STEAM Pathways: Assessing the Impact of Envirolution's Career Quest on Regional Innovation Ecosystems

Career Quest is an early workforce development program designed to assist students from 4th to 12th grade in exploring and building a career in STEAM (Science, Technology, Engineering, Arts, and Mathematics) and sustainability fields. Our program aims to help students identify a clear career path, whether it is acquiring the necessary skills to enter the workforce directly after graduation or choosing a major for further study at higher education institutions. Through a blend of hands-on learning, mentorship, and tailored educational pathways, Career Quest empowers young learners to make informed decisions about their future careers in rapidly evolving industries.

Program Literature Review

Career Quest is a collaborative program based on education, community impact, student outreach, and workforce development. This program creates an immersive experience for students in grades 4-12 to explore local businesses through educational tours, learn from STEAM professionals about their journey, examine the business's mission in action, and engage in educational hands-on activities.

The Value of Science Field Trips

The study by Behrendt and Franklin (2014) underscores the educational value of science field trips, highlighting their role in fostering student interest, understanding, and engagement in science. While the document provides comprehensive insights into the pedagogical benefits of such experiential learning opportunities, it does not specifically enumerate statistical findings regarding the outcomes of these educational interventions. Instead, the focus is on qualitative assessments of their impact on science literacy and student motivation, emphasizing the importance of integrating field trips with curricular objectives and the need for effective teacher preparation to maximize learning benefits (Behrendt & Franklin, 2014).

Design-Based Learning

Examining their study, Keane and Keane (2021) delve into the efficacy of a transdisciplinary approach that melds Science, Technology, Engineering, Art, and Math (STEAM) through the lens of design-based learning. This approach is posited to not only bridge the gap between traditional STEM disciplines and art but also to significantly enrich the educational landscape by fostering an environment where creativity, innovation, and digital fluency thrive. The study showcases how integrating artistic and design principles within STEM curricula can bolster students' engagement, understanding, and motivation, equipping them with the critical thinking and problem-solving skills essential for navigating the complexities of the modern world. Through design-based learning, students are encouraged to apply their knowledge in addressing real-world issues, thereby enhancing their preparedness for the challenges and opportunities of an increasingly interconnected global society (Keane & Keane, 2021).

Building Career Awareness

Career awareness in students begins to be formally addressed at various stages throughout their educational journey. According to Gracida (2019), it is crucial to start integrating college and career awareness curricula at each grade level in elementary schools to prepare students adequately for their future career paths. Moving into middle school, Watkins (1992) emphasizes the importance of career education, specifically career awareness and exploration, to help students understand the wide array of available career options and their personal interests. By the time students reach high school, interventions like the one conducted by Woodcock and Herman (1978), which focused on tenth-grade girls, demonstrate the effectiveness of targeted career development programs. Their study revealed that such interventions can significantly enhance career awareness, indicating the positive impacts of structured career guidance during adolescence. Together, these studies advocate for a progressive

approach to career education, spanning from elementary through to high school, to effectively build students' career readiness over time.

Developing an Understanding of Occupations.

According to Howard and Walsh (2011), children start to develop an understanding of different occupations and their societal roles as early as ages 3 to 5. By the time they reach the ages of 9 to 13, they begin to demonstrate more concrete ideas about careers and how education relates to future job opportunities, as noted by Auger, Blackhurst, and Wahl (2005). This period is crucial for career development interventions, as students' aspirations can be significantly influenced by the information and guidance they receive.

Stages of Career Development

Ginzberg et al. (1951) proposed a theory of career development that includes three stages: fantasy, tentative, and realistic, which occur from early childhood through adolescence. According to this theory, the fantasy stage occurs up until about age 11, during which children's career aspirations are not limited by their understanding of job requirements or necessary education. During the tentative stage, which spans from ages 11 to 17, children start to consider their interests and abilities in relation to careers, suggesting that while younger children may think about careers, their ideas are more about exploration and less about making informed decisions. Research by Helwig (2003) also supports the idea that children's career aspirations are influenced by their understanding of the work world, which evolves with age and cognitive development. By middle childhood, many students have already begun to align their interests with potential careers, although these ideas may continue to change and develop throughout adolescence.

Definition of the Career Quest Program

Career Quest is a forward-thinking early workforce development initiative targeting students in grades 4-12, focused on cultivating future careers in STEAM (Science, Technology, Engineering, Arts, and Mathematics) and sustainability. The program assists students in developing a career mission statement and mapping out a clear career path. For those unable to pursue higher education, Career Quest provides opportunities to capture and hone job skills directly relevant to the workforce. Alternatively, for students planning to attend college or university, the program helps in constructing a detailed career map that aligns with their educational goals.

Advantages of Career Quest:

1. **Real-Life Application of STEAM Concepts:** Students have the opportunity to observe and reflect on STEAM concepts through real-life applications during business tours. This exposure helps them understand how theoretical knowledge is applied in practical settings, enhancing their learning experience and appreciation for sustainability in business operations.

2. **Engagement in Hands-On Activities:** Each visit includes a hands-on activity designed specifically to develop skills needed at that particular business. This tailored approach ensures that students not only learn about specific job functions but also acquire essential skills that will be beneficial in their future career endeavors.

Program's Objectives

The objectives of the Career Quest program are designed to provide a comprehensive foundation for students interested in STEAM and sustainability careers, focusing on both immediate job readiness and long-term career planning. Here are the main objectives of the program:

1. **Career Exploration:** Introduce students to a variety of careers in STEAM and sustainability to help them understand different roles and the skills required in these fields.
2. **Skill Development:** Equip students with practical skills necessary for the workforce, especially those who might enter directly after high school, as well as skills that are fundamental for academic advancement in higher education.
3. **Career Planning:** Assist students in developing a clear career mission statement and a strategic career map, whether their path includes immediate employment after graduation or pursuing further education at a college or university.

Program Background

Career Quest, facilitated by Envirolution, serves as a dynamic bridge connecting students to the evolving fields of STEAM (Science, Technology, Engineering, Arts, and Mathematics) and sustainability. In 2022-2023, Career Quest has engaged 1,482 students across 26 schools in nine districts, providing a total of 2,946.75 career development hours. The program has successfully collaborated with 21 businesses, including industry giants like Tesla and Apple, offering students a firsthand look at various STEAM roles and the required skill sets. A total of 18 STEAM professionals have participated as guest speakers, enriching the student experience with diverse perspectives and expertise.

This program is not just about exposure; it's about creating meaningful connections that equip students for the future. Career Quest's approach combines in-person and virtual events, ensuring accessibility and broad reach. This adaptability has allowed the program to thrive even in a rapidly changing educational landscape.

Since its inception, Career Quest has reached 77 schools across 17 districts, impacting 4,954 students. Through 178 meticulously planned events, these students have accumulated over 8,558.75 hours of career development, showcasing the program's comprehensive commitment to nurturing the workforce of tomorrow.

Looking forward, Envirolution plans to expand Career Quest by adding new business collaborations and enhancing scheduling systems to streamline event coordination. These enhancements aim to improve the effectiveness and efficiency of the program, further empowering students and simplifying the participation process for all stakeholders.

Program Highlights

After just one visit to the Career Quest program,

- A remarkable 38.9% of students reported a strong interest in pursuing careers in Science and Technology. This enthusiasm extends across the STEAM spectrum, with 16.7% of students expressing interest in both Engineering and Arts, respectively.
- Interest in Mathematics careers saw a 5.6% increase post-visit, underscoring the program's effectiveness in engaging students with the full breadth of STEAM disciplines.
- An increase in committing to sustainability in daily life from 67% to 72% after one visit (Career Quest Dashboard, n.d).

The Pedagogy of Success

The pedagogy of success, as implemented by Envirolution, strategically connects learning with real-world applications through the Career Quest initiative. This approach facilitates direct interaction between participants and leading companies like Tesla, Apple, and Panasonic. Career Quest events offer participants hands-on experiences in professional environments, enhancing their understanding of STEAM applications and providing valuable networking opportunities. This method not only enriches learning but also empowers participants to influence STEM integration within their communities, supporting continuous engagement and professional growth through an interactive website. This integration of practical application and community involvement exemplifies the pedagogy of success, making learning impactful and relevant.

Table 1: Career Quest Events by Year

Academic Year	Number of Businesses	Number of Events	Number of Schools	Number of Students
2022-2023	21	56	26	1,482
2021-2022	15	41	21	1,103
2020-2021	13	36	14	905
2019-2020	1	23	16	835
2018-2019	1	22	16	629

Conclusion

Assessing the Impact of Envirolution's Career Quest demonstrates how the Career Quest program enhances STEAM education and workforce preparedness for students from 4th to 12th grade. Through educational tours, mentorship, and hands-on activities, Career Quest significantly boosts students' interest and engagement in STEAM fields, aligning their educational pursuits with future career paths. The integration of practical experiences with academic learning, highlighted by the program's success in increasing interest in various STEAM disciplines, exemplifies the effectiveness of real-world applications in education. This approach not only enriches students' learning experiences but also prepares them to meet future challenges, making

Envirolution's Career Quest a valuable model for fostering regional innovation and developing a skilled future workforce.

References

Behrendt, M., & Franklin, T. (2014). A Review of Research on School Field Trips and Their Value in Education. International Journal of Environmental & Science Education, 9(3), 235-245. https://doi.org/10.12973/ijese.2014.213a Keane, L., & Keane, M. (2021). STEAM by Design. *Journal of STEM Education: Innovations and Research, 22*(1), 11-20. https://doi.org/10.13014/K2SJ1HR5

National Science Foundation. (2023). *Dear Colleague Letter: Assessing Societal and Economic Impacts of Place-Based Innovation* (NSF 24-036). Retrieved from https://www.nsf.gov/pubs/2024/nsf24036/nsf24036.pdf

Rodríguez-Pose, A., & Wilkie, C. (2017). Innovation and geographic inequality in Europe: What are the implications for regional policy? *European Planning Studies, 25*(12), 2090-2107. https://doi.org/10.1080/09654313.2017.1327037

Varma, R. (2018). US science and engineering workforce: Underrepresentation of women and minorities. *American Behavioral Scientist, 62*(5), 692-697.https://doi.org/10.1177/0002764218768847