TECHNOVATION APP SCORES CORRELATED TO STUDENTS' SELF-REPORTED LEARNING GAINS

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Does a high score from a judge mean that the Technovation student has learned more?

As we scale and grow, we want to make sure our programs continue to have deep impact on participants. A step in that direction is to look at the data we collect, and identify patterns. One such area that we analyzed this year was comparing the scores that judges provide to Technovation students' work to the students' self-reported learning gains.

Technovation is the world's largest technology entrepreneurship competition for girls aged 10-18. Through Technovation, girls identify a problem in their community, develop a mobile app and launch a startup that addresses that problem. They are supported through the whole process by mentors (who could be educators, industry professionals or parents). At the end of the 100-hour program, girls submit mobile app prototypes, business plans, app code, a pitch video, and an app demo video. Judges review these materials online and provide a score.

We were interested to determine if there was any connection between the judges' scores and the girls'

self-reported gains. Our hypothesis was that girls who made significant learning gains would also be scored highly by the judges. However, what we found is that so far, there is no correlation between the two (except for a weak relationship in 2013 indicating that in this year the judges' scores were high and that girls also reported high learning gains).

Year	n	Correlation Coefficient (r)	Median Judges' Score	Skewness Judges' Distribution	Median Students' Score	Skewness Students' Distribution	
2013	62	0.4310	72	-0.252	77	-0.884	
2014	740	0.1633	72	-0.625	77	-0.467	
2015	615	0.0984	71	-0.539	81	-2.637 🛀	Highly skewe
2016	584	0.0443	65	-0.406	78	-1.807 🛫	giily one we
2017	496	0.0002	69	-0.168	79	-0.640	

Judges' Scores were moderately skewed (towards higher values with tails at lower values).

Students' Scores were moderately skewed except for 2015 and 2016, when they were highly skewed.

Our explanation for this is that the students' perceptions of the program's impact is based on the qualitative changes in their self-efficacy; that may be disconnected from the real-world value of their app and business plan.

Over the past 4 years we have tried to make the judging rubric more student-centered (as can be seen from the 2013 and 2017 judging criterion).

2013	Judging	Criterion
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App Demo	Does it have adequate functionality?
	Is the app visually appealing?
	Is the app's user-interface intuitive and easy to use?
Critical Thinking	Is the app a good solution to a problem in their local community?
	Do they understand the size of their market?
	Do they understand their competition and how they are differentiated?
Communication	Does the team convey their understanding of the computer programming?
	Does the Pitch explain their business plan?
	Is the Pitch clear and concise?
Strategy &	Do they leverage the capabilities of the platform they are using?
implementation	Is their app a good representation of their vision?

Do they have a practical vision for extending the capabilities of
their apps beyond the prototype?

2017 Judging Criterion

Ideatio	Score	
5 pts	The team clearly demonstrates how their app idea aligns with at least one of the 6 Technovation themes of the UN Sustainable Development Goals:	
	Poverty	
	Environment	
	Peace	
	Gender Equality	
	Health	
	Education	
	Learn more about these goals at sustainabledevelopment.un.org	
5 pts	The team has clearly outlined and provided evidence through facts and statistics of the problem they are addressing.	
5 pts	The app effectively addresses the problem that was outlined.	
	Ideation Total Score:	
Technie	Score	
5 pts	The app is fully functional and has no noticeable bugs.	
10 pts	The team has completed and you have verified the Technical Checklist . Please note this score should range from 0 to 10.	
5 pts	The demo video demonstrates the functionality of the app well.	
	Technical Total Score:	
Pitch (2	20 points)	Score
5 pts	The team clearly communicates the problem they are addressing.	
5 pts	The team presents a compelling argument to support the solution they are proposing.	
5 pts	The team's passion and energy for solving the problem is evident in their pitch delivery.	
5 pts	The pitch is specific and to the point.	
	Pitch Total Score:	

Entrep	Score	
5 pts	The business plan reflects a short term and clear strategy to achieve the plan.	
5 pts	The business plan reflects a long term and clear strategy to achieve the plan. It includes an assessment of the market, research on competitors, does not duplicate an existing product offering. This may be similar but must have some differentiating feature.	
5 pts	The market research portion of the business plan is thoroughly researched. For example, did they incorporate facts and figures, survey results, as well as the market size and segmentation?	
5 pts	There is a viable business model and the reason for selecting it is explained. For example: free, freemium, subscription, or paid.	
	Entrepreneurship Total Score:	
Overa	Score	
5 pts	You are convinced the app is feasible and that it can succeed.	
5 pts	Each component of the team submission was well thought out.	
5 pts	There is a cohesive and well communicated story about the problem and solution.	

5 pts There is a conesive and well communicated story about the problem and

5 pts The app addresses the defined problem in an original way.

5 pts The app stands out from others.

Overall Impression Total Score:



*Senior Division only

We have also worked to improve the training provided to the judges, so they have a better understanding of the program the girls are going through. Despite these changes, it is hard for the judges to not compare the Technovation student products with what they are used to seeing every day in professional environments.

A similar example of this disconnect is from our Curiosity Machine program that is implemented with younger children. Students build hands-on engineering-based designs out of easily available materials such as cardboard and popsicle sticks. An external judge may review their design and assign a low score based on what they think is good design executed with sophisticated materials. However, the student may have made huge gains in understanding how a particular concept is applied, and/or in her own ability to create, troubleshoot and innovate.

This disconnect is interesting to find and explore further as we improve our curriculum, training and judging processes.

Method of analysis:

Survey Scores

- Responses were collected from individual student post-survey questions related to attitude, expectations, and satisfaction about the Technovation experience.
- A completely positive experience resulted in maximum Likert scores and were normalized to a value of 100.

Judges' Scores

- Team scores from App Judging were assigned to each team member, and were normalized to a value of 100.
- The Judges' team score was compared to each team members' post-survey normalized Likert score to give scatter plots and distributions. Skewness was calculated:
 - Between -0.5 to +0.5: approximately symmetric
 - Between -1 to -0.5 or +0.5 to +1: moderately skewed
 - Less than -1 or Greater than +1: highly skewed















Judge Scores compared to **Student Self-Assessed Scores**



 





Further Exploration

We need to further explore the skewness in student scores in 2015 and 2016, compared to other years and identify any particular reasons for it. We would also like to find ways to build a higher correlation between student self-assessed scores and their paired judge scores. A high correlation would indicate that students can accurately estimate how they did by understanding the rubric and using a checklist.

In addition, we would like to dig a bit deeper and see if there are any hidden biases in the scoring—exploring connections between scores to language, country, region, culture, etc. Our goal is to make sure the judging process is as fair as possible, and studying the existing data is one way to ensure that.