Creativity as a Lens to Frame Teachers' Use of Games for Learning

Mamta Shah, Drexel University, mamta@drexel.edu

Teacher education in game-based learning

Leading scholars in the field have theorized digital games as contexts with potential to promote "situated understandings, effective social practices, powerful identities, shared values, and ways of thinking of important communities of practice" (Shaffer, Squire, Halverson & Gee, 2005, p.7). Researchers have illustrated the use of games to support learners' personal identity and goals towards engagement in academic domains and professional careers (Foster, 2008; Squire, 2010). However, despite educational researchers' demonstrated attempts to capitalize on the potential of games for enhancing students' curricular experiences, research on educating teachers in incorporating games in their practice is severely lacking at both pre-service and in-service levels (Molin, 2017; Shah, 2015). This is problematic given that immersive and interactive digital technologies such as games are fundamentally shifting teachers' pedagogical roles in orchestrating student learning. Shaffer and colleagues (2015) argue that these shifts necessitate a complete re-envisioning of how teachers are prepared to design experiences and facilitate learning in digitally-evolving classroom ecologies.

Few, but powerful exemplars exist in the extant literature to illuminate how a skilled teacher works in synergy with a well-designed game to facilitate students' personally relevant engagement with academic material in game-based classrooms (Eastwood & Sadler, 2013; Silseth, 2012). Even fewer studies have (a) defined the knowledge and skills that are germane for teachers to identify and leverage the educational potential of games (Foster, Shah & Duvall, 2015; Shah & Foster, 2015), (b) illustrated the process of supporting teachers' motivation to incorporate games in their practice (Chee, Mehrotra & Ong, 2015; Foster & Shah, 2017), and (c) documented how teachers' roles and practice in teaching with games evolve over time (Bell & Gresalfi, 2017; Shah & Foster, 2014b). The emergent status of research on teacher education in game-based learning (GBL) is disadvantageous to teachers' growing interest in employing games for teaching, learning and assessment and the field of games and learning at large (Takeuchi & Vaala, 2014). In the absence of comprehensive approaches for supporting teachers to innovate in their practice using games, teachers are likely (a) to not consider all aspects of games that can impact student learning (e.g. teachers seek obvious content alignment to curriculum but do not have a consideration for inherent pedagogical approach), (b) to resort to using games as standalone tools for review and practice but not as ecosystems of designed experiences for students to explore their interests in (Shah, 2015; Shah & Foster, 2018). I argue that recent research on creativity and educational technology offers a useful lens to frame how we support teachers to cultivate analytical and pedagogical skills that may be beneficial for them to constantly innovate their practice by identifying, examining, designing, and repurposing technologically-mediated experiences and environments for learning.

Teachers, games, and creativity

Larry Cuban (1986) documented teachers' adoption of radio, television, computers- technologies that were claimed to catalyze transformational changes in formal education since the 1920s. His work underscored the significance of teachers' roles as gatekeepers of technological and pedagogical innovations in schools. Technologies of today are rapidly changing; they are more complex than before in the kinds of experiences they can afford, and they transcend traditional barriers of physical and social spaces of inquiry, communication, construction, and expression (Foster & Shah, 2015a; Shah & Foster, 2015). Thus, if teachers are to be inventive in their use of technology in their curriculum, teachers need to be supported to develop the skill set to creatively examine and repurpose technology for educational purposes (Henriksen, Mishra & Mehta, 2015; Mishra, Koehler & Henriksen, 2010). Thus, in order to repurpose games for learning, teachers should be supported in (a) perceiving games in a *novel* way (something that did not exist in this form before), (b) designing curricular experiences using a chosen game in an *effective* manner (something that does the job better than before), and (c) considering the role of the context in choosing and repurposing a games for a specific learning objective in a *wholesome* manner (something that ties with the context). I illustrate this creative view of supporting teachers to use games through an excerpt from my dissertation research (Shah, 2015).

The mixed-methods study investigated the development and assessment of 14 pre-service teachers' knowledge of game-based learning using the Game Network Analysis (GaNA) framework (Foster, 2012) over 11-weeks. The framework includes a focus on the pedagogy and content of games as well as the process for employing game-based learning in classrooms in formal and informal settings (Foster, 2012). GaNA comprises of an analytical lens for game analysis and selection by helping teachers approach the game as a curriculum with constraints and affordances for technology, pedagogy, and content (Foster, 2012). It includes *Play Curricular*

activity Reflection Discussion (PCaRD) model that aids teachers in (a) the systematic incorporation of games in classrooms in order to flexibly accommodate challenges inherent in a typical school structure; (b) the design of learning environments where student engagement, teacher intervention, curricular inquiry are in synergy; and (c) overcoming limitations of the games being used (Foster & Shah, 2015b). GaNA facilitates teachers in designing opportunities for inquiry, communication, construction, and expression to foster transformative learning experiences anchored in the game (Foster & Shah, 2015a). The decisions teachers make during game analysis and game integration are guided by ecological conditions impacting the successful use of GBL experiences. These conditions include social dynamics, organizational and technological infrastructure, and pedagogical culture of the context in which GBL is to be introduced. In this way, GaNA offers one methodological tool kit to use games in new ways.

Creative repurposing of Minecraft for English/Language Arts using GaNA

Max (pseudonym) was a graduate male student who specialized in Secondary education in English/Language. He had no prior training in game-based learning and was interested in incorporating environments such as Minecraft as a way for highschool students to explore elements of good storytelling. Through the 11-weeks, Max was guided to learn about games through direct (playing) and vicarious approaches (researching websites, watching Youtube videos, reading empirical literature), concentrating on the games' content, pedagogical, and technological characteristics (Foster, 2012). Max learnt to play and see games in ways that he had never seen before. He learnt that playing *Minecraft* naturally involved exploring one's narrative experience and learning about cause and effect. Every choice the player made during their individual experience contributed to the final outcome (survival). For instance, if players spent a majority of their time digging holes and searching for minerals, they might not have time to build adequate shelter, and find themselves unprotected from monsters, making them susceptible to death. He believed this example and others he articulated were applicable to students' understanding of literature as narratives and character arcs contain many examples of cause and effect. Max was also able to comprehend that while students may learn from their own mistakes or decisions while playing, *Minecraft* did not explicitly provide opportunities for students to show their understanding of cause and effect as a narrative element. Additionally, there was no feedback from the game regarding this academic content for students to be able to self-correct or self-regulate their actions within the game. For instance, if a player did not survive, the game could not explain why this happened. These were the strengths and the shortcomings of *Minecraft* from the perspective of teaching English, which the instructor could leverage and address respectively by designing learning activities in conjunction with the game.

With this knowledge of the game, Max designed a lesson for students to understand how a character's actions affect a narrative using Minecraft as the curricular anchor creating opportunities for play, curricular activity reflection and discussion (Foster & Shah, 2015b). While the *play* would be naturalistic, Max had planned to identify teachable moments observing how students guided their characters in the world and made decisions for the character. During the *curricular activities* Max wanted to students make connections between the game and academic content. In one of the curricular activities he would engage students in reading different sample stories, identifying at least five examples of cause and effect, and recording them on t-chart graphic organizers. During reflection and discussion activities, Max wanted students to gain additional insights on cause and effect by prompting them to explore how they in their own lives or characters in stories could make different choices in specific situations, leading to different outcomes. Max planned to record insights gained from the P-Ca-R-D activities using *Minecraft* (a) to assess students understanding of cause and effect, and the ways it can affect a narrative, and (b) to plan future PCaRD sessions that focus on strengthening students narrative writing skills.

Looking ahead

Students' lives and the ways they learn in and out of school are being transformed in a Deweyan sense by technology-mediated experiences. Specifically, learners across sites have more opportunities to engage in *inquiry* (through tinkering, playing, experimentation), *construction* (through designing, creating, making, building, producing), *communication* (through mentoring, collaborating with peers, sharing within a community/affinity-based groups) and *expression* (of interest, affect, valuing through artefacts created) (Foster & Shah, 2015a; Shah & Foster, 2014a). This paper argues that working with teachers is imperative to democratize learning with games and other technological pedagogical innovations (e.g. making) in K-12 education. Research on creativity in educational technology offers a useful lens for supporting teachers to unpack *novel, effective, and wholesome* (Henriksen, Mishra & Mehta, 2015) ways to use games and design experiences. Doing so in conjunction with methodological framework like Game Network Analysis (Foster, Shah & Duvall, 2015; Shah & Foster, 2015) is a step in the direction of empowering teachers (a) to facilitate students' understanding of concepts, to support identities and dispositions, and to trigger future trajectories in academic domains and careers, (b) to complement

game-based learning with other theoretical and pedagogical approaches that can be instrumental in supporting knowledge and skills in domains and disciplines that are valued in schools, and (c) to foster interactions between self and learning and the resulting changes in learners' interest and valuing of the content encountered through game playing (Foster & Shah, 2017; Shah & Foster, 2018).

References

Bell, A., & Gresalfi, M. S. (2017). Teaching with videogames: How experience impacts classroom integration. *Technology, Knowledge and Learning*, 22(3), 1–14

Chee, Y. S., Mehrotra, S., & Ong, J. C. (2015). Professional development for scaling pedagogical innovation in the context of game-based learning: teacher identity as cornerstone in "shifting" practice. *Asia-pacific Journal of Teacher Education, 43*(5), 423-437.

Cuban, L. (1986). *Teachers and Machines: The classroom use of technology since 1920*. New York: Teachers College Press.

Eastwood, J. L., & Sadler, T. D. (2013). Teachers' implementation of a game-based biotechnology curriculum. *Computers & Education, 66*(0), 11-24.

Foster, A (2008). Games and motivation to learn science: Personal identity, applicability, relevance and meaningfulness. *Journal of Interactive Learning Research, 19*, 597-614.

Foster, A. (2012). Assessing learning games for school content: Framework and methodology. In D. Ifenthaler, D. Eseryel & X. Ge (Eds.), *Assessment in Game-based Learning: Foundations, Innovations, and Perspectives*. New York: Springer.

Foster, A. & Shah, M. (2017). Games, Science, and Identity Change: Findings From A Year-Long Teacher Professional Development. *In* M. Pivec & J. Gründler (Eds.), *Proceedings of the 11th European Conference on Game-Based Learning* (pp. 173-180), Graz, Austria

Foster, A. & Shah, M. (2015a). The ICCE framework: Framing learning experiences afforded by games. *Journal of Educational Computing Research, 51*(4), 369-395.

Foster, A. & Shah, M. (2015b). The play curricular activity reflection and discussion model for game-based learning. *Journal of Research on Technology in Education, 47*(2), 71-88.

Foster, A., Shah M., & Duvall, M. (2015). Game Network Analysis: A framework for teaching with games. In M.L. Niess & H. Gillow-Wiles (Eds.) *Handbook of Research on Teacher Education in the Digital Age* (pp. 380-411). Hershey, PA: Information Science Reference.

Henriksen, D., Mishra, P., & Mehta, R. (2015). Novel, Effective, Whole: Towards a NEW framework for evaluations of creative products. Journal of Technology and Teacher Education, *23*(3), 455-478

Molin, G. (2017). The Role of the Teacher in Game-Based Learning: A Review and Outlook. In M. Ma & A. Oikonomou (Eds.). *Serious Games and Edutainment Applications Vol II* (649-674). Springer International Publishing

Shaffer, D. W., Squire, K., Halverson, R., & Gee, J. P. (2005). Video games and the future of learning. *Phi Delta Kappan, 87*(2), 104-111.

Shaffer, D. W., Nash, P. & Ruis, A. R. (2015). Technology and the New Professionalization of Teaching. *Teachers College Record* (pp. 1-30).

Shah, M. (2015). *Pre-service Teacher Education in Game-Based Learning: Cultivating Knowledge and Skills for Integrating Digital Games in K-12 Classrooms.* Unpublished Doctoral Dissertation, Drexel University, Philadelphia, PA.

Shah, M. & Foster, A. (2014a). The inquiry, communication, construction and expression (ICCE) framework for understanding learning experiences in games. Special Issue on Applied Research in Immersive Environments for Learning. *International Journal of Virtual and Personal Learning Environments, 5*(2), 1-14.

Shah, M. & Foster, A. (2014b). Undertaking an ecological approach to advance game-based learning: A case study. Special issue on game-based learning for 21st century transferable skills: Challenges and opportunities. *Journal of Educational Technology and Society, 17*(1), 29-41

Shah, M. & Foster, A. (2015). Developing and assessing teachers' knowledge of game-based learning. *Journal of Technology and Teacher Education, 23*(2), 241-267. Chesapeake, VA: Society for Information Technology & Teacher Education.

Shah, M. & Foster, A. (2018). Promoting Teachers' Identity Exploration: The Way Forward in Teacher Education for Game-Based Learning. In E. Langran & J. Borup (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 478-486). Washington, D.C., United States: Association for the Advancement of Computing in Education (AACE).

Silseth, K. (2012). The multivoicedness of game play: Exploring the unfolding of a student's learning trajectory in a gaming context at school. *International Journal of Computer-Supported Collaborative Learning, 7*(1), 63-84.

Squire, K. D. (2010). From information to experience: Place-based augmented reality games as a model for learning in a globally networked society. *Teachers College Record*, *112*(10), 2565-2602

Takeuchi, L. M, & Vaala, S. (2014). Level up learning: A national survey on teaching with digital games. New York: The Joan Ganz Cooney Center at Sesame Workshop.