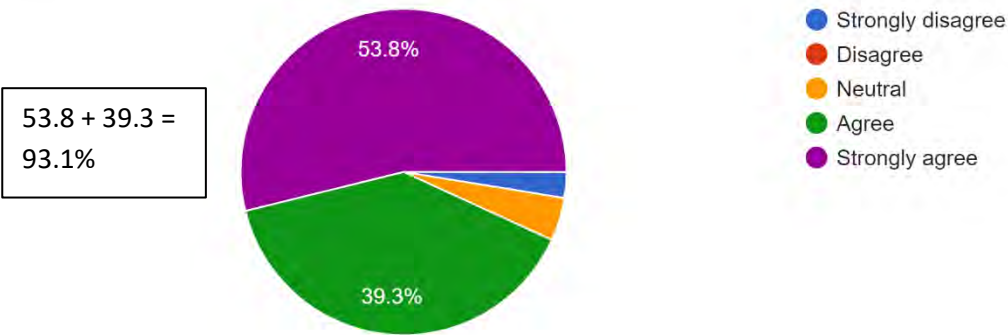
(Figure 6) Summary of 2024 pre-assessment student survey

## 2.2 2024 Post-survey

After World Championship events were completed, a post-assessment survey was conducted. 117 students participated in the survey anonymously. See figure 6 below. *Note that pre and post survey groups are NOT from the same population. See Figure 7.*

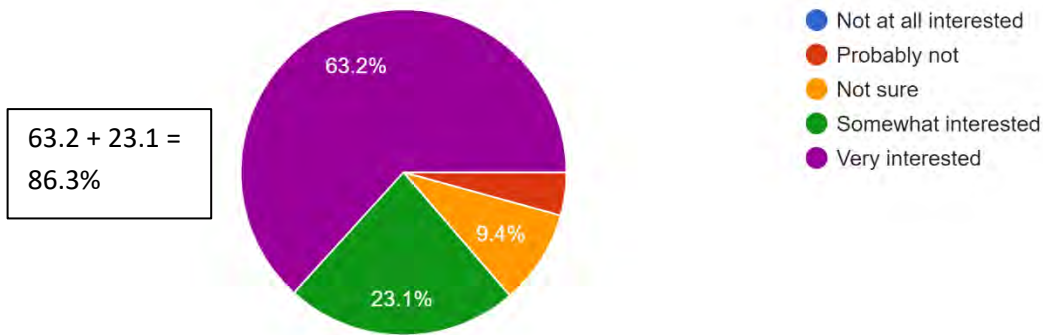
Q4. I like Science, Technology, Engineering, Math, and/or Coding related classes.

117 responses



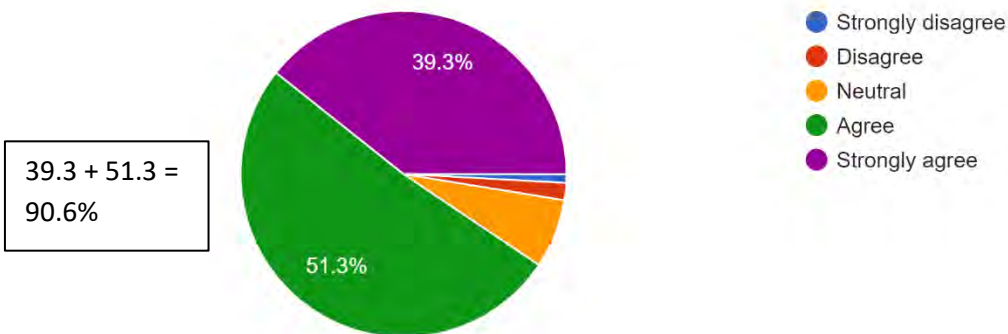
Q5. Are you interested in a career involving Science, Technology, Engineering, Math, and/or Coding?

117 responses



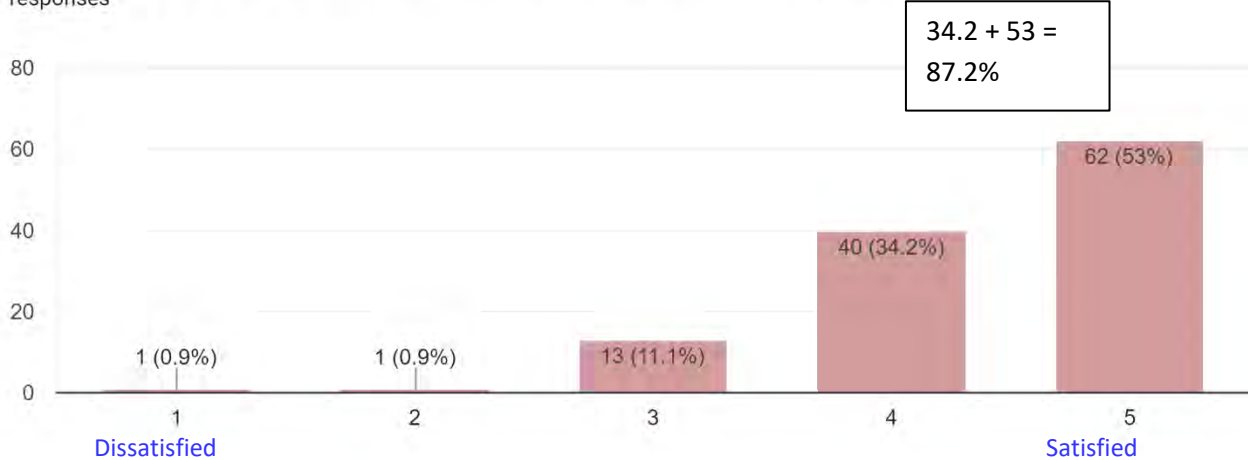
Q6. Robofest robotics experience helped me learn more about Science, Technology, Engineering, Math, and/or Coding.

117 responses



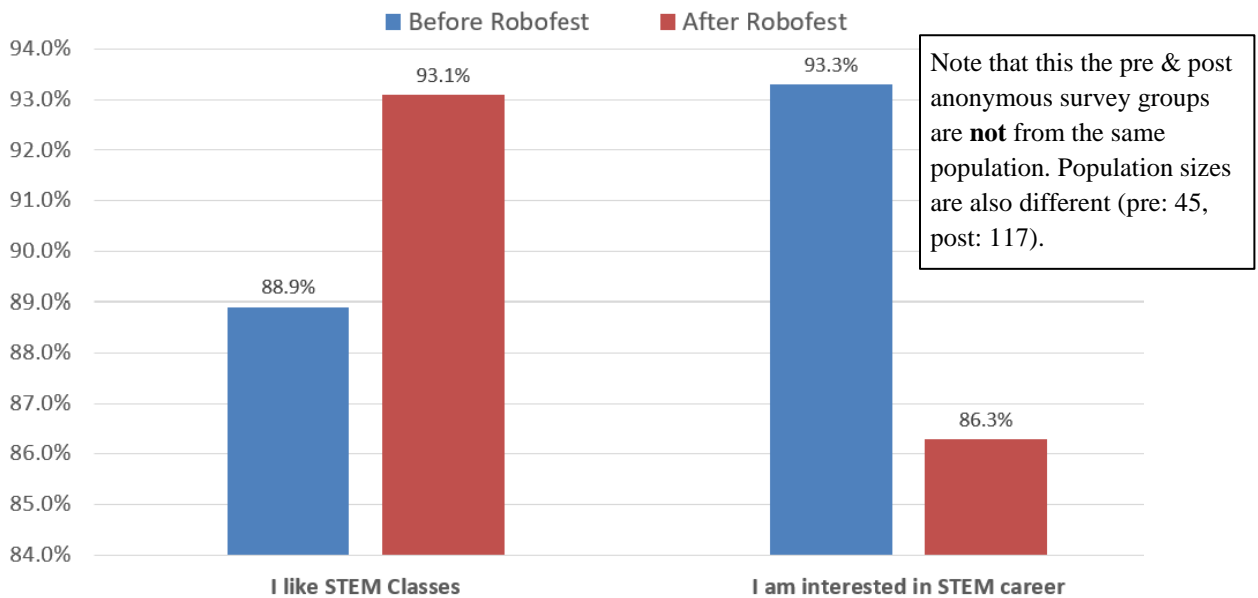
Q7. How would you rate your overall Robofest 2024 season experience?

117 responses



(Figure 7) Summary of 2024 post-assessment student survey

As shown in 2024 post-survey above in Figure 6, 93.1% of students liked STEM classes (Q4) and 86.3% of students also expressed that they would now consider a career involving STEM after their Robofest exposure (Q5). Q6 shows that 90.6% students indicated the Robofest robotics experience helped them learn more about Science, Technology, Engineering, or Math (STEM). Q7 shows that 87.2% of students were satisfied with Robofest 2024 experience.

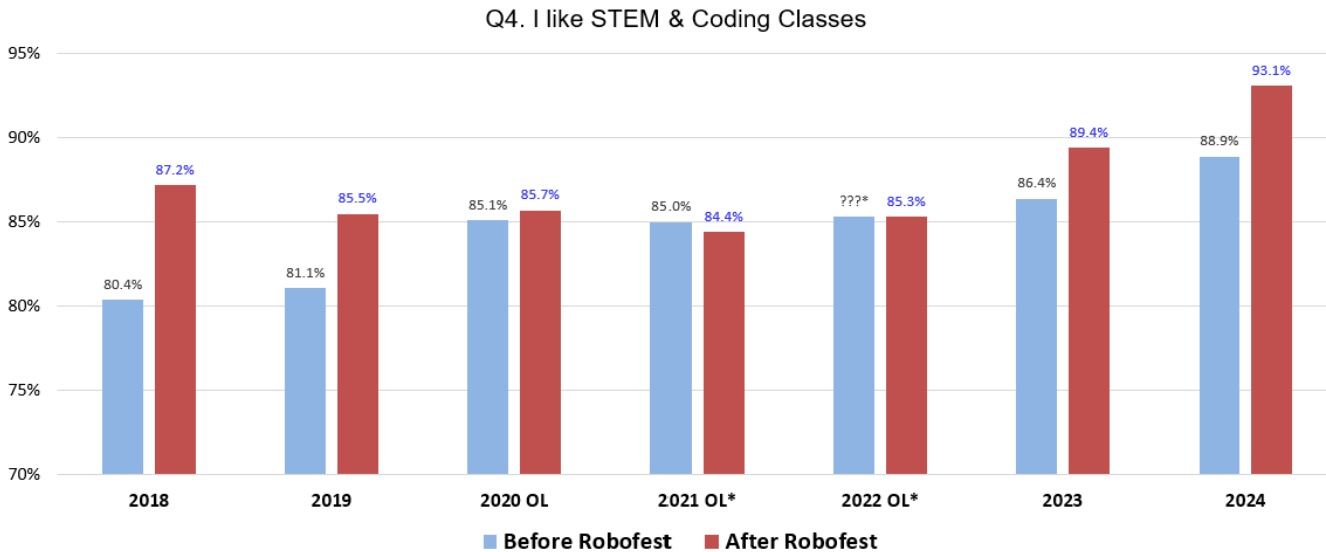


(Figure 8) 2024 Pre & Post Assessment Summary

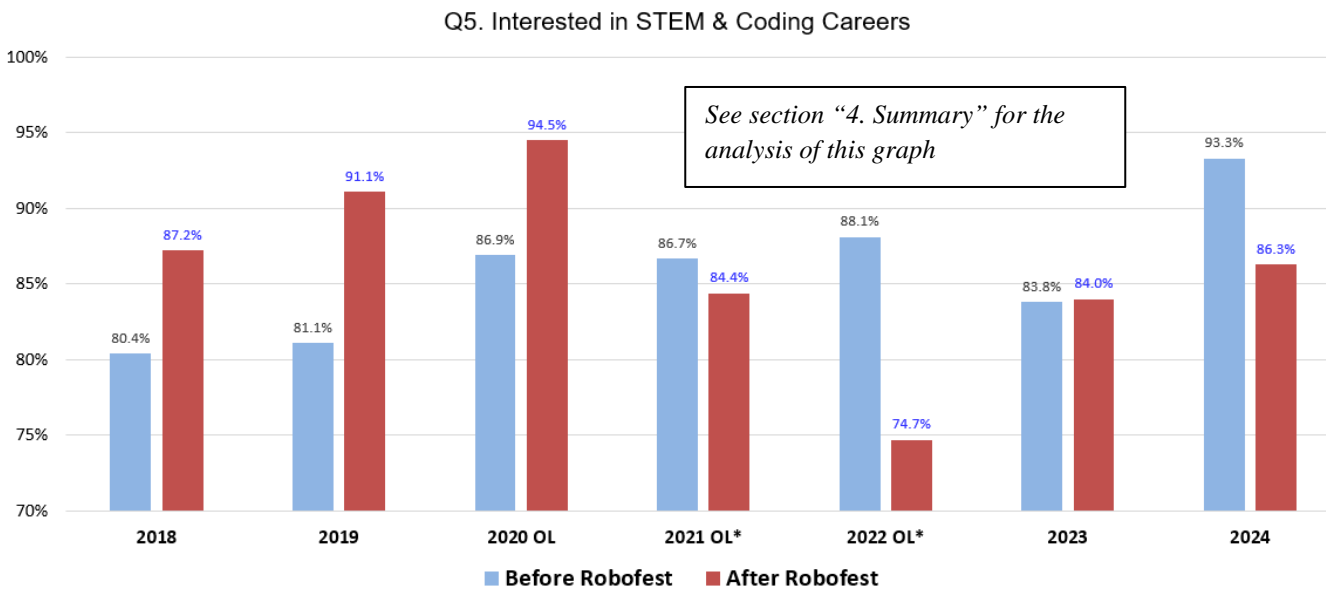
Figure 8 above shows the changes between pre and post survey results for the Q4 (STEM Likert) and Q5 (STEM Career interest). After students' Robofest experience this year, STEM Likert scale increased, however, STEM Career interest were decrease quite a lot, as shown right in Figure 8. Note that pre and post survey groups are NOT from the same population. Pre-survey population was too small (45, 117

students participated in the post survey) and not normally distributed; it was skewed. See section 4. Summary for more analysis.

The following, Figure 9, shows the STEM Likert pre & post assessment percentages since 2018. Figure 10 shows the STEM Career interest percentages from pre & post assessments since 2018.



(\*) most of the competitions were online. FYI: 2020 were completely online  
**(Figure 9)** Pre & Post STEM likert percentages since 2018



(\*) most of the competitions were online. FYI: 2020 were completely online  
**(Figure 10)** Pre & Post STEM Career interest percentages since 2018

### 3. Overall Program Self-Evaluation

Robofest's mission statement has the following three main goals:

- A) Generate excitement and interest in STEM among young people

- B) Develop essential skills such as problem solving, creative thinking, and teamwork (leadership & communication)
- C) Prepare students to excel in higher education and technological careers

We defined and collected the following metrics to measure the success of a Robofest academic year.

- 1) Total number of registered teams during an academic year
- 2) Dropout rate (% of registered teams that did not compete)
- 3) Percentage of teams that received over 60% scores for Games
- 4) Percentage of teams that received over 3.0 out of 5 for Exhibition
- 5) Percentage of teams that solved the unknown problems without the help from adults. (Robofest has unknown problems like exams unveiled at the beginning of competition.)
- 6) Overall coach & Judge/volunteer satisfaction rate
- 7) Percentage of teams that participated in the 2nd chance Game competition
- 8) Percentage of teams that improved scores on average in the 2nd chance competition
- 9) Percentage of students who indicate that Robofest robotics experience helped them learn more about STEM
- 10) Increased percentage of students who like STEM classes after having Robofest experience
- 11) Increased percentage of students who consider a career involving STEM after their Robofest exposure
- 12) Percentage of coaches who indicate that Robofest experience helped students in learning core soft skills such as teamwork, leadership, creativity, communication and problem solving
- 13) Percentage of World Championship RoboParade teams that passed the speed display (New)
- 14) Percentage of World Championship RoboParade teams that passed the speed math exam (New)

Evaluation of the 2024 year for each metric is summarized in Table 2. This evaluation is based on team registration data from RMS (Robofest Management System) database system, score sheets, and assessment surveys. Note that we have two new metrics 13) and 14) from RoboPrade events. The overall evaluation of the Robofest 2023-2024 year related to Robofest’s goals is analyzed in Table 3.

Metric #	Criteria	Goal	Outcome	Evaluation
1)	Total number of registered teams	> 500	855*	Successful
2)	Dropout rate (no show)	< 5%	3.56%*	Successful
3)	% of Game teams with over 60% scores	> 30%	41.44%*	Successful
4)	% of Exhibition teams with over 3.0	> 50%	84.48%*	Successful
5)	% of Game teams that solved unknown end task	> 40%	36.46%*	Unsuccessful
6)	Overall coach & volunteer satisfaction rate	> 80%	89.2%	Successful
7)	% of US Game teams that tried 2 <sup>nd</sup> Chance before the World Championship	> 20%	8%*	Unsuccessful
8)	% of US Game teams that improved scores on average in the 2nd chance competition. Video submission teams included.	> 60%	80%*	Successful
9)	% of students who indicate that Robofest experience helped them learn more about STEM	> 80%	90.6%	Successful



10)	Increased % of students who like STEM classes after having Robofest experience	> 2%**	4.2%	Successful
11)	Increased % of students who consider a career involving STEM after their Robofest exposure	> 2%**	-7.0%	Unsuccessful
12)	% of coaches who indicate that Robofest experience helped students in learning essential skills such as teamwork, creativity, leadership, communication & problem solving	> 60%	91.9% (based on Coach survey, Q5)	Successful
13)	RoboParade correct speed display	> 60%	68.8%	Successful
14)	RoboParade speed math exam	> 60%	68.8%	Successful

(\* ) data provided by Robofest Office; (\*\*) changed from 3% to 2% from 2024 - justification for the change: Most students were already interested in STEM when they register

**(Table 2)** Evaluation of 2024 year for each quantifiable criteria

Goal	Metrics used to measure the success of the goal	Successfully or almost successfully achieved metrics	Evaluation <sup>++</sup>
A)	1), 2), 6), 7), 10) <sup>+</sup> , and 11) <sup>+</sup>	1), 2), 6), 10)	67% (4/6)
B)	4) <sup>+</sup> and 12)	4) and 12)	100% (2/2)
C)	3), 4) <sup>+</sup> , 5), 8), 9), 10) <sup>+</sup> , 11) <sup>+</sup> , 13), 14)	3), 4), 8), 9), 10), 13), 14)	77.8% (7/9)

(+): Criteria used for two Goals, A) and B); (++) We target to reach 70%

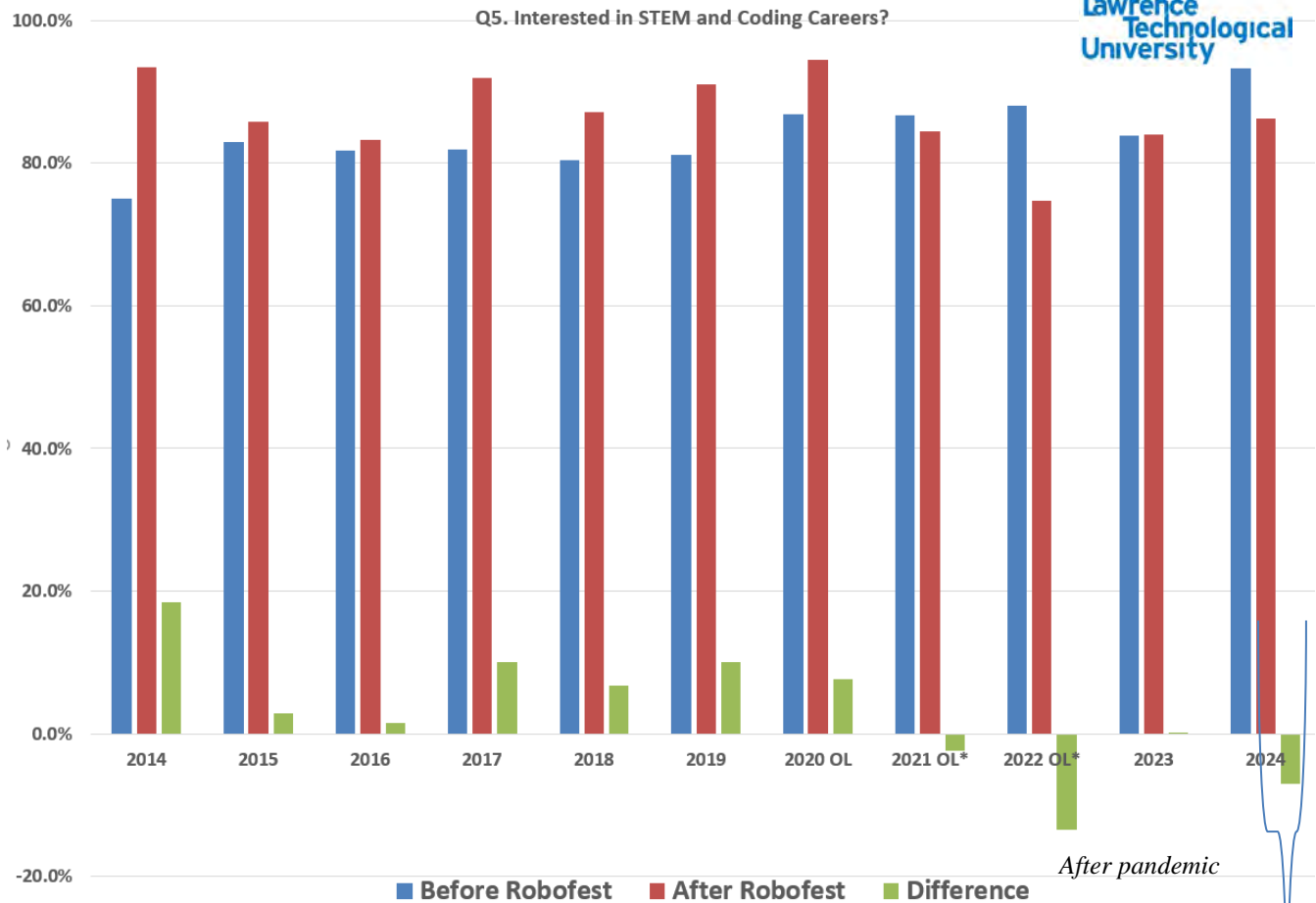
**(Table 3)** Overall evaluation based on analysis of Goals and Metrics.

## 4. Summary

According to student assessment data as well as coach and volunteer surveys summarized in Table 2, 2023-2024 Robofest has achieved two of its primary mission goals, which are (B) Develop essential skills such as problem solving, creative thinking, and teamwork (leadership & communication) and (C) Prepare students to excel in higher education and technological careers.

We partially achieved goal (A): We will find ways to promote students to try 2nd chance opportunities before the World Championship. A possible solution can be waiving the event fee.

Percent of students who consider a career involving STEM after their Robofest exposure was decreased 7%. After additional analysis, we found an interesting pattern. It is interesting to see in Figure 11 below that STEM career interest was decreased (or similar) after Robofest experience since 2021. We have used exactly the same survey methodologies since 2014 till now. Before the pandemic (2014-2020), STEM career interest was always increased after the Robofest exposure. After 2021, it is obvious that the trend was reversed. We believe that the lack of hands-on learning experiences during the pandemic years has weakened students' practical skills, rather than their perceptions of STEM skills, in preparation for STEM careers. As they face the complexities of real-world challenges, there is a concern that their interest and confidence in STEM career paths may diminish.



(Figure 11) Pre & Post STEM Career interest percentages and differences since 2014

We need further research on this issue with improved data collection. In future years, hopefully supported by a grant, we will enhance the survey methodologies to have same population between pre and post surveys, increase pre survey population size, and rigorous statistical analysis such as paired t-test.

We will continue to introduce innovative methods and enhance our programs to inspire students' interest in STEM, with an emphasis on Mathematics, Physics, and Computer Science. We will try hard to ensure effective STEM learning and improving students' competencies and confidence through the Robofest programs.

Respectfully,

CJ Chung, Ph.D.

Professor of Computer Science; Founder & Advisory Board Chairperson of Robofest  
 Lawrence Technological University, Math and Computer Science Department  
 21000 West 10 Mile Rd., Southfield, MI 48075

[cchung@LTU.edu](mailto:cchung@LTU.edu)

[www.ltu.edu](http://www.ltu.edu)

Robofest Advisory Board Members: Paul M. Akangah, Emma Alaba, Phil Bigos, Gavin Coleman, Scott Eisele, Linda Pence, Josh Siegel, Gordon Stein, and Maurice Tedder

## Appendix 1: Coach Survey Comments / Robofest Office's Responses

Q10. Please write any suggestions, comments, criticism, and encouragement to improve the quality of Robofest.	Answers/Comments by Robofest Office
<p>We're very appreciative of how inclusive the event is and that one of our team members is allowed a support person throughout the entire experience.</p> <p>You did a very good job of running on time.</p>	<p>Thank you!</p>
<p>Judging for BottleSumo wasn't great. I would appreciate some improvement in preparation for judges next year.</p>	<p>BottleSumo is one of the more difficult events to judge. We are working on rule changes that will make it easier to judge and will work harder to improve the judging for next season. This year we developed a BottleSumo Committee that will continue to evaluate the best protocols.</p>
<p>There were problems with the ramps at the World Championships. As they were moved around during the Sumo challenge, they became wobbly and were not always level with the table. Although we appreciated the extra challenge this provided, going forward, this problem would need to be resolved. We think that going forward, the concept of "programming on the fly" should be defined much more closely to prevent the misunderstandings that occurred at the Senior Bottle Sumo event. We observed teams who would place their robot on the table as they were preparing for their event and touch buttons on the robot. To us, that is the team members inputting data to the robot which should not be happening at the table. That is not the definition of an autonomous robot which is the robot inputting data based on the programming. The only button that should be pushed is the start button.</p>	<p>We were happy to provide this innovation for this year's competition. Thank you for the honest feedback to consider as we move forward. Ramp variation is part of the challenge and reflects real world situations. We agree that there is too much inputting and will be considering changes to address the concerns.</p>
<p>I believe robofest needs to include a presentation consisting of a poster and engineering notebook.</p>	<p>The poster and notebook fall under the exhibition style rubrics. This would be an additional layer for game style. Thank you for your feedback.</p>
<p>Dr Chung, Pam, and all the organizers and judges were great!</p>	<p>Thank You!</p>
<p>It would be nice to have student mentors from other veteran teams help rookie teams with the design /build of the robots.</p>	<p>Great idea. Given enough lead time, coaches can request assistance and the Robofest office will do our best to connect teams.</p>
<p>The qualifier at Seffner Middle School was not well organized. I don't have enough information to know why, but our families were severely disappointed that competition tables were not configured correctly, nor was there adequate volunteer participation (meaning that Gavin had to personally judge every division, leading to excessive wasted time for participants/families), nor were the promised food trucks available. That was not a positive experience. Speaking of food trucks, the Wizard truck at the WCs was, to be blunt, awful. They were egregiously slow (we were in line for nearly an hour; AN HOUR!) and the quality of the food, when it finally arrived, was suspect (one of our students even got ill). The</p>	<p>The Robofest office will continue to support qualifying events to improve. Participants/parents are encouraged to reach out to their local site host to help organize and execute.</p> <p>We will continue to work to improve food offerings and to meet individual needs the best we can.</p> <p>Great idea on the mixer idea for students to have organized time to get to interact - the</p>

<p>Robofest events themselves were well run, but this stood out as maddening.</p> <p>That said, we are so grateful for Robofest. It's a great program that certainly benefits students and spreads the name of LTU well beyond where it would otherwise be known. A key benefit of the WCs is the cultural exchange that can happen there. To that end, perhaps Robofest could set aside time/space for teams to share about kids' lives in their country and how robotics works at their school/program. We'd certainly participate if we could.</p> <p>Thank you -- everyone at Robofest -- for a great program!</p>	<p>challenge of how and when in our already full schedule. Will do our best for 24-25.</p>
<p>Just the newcomer central sight, it was hard to find all that we needed. I was a new coach this year and had to research what we needed for each event. Also, participation certificates for the whole team and not just the drivers. Thank you</p>	<p>We will work hard to provide new coaches with tips and tricks to find all the materials needed to navigate the program. Certificates and medals were provided for each registered participant. Coaches have the ability to print certificates for participants, assistant coaches, team volunteers and sponsors directly from their coach home page in the registration system.</p>
<p>It would be great if coaches have pre-sessions before classes it self. So that they know what to do and how to do..</p>	<p>New coach training is available and is being updated. Thank you for the feedback.</p>
<p>I'm thrilled to share my thoughts on how we can further enhance the quality of Robofest. Firstly, I wholeheartedly support the idea of having a dedicated game facility for the event. This will provide a centralized space for participants to showcase their robots and engage in friendly competition. It will also create an immersive atmosphere for attendees to marvel at the innovative creations on display.</p> <p>Additionally, the inclusion of vendors offering food and robot components would greatly enrich the overall experience. A well-fed and energized crowd is essential for sustained enthusiasm, and having access to robot components on-site would be incredibly convenient for participants and enthusiasts alike.</p> <p>In terms of suggestions, it would be beneficial to ensure that the game facility is equipped with ample space and resources to accommodate the diverse range of robots and their respective challenges. This will help prevent overcrowding and ensure a smooth flow of activities throughout the event.</p> <p>Furthermore, encouraging vendor participation from a variety of food and robot component suppliers will contribute to a more vibrant and inclusive atmosphere. Diverse offerings will cater to different preferences and needs, enhancing the overall appeal of the festival.</p>	<p>Great idea - we will consider this suggestion knowing that we have logistical limitations.</p> <p>Robotic components are generally acquired by teams prior to competition, the Robofest Office does their best to accommodate last-minute situations.</p> <p>We are looking at expanding our food truck offerings at the World Championship event.</p> <p>Thank you for your kind and thoughtful suggestions.</p>

<p>In terms of constructive criticism, it would be beneficial to carefully curate the vendor selection process to ensure that they align with the theme and values of Robofest. This will maintain the integrity of the event and provide attendees with high-quality products and services.</p> <p>Lastly, I want to express my encouragement and support for the continuous improvement of Robofest. It's evident that the organizers are dedicated to providing a memorable and enriching experience for all participants and attendees. I'm confident that with thoughtful planning and execution, Robofest will continue to be a highlight for robotics enthusiasts and innovators.</p>	
<p>Suggestions</p> <ol style="list-style-type: none"> <li>1. Training Sessions: Offer pre-competition workshops and tutorials.</li> <li>2. More Categories: Introduce diverse challenges for different skill levels.</li> <li>3. Real-Time Feedback: Provide immediate performance feedback..</li> <li>5. Virtual Option: Facilitate virtual participation..</li> </ol> <p>Criticism</p> <ul style="list-style-type: none"> <li>- Complexity: Some challenges may be too hard for beginners.</li> </ul> <p>Encouragement</p> <ul style="list-style-type: none"> <li>- Keep Improving: Continue enhancing STEM promotion.</li> <li>- Innovation: Keep encouraging creativity.</li> <li>- Positive Impact: Your impact on skills and teamwork is evident.</li> <li>- Community Growth: Keep nurturing the growing community.</li> </ul>	<p><a href="#">eAcademy at robofest.net</a> offers many online training sessions. We will strive to update new coach resources.</p> <p>We will continue to strive to offer events for all levels of computer science learners.</p> <p>Game scoring allows opportunity for beginner teams to strategize and play to their strengths.</p> <p>We will consider virtual participation.</p> <p>Thank you for your constructive thoughts.</p>
<p>The pacing at the World Championship was not great. The event started a very long list of introductions that disengaged the students and attendees. During the matches of the Game, there was no commentary and lots of "dead air" on the microphone. Results of matches were not announced, there was no clapping for the actual students who had just competed. The lack of energy made the event less engaging and rewarding than it could have been. I suggest having a master of ceremony beyond just the staff of Robofest to comment on the matches.</p>	<p>It is important to recognize those who make Robofest possible. Good suggestions. We will see what can be done to streamline the event and increase the excitement. Thank you.</p>
<p>The event in Sefner, FL this year was not very organized. There was one person setting up for the event and we were late starting. Me, along with other coaches and mentors had to finish setting up certain events because it was set up poorly. The tables for the parade were not even which caused most of the floats to get stuck. When it came time to judge the events there was no good flow to how the judges made their rounds. For example, they started with measuring the parade floats and then moved over to the exhibition. The kids waiting to finish the parade had to wait about 2 hours.</p>	<p>We will work with our site hosts to assure they have enough volunteer support. All participants should consider recruiting volunteers or even pitching in to enhance the smooth operation of events.</p>



<p>Referees must be well trained Only one team must participate in the country, to ensure impartiality.</p>	<p>Thank you for your suggestions. We will work to improve our judging and will evaluate our allocation system.</p>
<p>The whole program is amazing. But as a suggestion, It would have been nice if there is a platform to make online assesment for teams who are unable to make it to the world championship.</p>	<p>To ensure fair evaluation, the in-person World Championship teams will be judged in person. We do see the value in creating a separate online WC, which may or may not be possible due to limitations of resources at this time.</p>
<p>Enhance Robofest by expanding learning resources, establishing mentorship programs, organizing feedback sessions, introducing diverse challenges.</p>	<p>eAcademy at robofest.net offers many online training sessions. We will continue to refresh and evaluate.</p>
<p>Please let it for free</p>	<p>We wish we could! Robodest is one of the most affordable robotics competitions and we do our best to keep the cost low.</p>
<p>Keep offering funding routes for new upgraded equipment.</p>	<p>MCWT and 99H are available funding sources for Michigan teams, and we watch for legislation in other states that may offer grants to those teams. Cost is low compared to many other programs. Teams can seek local sponsorships to offset costs.</p>
<p>Robofest needs to promote to all teams an understanding of and commitment to fair play, ethical behavior, integrity, and general goodwill toward an opponent. The behavior of Jordan and Ghana, during the senior bottle sumo, towards each other and towards the officials was very disrespectful and unsportsmanlike. Neither team could accept that the other teams robot won the match and they contested the officials decision numerous times demanding a rematch. It got so heated you almost had a fist fight break out.</p>	<p>The Robofest Team Pledge is in place to guide students toward appropriate behavior. Additional reminders moving forward are being considered.</p>
<p>Overall I think Robofest is an excellent opportunity for kids to learn and grow in a number of areas listed above. My only constructive criticism is in regards to the Game event day activities at the World Championships.</p> <p>Many students and spectators found the proceedings to be very long and drawn out. It seems like there are several opportunities to cut down on the amount of time spent sitting in the stands. For example, it took quite some time for each judge to introduce themselves during the opening ceremony and there were so many of them that it was impossible to remember all of the names by the time they were done. During the closing ceremonies the audience had to wait for a team to be called, run up on stage, high 5 all of the judges, and get their pictures taken before the next team was called. This really prolonged the amount of time it took to present all of the awards.</p> <p>It was very difficult to hear what was being said at times during the award ceremony. There were two big monitors used to display the agenda, it would be very helpful if they could also show the award category and team name of the team that was being announced.</p>	<p>We wanted to give more recognition for volunteer Judges. We will see what can be done to streamline the event.</p> <p>Yes, we will consider displaying the list of winners on the monitors.</p> <p>Thank you for the constructive feedback.</p>

<p>Overall program was good and the students learned alot, I have a few suggestions for next year.</p> <p>for Exhibition category the spaces provided to display the project was not enough and visitor friendly, it should be in a hall like bottle summo etc...</p> <p>The time given to setup the both for exhibition was too much it can be reduce to 1 day as most of the project setup was done on the day of judgement or day before judgement.</p> <p>the visitor poling part was great it should continued to next year.</p> <p>The spaces for exhibitors should be limited no projects should allow to use extra space so things can be done in proper manger.</p> <p>LTU highly need to properly market the Robofest through Social Media and other channels</p> <p>Robofest need to work on ambience of the event which include branding in the competition which creates attraction for more students for upcoming year events.</p> <p>during the events of 3 to 4 days workshops can be add in to it so that those students who are free on certain time day can get maximum through this visit which will leads to the university program registrations.</p>	<p>We are so glad that the students learned - that is our primary goal.</p> <p>The exhibition event is one day - teams have the option of setting up earlier than Saturday - team choice can make Exhibition, RoboArts and RoboMed one day.</p> <p>LTU did offer a University Tour on Thursday immediately following the welcome meeting. We can look at expanding this option.</p>
<p>The embassy should not deny coaches for those teams to travel without a coach.</p>	<p>We agree- this is out of Robofest office's control. Suggestions welcome.</p>
<p>Really enjoyed the opportunity! Thank you to your hard working staff for organizing the details.</p>	<p>Thank you! You are welcome!</p>
<p>The rules could be written more clearly, especially to a new team.</p>	<p>Thank you for the feedback.</p>
<p>I would suggest that Robofest management to arrange for Accomodations, airport transfers, ground transportations to venue and lunch for the visitors, registration fee can be increased for the visitors to include all that.</p>	<p>This is the responsibility of each traveling team, as each country has their own unique needs. Robofest will continue to provide resource ideas for teams traveling.</p>
<p>I think it is fantastic! I am so glad we took advantage of this opportunity! If I have any criticism at all, it would be that new coaches may need additional guidance, e.g., a timeline of what is due and when, to help them navigate their first season.</p>	<p>Thank you - so happy to have you this year. We are constantly striving to streamline information, we appreciate the suggestion.</p>
<p>Students from various regions learn from each other and they also create networks with each other</p>	<p>We agree - considering when and how to facilitate.</p>
<p>The new rule for this year: "Final Ranking is determined by the (Best+Average)/2 of the two rounds" made my team rank lower than the team that was a total of 20 points less than us. This rule is a little bit discouraging to a team like us with very consistent performance but makes minor mistakes for both rounds. My team feels it would be better if we could use the (Best + 2*Average)/3 of the two rounds, this way it can be balanced to encourage higher scores as well as consistency.</p>	<p>The data shows that (Best+Average)/2 gives teams that do not do well in the first round a better chance of making it up in the second round. We feel that this strikes a good balance between high score and consistency. We will do a survey and make changes based on the data. Thank you.</p>
<p>Ghana should get more slots</p>	<p>Demand for slots has been very high. We are working to accommodate requests in a fair</p>

	manner. Team quotas are based on the number of teams competing in the qualifiers.
If Robofest provides full scholarship to top 3 place winners, LTU can attract winning students from U of M Ann Arbor and Ivy League schools.	We understand. Thank you.
I loved the Game problem this year. It was just the right balance of approachable and challenging. Thank you for a great year!	Thank you for the positive feedback!
We love Robofest and had wonderful experiences this year...thank you!!!	Thank you for the positive feedback!
This is great program and I like you always help me out. Thanks everything you do for students	Thank you for the positive feedback!
You need to be more inclusive to non binary and other underrepresented genders when you create your surveys.  And your website doesn't have an option for "hispanic" when people are registering.	We have updated our registration system to be inclusive, and our survey has also been updated. We will continue to review our materials and make changes where needed.  Thank you for the suggestions in formatting the forms.
LTU Instructors, Mentors, always do a great job. My students always love it, I Thank the sponsors for helping you with the RobFest Camp funds. It wS FANTASTIC!!!!!!	Thank you for the positive feedback!
It was great.	Thank you for the positive feedback!
Your programs are wonderful, I like the way it is presented to students of all ages. GREAT JOB!!!!	Thank you for the positive feedback!

## Appendix 2: Volunteer Survey Comments / Robofest Office's Responses

<b>Q5. Please provide any suggestions/comments which will help us enhance the quality of Robofest for S. T. E. M. education.</b>	<b>Answers/Comments by Robofest Office</b>
Food was bad, maybe we can make an official team to be in every event	Thanks for the feedback.
World Championship food preparation for volunteers needs improvements	Thanks for the feedback.
I judged the roboarts category. I would suggest that in future you move the competitors exhibit out of the hallway. This location had a lot of foot traffic and impeded judges ability to hear, observe, and ask questions. At one point a visitor actually stumbled into the exhibitor while they were being judged. It was okay but could have been really bad	Thank you for your suggestion. Space is a continued challenge. We will do our best to assure a safe environment.
If possible, it would be helpful to have a technical resource to ask questions regarding Vex or other commonly used equipment. We are experiencing what seems a max program size limitation and have not been able to get a response from the manufacturer.	We do our best to offer technical assistance where we can.
The form wouldn't take my school email address.	Sorry about that. Unfortunately, the IT policies related to some emails are not

	compatible with our systems. Please contact us when you have issues.
<p>I thought Robofest was very well run - organized, with clear instructions and timeframes for student participants.</p> <p>The only thing I would suggest for improvement: we borrowed 2 robots from the Acadia program, as our school just doesn't have a budget to buy them. When we arrived at the competition, we realized that many other schools and programs had much newer robots and expensive upgrades (sensors, etc.). Not sure if it is possible but maybe have a portion of the competition where all teams have exactly the same equipment, like teachers often do with the common 'Science Olympics' programs at schools, where everyone gets the same materials, and must build from there.</p> <p>We were sitting in the stands, and one of our teams was on the floor, and I heard a group of students behind us say, "geez, look at the dinosaur on number 6" (meaning our robot was a really old model). I, and our students, still had a terrific time, and would attend again. But I guess now we know what we are up against, so we'll try to fundraise for next year. Thank you very much for the experience!</p>	<p>Thank you for the feedback. We appreciate knowing the challenges you are facing at the local level. Additional sensors are relatively inexpensive and are recommended for Robofest challenges. We feel that coding is the key factor in our Game challenges, and independent of robot kit.</p>
Many thanks for your great efforts	Thank you for the positive feedback!
Lots of long-standing periods throughout the day... Water breaks would be good.	Thank you for the idea!
You are all great!	Thank you for the positive feedback!
We could allocate more resource / manpower during registration (check-in) process to avoid waiting time.	Thanks for your patience.
Everyone did a great job.	Thank you for the positive feedback!
I enjoy the student workshops that are offered.	Thank you for the positive feedback!
<p>Our Game qualifier at Seffner Middle School was not well-managed. The site wasn't ready, our competition table was initially mis-configured, there were not enough volunteers, and the promised food trucks didn't arrive. Yuck. We have chatted with another coach in our county, and we will manage hosting differently next year. Our experience this year makes me think that a team's local experience is almost completely dependent on the local site host, with little (too little) oversight from Robofest.</p> <p>Our experience at the WCs was almost entirely positive. The lunch options on Saturday were severely lacking, and the Wizard food truck was abysmal.</p> <p>Overall, Robofest is a great program for which we are grateful. Thanks to you and LTU for managing Robofest!</p>	<p>We will work with our site host to assure they have enough volunteer support. All participants should consider recruiting volunteers or pitching in to enhance the smooth operation of events.</p> <p>Thank you for the feedback</p>
This is a wonderful program. It is inspiring to watch the participants working together and having so much fun while doing it.	Thank you for positive feedback!
Excellent program. 1st time attending. Kids loved experience	So glad you joined us! Hope to see you next year.
Job well done!	Thank you for the positive feedback!

<p>Put the food trucks closer to the gym, maybe in the parking lots of Buildings 16 and 17.</p> <p>We also need better sound and lighting -- and could we please have some peppy music playing during down times in the event, like during the lunch break and just before the awards ceremony, and stuff being shown on big screens in the gym? We need an entertainment-style showrunner to make the event more of a wow experience. Or at least a DJ.</p> <p>It would also be good to have an actual advertising/marketing budget to promote the event, not just sending out news releases and hoping for the best.</p>	<p>Good suggestions - We will consider the possibility of moving the food trucks to the front lots as we did in previous years.</p> <p>Background music is a matter of preference, some international site hosts and coaches have commented that they like the setting without loud music for honoring all beliefs of all teams. We strive to keep our events academic competitive learning opportunities for all. We will consider adding some music to add entertainment during downtimes.</p> <p>We have a new marketing department at LTU and we are developing a strategy to promote Robofest.</p>
<p>Excellent program I love it and supporting from last 18 years</p>	<p>Thank you for positive feedback!</p>
<p>It's getting more and more difficult to maintain support from my school to continue with Robofest. There is another robotics competition that does a lot of self promotion and gets a lot of press and exposure. It would be nice if Robofest was able to have a larger presence outside MI, to help me justify our participation.</p>	<p>Thank you for the feedback- press template available upon request -site host must request.</p>
<p>This is a great event for STEM education, especially at a grass root level. Increase visibility of the event by advertising and by collaborating with other institutions and organizations.</p>	<p>Thank you for the feedback.</p>
<p>Would be helpful if Robofest could provide a little funding for teams outside U.S for their travels and accommodation. Thank you</p>	<p>The Robofest budget does not allow this at this time - consider seeking a sponsorship.</p>
<p>We could have used some help with robo parade as it was our first time. Maybe offer a workshop or more examples for design, sensors, and coding. Thanks!</p>	<p>Noted - planning a fall 2024 competition. Slideshow step by step instructions are available on e-Academy</p>
<p>Keep doing what you are doing!!!</p>	<p>Thank you for positive feedback!</p>
<p>It's very clicky and it makes it awkward for new volunteers.</p>	<p>So sorry this was your experience. This is never our intent - we pride ourselves in being welcoming and inclusive. We provide judge pre-meetings to help volunteers be comfortable. Some possibilities are to consider arriving earlier or working with the host to be more engaged earlier in the season. We certainly appreciate that you are volunteering at Robofest.</p>
<p>Addressing educational authorities in the participating countries to adopt the competition to obtain stronger and more comprehensive participation</p>	<p>We encourage our international partners to engage with the educational authorities in each country.</p>
<p>ROBOFEST has done and is doing a great job in the STEM space. In relation to the competitions, I think some teams may NOT be playing by the rules and in some cases are being very 'negatively smart' with cheating. The 'authorities' in ROBOFEST should not be afraid to confront such cases should they occur even if the concern is that it might lead to dwindling numbers. A world with more ethical</p>	<p>Thank you for the feedback - this is under advisement for the 24-25 season.</p>



smart people is far safer and better than with less -'my little sixpence'	
Make the event more fun. Remove some of the boring stuff like long introduction of volunteers. Add... a dance party!	We will see what can be done to streamline the event. Thank you for the suggestions!
Another great season!	Thank you for positive feedback!
Robofest has a strong history and has filled a space for low cost robotics competition. My main concern for future participation is about how the program will be able to transition to new leadership and continue to engage the US stem educators in a busy space with several robotics options. It is a tough phase for the organization. I am cheering for you.	Thank you for your continued support of our unique all hands on academic centered computer science program.
Work with the school districts to promote RoboFest events throughout the school year. As you know, everyone knows about FIRST robotics competition.	In progress. 99H Grant and Macomb County Programs as evidence.
The variety of challenges provides opportunities for students of all ages and levels of experience and skill to participate. Many students start with parade or Sumo and enthusiastically continue to hone skill, and take on increasingly complex events. Collaboration and problem solving skills are emphasized. The reasonable cost and easily available game materials allows many to participate.	Thank you for the positive feedback!
Keep it up! Thank you!	Thank you for the positive feedback!
This is specific to our site, I think there needs to be more people to set up. I also think it should be advertised to all local schools to attend	We are so grateful to our volunteers because our small staff could not do what we do without their help. Please consider volunteering in the areas that you would like to see improved. The World Championships has a lot of moving parts in a very short span. Suggestions noted. Thank you.

### Appendix 3: Student Survey Comments / Robofest Office's Responses

<b>Q8. Please provide any comments/encouragements/ suggestions which will help us enhance the quality of Robofest for learning.</b>	<b>Answers/Comments by Robofest Office</b>
thank you	You are welcome - so happy you joined us this year!
I really think the organization was fantastic, but I believe if you only gave us more time to engage with other teams I'd be very happy. All in all, it was perfect	You are welcome - so happy you joined us this year! We appreciate the suggestion. We plan a pilot program to engage with other teams in RoboMed first.
Pretty good experience overall	Thank You!
I hope the i parspite next year	We hope so too!
Thank you for accommodating my needs. Without the accommodation I would not have been able to participate in Robofest.	This means a lot to us in the Robofest office - we want you to be your personal best!

To put a third place for roboarts especially senior	Places recognized with awards are based on the number of teams in each category.
Create more ability to make social environmental and economic impact. Make it smooth for visa applications to allow granted visa without denial.	Thanks for the comments.
It was a good experience,the judges were friendly and I enjoyed my time during the competition	Thank you for the positive feedback.
Make the category Game 3 rounds	Thank you for the suggestion. Unfortunately, time constraints make it difficult to add a 3rd round.
Make ranking system based on average of two scores, not average of average and highest score	The data shows that $(\text{Best} + \text{Average}) / 2$ gives teams that do not do well in the first round a better chance of making it up in the second round. We feel that it strikes a good balance between high score and consistency, but will review the data. We will do a survey and make changes based on the data. Thank you.
iam from pakistan our national organier did not confirm me to particapte in international event.iam participated lots of internatinal event like WRO and FLL but in robofest iam diappointing .	We are sorry you are disappointed - let us know how we can support you to prepare for next year.
More tables for practice and set up right.	We do our best to provide as many practice tables as possible, but will see if we can add more.
Really fun	Thank you for the positive feedback.
Amazing experiance	Thank you for the positive feedback.
Have everything prepared before guests start to arrive. Also, add more competitions.	We will do our best to be better prepared for next time. Thanks for the comments.
nothing to say it was a great experience	Thank you for the positive feedback.
Pair students with experienced mentors or industry professionals to provide guidance and support throughout the competition. Organize workshops and webinars on topics like robotics programming, AI, or machine learning to provide participants with additional skills and knowledge.Organize workshops and webinars on topics like robotics programming, AI, or machine learning to provide participants with additional skills and knowledge.	Coaches and other team support adults can provide these opportunities throughout the preparation season. Judges are vetted and available to students in limited capacities during the competition itself. Please reach out to our office if you need help with connecting with professionals in your local community. Dr. Chung is offering free AI and scratch coding online workshops sponsored by the United Nations. Please sign up at: <a href="https://aiforgood.itu.int/speaker/chan-jin-cj-chung">https://aiforgood.itu.int/speaker/chan-jin-cj-chung</a>
I think for some of the game rules which can be a bit ambiguous or unclear, further explanation could be given to make the rules more clear(eg with the stop line violation rule). Also when a game task is given it would be nice to connect and relate that game task even more so to what is currently being done in the industry and to	Thank you for your feedback. We will work to improve the rules.

probably have some sort of field trip to those related industries as well as probably some internship opportunities at those industries.	
Introduction of get-together session between countries. I feel like it is going to help most of the teams know their flaws and also discover new idea for the subsequent years.	Great idea for students to have organized time to get to interact - the challenge we are working on is the how and when in our already full schedule. Will do our best for 24-25.
It was a great experience but I think it needs mor quality at regionals.	Regional directors are volunteers, please reach out to support them in areas that need improvement.
The game ending mission was a little bit too easy(under standard).There can be relatively harder situations autonomous taxis are eligible to face so the game ending mission must be made stricter(An example is introducing another pedestrian onto the board say, it's to be avoided too during your run). Also, during the competition, supervision was somehow poor because I saw some coaches decend to their teams to aid them and it's not allowed	Though the game ending task may have seemed too easy, only about 17% of the teams were able to achieve it. We will strive to improve our pit proctoring.
Just keep up the good work in giving opportunities to people like us.Because of you I'm now steps closer to achieving my goal	We are so glad you are making the most of your Robofest experience!
Robofest is very good how it is, but fo junior division, make round 2 a little easier as this year it was "biased" towards people who could pick up multiple golf balls.	We strive to create UTF's that do not favor one strategy over another, but it is not always possible. Thank you for the specific feedback.
Several teams were visibly cheating with external help and modifying their robots after impound. They were confronted by judges, but nothing was done about it and they were not disqualified as the rules would suggest they would be for such behavior.	Thank you for the feedback.
I would prefer it if the challenge did not rely so much on luck. I did bottlesumo, where the strategy was to essentially hope for the best.	Though chance and timing are factors in the BottleSumo competitions, good coding is still a big factor. We will investigate ways to reduce luck as a factor.
nothing. robofest is a fun experience, and i'm happy that i've competed in it.	Thank you!
I think that Robofest should take place in a bigger room with more seating. I thought that the gym this year was pretty hard to move around in because of how small it was.	Thank you for the suggestion. We will investigate the use of the main campus space for Exhibition Style competitions.
Robofest was very good. At Robofest World Championship we need more outlets.	Thank you for the suggestion. We will get more outlets for next time.
It was great i liked it	Thank you for the positive feedback.
spend as much time making sure everything works	Thank you for the feedback.
Here is a polite way tol would like to provide some feedback regarding the Exhibition. I felt that the organization seemed a bit haphazard, as there were no booth numbers on the first morning. Additionally, the walkways were somewhat narrow. Addressing these issues could greatly enhance the overall experience. Thank you for considering my suggestions.	We will evaluate this and look for ways to improve organization and use of the facility space. Thank you.

All good	Thank you for the positive feedback.
I like the program and it's a great experience for 6th graders .	Thank you for the positive feedback.
Please explain the rules exactly before the WorldChampionship	Part of the team preparation responsibilities is to read and understand the rules. Rules are posted at Robofest.net
For the rule of 1 sex after the black line it needs to be clear	Thank you for the feedback.
My first time I love it and joining again	Look forward to seeing you again next year!
Love it and learn programming	Thank you for the positive feedback! That is why Robofest has launched.
Love it and Mr Chris is excellent mentor	Thank you for the positive feedback!
I love robotic I will continue in my high school	Thank you for the positive feedback!
Doing robotics again	Thank you for the positive feedback!
our biggest goal is to win a competition and I believe we can achieve that when we come back for 24-25	Thank you for the positive feedback! Good luck in 24-25! Keep learning!
Robofest was extremely fun and I enjoyed meeting all the new different people	Thank you for the positive feedback!
Rather than using points scoring, use a personal logic based rating system.	Thanks for the feedback.
Don't penalize points if robot displays number but doesn't stop	We are required to follow the rules for judging.
There should be more food options	Thank you for the feedback
It really did help me all lot :)	Thank you for the positive feedback!
nothing it was all good	Thank you for the positive feedback!
Encourage student to do it	We are doing our best - Thank You!
I think more slots should be given to African countries n countries and also competition days should be more than three days.This will allow other competitors to have a view of all the other competitions	Slots are determined by a variety of factors (see general rules) including the number of events and the number of teams participating in each country.
Great experience, would be great if there are more food and drink options on the game days, so there is less line up.	Thank you for the suggestion.
Give everyone a prize for trying.	All participants receive a medal and a personalized certificate.
It's cool and I really liked it.	Thank you for the positive feedback!
My son noted that the Robofest staff was very kind and encouraging. Thank you!	You are welcome - we do our best to love people at Robofest!