Identity Exploration in a *Kerbal Space Program* Community Forum

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Abstract: Video games and surrounding affinity spaces have potential to support STEM learning as a situated, targeted, and intentional process of identity exploration. Further research is needed to understand how players use affinity spaces to further their unique identity exploration processes. This research examines how an online video game community discussion forum supports different trajectories of identity exploration based on individual knowledge, interests, goals, and perceptions of self. Public longitudinal data was downloaded from 78 *Kerbal Space Program* players, which informed the selection of two comparative case studies selected to illustrate ways in which identity exploration may manifest. To inform the case studies, lines of player data were coded as representative of identity exploration as defined by Projective Reflection. Findings align with existing research to illustrate how individuals may be enculturated into or pushed out of affinity spaces based on their patterns of identity exploration over time.

Introduction

Reports on the 21st century workforce point to accelerating technological changes and economic globalization, which will require workers to longitudinally develop newly emerging and specialized skills to remain competitive across lives and careers (Binkley et al., 2012; Schwartz, Collins, Stockton, Wagner, & Walsh, 2017). Learners will benefit less from experiences that promote the passive accumulation of static foundational knowledge, and more from opportunities to develop the cognitive and affective skills that will support intentional and flexible self-authorship and context-based adaptation. From this perspective, learning is an active and self-directed process of *identity exploration*, or "adaptive learning, motivation, and the development and achievement of educational goals" (Kaplan, Sinai, & Flum, 2014, p. 250) that leads to change over time (Foster, 2014). Identity exploration has been lauded as a valuable process for improving preparation for and acquisition of emerging and under-accessed STEM careers (Callahan, Ito, Campbell, Wortman & Wortman, 2019), and holds particular promise for supporting underrepresented gender (Vincent-Ruz & Schunn, 2018) and racial groups (Estrada et al., 2016).

Immersive virtual environments such as video games have been highlighted as valuable tools for supporting identity exploration (DeVane, 2010) in part due to the collaborative social communities that develop around them (Ito et al., 2009; Lankshear & Knobel, 2011). Gee (2004; 2018) defines such communities as *affinity spaces*, or a coalition of digital and real-world sites that support socially and culturally situated participation around a shared interest or topic. Games hold potential for supporting nurturing affinity spaces that can foster proactive knowledge acquisition, socially mediated engagement, and the exploration of roles that differ from a users' real-world self (Gee, 2007; Gee & Hayes, 2012), making them rich sites for examining identity exploration. Despite this potential, research is needed to understand trajectories of identity exploration in game affinity spaces using theoretically robust theories of games and learning (Ellcessor & Duncan, 2011). Examinations of case-by-case trajectories may help to elucidate how the "many different forms and routes to participation" (Gee, 2004, p. 87) enacted by affinity space participants can result in differential identity exploration outcomes.

To address this topic, this research explores how a community discussion forum can support the exploration of role-specific identities related to rocket engineering. Two qualitative comparative case studies are presented to illustrate different ways each player of the space flight simulation game *Kerbal Space Program* (*KSP*) used the Steam community discussion forum to enact situated, targeted, and intentional identity exploration of personally relevant roles. A social network of friendships between *KSP* players on the Steam platform was used to sample two central actors in the forum community, who served as data-rich player cases. Case study development was informed by an inductive-deductive coding of individual forum posts using the Projective Reflection theoretical framework to conceptualize identity exploration processes in game settings. Findings confirm the potential of the *KSP* forum as a space where players can discuss and reflect upon their unique exploration of specific STEM roles, but also illustrate how community and platform norms can tacitly support and/or discourage the exploration of certain identities. The work concludes with implications for games and game affinity spaces as sites for exploring emerging 21st century careers. The research question asks: *How does identity exploration as defined by Projective Reflection manifest across participants in a video game affinity space?*

Games and affinity spaces for identity exploration

As semiotic spaces (Gee, 2005), games can shape identity exploration processes by providing socially safe contexts where players may explore new roles (Squire & Barab, 2004) and connect in-game activities to real-world meaning to increase personal relevance (Silseth, 2012). The capacity of games and virtual environments for supporting exploration of professional career identities is supported by Shaffer's (2006) concept of epistemic frames, which conceptualizes professional praxis as an epistemic frame composed of skills, knowledge, identity, and values linked together by a domain-specific professional epistemology. Miller and colleagues (2011) demonstrated how games can support such processes through their implementations of *CSI: The Experience*, which offered authentic professional play that not only developed students' science content knowledge but allowed them to collectively explore identities and develop interests related to forensic science careers. Beckett and Shaffer's (2005) examination of high school students using a designed augmented reality environment also illustrated how the experience promoted understanding of the complexity and interdependence of variables in ecological systems, which connected the authentic virtual experiences to students' real-world contexts.

Online participatory cultures such as community discussion forums have also been recognized as valuable platforms for identity exploration, as places where individuals may cultivate a specific role or persona for others to review, or negotiate community roles and identities together (Graham, 2015). Discussion forums in particular may also serve to enhance in-game role exploration opportunities by offering a site for players to experiment with different styles of language, voice, and novel personas (Lewis & Fabos, 2000). Despite the value such affinity spaces afford for enhancing or extending identity exploration opportunities in and around games, existing research examples tend to emphasize whether individuals identify with identity labels such as "gamer" (Condis, 2014) without strategically connecting such identifications to the complex underlying cognitive and affective changes that shape them. Ellcessor and Duncan's (2011) examination of projective identities in game communities further highlight potential limitations of the theory when applied to affinity space research by illustrating how participants can and should develop their identities beyond the game and community-defined boundaries of a projective identity. To address the need for research on identity in game affinity spaces backed by a more robust theoretical framework for conceptualizing identity exploration, this research leverages Projective Reflection as an analytical tool to assess trajectories of identity change in *KSP* players.

The Projective Reflection theoretical framework

Recent research on games and identity has leveraged the Projective Reflection (PR) framework (Barany & Foster, in press), which operationalizes identity exploration as a process of longitudinal development in game-based learning environments as mediated by features of game context and community (i.e. affinity space). Projective Reflection offers both theory and methodology to provide an analytical approach for understanding the way learners engage in self-transformation, or identity change, in immersive interactive environments such as games and virtual worlds. Projective Reflection frames identity exploration as enacted by players across three stages: (a) starting self at the beginning of an experience, (b) exploring possible selves as players actively and intentionally try out new roles, reconciling who they are and what they want to be, and (c) new self at the end of an experience.

PR uses four theoretical constructs to conceptualize identity in virtual learning or game contexts as affinity participants (a) project out what they will need to do in the future to achieve a desired self, and (b) reflect on their current self as influenced by context and affinity space participation. Identity change is assessed as students intentionally explore roles they find valuable through cognitive and affective shifts in: (a) disciplinary *Knowledge* and game and technical literacy such as foundational knowledge (content), meta knowledge (knowing how to use content) and humanistic knowledge (knowing how content relates to the self) (Kereluik, Mishra, Fahnoe, & Terry, 2013), (b) domain-specific *Interests and Values* (i.e. Wigfield & Eccles, 2000), (c) patterns of *Self-organization and self-control* (i.e. Hadwin & Oshige, 2011), and (d) *Self-perceptions and self-definitions* (Kaplan et al., 2014) in a targeted domain (La Guardia, 2009). Table 1 illustrates how the four PR constructs may be enacted in a game environment with examples pulled from the cases.

Table 1: Projective Reflection constructs to frame identity exploration in *Kerbal Space Program*

	Definitions in *KSP* context	Case examples
Knowledge	• Describing changes in knowledge • Correct use of new knowledge in discussion	• "That's just something I eventually puzzled out myself when trying to understand why [the rocket boosters were not working]" • "I have increased the consumption rates of life supplies to 4X without changing any of the other values, this at least makes it so if it

		says 20 units of whatever for one kerbal [passenger] each unit will last 6 hours…"
Interests and valuing	• Affirming personal interest, valuing or relevance of a topic or behavior • Affirming value or relevance of a topic or behavior for the community	• "346 hours play time and still loving it!" • "I made a new Jet Proto[type]… But wings can be angled to fit your type of flying style!"
Self-organization and self-control	• Modifying behavior based on peer feedback • Describing goal setting and strategies for success	• [When peer expressed dislike of the sign-off "Enjoy."] "I'm sorry, I am proud of my stuff. Does it come off as rude in some way? I don't have to add that" • "I need to redesign my aging CSR (Crew, Supply, and Recovery) shuttle. The old design has been in use since the early stages of Kerbin Space Lab"
Self-perceptions and self-definitions	• Reflections on how players see themselves in past, present, or future	• "I do everything except SSTOs [single-stage to orbit ships] and VTOL [virtual takeoff and landing ships]"

The design of this study leveraged the four PR constructs to qualitatively examine how participants reflect on internal processes of identity exploration over time, as mediated by contextual and community features. PR has been used as an analytical tool to examine virtual environments with potential for promoting identity exploration (i.e. Shaffer's (2006) virtual internship *Land Science*) to identify contextual and design features that could support identity change (Foster, 2014). Existing player reflection data was also analyzed to understand players' internal processes of identity exploration as they were enacted during play experiences in these virtual environments. These initial assessments using PR served as the basis upon which to iteratively design and implement new virtual learning environments that can support a more integrated process of identity exploration and change related to science careers. While this research illustrated the value of identity exploration in games, such an examination has not been extended to the participatory cultures that develop around game environments.

Research methods

Study design involved the identification of rich player cases that could exemplify developmental trajectories of growth in a video game affinity space. Social network analysis was used to visualize a community of players and identify the two most central participants in the friend group. Comparative case studies were developed based on deductive coding of player forum posts to elucidate patterns of identity exploration over time in each case.

Setting

Data was collected from the community page for the single-player space flight simulation video game *Kerbal Space Program (KSP)*. Both the game and community discussion forum are hosted on the Steam online gaming and community platform. *KSP* was created to simulate practices related to the field of rocket science, and incorporates elements of chemistry, geology, and physics. Game designers also explicitly designed the game to support a "vibrant, diverse community of space and explosion enthusiasts" (Take-Two Interactive, 2011-2018, p. 1) that encourages players to explore a variety of roles through gameplay and community participation, such as designers, space engineers, corporation leaders, scientists, artists, and storytellers.

Sampling and data collection

To collect information on the patterns of participation enacted by users on the *KSP* community page, data was collected from the Steam Web API, which supports downloading of anonymized, public user data related to gameplay and participation. Public, player-to-player discussion data was scraped directly from the community page using a Python data mining script. From these two data sources, a network of 42 highly connected users were sampled from the population of over 230,000 *KSP* players on Steam. The sample consisted of the subset of participants who have replied to at least one discussion board post made by a player they added as a Steam friend, or who have received at least one reply from a friend. Sampling using this method identified users who have connected to peers in multiple ways (friendship and peer forum discussion). As the two players in the social network with the highest individual centrality measures, Cromwell and UncleAl (pseudonyms) were selected as case studies that would be illustrative of the identity exploration trajectories of players that posted and engaged regularly with peers on the community discussion boards. From the chronological list of *KSP* forum posts, those

made by referencing each case were isolated and organized into chronological accounts of forum participation.

Table 2: Ranked individual centrality measures for the top five most central participants in the network

	Closeness	Betweenness	Degree	Eigenvector
Cromwell	94.00	398.05	9	0.45
UncleAl	106.00	331.55	9	0.39
Player3	117.00	251.60	7	0.17
Player4	120.00	161.80	7	0.29
Player5	111.00	179.00	4	0.23

Data analysis

According to Yin (1995; 2017), case study analysis may be guided by existing frameworks or "templates" for analysis and may result in findings that "emerge unexpectedly from the analysis" (p. 78). This method was used to characterize an inductive-deductive process of co-occurring (a) deductive coding techniques guided by the four Projective Reflection constructs, and (b) an inductive process of code expansion and refinement grounded in what emerges from the data with regards to identity exploration and change. First, a graduate-level coder read all available text and examined every image, followed by the coding of segments of text or imagery as representative of a phenomenon – one or more of the four PR constructs. Once a primary round of coding was completed, code revision and refinement continued as an inductive process of adding codes (filling in), examining existing codes based on new perspectives (extension), exploring new relationships between existing codes (bridging), and identifying new categories (surfacing) (Lincoln & Guba, 1985) until all incidents were classified and theoretical saturation was reached (Lincoln & Guba, 1985). Case study narratives were then written and refined based on a chronological review of text and applied codes, and repeatedly subjected to review by a faculty researcher with theoretical experience in games and identity. The theoretical expert also examined each applied and refined code and identified areas of disagreement, which were discussed with the first coder until agreement was reached.

Findings

Case studies of Cromwell and UncleAl revealed unique trajectories of identity exploration that were influenced by the affinity space in different ways, showing changes in knowledge, interests and values, patterns of self-organization and self-control, and self-perceptions and self-definitions as defined by Projective Reflection.

Case: Cromwell

Starting self

Cromwell was a regular participant in the *Kerbal Space Program* community forums from early 2014 to early 2016, with a few periods of posting/play between 2016 and 2018. In his first post, Cromwell shared that he had completed "346 hours play time and still love it!" and "my 100th space station," suggesting he had experience with gameplay before posting to the forum. Despite potentially high levels of in-game knowledge, Cromwell struggled to understand the posting parameters of the site (maximum 12 images per post), leading to spillover of his narratives across multiple posts as he expressed confusion over why "the last 2 [images] won't show here."

Cromwell was interested in sharing machine designs that he considered unique or attractive, or as he put it, "my most treasured creations." Typical early reflections on his own self-organization and self-control included posts that offered chronological descriptions of his trial and error in ship designs and launches, and strategies of ship modification over time. Descriptions were punctuated with screenshots of his design process and artistic shots of his completed machines. After a few weeks of regular posting, another user suggested that Cromwell's in-game focus was "advanced capitol ships," to which Cromwell replied with a correction, "I do everything except SSTOs [single-stage to orbit ships] and VTOL [virtual takeoff and landing ships] ☹."

In sum, Cromwell's initial processes of identity exploration revolved around his *self-perception* as a player who had put in many hours of gameplay, and who engaged with a wide selection of in-game goals, features, and designs (except for SSTOs and VTOL). He explicitly affirmed his *interest and valuing* of *KSP* gameplay as something he enjoyed, and actively attended to his own gameplay milestones (*self-organization*). While *knowledge* of in-game mechanics (i.e. how to build a rocket) were initially well-established in the content of his posts, understanding of the rules of engagement on the discussion forum continued to develop as he struggled to upload images and text in clear and consolidated ways.

Exploring possible selves

Cromwell continued to publicly celebrate markers of playtime reached as his years of participation progressed. Posts included increasing use of game-specific jargon, showing knowledge of space engineering terminology. He typically identified the design challenges he set for himself and the processes by which he worked toward success. As his goals grew in complexity, Cromwell organized and labelled post narratives by phases such as "Fuel Production part 2." This style allowed Cromwell to add written and visual detail to conceptualize his iterations. As he put it, "TRIAL AND ERROR IS THE KERBAL WAY."

His writing evolved over time to reflect increasing personal valuing of the aesthetics of his designs, and the artistic quality of his screenshots. In several instances, he described successfully landing a ship (a difficult feat), only to attempt to "hop" the ship into a more visually pleasing position to collect screenshots, which risked tipping the ship and failing the mission. Cromwell also began naming the ship designs that he found particularly "beautiful" or "funky." After a few months, he began crafting detailed engineering "blueprints" for his named ships (likely using a digital art software), in which he illustrated and labelled individual design pieces and included ship dimensions and images of the completed machine from several angles. Cromwell shared these on the *KSP* community page as game artwork, which garnered peer attention and appreciation for the attractiveness of his blueprint layouts and the work that went into creating them. Over a year into posting, Cromwell created a company logo with his username and personal imagery that he photoshopped into screenshots of space landings and blueprints, solidifying his exploration of the space engineer/designer role.

Cromwell's identity exploration and participation were also influenced by peer responses and actions. Cromwell would review others' posts on request, but also solicited review and feedback for his art. Most peers offered positive affirmations or asked questions about how he created a design or image. In one case, a peer wrote that they loved his ship "concept art," but found his routine written sign-off of "Enjoy" to be annoying. Cromwell responded "I'm sorry, I am proud of my stuff. Does it come off as rude in some way? I don't have to add that." His next post concluded with "Please Enjoy?" then he ceased using a sign-off.

In sum, Cromwell's identity exploration shifted as he developed *knowledge* of how to use the forum to best achieve his goals. He enacted strategies of *self-organization* to detail his in-game design processes through the use of labels and developed a more detailed narrative style that chronicled his process of design trial and error. His *self-definitions* shifted as he engaged more deeply as a ship designer and as a graphic artist on the forum, connecting to his increasing *interest* in creating both functional and aesthetically pleasing ships.

New self

In Cromwell's later years, he would take long breaks followed by short bursts of participation and reflections on his changing motivations. He described what he felt was a loss of "inspiration," and favored linking and referencing images he had previously uploaded over posting new content. In one post, he mentioned a new game he was playing. Final months of Cromwell's participation consisted of more reflective and summative text, in which he celebrated his achievements (i.e. 1800 hours of play) and community participation (i.e. over 2500 in-game screenshots taken). He concluded a later post with "Like it and comment, I live for it. :D :D :D," affirming personal valuing of sharing his stories, engineering designs, and art pieces with peers for mutual appreciation.

In sum, Cromwell took a more summative approach to his reflections on his detailed *knowledge* and his monitoring of game and forum achievements (*self-organization and self-control*). While *valuing* of peer interaction and validation remained, he described waning *interest* in gameplay as he played other games. At this point, his *self-perceptions and self-definitions*, though not explicitly described, were perhaps akin to a curator of the corpus of digital art and design story arcs he had contributed to the online forum community.

Case: UncleAl

Starting self

UncleAl participated in the *KSP* community forums from early 2014 to early 2016, which included answering questions that demonstrated her knowledge of using game modifications (modding) on the community forums and sharing screenshots and YouTube videos of her machine designs. UncleAl initially made individual threads for her discussions of gameplay activity, however, friends and other users suggested she move this information to the larger community thread. This demonstrates that UncleAl may have begun posting with a limited knowledge of how to contribute to the community, resulting in intervention from peers to shift her behavior.

UncleAl responded by posting to the thread concerning what players' daily achievements, but described limited valuing of the subject matter, stating "there is more important things on the discussion than to know what other people did in this game." She later described how a friend had offered co-regulation by warning her privately not to post off-topic comments to the forum. Admiral Halsey's friend later responded "I go on vacation for two

weeks and you become a better forum citizen while I'm gone? I almost don't believe it. Its Magic!" to which she responded with a meme-related joke that continued the banter. This interaction suggests a shift in UncleAl's self-organization and self-control toward community-mediated patterns of behavior. UncleAl made few references to her sense of self during early participation. However, after the first few posts, she commented "Today I took a break and did some modding [designing game modifications]." Such reflections would foreshadow continued identity exploration of the modder role in future and illustrates her goal setting as a form of self-regulation.

In sum, UncleAl's starting self data suggests that she began with initial *interest* in the use of mods to alter gameplay and the design capabilities of *Kerbal Space Program*. Though she demonstrated initial *knowledge* of the use of mods for this purpose through her discussions and designs, she struggled to adhere to community guidelines, which resulted in peer feedback to shape her strategies of *self-organization* with regards to affinity space participation. As UncleAl engaged with the community, she also described limited *valuing* of the community forum topics, perhaps because of their limited relevance to her modder *self-definition*.

Exploring possible selves

Over time, UncleAl would demonstrate further specialized knowledge and expertise in downloading and using *KSP* game mods by designing machines that would not necessarily function in space, such as planes and an airbus. She described regularly downloading and using mods in her gameplay to help her achieve her design ends. She also regularly commented on peer posts that similarly implemented visual modifications and described mods she found interesting or valuable. For example, UncleAl responded to a peer's post on the mod Scatterer, designed to make the game look like an earthbound flight simulator: "I too got the scatterer mod… the atmosphere looks, well, glitched when in orbit… I can't believe it's still KSP!"

Overall, UncleAl very rarely made references to her own self-perceptions or self-definitions, instead leveraging the space as a platform to share her expertise with modding and her own modded designs as a form of self-organization and self-control. In 2016, UncleAl posted several pieces of meme artwork suggesting that her peers were calling for workshops or guides that could assist with the installation and use of mods, after a recent game update rendered previously modded game files temporarily unusable. These posts led to UncleAl's page serving as the site of a community-wide controversy, as peers argued about what guides were needed in which virtual locations. In response, UncleAl leveraged her expertise on the topic to publish a step-by-step guide for using mods in *KSP* "inspired by the mass amount of forums people not knowing or having problems with mods." She also shared workshops on her ship designs, including a video detailing how to successfully take off and land one of her aircraft-style ships. This video featured a personalized logo she created that included a pixelated picture of her face, situating herself as the designer and creator of modded non-space machines (self-definition).

In sum, UncleAl regularly engaged in peer interaction around her specific *interest* in *KSP* mods, demonstrating increasingly detailed *knowledge* and expertise as she offered advice and answered questions for other mod users. Her reflections and forum participation suggest that she was attentive to needs and opinions of the community, with her meme posts serving as commentary on relevant mod-related issues. These reflections suggest that UncleAl saw herself (*self-perceptions*) as a knowledgeable *KSP* mod user who could share her expertise. Creation of video and written guides for using mods illustrated her growing confidence in this role, as well as her use of *self-organization and self-control* strategies as she responded to peer needs and feedback.

New self

At some point after 2016, after completing over 1000 hours of *KSP* gameplay, UncleAl changed her username, and deleted the majority of screenshots and photos she had shared in the discussion forum. Though *Kerbal Space Program* is still listed as her favorite game on Steam, the text on her public user profile reads "I wasted my steam hours on *KSP*, I want them back." It is unclear what shifted her motivations to engage with the game, or what caused her exploration of the designer and modder identities within this game to cease. It is clear from her participation in the community up until that point, however, that UncleAl gained specialized *knowledge* of *KSP* modding and non-space transportation design and explored *self-definitions* relating to modding to support her *interest* in using the game for non-space machine design. Patterns of *self-organization and self-control* manifested as attunement to community modding needs, and her engagement in the controversy around modding policies.

Discussion and conclusion

A comparative assessment of Cromwell and UncleAl reveal similarities and differences in their longitudinal processes of identity exploration enacted through their participation in the *Kerbal Space Program* community forum. Despite similarly high levels of centrality within the active social network of posters, each case displayed unique trajectories of development related to *KSP* knowledge, interest and valuing, patterns of self-organization and self-control, and self-perceptions and self-definitions. While Cromwell's trajectory of identity exploration

evolved around space engineer and artist/designer roles, UncleAl's trajectory of identity exploration emerged in relation to her increasing expertise as a modder on the *KSP* forum. Cromwell regularly affirmed interests and valuing of play and participation, while UncleAl did not always affirm the value of the community forum for meeting her needs, particularly after her initial participation attempts were met with community censure.

Cromwell monitored his progression in gameplay and later community posting over time, setting and persistently working toward increasingly complex in-game (i.e. building ships) and forum goals (i.e. taking attractive photos, designing a logo). While in some cases Cromwell struggled to adapt to the forum posting rules or please his peers, he later adapted his narrative style with the implicit goal of sharing his design processes and incurring positive community feedback. Over time, UncleAl instead demonstrated increasing awareness of the community needs and issues among modders, and then used her specific expertise and interests to meet their needs as a modding expert. Her engagement with the modding controversy also illustrates the socially negotiated nature of identity exploration in affinity spaces, or what Graham (2015) refers to as group identity.

Findings reveal how the forum allowed both cases to expand on the authentic space engineering experiences in the game by 1) helping them improve reflection on goals, strategies and processes of change, and 2) allowing both to expand their exploration of roles that would not be supported by gameplay alone (i.e. artist, modder). This confirms the importance of affinity spaces as sites for examining identity change, as they encourage the expansion of identity exploration beyond in-game projective identities (Ellcessor and Duncan, 2011).

Both cases may serve as unique examples of outbound trajectories of participation (Wenger, 1998), that are formed as a user prepares to leave a community. While Gee (2005) affirms that players "can get different things out of the [affinity] space – based on their own choices, purposes, and identities" (p. 85), Graham (2015) warns that trajectories of identity exploration that do not align with norms and the values of a group-mediated identity may get pushed out over time. While Cromwell may have ended participation with a positive summative outlook, UncleAl's case suggests that some, but not all features of the space were valuable to her early identity exploration. Over time, she involved herself in community controversy about what aspects of identity exploration were accepted on the platform, and eventually chose to intentionally end her use of the affinity space for play and identity exploration. This raises important questions about whose identity exploration trajectories are supported or pushed out in game affinity spaces and what that means for their continued growth and identity change.

Implications

Understanding and promoting identity exploration practices is one way to equip students with necessary tools for success in a 21st century life and career context (Kaplan et al., 2014). This work contributes to this aim by examining identity exploration enacted by participants in an online gaming community. Participants used the forum to enhance their authentic participation in both STEM roles such as designer and engineer, but also community-valued roles such as artist and community content expert. They self-monitored, set goals and worked towards them, and responded to feedback to shape unique trajectories of identity explorationover time. It is these kinds of identity exploration processes that may be harnessed to better prepare learners for future STEM careers.

Findings from this research have practical implications to inform the design of and development of online affinity spaces to support transformational experiences in users. For example, case study examinations revealed that the forum included few features that prompt them to reflect on their changing self-perceptions and self-definitions. This could be addressed on Steam through platform updates, or in the design of new online environments that can better support learning as identity change. Understanding how identity exploration manifests in game affinity spaces can inform how to design and curate formal teaching and learning environments that encourage similar processes. This knowledge can support educators, who are increasingly encouraged to teach using online affinity spaces, such as those that develop around video games (Jenkins et al., 2009).

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