BOARD # 207: Impact of a stipend on high school students' participation in a two-week summer workforce development program focused on microelectronics (Work in Progress)

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Overview of the project:

This study explored the impact of a stipend on high school students' participation in a two-week summer workforce development program focused on microelectronics. The two-week program was part of a Midwest economic development organization's multi-tier plan to attract new companies to their region focused on the semiconductor and microelectronics industries. As part of this plan to attract this new industry, the regional economic development organization funded a two-week workforce development program for high school students to learn more about semiconductors and microelectronics and career pathway options associated with those industries. The research team drew upon Social Cognitive Career Theory (SCCT) for guiding the design of the two-week student experience. SCCT emphasizes the interplay between personal attributes, environmental factors, and behavior in shaping career choices and outcomes. Participating high school students received a stipend of $1,500 to participate in their two-week summer program. Our research question was, "What impact did the stipend have on students' participation in this program?" This study utilized a qualitative research methodology. Student responses from an initial application to attend the program and student comments made during a final focus group reflection activity were analyzed to identify themes and evidence of the stipend's impact on their participation in the program. Students described various reasons for participating in such a workforce development program and included the provision of a financial stipend as a significant consideration in such a decision. This study provides insight into how students weigh their options related to other income-generating summer jobs when considering investing their time in this type of workforce development program.

Design/Method:

Research Design Overview:

This study utilized a qualitative research methodology with thematic analysis.(Braun & Clarke, 2006) The data collected for the study comes from students' typed responses on an initial application to attend the program, students' typed reflections at the conclusion of the day's events during the program, and student comments made during a final focus group reflection activity on the final day of the two-week program. The study used a descriptive-interpretive approach for analyzing the data. The data was analyzed through an open coding process to identify themes and evidence of the stipend's impact on their participation in the program.

Rationale for Study:

STEM programs during summers are correlated with STEM interest, involvement and persistence among high-school students (Schmidt et al., 2020) (Kitchen et al., 2018) (Birney et al., 2023). These programs offer real-world, experiential learning opportunities not found in traditional high schools (Kitchen et al., 2018) (Cappelli et al., 2019) (Birney et al., 2023). Also, summer STEM camps were found to be particularly beneficial to underrepresented STEM students (Salto et al., 2014) (Friedman et al., 2017)(Michel et al., 2021). Moreover, there is also evidence to show that summer STEM camps can help with STEM career intentions for college students and intentions to major in STEM (Kitchen et al., 2018) (Svoboda et al., 2016).

This study looks at a different perspective from the other research mentioned above in that this summer program provided a stipend to participants. Providing paid internship experiences has been shown to reduce socioeconomic barriers and increase participation in internships by traditionally underserved individuals (Hora et al., 2022). This study seeks to understand and uncover students' perceptions of the provision of a stipend on their participation in a workforce development program that does not immediately lead to a job as would be typical of a college-level summer internship. The program resembles a summer STEM enrichment program for high school students but includes distinct workforce development features and some elements resembling a summer internship. The research literature makes little reference to similar programs, so the research team decided to explore students' perceptions related to receiving a stipend to participate in this type of intermediate program of workforce development/enrichment/internship experience.

Researcher Description:

As the lead author for this study, I am a second-year graduate student pursuing a PhD in Engineering Education. I taught high school chemistry and engineering for 20 years in public schools in various educational contexts, including rural, urban, and suburban school districts. I participated in two paid internships during two summers as an undergraduate student. As part of my high school engineering teacher responsibilities, I also served as a building-level supervisor for high school students participating in internships during their high school academic year.

Participants:

Students were recruited during the spring semester of 2024 to participate in a two-week summer program that took place between a large research university and a nearby community college in June of 2024. Information flyers and a few information meetings were distributed at several high schools in the surrounding five-county area. Students were either juniors or seniors (ages 15-18 years old) for the upcoming academic year following the summer program. Students were required to complete an online application consisting of general demographic information and a few free-response questions addressing why they were interested in the program and why they thought they would be a good candidate. Priority was given to the few candidates from the more distant counties to ensure each county would have representation in the final participant list. Then, the local county applicants were screened with a rubric that valued students' evidence of interest in the program and willingness to participate fully in all program activities. The students

were asked on the application to specify their previous math and science classes, but this information was not used for making the final selection decision. A total of 60 high school students participated in the program and 53 students agree to have their responses be a part of this study.

Data-collection:

The various data were collected using different electronic tools and techniques. The initial application questions were administered via a Qualtrics survey using the university's academic account. During the summer program, students used Google Classroom to access all digital resources used in the program's activities. Students were provided a link on Google Classroom for the daily reflection questions submitted via a different Qualtrics survey. The last set of data came from transcripts of nine focus groups comprised of 3-8 students and led by two adults. These focus groups took place on the last day of the two-week summer program. The adults leading the focus groups received specific coaching on how to facilitate these sessions from a qualitative research faculty member of the university. Most of these facilitators were doctoral students in engineering education. The questions were prepared ahead of the focus group, and the two adult facilitators were responsible for guiding the progression through the questions and taking field notes related to the focus group's experience. The audio recordings of each focus group were transcribed and analyzed.

Data-analytic Strategies:

Data was downloaded from the Qualtrics platform and converted to Microsoft Excel spreadsheets. The transcripts of the focus group discussions were transferred to Microsoft Excel spreadsheets and student responses were matched with the question number from the interview protocol. All student data was then anonymized by converting student names to unique participant numbers. The anonymized data spreadsheets were analyzed to identify key ideas student brought up related to their motivation for attending the two-week summer program. Responses were grouped into different themes related to these motivations.

Findings

The qualitative analysis of focus group discussions reveals three primary themes regarding participants' motivations for enrolling in the semiconductor workforce development summer program: interest in engineering and technology, career preparation and college applications, and financial incentives. In this paper, we will only focus on the responses that align with our research question of how the stipend impacted their choice to participate in the program.

Financial Incentives: The financial stipend associated with the program emerged as a significant motivator for many participants. One participant candidly admitted, "Truthfully, I'm also here for the money," while another participant emphasized the importance of the stipend in making the program accessible: "I feel like the amount needs to be enough so that they feel they won't be losing money by attending this program." This perspective was prevalent among participants, with many acknowledging that the stipend allowed them to prioritize the program over summer

jobs. The financial incentive thus played a dual role: it not only attracted participants who may not have otherwise engaged with the subject matter but also enhanced the overall perceived value of the learning experience.

Additionally, several students said that the stipend did not influence them to participate. These students appeared to have strong plans to attend the host university and believed the program would provide them with additional clout on their application to that university. A few of these students acknowledged they were thankful to have the funds but stated they would have attended this program even if there was no stipend attached to attendance to the program.

A few insightful conversations were captured during the focus groups that provided an understanding of how students thought about the amount of funds provided for the stipend. Sam started the exchange with,

> "For this program it seems like the goal is to just spread awareness to people who don't exactly have the most amount of interaction with the field. So in that case I would say a stipend would definitely incentivize it for people who don't already are actively pursuing it. It gives them a little more incentive and then once they see it'll help get them into it. And then for the amount of the stipend, I would say it depends on the hours. I would say roughly $15 an hour because this one is roughly $21 an hour. I'd say 15 and below or maybe even 12 and below, depending on the area would be about the minimum personally."
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> [Julie] "Yeah, no, I totally agree. I was fairly limited my knowledge of semiconductors before going into this, but once I found out about the stipend, obviously it got me a little bit more excited because I wanted to actually participate fully and stuff and I think it was a rather generous stipend for sure. So I think yeah, 21 was a lot, $21 per hour was a lot. But like Sam said, I think $15 below or even $12 and below, maybe be a little bit little. And to be honest, we have a lot of really awesome opportunities at [local university], so I think this stipend was worth it for this one for sure, yeah."
>
> [Sam] "I chose those numbers mainly because my experience with the work in the area, I've had quite the number of part-time jobs. I think I've had six now, but I've seen that roughly for it to be worth most of them, McDonald's or Panera, it's $12 an hour plus tips sometimes depending on the work and the benefits. So it's just like for someone who doesn't know about how valuable this information is, they would have a better opportunity there as well where they choose that with this."
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> [Jose] "And I work for my school's like tech department over the summer too and I make $12 an hour there. I mean it's totally a reasonable amount of money but I think anything less than that is just, and for as much value as this program is. Yeah, I just wouldn't go below that."

Student responses like this demonstrate how students made mental comparisons among locally available part-time employment opportunities and the hourly equivalent of what students received from the stipend for the contact hours of the summer program.

Discussion

The two-week summer program sought to bridge the gap between formal education that takes place in a high school context and that of an internship. Currently, there are few jobs in the region that correspond with the emerging microelectronics industry's projected workforce needs. Therefore, the project sought to build interest and begin to plant seeds for future workers within the microelectronics industry within the target geographic region.

As stated in the findings, students responded that their choice to participate in the program for many of them corresponded to an interest in engineering and technology, as well as an awareness of gaining experience that would be beneficial to a competitive application to higher education. However, the student responses also brought attention to the need for students to meet certain financial requirements. This motivation from the stipend was not the same for all participants. The findings clearly provide evidence that for many students, the choice to participate in this workforce development program was either completely dependent upon the stipend or at least moderately inspiring. Within the area of the financial incentive of the stipend associated with the program, we are able to gain insight that the use of stipend as a motivation component has multiple dimensions for students. For example, it became evident that students needed to have a stipend that represented a comparable or superior level of funding that they would be able to receive from the readily available jobs to students of this age group.

For example, as shared in the findings section, we hear students talk in comparison about the hourly wages that are available and how the stipend was clearly a superior option financially for them. This becomes significant for program planners when they seek to establish what stipend level would serve as a motivation factor for participation in similar workforce development summer programs. Another major consideration within the financial incentives is the ability for such incentives to broaden participation from traditionally underrepresented groups in engineering.

For example, many families need supplemental income, and participating in a summer program at the expense of losing income from a summer job would be a hardship. A significant stipend makes participation available for a much larger percentage of the population. It is important to note that the stipend does not eliminate all barriers to participation.

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