PERSISTENT POSSIBLE SCIENCE SELVES

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ABSTRACT

This paper examines literature on the development of self-knowledge for possible selves—how an individual thinks about oneself and one's potential future selves (Markus & Nurius, 1986). Future science selves research, a recent offshoot of possible selves theories, centers on the development and loss of future possible scientific selves and factors such as academics, apprenticeships, or serious science gaming that may influence the science self and science career interest. Science career persistence is thought to be related to scientific exposure, reflection in real-world contexts, mentoring programs, and intensive math and science academic programs. While serious science gaming may prove to encourage science selves by providing positive virtual science-related experiences, there is limited research on best learning contexts or long-range effects of academic science gaming on adolescents.

KEYWORDS

Possible science selves, career interest, serious science gaming, experiential learning, persistent science selves

1. INTRODUCTION

Expansion of the science- and math-related workforce to meet rising demand requires attention to theories highlighting the career interest development during the developmental years. The possible selves metaphor of self-knowledge that examines an individual's self-view has been described as the link between self-concept and motivation (Markus & Nurius, 1986). In general, self-concept research revealed the vast complexity of self-knowing (Gergen, 1972; Greenwald & Pratkanis, 1984), while possible selves added theories on self-concept to explain the role of self-images in personal functioning motivation for behavior and change (Markus & Nurius, 1986). Future science selves research examines the development and loss of future possible selves. This paper examines literature on learning and self-views such as possible selves, possible science selves, serious science gaming, and experiential learning that can guide efforts to expand participation in science- and mathematics-related occupations. It is hoped that such an examination will provide insights for educators, researchers, and instructional designers in their efforts to create and provide experiential and digital contexts that will help students develop future science selves.

2. CONCEPTUAL RATIONALE

Mental self-images can be viewed as self-perspectives of who an individual is at present, and who or what that person would like to become in the future (Erikson, 1950) or as components of adolescent development that support the solidification of person and formation of occupational identity (Super, 1980). The future selves theory regards career interest as one facet of individual development that is related to self-perceptions and imagined selves. Markus and Nurius (1986) developed future selves concepts based on the possible selves psychological theories advanced by American philosopher and psychologist, William James during the years 1890-1950. Possible selves have been summarized as the possible images of self that are desired or expected and negative images of the self that are to be avoided. These images of self are thought to work together to motivate behavior (Shepard & Marshall, 1999). Oyserman, Bybee, and Terry (2006) posited that self-image can impel action to achieve goals. Human developmental includes expansion and narrowing of the range of possible selves and accompanying career interest (Ginzberg, 1972). Oyserman and Fryberg (2006) found evidence to indicate a loss of possible academic selves during transitions from elementary school to middle school to high school.

2.1 Possible Science Selves

Packard and Nguyen (2003) applied the lens of the possible selves to examine persistence in the science careers of women (n = 41) who were 18 to 21 years of age. They examined career plans at the end of high school and during the first and second years of college and also studied changing career trajectories. Thirty of the forty-one women began with math- and science-related career goals. Women who maintained initial interest or changed to a science-related career field shared common factors: strong interest, participation in academic and workplace opportunities, and supportive relationships with parents, friends, and mentors. Participants credited their persistence to awareness of science careers, reflection in real-world contexts, mentoring programs, and intensive math/science programs.

2.2 Developing Science Selves through Serious Games

Beier, Miller, and Wang (2012) examined how students "for whom there is neither mentor nor positive STEM [science, technology, engineering, and mathematics] -related experiences" acquire an interest in STEM. They postulated that it is important to create positive experiences for students early in the school years, before and during the middle school years, during the more impressionable years of human development. They report enthusiasm for forensics among middle school students who role-played a related video game at school and discussed the experience via social media.

Foster (2008) suggested that video gaming may be effective in creating meaningful learning experiences. Lee and Hoadley (2007) indicated that massively multiplayer online games (MMOGs) can serve as valuable learning explorations that reinforce identity formation. Wonica (n.d.) proposed that avatar identities allow positive change among children via exploration in virtual worlds with an idealized self. Wonica (n.d.) believed that gaming identities can assist in identity formation for academic and emotional growth. Dodge, et al. (2008) examined video gaming as a bridge to cognitive and communicative experience for personal growth and transformation. Research along these lines is seeking to identify and harness the unique affordances of virtual worlds and role-play. Yet, the variety of options for learning in digital contexts poses many unanswered questions regarding the value of experience and the context of learning.

2.3 Experiential Learning

Experiential learning theories, which provide a comprehensive framework for learning contexts, based on works of Dewey, Lewin, and Piaget can guide in the identification of experiences and learning for science selves. Experiential learning emphasizes the importance of interaction of four types of abilities: concrete experience, reflective observation, abstract conceptualization abilities, and active experimentation abilities (Kolb, 1984). Higher forms of individual adaptation, such as the development of person and creativity, require conflict among these elements of individual ability and real-world experience in interactions between individuals, objects, and persons. Self-concept for possible selves is an example of individual adaptation and development of person. Research is needed to determine if serious science gaming, situated in virtual worlds, will prove to support aspects of experiential learning for the positive development of person.

3. SYNTHESIS

While the early research on the relationships of serious games, role-playing, and virtual environments to self-concept seems to support the notion that gaming experience may provide students with scientific role-play and support the development of possible selves among adolescents, experiential learning concepts indicate that individual development in complex life domains requires real-world interactions and negotiation between perceptions and concrete realities. Advances in digital technologies and the variety and quality of experiences that can be provided in virtual environments warrant an examination of the effectiveness of game-based exploration and apprenticeships among various age groups. While serious science gaming may prove to support the development of serious scientific selves and aspects of experiential learning, such as abstract conceptualizations and active experimentation, additional research is needed on the relationship of gaming to the development of self-concept and persistent possible science selves during the developmental years.

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