Implementing Virtual Reality for Agricultural Career Exploration: Participation and Outcomes Across Diverse High Schools

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Introduction / Need for Research

Career exploration during high school plays a critical role in shaping postsecondary education and workforce choices, yet students from racially and ethnically diverse backgrounds pursue agricultural careers and degrees at rates lower non-minority peers (Faulkner et al., 2009). Virtual reality (VR) technology offers a promising way to address these gaps by providing immersive, low-stakes experiences that can expose students to a wide range of agricultural occupations regardless of geographic or economic constraints (Holly et al., 2024). Despite this potential, little research has examined how VR-based agricultural career exploration is implemented in high schools or how effectively such programs engage students (Pulley et al., 2025). This study examined the implementation of a VR agricultural career exploration project across selected high schools in Tennessee, chosen for their racial and ethnic diversity, with the goal of increasing access to postsecondary agricultural career information for underrepresented student groups. Each participating teacher opted in voluntarily, received no financial or tangible incentives, and was required to provide a memorandum of understanding signed by school administration consenting to student access and connectivity. Teachers attended an onboarding training session with the VR vendor before their accounts were created, and during the first year of implementation received quarterly emails with check-ins and invitations to optional follow-up training. Each school received two VR headsets and access to immersive simulations ($N = 33$) designed to introduce students to a wide range of agricultural careers. The data analyzed here reflect one and a half academic years of project implementation. The research questions guiding this study were: (RQ1) what percentage of participating schools are actively using the VR career exploration program; (RQ2) how does the number of unique student explorers at each school relate to the breadth of agricultural careers explored; (RQ3) to what extent does student engagement, measured by the number of careers explored, influence the number of career simulations rated highly (4 or 5); and, (RQ4)What differences exist between schools in terms of student participation and high-quality ratings of agricultural career simulations?

Theoretical Framework

Super's (1980) Life-Span, Life-Space Career Theory frames career development as a lifelong process in which individuals adopt and navigate multiple roles whose relative importance fluctuates across the life span. The theory's "Career Rainbow" conceptualizes these roles as overlapping arcs in a person's life space, showing how time, energy, and psychological involvement shift as new opportunities or responsibilities emerge. Within this model, the exploration stage (from ages 14-25) is particularly relevant to adolescents and young adults as they test interests, evaluate alternatives, and make early decisions about education and work. Decision points punctuate the life course and are influenced by both personal determinants (e.g. abilities, values, interests) and situational determinants (e.g. school environment, socioeconomic conditions, access to opportunities). The VR agricultural career exploration program operationalizes this framework by offering immersive, low-stakes experiences that help high school students "try on" a variety of agricultural careers during the exploration phase. By simulating occupational roles that students might otherwise never encounter, the program expands their life space, supports decision-making at critical junctures, and provides equitable access to information about postsecondary agricultural pathways. In this regard, Super's theory

not only explains why exposure to diverse experiences matters but also highlights how technology can mediate personal and situational determinants to foster more informed and inclusive career development.

Methodology

Data for this study consisted of school-level usage reports over a 17-month implementation period. Each record captured the number of unique student explorers, the number of distinct agricultural careers accessed, and the number of career simulations rated at a 4 or 5. Descriptive statistics were used to determine the proportion of participating schools actively using the VR program and to summarize total participation, career explorations, and high ratings across schools. Pearson correlation coefficients were calculated to assess the strength of the association between the number of unique explorers and careers explored, and between careers explored and high ratings, to identify patterns of engagement across schools.

Results / Findings

RQ1. Of the participating schools ($N = 18$), seven had at least one unique explorer while 11 had zero participation. This means approximately 39% of participating schools had begun using the VR equipment. This highlights that while most schools are not engaging students, only a small portion have implemented the program.

RQ2. The Pearson correlation coefficient between unique explorers and careers explored revealed a strong positive correlation ($r = .98$), suggesting schools with more unique explorers tend to explore more careers.

RQ3. The Pearson correlation between careers explored and careers rated 4 or 5 revealed a strong positive correlation ($r = .99$), suggesting schools where students explore more careers also generate more high ratings, which may reflect greater interest among students.

RQ4. In total, 69 unique student explorers accessed the VR career exploration system across all participating schools, with 140 career explorations logged and 99 high ratings. On average, students explored about .66 careers per explorer per school. Results indicate substantial variability in implementation but also demonstrate a clear pattern that more student users lead to more careers explored and more high ratings.

Conclusions / Implications / Recommendations

These findings suggest that while virtual reality holds strong potential to expand awareness of agricultural careers, uneven implementation across schools limits its impact. With only 39% of participating schools actively using the technology, access alone is insufficient to close participation gaps long observed among racially and ethnically diverse students (Faulkner et al., 2009). Although VR can offer equitable, immersive experiences that expose students to a broad range of agricultural occupations (Holly et al., 2024), this study reinforces the importance of intentional integration and teacher engagement to achieve meaningful outcomes. Consistent with Pulley et al. (2025), who called for more research on how VR is adopted in agricultural education, these results point to the need for stronger teacher supports, structured implementation plans, and opportunities for professional collaboration. Grounded in Super's (1980) Life-Span, Life-Space Theory, the findings highlight that VR can serve as a tool that expands students' life space (i.e. allowing them to "try on" agricultural roles they might not otherwise encounter) thereby supporting more informed, confident, and equitable career development.

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