



2017  
2022

# 5 Years Impact Evaluation Report

STUDENTS TODAY  
INNOVATORS  
TOMORROW





# ventOR

Portland State  
UNIVERSITY







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# Executive Summary

**Education Northwest** partnered with **Portland State University Center for Entrepreneurship** to conduct a formative evaluation of **Invent Oregon (InventOR)**, aiming to examine how participating students and faculty/staff access and experience the program and how their participation relates to self-reported outcomes of interest. We conducted focus groups with 20 current (summer 2022) InventOR participants and 10 participating faculty and staff from partner institutions during the Invent Oregon Bootcamp event. We also administered an online survey to InventOR alumni from the past four years (since the launch of InventOR) and received 60 responses. The report addresses three key research questions, presented with key findings below.

**20**  
current InventOR  
participants

**10**  
participating  
faculty and staff

**60**  
responses

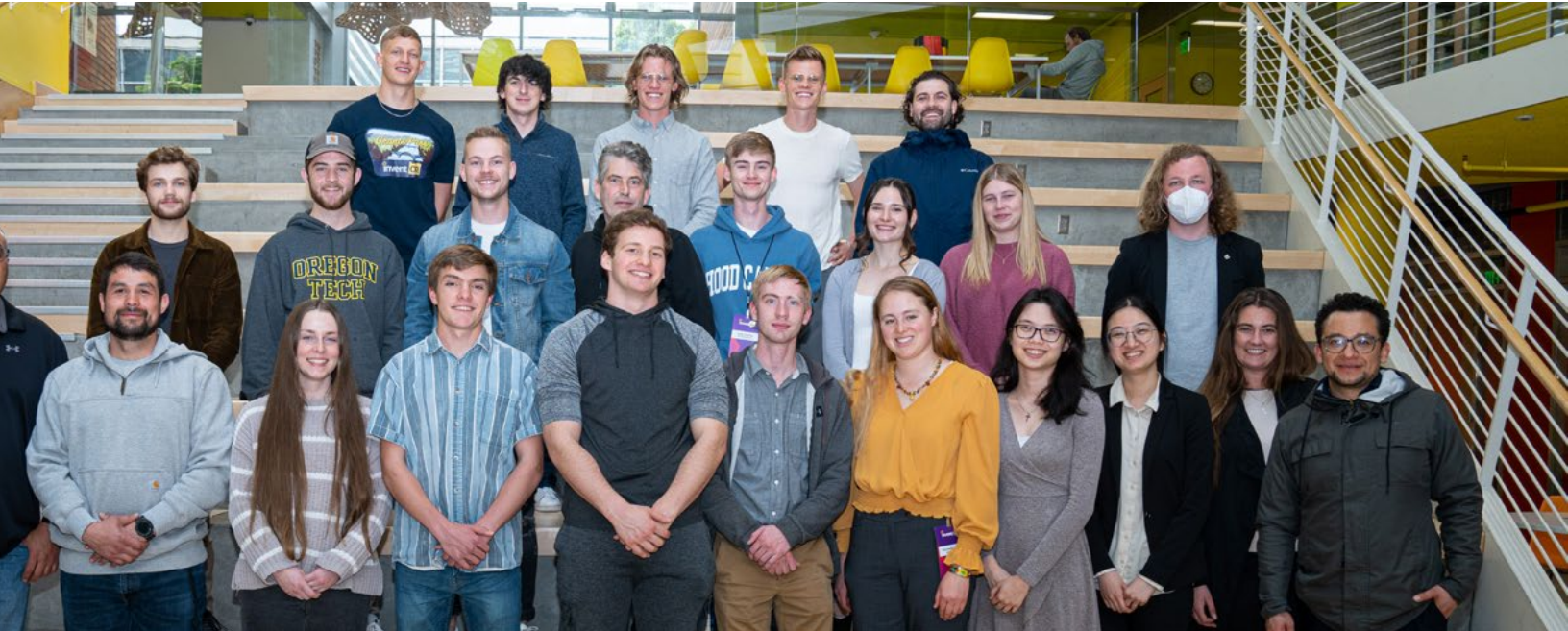


## Who participates in Invent Oregon?

InventOR aims to empower students everywhere to see themselves as inventors, including students from regions and demographic groups traditionally underrepresented by science, technology, engineering, and mathematics (STEM) and entrepreneurship programming. About a third of InventOR participants who responded to the survey identified as Black, Indigenous, or as a person of color (35 percent), came from homes that speak a language other than English (32 percent), and are the first in their family to attend college (29 percent). Nearly a quarter (22 percent) preferred she/her pronouns. Of the 97 percent of participants who have graduated or are attending a college or university, about a fifth of participants have graduated with (15 percent) or are pursuing a master’s degree (19 percent), and most majored in or are majoring in STEM.

Most faculty, staff, and students learned about InventOR through competitions at their institutions. The most common motivations for joining InventOR were to develop an existing idea; learn more about entrepreneurship, business, or inventing; have fun and challenge themselves; forge connections with peers and professional mentors; and obtain financial support for their projects. In the faculty/staff focus group, most of the participants described being motivated to engage in InventOR primarily to benefit their students. Barriers to participation—for both students and faculty/staff—included a lack of awareness of InventOR, a mismatch between student interests and the program’s focus on invention, and the timing of convenings





### How do participating students and faculty/staff experience the program?

Students reported primarily positive experiences with InventOR that included high levels of mutual support and sense of belonging. Challenges for student participants included timing, expecting more individualized support, problems with the judging process, and varying levels of support from college and university administrators. For faculty and staff partners, issues with recruiting students and reports of inconsistent support from college or university administrators emerged as the most common challenges.

### How does participation in Invent Oregon relate to self-reported outcomes among participating students, faculty, and staff?

The primary goal of InventOR is to help college students at all levels take their concept from an idea to reality. Among survey respondents, nearly one-third reported having taken steps to commercialize the prototype they worked on during the program. Most survey respondents also reported gaining increased experience and understanding in their fields that can help prepare them for this and future prototype development opportunities. Confidence and sense of belonging were described as significant impacts of the program in focus groups and open-ended survey responses. In both the survey and focus groups, participant networks built through InventOR were described as valuable investments for the future.

### Recommendations

The report concludes with a series of recommendations based on the findings of the survey and focus groups, along with insights from sharing preliminary findings with program leaders. Recommendations address the following topics:

- Investing in more outreach and direct communication with partner institutions
- Recruiting continuously
- Adapting the agenda for convenings to increase personalization, organization, and efficiency
- Pursuing partnerships or joint initiatives with other programs to broaden the reach of InventOR
- Forming an alumni network or taking other steps to help participants stay connected

# I. Introduction

Invent Oregon (InventOR) is the state's only college-level invention competition, providing grants and guidance for teams of students to develop their ideas for inventions that stand to make a positive impact on the world. InventOR supports students through all stages of prototyping while they learn about the process of commercialization. With support from the Lemelson Foundation, Business Oregon, the Oregon Community Foundation, and PSU's Center for Entrepreneurship, InventOR helps Oregon college students from diverse backgrounds, different majors, and varying levels of experience take their concepts from idea to reality.

## Evaluation

Education Northwest partnered with InventOR to examine how participating students and faculty/staff access and experience the program and how their participation relates to self-reported outcomes of interest. To do this, we conducted focus groups with current (summer 2022) InventOR participants and participating faculty and staff from partner institutions during the Invent Oregon Bootcamp event. We also administered an online survey to InventOR alumni from the past four years (since the launch of InventOR).

## Research questions

The report addresses three key research questions:

1. Who participates in InventOR?
2. How do participating students and faculty/staff experience the program?
3. How does participation in InventOR relate to self-reported outcomes among participating students, faculty, and staff?

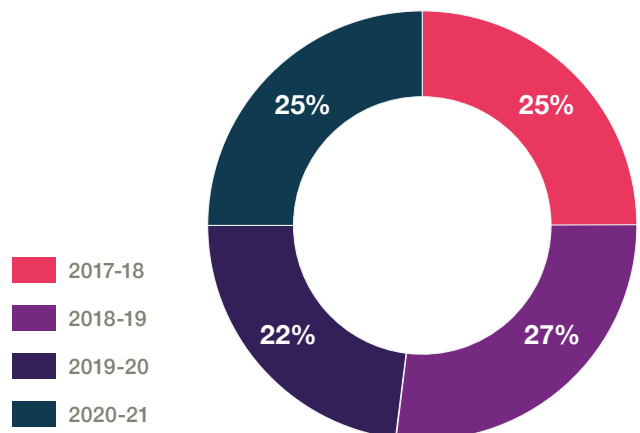
## Data and methods

The evaluation team addressed the research questions using two data sources: focus groups with current students and faculty/staff and surveys of student participants from the previous four years of InventOR's implementation (from 2017–18 to 2020–21).

We developed data collection instruments in partnership with InventOR leaders, drawing from InventOR's internal evaluation tools and preliminary iterations of the program logic model. The focus group protocols were designed to guide current students and faculty/staff in discussing and reflecting on their experiences with InventOR, including the program features and resources that facilitated their successes and the additional support they needed to overcome challenges. Two student focus groups and one focus group with faculty/staff members, each consisting of roughly 10 participants, took place in Portland during the InventOR Bootcamp convening May 5–7, 2022.

For the survey, Education Northwest sent an invitation to 170 active email addresses that included both personal and academic emails. We received 60 responses for a 35 percent response rate. Respondents included similar numbers of participants from each of the four years of InventOR (figure 1). The colleges and universities where participants attended during their time with InventOR are listed in table A1 in the appendix.

*Figure 1: Similar numbers of participants from each program year responded to the survey*



Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 58)



# II. Who participates in Invent Oregon?

## Overview of Invent Oregon

InventOR launched in the 2017-18 school year. Partner institutions around the state of Oregon (19 partner institutions in 2022, up from five in the first year) open applications each fall for student teams to compete in preliminary school level competitions. The winning two teams from each institution are invited to attend the InventOR Bootcamp event each spring, which culminates in a semifinal competition. The teams that participate in Bootcamp receive up to \$2,500 in development grants to take their invention from an idea to a working prototype while learning about the process of commercialization and working with professional mentors. At the InventOR Collegiate Challenge finals each June, students present their invention and compete for \$30,000 in cash prizes. The Bootcamp and Collegiate Challenge convenings took place in person for the first two years of InventOR in 2018 and 2019, and were moved to a virtual space in 2020 and 2021 due to the COVID-19 pandemic. In person convenings resumed in 2022, with Bootcamp held in Portland and the finals held at Rogue Community College in Grants Pass.

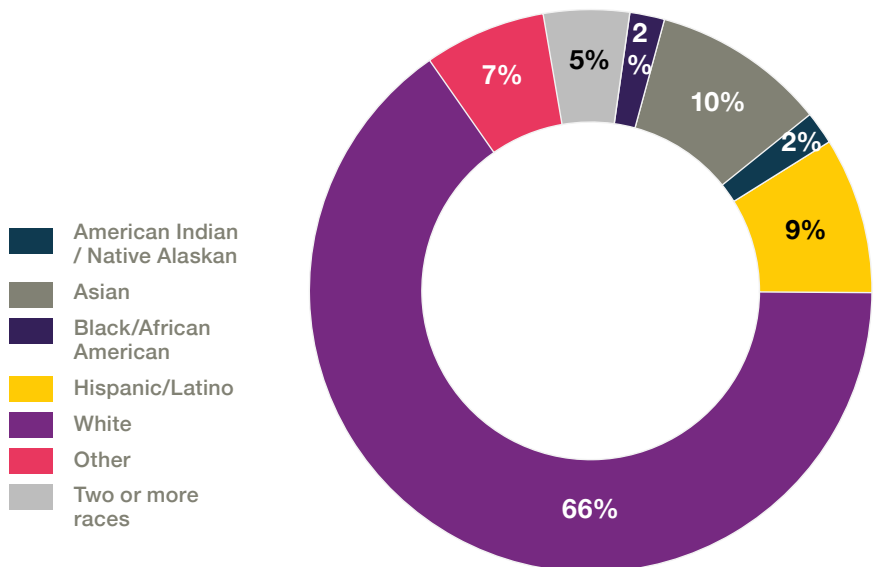
InventOR aims to empower students everywhere to see themselves as inventors, including students from regions and demographic groups traditionally underrepresented by STEM and entrepreneurship programming. About a third of InventOR participants who responded to the survey identified as Black, Indigenous, or a person of color (35 percent), came from homes that speak a language other than English (32 percent), and are the first in their family to attend college (29 percent). Nearly a quarter (22 percent) preferred she/her pronouns.

### Demographic characteristics of survey participants

About one-third of survey respondents (35 percent) identified as Black, Indigenous, or a person of color (figure 2).

Figure 2: About one-third of survey respondents identified as Black, Indigenous, or a person of color

### How do you identify your race/ethnicity?



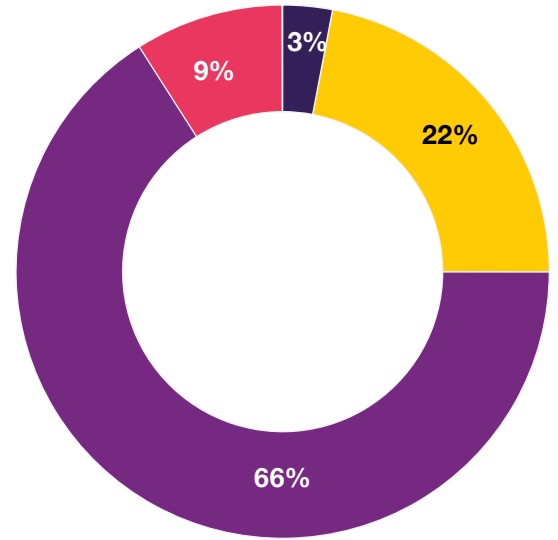
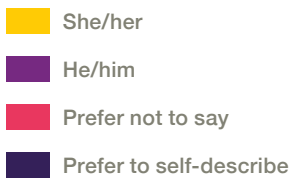
Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 58)  
 Note: Percentages may not add to 100 due to rounding.

## II.

About two-thirds of survey respondents prefer he/him pronouns, while about a quarter prefer she/her pronouns. We also asked about participants' other identities. Twenty-one percent identified as LGBTQIA+, and a few identified as an immigrant or religious minority (table A2).

### What are your preferred pronouns?

Figure 3: Two-thirds of survey respondents use he/him pronouns



Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 59)

About a third of respondents' families speak a language other than English at home (32 percent), and about a third of respondents are the first in their family to attend college (29 percent).

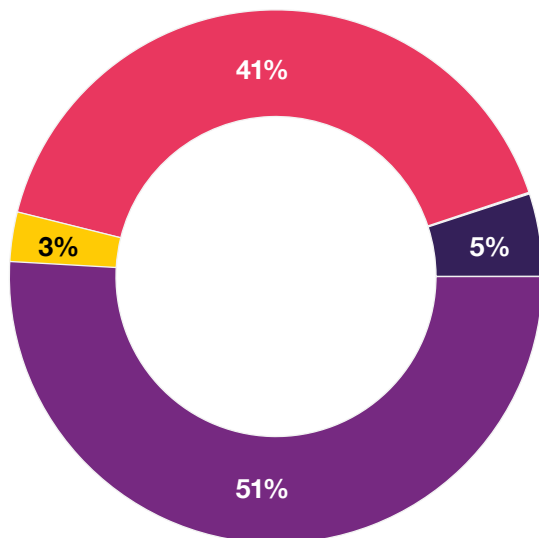
Most participants had either graduated from a college or university (51 percent) or were currently attending a college or university (46 percent) (figure 4).

**32%**  
ESL families

**29%**  
First generation college student

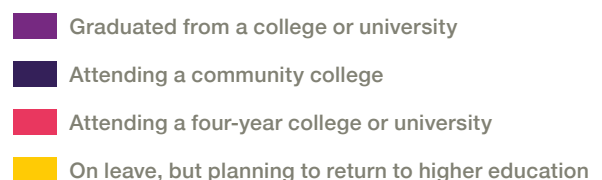
**51%**  
Graduated college or university

**46%**  
Attending college or university



### What is your current enrollment status now in 2022?

Figure 4: About half of survey respondents have graduated and about half are currently attending a college or university

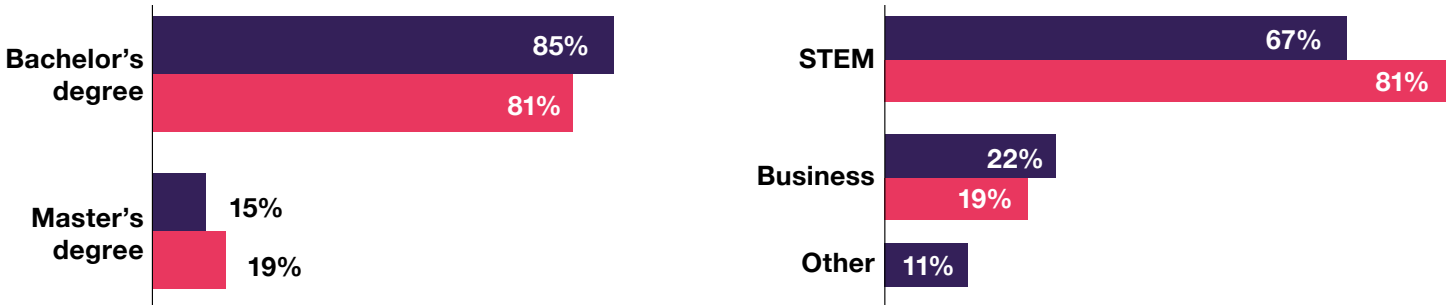


Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 59)



Of the 97 percent of participants who have graduated or are attending a college or university, about a fifth have graduated from a master’s degree program (15 percent) or are pursuing a master’s degree (19 percent), and most majored in or are majoring in STEM (figure 5). Other majors included sociology, psychology, and communication. Of the participants pursuing a degree, all but one are pursuing the degree full time (26 out of 27, 96 percent).

Figure 5: About a fifth of participants have graduated with or are pursuing a master’s degree, and most majored in or are majoring in STEM



Legend: Graduated (dark purple), Pursuing a degree (red)

Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 53)

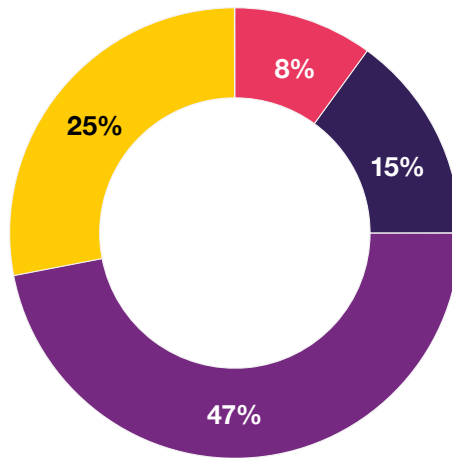


InventOR expressed interest in understanding how the experiences and outcomes of students might differ based on demographics and school characteristics (e.g., community college or four-year college). Throughout the report, we describe relevant differences in alumni responses based on these characteristics.

About three-quarters of participants are employed full- or part-time (figure 6). Some respondents noted that they were not seeking work due to being current students. Of those who are employed, about three-quarters are employed in a STEM field.

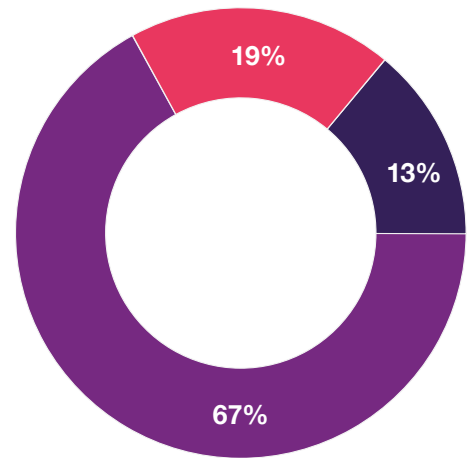
Figure 6: About three-quarters of respondents are employed, and most of these are working in STEM

What is your current employment status?



Legend: Employed full time (purple), Employed part time (yellow), Not currently working or seeking work (red), Seeking work (dark purple)

In what field are you currently working or seeking work in?



Legend: STEM (purple), Business (red), Other (dark purple)

Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 54).

## II. Pathways to Invent Oregon

Students come into the competition at different levels and with unique goals, and participants follow multiple and varied pathways to find their way to InventOR. In this section, we describe the pathways and motivations of faculty, staff, and students participating in InventOR. As InventOR participation often begins in students' home colleges and universities, we also look at how students' motivations for participating in InventOR differ based on whether they attended a community college or four-year college or university at the time of participation.

### Most faculty, staff, and students learned about InventOR through competitions at their institutions

In the focus group with faculty and staff, nearly half of the participants said they first learned about the program when being recruited by InventOR to serve as a judge. Several participants described learning about InventOR through direct communication with InventOR leadership, citing Director Juan Barraza's "strength of personality" as an influence in their decision to become involved. About half of the faculty/staff focus group participants indicated they personally took the initiative to get involved; the other half were "voluntold" or handed the role by someone else at their institution. One faculty member described hearing about InventOR from mentors at other institutions on Twitter and feeling "quite competitive" about getting their students involved as well.

In student focus groups, the most commonly described avenue for learning about InventOR was through other competitions at school. Eight of the 20 focus group participants described hearing about the program through competitions, such as the Catalyze Klamath Falls Challenge and the CleanTech Challenge, and nearly as many (seven of 20 students) said they learned about it through other activities at school, such as a class or a senior thesis. One quarter of students said they were encouraged to apply by a faculty member at their institution, and four said they heard about it from InventOR alumni or other current participants. Several students said they learned about InventOR from a newsletter or other media source. One student described taking the initiative to email InventOR repeatedly until someone responded.



I'm not a business person, I'm not even an engineering person really, but Juan makes it so engaging.  
 – Focus group faculty member

There's just one poster in my school. And then I contacted but nobody responded... so I was like, oh, maybe it's not happening. And then like two years later... I just emailed until somebody responded and now I'm here.  
 – Focus group student

Our college engineering program requires entry into InventOR as part of a junior-level class.  
 – Focus group student





## Students are motivated by diverse factors to participate in InventOR

Most survey respondents joined InventOR to develop an existing idea; to learn more about entrepreneurship, business, or inventing; and to have fun and challenge themselves (table 1). When asked in an open-ended survey question to describe other reasons they participated, responses included:

- When you're pursuing an idea, you might as well take every opportunity and go all the way to the top.
- We were enrolled through our servant engineering program.
- My teacher strongly suggested it.
- It was required by our school.

*Table 1: Most survey respondents joined InventOR to develop an existing idea; to learn more about entrepreneurship, business, or inventing; and to have fun and challenge themselves*

Why did you decide to participate in InventOR?	Respondents
To support development of an existing idea or prototype	69%
To have fun	66%
To learn more about entrepreneurship or business	63%
To challenge myself	61%
To learn more about inventing	49%
The cash prize	49%
The development grant	46%
To build my college resume	39%
To meet other people doing similar projects	27%
To learn how to build things with tools	24%
To learn more about science, computer science, or engineering	22%
My friends also wanted to go	17%
Another reason	7%

Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 59)

Note: Respondents were able to select all that apply.



There were a few differences in student motivation to participate between community college students and four-year college or university students. The cash prize and development grant were less important to community college participants (21 percent and 14 percent, respectively) than they were to four-year college participants (58 percent and 53 percent, respectively). Community college participants (50 percent) were also less likely to say they participated in InventOR to develop an existing idea or prototype than were four-year college participants (73 percent). Alternatively, community college participants were more likely to say they decided to participate to have fun (86 percent) and to challenge themselves (86 percent) than were four-year college participants (58 percent and 51 percent, respectively).

These differences in student motivations may, in part, be driven by differences in their college experiences. Some four-year college participants are working on their invention as part of a capstone project and may be further along in prototyping their project. This may also mean that four-year college participants are in more immediate need of the development grant and prize money to move forward with their more developed inventions, while community college participants' inventions may be more emergent. Differences in participants' motivations by community college versus four-year college and rural college versus urban colleges are located in the appendix (table A3).

In the student focus groups, students described multiple and varied motivations for participating in InventOR. A major theme among responses was the desire to forge connections with others, including both peers and professional mentors.

Another common motivation that surfaced in the student focus groups was the need for financial support. Several students stressed that while the InventOR development grants and prize money are helpful, the actual development and commercialization of their prototype would require more substantial and sustained sources of capital; they hoped their participation in InventOR would help them learn how to write grants and take other steps to secure future funding.

I'm excited to be working with the mentors over the next two months ... and also just meeting like-minded entrepreneurial people. — *Focus group student*

Being around people who are also motivated and want to be here and want to learn and want to do things ... that's motivating [to surround] yourself with people who are like actually, like, doing things. — *Focus group student*

I think the biggest thing is someone to hold you accountable because it's kind of like a personal coach in a way ... You're not going to be able to perform the best you can if you don't have someone sort of holding you accountable. — *Focus group student*

Let's say we were to win 10 grand ... I can, you know, do something probably. But at the end of the day, startups are pretty expensive. Like a lot more than 10 grand. — *Focus group student*

I think the funding, like the prototype grant, I think will definitely be helpful, but it's only a start. — *Focus group student*

If we added another day to this like boot camp, I would want it to be all about finding money. — *Focus group student*

More grant funding I think would increase the amount the groups could get done. — *Student survey respondent*



Our group has been doing actual prototyping for most of the school year, but what we haven't been doing is looking at it from like an entrepreneur perspective ... so it's fun to approach it from that angle. That's kind of a new aspect here.

— *Focus group student*

Most people can't wrap their head around what somebody who's 25 years old right now is going to see when they're 60. [If we] are not preparing them to go into that world, we're kind of deserting these folks. So if the world they're heading into is going to be really, really weird, they better have the right skill set for it. — *Focus group faculty member*

These students are oftentimes struggling... Entrepreneurship is a way for them to feel part of and embedded in your campus...

There are so many stigmas that are negative with mental health.

And yet when they are in an entrepreneurial space, and they have that freedom, they're able to focus on their strengths rather than their weaknesses. — *Focus group faculty member*

The first year I advised the students group, which took a lot of time for me, and it ended up with like student success in the procedure.

And then that recognition encouraged our chair to give me a course buy-out because I was advising students ... which could reduce my teaching load ... which led me advise three teams to a challenge. And then that became a kind of a convention in our school.

— *Focus group faculty member*

Similarly, in an open-ended survey question about how to improve InventOR in the future, four students requested more financial support.

Several focus group students mentioned that they were excited to spend time learning how their product could be applied in the real world and “actually help people.” InventOR represented a chance for some students to learn a new aspect of the prototype development process; for several, that meant shifting their focus away from technical aspects and focusing more on business, while for others, the reverse was true.

### **Faculty and staff are motivated by helping their students learn and grow through InventOR**

In the faculty/staff focus group, most of the participants described being motivated to engage in InventOR primarily to benefit their students. These perceived benefits for students ranged from help with finances to career preparation to mental health support.

Two of 10 faculty/staff focus group participants echoed students' motivation for finding like-minded partners and “coming together with cool people to talk about the thing that we do.” A couple of faculty members also described how student successes in InventOR can translate into changes in their teaching loads, freeing up more time for their involvement.

### **Program features that facilitate participation include financial incentives, connections with peers, and mentorship opportunities**

In surveys, when asked what was important for their participation, student alumni reported development grants (90 percent) and prize money (83 percent) for InventOR as well as peer (86 percent) and mentor (83 percent) relationships (figure 7). Some participants said that site visits (49 percent) and guest speakers (39 percent) did not matter to their decision to participate in InventOR.

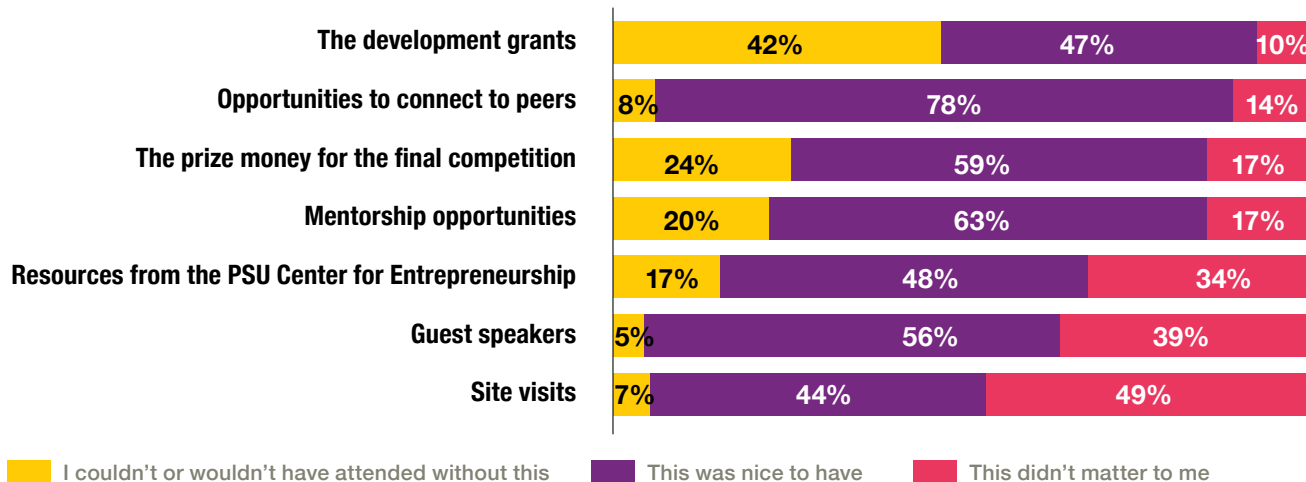
Similar to students' motivations, there were a few differences between the needs of participants attending a community college and a four-year college or university. The prize money did not matter for more community college participants (38 percent) than four-year college participants (11 percent). Additionally, more community college participants (23 percent) would not or could not have participated without site visits compared to four-year college participants (2 percent). Differences in participants' requirements for attendance by community college versus four-year college and rural college versus urban colleges are located in the appendix (table A4).



II.

### How much did the following things matter for your decision to participate in InventOR?

Figure 7: The financial incentives for InventOR and peer and mentor relationships were important for most survey respondents



Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 59)

“ The awareness of entrepreneurship in general doesn't really exist—so we are pretty much starting from scratch in recruiting students to participate in the competition—which InventOR doesn't financially support. So, we are stuck counting on our existing recruitment pipelines [and] we don't necessarily have the infrastructure to fully take advantage of it. Kind of like giving laptops to people without internet. There's a huge gap between institutional support and the FTE required to actually recruit students! Recruiting students is a person-to-person thing. — Faculty focus group participant

### Barriers to participation include a lack of awareness of InventOR, a mismatch between student interests and the program's focus on invention, and the timing of convenings

Participants in the faculty/staff focus group cited lack of awareness of entrepreneurship, communication, and access to resources as the biggest barriers for students to engage in InventOR.

Most of the faculty/staff focus group participants agreed that an increased investment in time and resources from InventOR program staff, including personal visits to campuses, sharing

success stories, and developing more outreach materials would help to build awareness of the benefits of participation. These investments would also help encourage university or college administrators to support the program. Several faculty/staff members also emphasized the potential for the program to foster a culture shift at the institutional level, but only if it could be more closely integrated with existing departments and course offerings.

There are no related courses or credit offerings at the college. — Faculty focus group participant

We're working to create more teams from other departments. — Faculty focus group participant





Many participants in the faculty/staff focus group agreed that InventOR's focus on invention was a limiting factor for both staff and student participation. This was framed as an equity issue because the specific focus on invention makes it more difficult to diversify the InventOR participant pool.

I wish that it wasn't just a focus on invention ... it is such a narrow focus. We're talking about entrepreneurship and, you know, so maybe it should be Reinvent Oregon or it should be Innovate Oregon ... you know in our case, the women and LGBTQ nonbinary people who participate in my class are not STEM-aligned students ... if the focus remains on invention, I suspect that it's really going to be a challenge to get students other than white men. — *Faculty focus group participant*

The faculty/staff focus group suggested that InventOR consider offering separate, complementary tracks of programming tailored to student interests both within and beyond invention.

Almost half of the participants in the student focus groups mentioned time as a barrier for participation. A few students mentioned that it was hard to juggle InventOR with other obligations. For some others, the timing of Invent Oregon Bootcamp was a barrier because the event was happening during or close to final exams. Several student teams emphasized that they learned about InventOR at the last moment and had to act quickly to get involved. The last-minute nature of this communication with InventOR may also represent an equity concern because some potential participants may not be able to respond spontaneously to opportunities due to conflicting obligations in their summer schedules.

I didn't personally know about Invent Oregon until the day of our school event competition ... so it, it is kind of spontaneous and like it's just been a really fun time. — *Focus group student*

My programming professor answered an email from the administration at the last minute [and said] paperwork was due two hours ago. So they stretched it to Monday so we could put together a team. — *Focus group student*

## III.

# How do participating students, faculty, and staff experience the program?

Students reported primarily positive experiences with InventOR that included support from their home institutions and feelings of belonging in events. As InventOR works in partnership with students' home colleges and universities, we looked at how students' support from their home institutions differs based on whether their college was a community college or four-year college or university or situated in an urban or rural environment at the time of participation. Additionally, to understand the extent to which InventOR is serving all students, we looked at any differences in student experiences based on demographics.

## Students reported varying levels of support from their home institutions

We asked survey respondents what resources and supports they received from their college or university while they participated in InventOR, including financial support and support from faculty advisors. We also looked at differences in these responses between students from different types of institutions in different regions.

Over half of survey respondents' schools hosted a competition to qualify them for InventOR, though this was much more common among four-year colleges (69 percent) than community colleges (29 percent) (Figure 8). Other differences include:

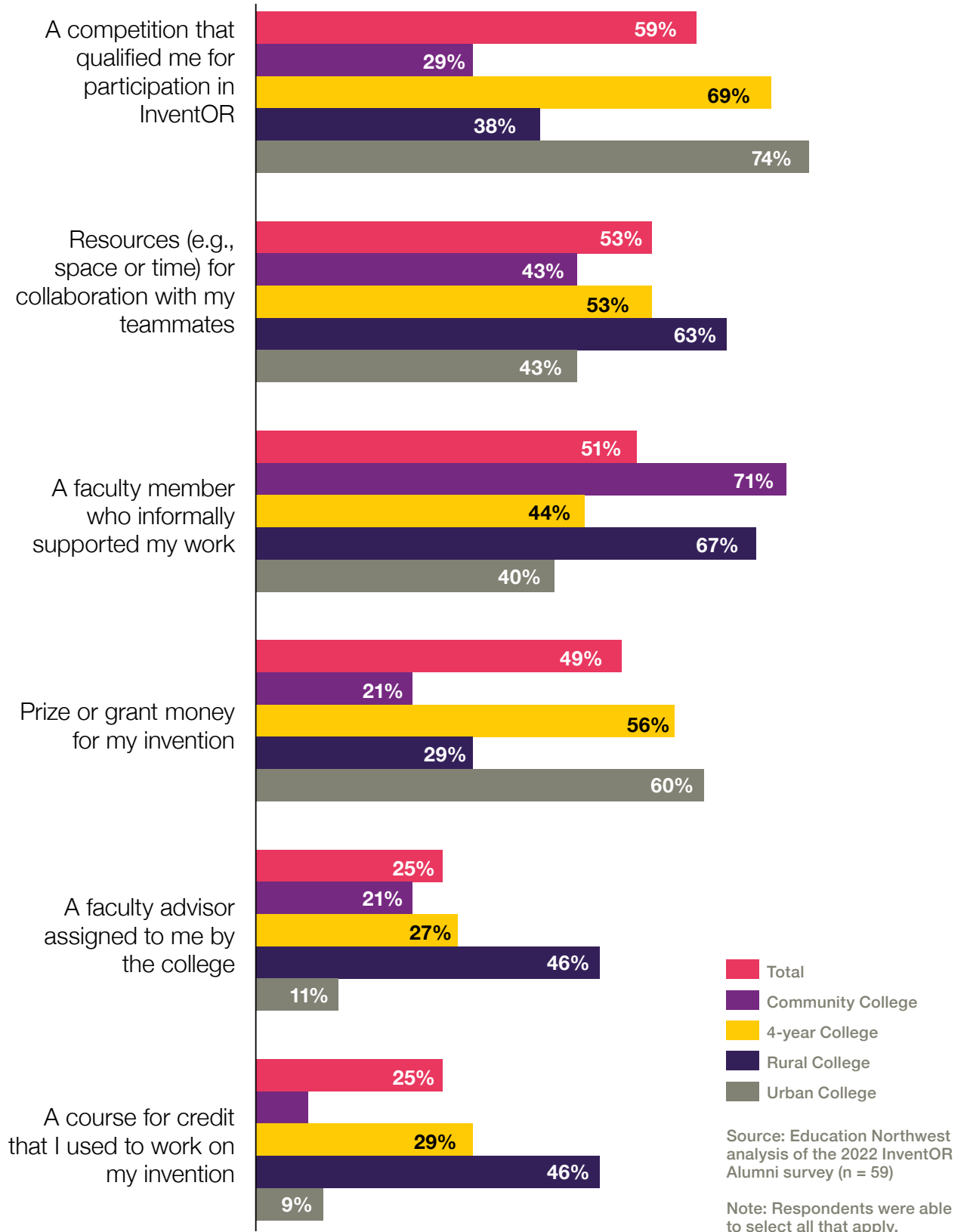
- Four-year colleges (56 percent) were more likely to provide prize/grant money for participation than community colleges (21 percent).
- Community college (71 percent) students were more likely to receive informal support from faculty than four-year college students (44 percent).
- Students attending rural colleges were more likely to have an assigned faculty advisor (46 percent) and a course to work on their invention (46 percent) than urban college students (11 percent and 9 percent, respectively).

Only two respondents said their school did not provide them with support for participation in InventOR.



Figure 8: Most four-year colleges provided a competition for InventOR participants, but more community colleges provided informal faculty support

**What resources or supports did your home college or university provide you leading up to or while participating in InventOR?**



### III.

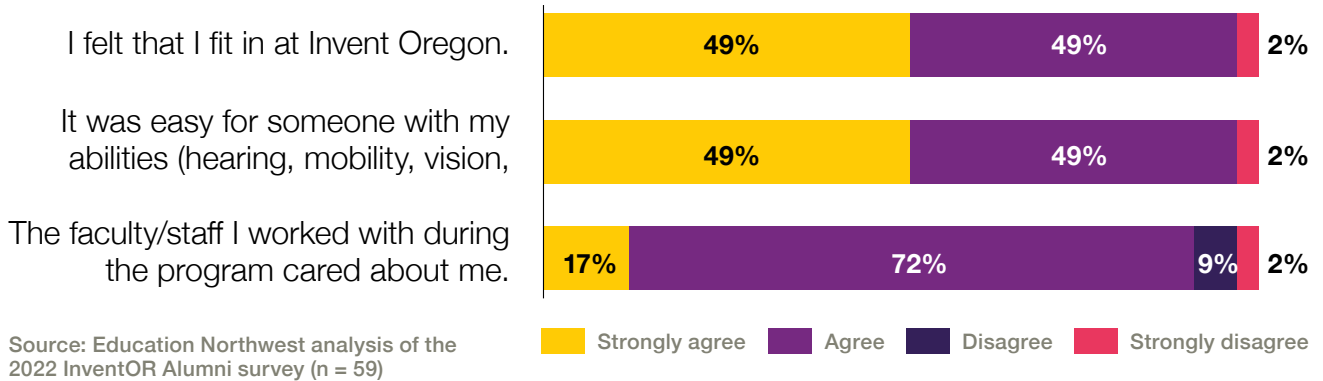
## Representation and sense of belonging are important features of InventOR

In open-ended survey responses, many students described the sense of belonging that InventOR fosters as a key feature of the program.

Similarly, mutual support was a theme that emerged in focus groups and open-ended survey responses: while students found the competitive nature of the programming energizing, many also emphasized that they were rooting for one another's success: As one student phrased it, "There are no losers here."

Nearly all (98 percent) survey participants said they fit in and it was easy for someone with their abilities to participate in InventOR (figure 9). Most respondents (89 percent) also said the faculty and staff in InventOR cared about them.

*Figure 9: Survey respondents fit in and could participate at InventOR events*



It was so nice to be able to be a part of a group of people moving in the same direction and growing together. — *Student survey respondent*

It's great to see that I'm not alone. — *Student survey respondent*

It also created a greater bond with the team I was on that has lasted ever since. — *Student survey respondent*

Maybe, at the end of the day, we're all technically competitors, but at the same time, we all have mutual respect for each other and admiration as well. — *Focus group student*

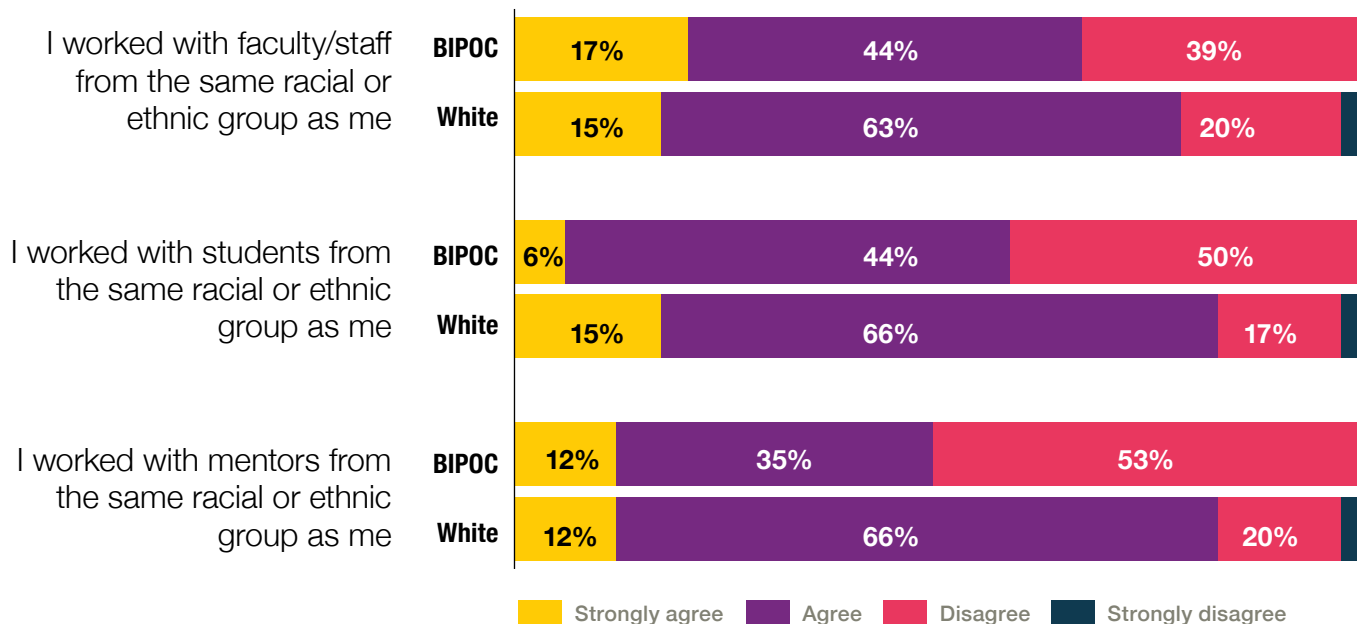


While InventOR works to increase access to opportunities in inventing for all students, ensuring equal access and representation among BIPOC students is a key goal. BIPOC students are more likely to experience barriers to invention and entrepreneurship, yet they can overcome some of these barriers with support of social networks and mentorship from other BIPOC inventors and entrepreneurs.<sup>1</sup> BIPOC survey respondents were less likely to say that they worked with individuals who share their racial and ethnic identity at InventOR events than other participants (figure 10).

<sup>1</sup> Fechner, H., & Shapanka, M. S. (2018). Closing diversity gaps in innovation: Gender, race, and income disparities in patenting and commercialization of inventions. *Technology & Innovation*, 19(4), 727–734.



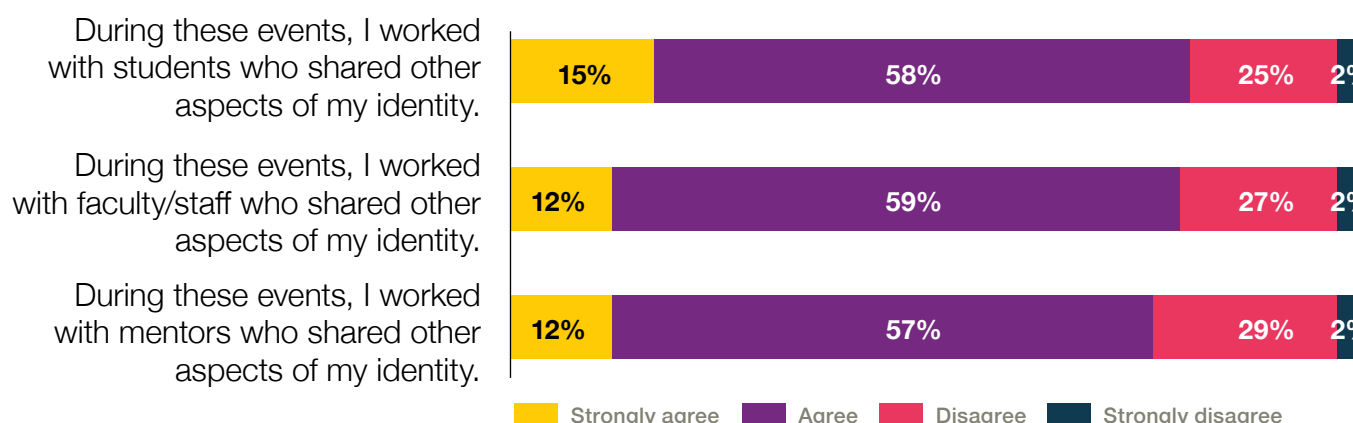
Figure X: BIPOC survey respondents were less likely to say that they worked with individuals who share their racial and ethnic identity at InventOR events



Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 59)  
 Note: In this figure, BIPOC refers to any individual who identified as a non-white race in the survey.

Finally, we asked participants to reflect on the extent to which they worked with individuals during InventOR events who shared other aspects of their identity. Many students worked with other students (73 percent), faculty and staff (71 percent), and mentors (69 percent) who shared other aspects of their identity apart from race and ethnicity (Figure 11).

Figure 11: Most survey respondents said they worked with individuals who shared aspects of their identity at InventOR events



Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 59)



### Challenges for participants included timing, expecting more individualized support, problems with the judging process, and a lack of support from college and university administrators

As described earlier, the timing of the InventOR Bootcamp alongside final exams and summer commitments posed a challenge for students to participate, and many had little advance notice. Eight of the twenty focus group students cited time as their biggest challenge. A few faculty members echoed this challenge during their focus group, and one faculty member highlighted that the agenda—for Bootcamp in particular—should be tighter to make efficient use of every minute.

We're going to spend about a course's worth of time here today, and we're not directly serving students ... it is a lot of effort. Can we do it smarter? — *Faculty focus group member*

InventOR aims to match each team with mentors and experts who can meet their specific needs and who have the necessary backgrounds to provide guidance. Some students, however, expressed their perception that some of the support from InventOR, including mentorship, was too general. Several students expressed a desire for more individualized support from mentors who could share personal experiences from the industries students are interested in.

It'd be cool to have more mentors that would maybe even be personalized for the person's business. For instance, I'm working on a wearable tech thing. If they could find somebody who made a wearable tech thing and be like, 'Hey, you can work with this guy exclusively' that would be pretty slick. But I know, I imagine, that'd be pretty expensive and probably hard to do. — *Student focus group participant*

In open-ended survey responses, six students expressed frustration with the judging process in the InventOR competitions, describing their perceptions that judges did not ask the right questions to determine the viability of team projects from a technical perspective, focusing too much on business aspects.

Getting judges with more hard science technical backgrounds, and less pure business minded folks, would be a plus. Numerous projects with little to no technical viability often seem to make it to the finals when there are tons of unaddressed questions remaining about exactly how practical (or safe) the project may be. — *Student survey respondent*

For faculty and staff partners, challenges with recruiting students and reports of inconsistent support from college or university administrators emerged as the most common challenges during focus groups.

I feel like it's really a fixed mindset in our administration ... I shuffle and move, but I'm finding I'm getting shut down because they don't feel like entrepreneurship is relevant. ... I think we need more help from Juan and his team and Lemelson. We need some kind of heavy hitters to come in and say, 'Hey, you all need to work on this.' — *Faculty focus group participant*



EQUIPTEC  
PACK

MVA

2015



IV.

# How does participation in Invent Oregon relate to participant outcomes?

While participating in InventOR, students learn about design, sustainable invention principles, business modeling, intellectual property protection, and commercialization. The program aims to build technical skills and to help participants develop confidence and professional connections that will lead to success in their future careers and endeavors, while promoting a richer and more diverse workforce of inventors and entrepreneurs in Oregon.

“ Being part of InventOR helped me see the entrepreneurship ecosystem that exists in larger cities and start thinking about ways we can foster that in rural communities like mine. It introduced me to people who have a very similar fire as I do, and even though we come from different schools and are technically competing with each other, I don't think any of us really felt like we were 'enemies,' and instead, we were just happy to see that there are other people out there like us. That was beautiful to see. ”  
— Student survey respondent

**Nearly a third of past participants reported making progress in commercializing their prototypes**

**29%**

of survey respondents have taken steps to commercialize the prototype they worked on during the program

The primary goal of InventOR is to help college students at all levels take their concept from an idea to reality. In focus groups, nearly half of the students described knowledge about business and entrepreneurship as one of the main benefits they had gained from InventOR so far. Among survey respondents, 29 percent of participants have taken steps to commercialize the prototype they worked on during the program. In an open-ended survey question about the program's impact, eight of 53 respondents said they have made progress in bringing their invention to market.

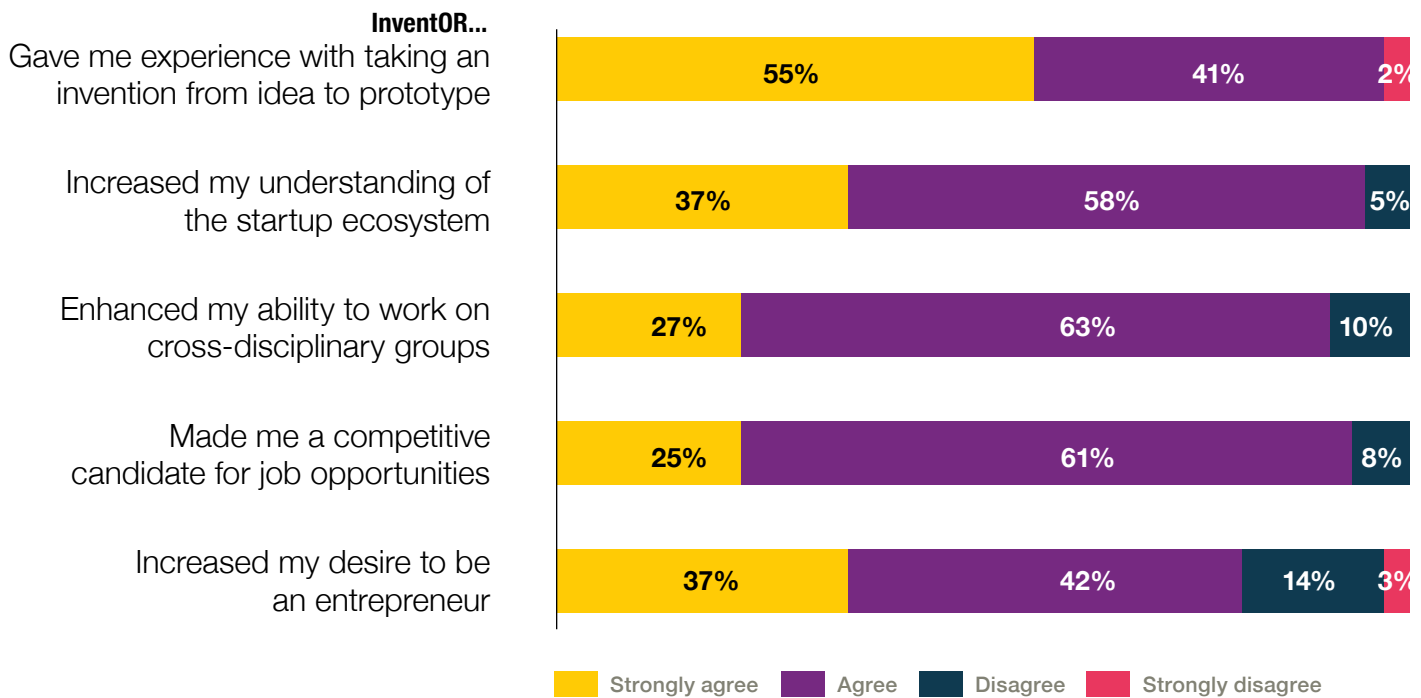
We have been working for five years continuing to develop and refine our business and inventions! Though we haven't commercialized any products in the traditional sense, we have commercialized a food product. — Student survey respondent

I got an interview with the Department of Energy about my invention. — Student survey respondent

## Participants gained knowledge and confidence

InventOR seeks to provide participants with increased experience and understanding in their fields that can help prepare them for this and future prototype development opportunities. Most survey respondents said that InventOR helped them build their experience and understanding in invention and entrepreneurship (figure 12). Nearly four-fifths of respondents said InventOR increased their desire to become an entrepreneur. Individuals who prefer he/him pronouns were more likely to agree or strongly agree that InventOR increased their desire to be an entrepreneur compared to those of all other genders (92 percent, compared to 62 percent).

Figure 12: Survey respondents said that InventOR helped them with their experience and understanding of invention and entrepreneurship



Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 59)

Participants were also asked to reflect on the increase in their understanding and confidence in invention and entrepreneurship before participating in InventOR and after completion. About half of students began InventOR with an understanding of the steps they would need to take to pursue a career in invention or entrepreneurship; however, nearly all (93 percent) left the InventOR experience with that understanding (figure 13). Similarly, about three-quarters of participants felt they could be an inventor (71 percent) or entrepreneur (74 percent) when they entered the program, and these feelings increased to 93 percent and 88 percent, respectively, after participation.

**71%**

They could be an inventor

**50%**

Students began InventOR with an understanding of the steps

**74%**

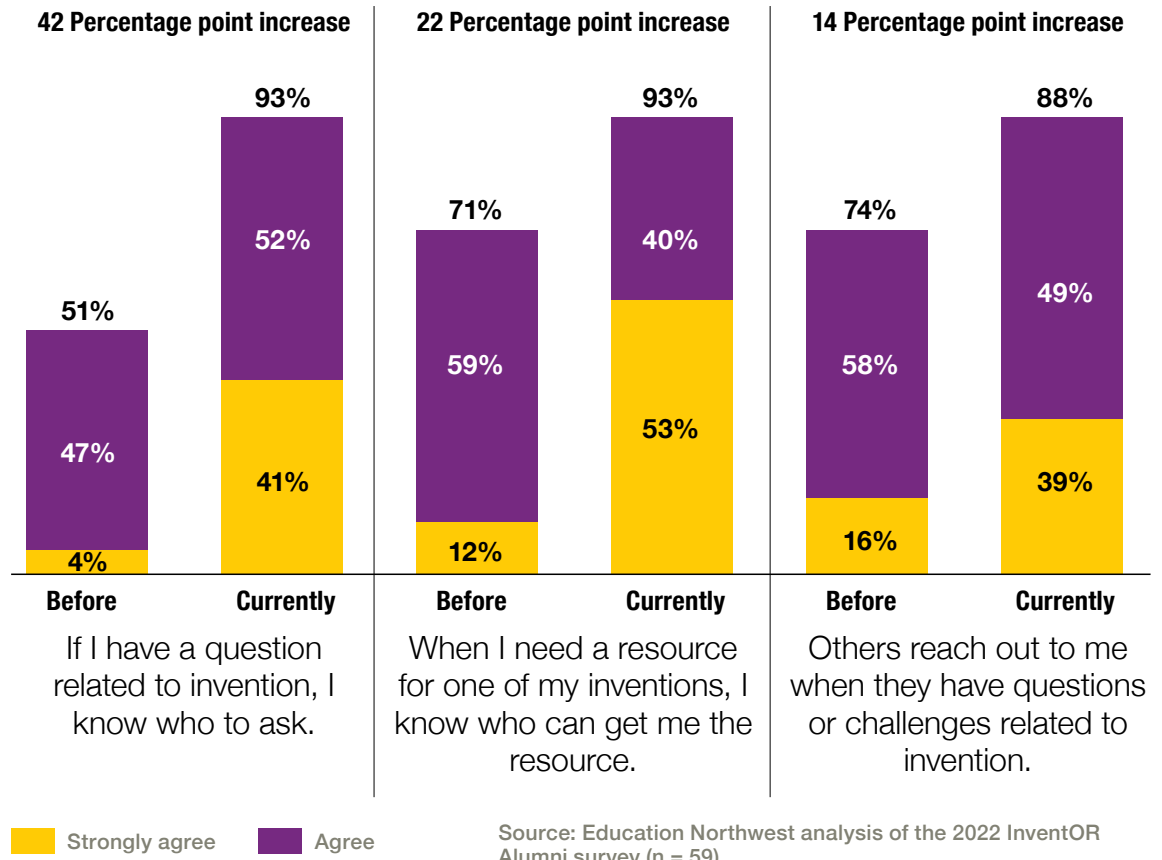
They could be an entrepreneur

**93%**

Confidence in invention and entrepreneurship

IV.

Figure 13: Survey respondents grew in their understanding and confidence in invention and entrepreneurship during InventOR



82%

of survey respondents said InventOR helped them make valuable connections for the future

Confidence was a theme that emerged in focus groups and open-ended survey responses, with 18 students citing confidence and sense of belonging as a significant impact of the program in open-ended survey responses.

Literally it was life changing. It completely shifted my focus of what I wanted to do with my life. It opened so many doors of possibility that I didn't even realize were there and totally changed my vision of what I thought my career could look like. And it helped me grow as an individual, pushed me to see my own value and worth, and taught me how to be proud of that. I'm so, so, so eternally grateful. — *Student survey respondent*

It made me more confident in my abilities and opened my eyes to how an idea can go from an idea to a prototype and how to build a small business around that. It also created a greater bond with the team I was on that has lasted ever since. — *Student survey respondent*

For a few past participants, InventOR was instrumental in showing them that they did not, in fact, want to pursue the path of being an inventor or entrepreneur. While likely not an intended outcome of the program, this clarity in future goals may ultimately be considered a benefit for students who are in the stages of making decisions about the next steps in their careers.

By participating in InventOR, I learned that I do not enjoy the business side of commercializing a product. I prefer working on the technical aspects of the prototype.  
— *Student survey respondent*



# Participant networks built through InventOR can be valuable investments for the future

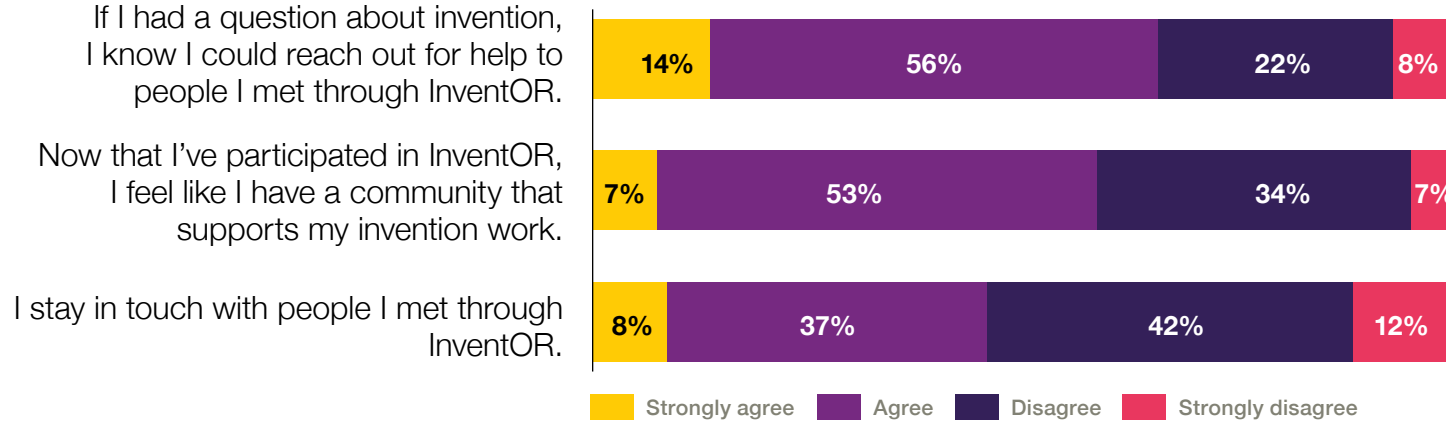
In addition to building experience, understanding, and confidence during their experience, InventOR is meant to build connections that participants can rely on during their future efforts in prototype development, college completion, and job placement. In focus groups and open-ended survey questions, several students and faculty/staff members mentioned wanting to stay connected to fellow participants at the conclusion of the program.

I wish there would be an opportunity [after they] hand out all their prizes and whatnot to revisit next year... You know, somebody here could be the next big shot... So maybe support with staying connected. — *Focus group student*

Going through a conference, you [and the other participants] are best friends. And then you never see them. — *Focus group faculty member*

Most survey participants (82 percent) agreed or strongly agreed that InventOR helped them make valuable connections for their future. Additionally, about three-quarters of participants felt that, after InventOR, they have connections they can reach out to if they have questions (figure 14). About two-thirds of survey participants reported feeling like they have a community that supports their invention work, and a little less than half of participants said they stay in touch with people they met through InventOR.

Figure 14: After participating in InventOR, over two-thirds of survey respondents have connections they can reach out to with questions

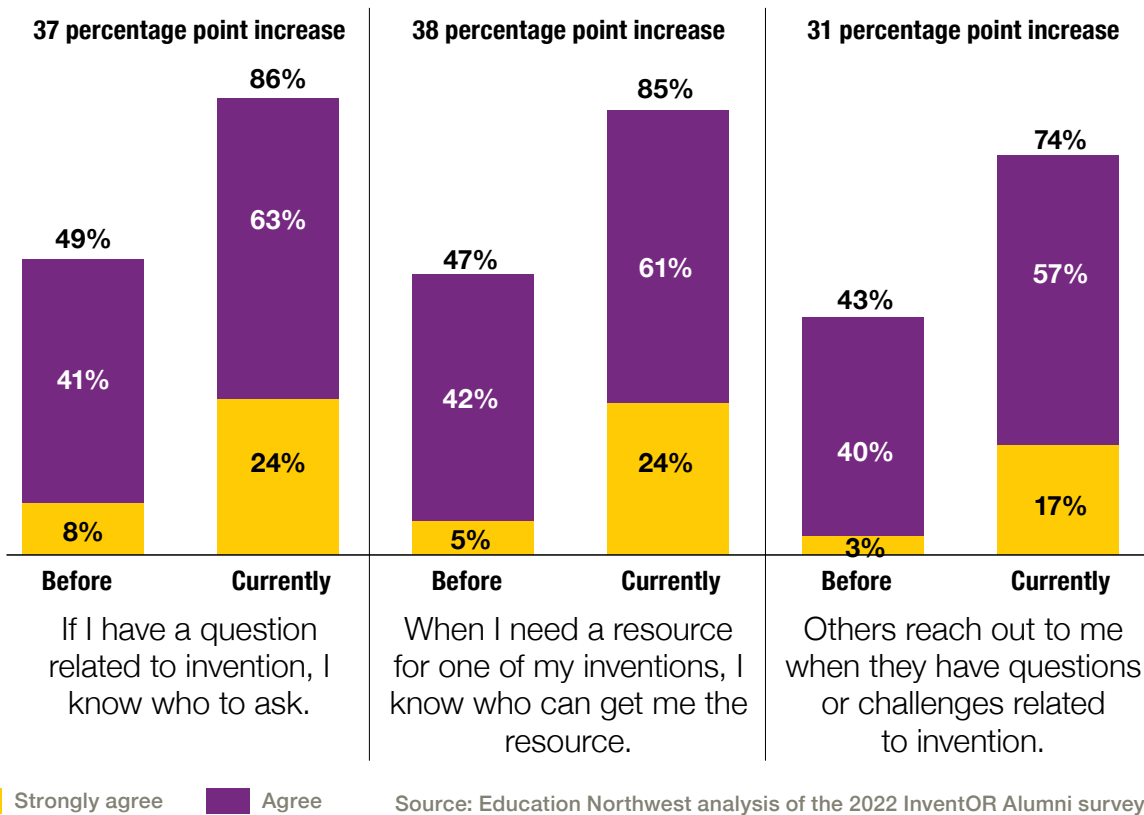


Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 59)

Participants were also asked to reflect on the increase in their social networks before participating in InventOR and after completion. While a little less than half of participants reported coming into InventOR with connections that could help them if they had questions or needed resources, 85 percent or more felt they had those connections after participating in InventOR (figure 15). Additionally, the percentage of participants who felt they were a resource to others grew from 43 percent before InventOR to 74 percent after participation.

IV.

Figure 15: Survey respondents' connections grew during InventOR



Finally, we asked survey respondents how many reached out to someone they met through InventOR after the program and what they reached out for. Survey respondents have reached out to InventOR connections to develop their ideas and commercialize their inventions (figure 16). About a third of survey respondents have reached out to an InventOR faculty member for help in developing an idea for an invention.

Figure 16: Survey respondents have reached out to InventOR connections to develop their ideas and commercialize their inventions

	InventOR faculty member	Work-based mentor	InventOR student	Other business connection	Other InventOR connection	I have not reached out to anyone for this
Help me develop an idea for an invention	20	16	18	14	7	22
Help me commercialize an invention	15	16	8	14	6	28
Help me understand what I needed to do to be successful in an internship or job	11	12	8	7	4	34
Stay in college during challenging times	8	7	12	1	5	36
Connect me to an internship or job opportunity	10	9	5	8	5	40
Stay in a STEM major during challenging times	6	4	6	3	2	44

More than half of the student focus group participants named networking or connections as one of the main benefits they gained from InventOR. As one student described it, InventOR was helping them create “a network of idea-generators and thinkers.”





# v. Recommendations and next steps

Invent Oregon will continue to grow and expand, supporting more postsecondary students across Oregon as they design innovative solutions to today's problems. Based on findings from the survey of past participants and focus groups with current participating students and faculty/staff, InventOR may wish to consider the following recommendations.

- Invest in more outreach and direct communication with InventOR staff at each institution to build awareness and make InventOR part of Oregon's postsecondary education culture. Faculty and staff from partner institutions suggested that this may mean more administrative and logistical support so the director and other program leaders can focus on relationship building and instrumental support.
- Recruit continuously so that potential student participants learn about InventOR in a timely way, and the program doesn't lose participants who cannot respond to last-minute opportunities.
- For each convening, adapt and build on materials and processes developed to continuously increase organization and efficiency. For example, students and faculty/staff expressed wanting more information about the convenings earlier so they could plan for the necessary logistics.
- Students and faculty/staff participants requested agendas for the InventOR Bootcamp designed to make the most efficient use of limited time together. Suggestions included bringing in a patent attorney, offering time with fundraising specialists to learn how to apply for grants and other funding opportunities, and matching students with mentors from similar industries or generally offering more industry-specific programming (e.g., specific content for textile design, healthcare products, agriculture, etc.).
- Pursue partnerships or joint initiatives with other programs that focus on related concepts and skills beyond invention, such as innovation and entrepreneurship. Partnerships with other programs may help to broaden the reach of InventOR by attracting more students from groups that have been traditionally minoritized or underserved by STEM programming.
- Form an alumni network or take other steps to help participants (both students and faculty/staff) stay connected after each program cycle ends so that InventOR alumni persist in their objectives. This could include a board with job postings.
- Several students in focus groups emphasized that they already want to attend again next year. This suggests that InventOR has the opportunity to welcome multiple-year participants if that were to align with the evolving program model and goals.





# A. Appendix A: Additional data

*Table A1: Most alumni respondents attended George Fox University, Oregon State University, and Portland State University*

College or university	Respondents
George Fox University	10
Oregon State University	9
Portland State University	9
University of Oregon	6
Rogue Community College	5
Southwestern Oregon Community College	4
Clackamas Community College	3
Klamath Community College	2
Oregon Health and Science University	2
Oregon Institute of Technology	2
Southern Oregon University	2
University of Portland	2
Eastern Oregon University	1
Lewis and Clark College	1
Warner Pacific University	1

Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 60)

*Table A2: One-fifth of survey respondents identify as LGBTQIA+*

Do you identify with any of the following?	Respondents	Do you identify with any of the following?	Respondents
LGBTQIA+	12	Ever in foster care	1
Immigrant	3	None of the above	32
Religious minority	2	Prefer not to say	10
Disabled	1		

Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 60)

Note: Respondents could select all that apply.



Table A3: Differences in motivation based on the type of college participants attended

Why did you decide to participate in InventOR?	Community College (n=14)	4-year College (n=45)	Rural College (n=24)	Urban College (n=35)	Total (n=59)
To support development of an existing idea or prototype	50%	73%	67%	69%	69%
To have fun	86%	58%	71%	60%	66%
To learn more about entrepreneurship or business	57%	62%	67%	57%	63%
To challenge myself	86%	51%	63%	57%	61%
To learn more about inventing	64%	42%	63%	37%	49%
The cash prize	21%	58%	33%	60%	49%
The development grant	14%	53%	29%	54%	46%
To build my college resume	43%	36%	33%	40%	39%
To meet other people doing similar projects	36%	24%	29%	26%	27%
To learn how to build things with tools	43%	18%	33%	17%	24%
To learn more about science, computer science, or engineering	43%	16%	38%	11%	22%
My friends also wanted to go	29%	13%	8%	23%	17%
Another reason	7%	7%	17%	0%	7%

Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 59)

Note: Respondents were able to select all that apply.

Table A4: Differences in requirements based on the type of college participants attended

	College type	This didn't matter to me	This was nice to have	I couldn't or wouldn't have attended without this
The development grants	Overall (n = 59)	10%	47%	42%
	Community (n = 14)	15%	38%	46%
	Four-year College (n = 45)	9%	49%	42%
	Rural (n = 24)	13%	42%	46%
	Urban (n + 35)	9%	50%	41%
The prize money for the final competition	Overall (n = 59)	17%	59%	24%
	Community (n = 14)	38%	46%	15%
	Four-year College (n = 45)	11%	62%	27%
	Rural (n = 24)	25%	63%	3%
	Urban (n + 35)	12%	56%	32%

## A.

	College type	This didn't matter to me	This was nice to have	I couldn't or wouldn't have attended without this
Guest speakers	Overall (n = 59)	39%	56%	5%
	Community (n = 14)	46%	46%	8%
	Four-year College (n = 45)	38%	58%	4%
	Rural (n = 24)	46%	50%	4%
	Urban (n + 35)	35%	59%	6%
Site visits	Overall (n = 59)	49%	44%	7%
	Community (n = 14)	46%	31%	23%
	Four-year College (n = 45)	51%	47%	2%
	Rural (n = 24)	46%	46%	8%
	Urban (n + 35)	53%	41%	6%
Mentorship opportunities	Overall (n = 59)	17%	63%	20%
	Community (n = 14)	31%	46%	23%
	Four-year College (n = 45)	13%	67%	20%
	Rural (n = 24)	21%	54%	25%
	Urban (n + 35)	15%	68%	18%
Opportunities to connect to peers	Overall (n = 59)	14%	78%	8%
	Community (n = 14)	15%	69%	15%
	Four-year College (n = 45)	13%	80%	7%
	Rural (n = 24)	8%	79%	13%
	Urban (n + 35)	18%	76%	6%
Resources from the PSU Center for Entrepreneurship	Overall (n = 59)	34%	48%	17%
	Community (n = 14)	46%	31%	23%
	Four-year College (n = 45)	32%	52%	16%
	Rural (n = 24)	46%	42%	13%
	Urban (n + 35)	27%	52%	21%

Source: Education Northwest analysis of the 2022 InventOR Alumni survey (n = 59)

Note: Respondents were able to select all that apply.

# Appendix B: Survey questions

Thank you for taking this survey!

Education Northwest is partnering with PSU Center for Entrepreneurship to conduct an evaluation that will help them learn about the Invent Oregon program (InventOR), so the program directors can understand what works well and what can be improved. We will ask you questions about your experience with InventOR. The survey should take about 15 minutes to complete.

Your answers are completely confidential. Your comments and ratings will never be used in connection with your name, will never be given to faculty members, and will never be used to judge or evaluate you. Your participation is voluntary, and you may choose to answer or not answer any of these questions without any negative consequences.

Thank you very much for contributing your feedback! Your answers will provide the program leaders with information to keep making InventOR better for future participants. As a thank you for your participation, InventOR will be sending you \$20 for your time.

If you have questions about this survey, please contact Dr. Ashlie Denton. Thank you for your help!

1) Do you consent to take the survey?

Yes

No

[If “no,” then survey takers go to the final page.]

Invent Oregon Participation

2) When did you participate in InventOR?

a. 2017–2018

b. 2018–2019

c. 2019–2020

d. 2020–2021

Other:: \_\_\_\_\_\*

3) At the time of participating in InventOR, which college or university were you attending?

Clackamas Community College

Eastern Oregon University

George Fox University

Klamath Community College

Lewis and Clark

Linfield University College

McKay High School

Oregon Health and Science University

Oregon Institute of Technology

Oregon State University

Portland Community College

Portland State University

Rogue Community College

Southern Oregon University

Southwestern Oregon Community College

University of Oregon

University of Portland

Warner Pacific University

Western Oregon University

Other:: \_\_\_\_\_\*



**B.**

4) What was your current enrollment status for the 2021-22 school year?

- Graduated from a college or university
- Attending a community college
- Attending a four-year college or university
- On leave, but planning to return to higher education
- Left higher education, and not planning to return
- Other:: \_\_\_\_\_ \*

[If “Graduated from a college or university,” then survey takers answer questions 5 and 6.]

[If “Attending a community college” or “Attending a four-year college or university,” then survey takers answer questions 7, 8, and 9.]

5) What type of degree did you graduate with?

- Associate degree
- Bachelor’s degree
- Master’s degree
- Doctoral degree
- Other:: \_\_\_\_\_ \*

6) What did you major in?

- Science, Technology, Engineering, or Math (STEM)
- Business
- Other:: \_\_\_\_\_ \*

7) What type of degree are you pursuing?

- Associate degree
- Bachelor’s degree
- Master’s degree
- Doctorate degree
- Other:: \_\_\_\_\_ \*

8) What are you majoring in?

- Science, Technology, Engineering, or Math (STEM)
- Business
- Other:: \_\_\_\_\_ \*

9) Are you attending school full-time or part-time?

- Full-time
- Part-time

10) What is your current employment status?

- Employed full time
- Employed part time
- Seeking work
- Not currently working or seeking work
- Other:: \_\_\_\_\_ \*

[If “Employed full time,” “Employed part time,” or “Seeking work,” then survey takers answer questions 11.]

11) In what field are you currently working or seeking work?

- Science, Technology, Engineering, or Math (STEM)
- Business
- Other:: \_\_\_\_\_ \*

**Invent Oregon Experience**

12) How did you first hear about InventOR? [open-ended response]

13) Why did you decide to participate in InventOR? Please select all that apply.

- To learn more about science, computer science, or engineering
- To learn more about inventing
- To learn more about entrepreneurship or business
- To support development of an existing idea or prototype
- To learn how to build things with tools
- To challenge myself
- To meet other people doing similar projects
- To have fun
- The development grant
- The cash prize

- To build my college resume
- My friends also wanted to go
- Another reason:: \_\_\_\_\_\*

14) What resources or supports did your home college or university provide you leading up to or while participating in InventOR? Please select all that apply.

- A faculty member who informally supported my work
- A faculty advisor assigned to me by the college

- A course for credit that I used to work on my invention
- A competition that qualified me for participation in InventOR
- Prize or grant money for my invention
- Resources (e.g., space or time) for collaboration with my teammates
- Other:: \_\_\_\_\_\*
- My college did not directly provide me with any resources or supports

15) InventOR...

	Strongly disagree	Disagree	Agree	Strongly agree	Not applicable
Increased my desire to be an entrepreneur					
Increased my understanding of the startup ecosystem					
Helped me make valuable connections for my future					
Enhanced my ability to work on cross-disciplinary groups					
Made me a competitive candidate for job opportunities					
Gave me experience with taking an invention from idea to prototype					

16) Think about when you were deciding to participate in InventOR. How much did the following things matter for your decision?

	This did not matter to me	This was nice to have	I would not or could not have participated without this
The development grants			
The prize money for the final competition			
Guest speakers			
Site visits			
Mentorship opportunities			
Opportunities to connect to peers			
Resources from the PSU Center for Entrepreneurship			

**B.**

17) Think about your relationships and resources before and after participating in InventOR and answer the following questions.

	Before participating in InventOR	Currently
If I have a question related to invention, I know who to ask.	Strongly agree	Strongly agree
When I need a resource for one of my inventions, I know who can get me that resource.	Agree Disagree	Agree
Others reach out to me when they have questions or challenges related to invention.	Strongly disagree	Disagree
If I wanted to, I definitely could be an inventor.		Strongly disagree
If I wanted to, I definitely could be an entrepreneur.		
If I decide to pursue a career in invention or entrepreneurship, I know some of the next steps I should take.		

18) Please reflect on your experiences with InventOR.

	Strongly disagree	Disagree	Agree	Strongly agree
I stay in touch with people I met through InventOR.				
If I had a question about invention, I know I could reach out for help to people I met through InventOR.				
Now that I've participated in InventOR, I feel like I have a community that supports my invention work.				

19) Since I started participating in InventOR, I have counted on people I have met during InventOR to:

	InventOR student	InventOR faculty	Work-based mentor	Other business connection	Other InventOR Connection	Not applicable – I didn't reach out to anyone for this
Help me develop an idea for an invention.						
Help me commercialize an invention.						
Stay in college during challenging times.						
Stay in a STEM major during challenging times.						
Connect me to an internship or job opportunity.						
Help me understand what I needed to do to be successful in an internship or job.						



20) The next group of questions ask about your experience with Invent Oregon events, including Bootcamp and State Finals competition (virtual or in-person).

	Strongly disagree	Disagree	Agree	Strongly agree
I felt that I fit in at Invent Oregon.				
It was easy for someone with my abilities (hearing, mobility, vision, learning, attention) to participate in Invent Oregon.				
The faculty/staff I worked with during the program cared about me.				
During these events, I worked with faculty/staff from the same racial or ethnic group as me.				
During these events, I worked with students from the same racial or ethnic group as me.				
During these events, I worked with mentors from the same racial or ethnic group as me.				
During these events, I worked with faculty/staff who shared other aspects of my identity.				
During these events, I worked with students who shared other aspects of my identity.				
During these events, I worked with mentors who shared other aspects of my identity.				

21) Since participating in Invent Oregon, have you taken steps to commercialize (i.e., launch a company or work to make money from your invention) the prototype you worked on during the program?

Yes

No

[If “yes,” survey respondents answer question 22.]

[If “no,” survey respondents answer question 23.]

22) Please describe the steps you have taken to commercialize your Invent Oregon prototype. [open-ended response]

23) In the future, what would make you more likely to commercialize (i.e., launch a company or work to make money from your invention) the prototype you worked on during Invent Oregon? [open-ended response]

24) What impact do you believe participating in Invent Oregon had on you? This can mean any type of impact on you personally, your team, your invention, or anything else. [open-ended response]

25) How would you suggest improving the Invent Oregon program in the future? [open-ended response]

# B.

## Personal Demographics

The final set of questions ask you about your demographic characteristics and different aspects of your identity. Your responses will help Invent Oregon leaders and staff members understand how different groups of people might experience the program in different ways, so they can take steps to ensure the program offers access and opportunities to every participant.

26) Do your family members or guardians speak a language other than English at home?

- Yes
- No

27) What is your current ZIP code (so we can see where InventOR students and graduates are living)?

[open-ended response]

28) What are your preferred pronouns?

- She/her
- He/him
- They/them
- Prefer not to say
- Prefer to self-describe:: \_\_\_\_\_ \*

29) How do you identify your race/ethnicity? (Select all that apply.)

- Asian
- Black or African American

- Hispanic or Latino/a/x
- Native American or Alaska Native
- Native Hawaiian or other Pacific Islander
- White
- Other:: \_\_\_\_\_ \*

30) Do you identify with any of the following? (Select all that apply.)

- Religious minority
- Disabled
- LGBTQIA+
- Immigrant
- Ever in foster care
- None of the above
- Prefer not to say

31) Have any of your parents or guardians graduated from college?

- Yes
- No

32) If you would like to receive a \$20 gift certificate for your time, please enter your email here:

\_\_\_\_\_

Thank You!

Thank you for taking our survey. Your response is very important to us.





