Chen, W. et al. (Eds.) (2017). Proceedings of the 25th International Conference on Computers in Education.
New Zealand: Asia-Pacific Society for Computers in Education

Scaffolding Historical Inquiry through a Collaborative Maker-based Activity

Benjamin LILLE[a*] & Margarida ROMERO[b]
[a]*Département d'études sur l'enseignement et l'apprentissage, Université Laval, Canada*
[b]*Laboratoire d'Innovation et Numérique pour l'Éducation, Université Nice Sophia Antipolis, France*
* benjamin.lille.1@ulaval.ca

Abstract: Teaching strategies in history education could influence the development of learners' competencies. Lecture-based approaches on historical knowledge have limited potential in developing students' historical thinking and critical thinking competencies while historical inquiry has been argued to be an efficient way to develop these skills. Engaging in historical thinking development through inquiry is, however, a complex and difficult process for novice students as they will potentially face didactic and cognitive limits. We wish to contribute to the didactics of history literature in proposing scaffolds for historical inquiry through a collaborative maker-based activity combined with a knowledge building (KB) tool. Considering computer-supported collaborative learning (CSCL) literature to design collaboration, we argue that core mechanics of a sandbox videogame, 3D printing and maker culture can offer scaffolds in collaborative historical inquiry as they present congruities with cognitive operations required in historical inquiry

Keywords: Historical thinking, maker-based education, game-based learning

1. Introduction

Historical thinking development through inquiry is a process with potential obstacles and students' resistance. Historical thinking, or historical reasoning, is argued to be an analytical and critical posture where historical sources are breeding ground in establishing fact to answer historical or historiographical questions by elaborating an historical interpretation (Yelle & Déry, 2017). Historical inquiry can be cognitively demanding for novice learners. Therefore, there is a need to induce conceptual change for them to accept the relative nature of history. Limon (2001) has stressed that teaching strategies aiming at conceptual change are requiring a higher student engagement than what traditional teaching strategies can offer. Technology-enhanced learning has therefore been argued as a way that can help scaffold historical inquiry (Brush & Saye, 2008; Hicks & Doolittle, 2008; Li & Lim, 2008). Educational technologies offer affordances that can help students in adopting a more active attitude and role towards learning (Kreijns & Kirschner, 2004; Resta & Laferrière, 2007). Within educational technologies, maker technologies such as 3D printing and the maker culture has been argued as a movement that can help develop 21st century competency such as problem-solving, creativity and critical thinking (Martin, 2015). Considering the need for conceptual change, for scaffolds and for student engagement, we stress that maker-based activity with Minecraft videogame could help students in inquiring about the past. We, therefore, argue that integrating these learning activities in history teachers' practices could help scaffold historical inquiry in order to develop students' historical thinking. The main research question is therefore: how can a maker-based activity scaffold historical inquiry in order to develop students' historical thinking. Within these learning activities, collaborative maker-based education, in which the learners engage in learning by making artefacts, could support the historical inquiry required to develop students' historical thinking.

2. Digital Games Uses for Maker-Based Education

In this building activity, learners will be engaged in the collaborative creation of an historical society in order to answer an historical or historiographical question. As building an accurate historical society is complex, the building activity is considered both as a problem to solve and a way to express historical

understanding. Learners are therefore engaged in the construction of the studied society's physical environment like a city or a medieval village while also engaged in interpreting historical sources and accounts related to the studied society. Thus, learners are investigating the complexity of historically-situated social values, economic structure as well as political and cultural contexts. Based on the LM-GM model (Arnab et al., 2015) and its extension LM-GM-LT (Patino, Proulx, & Romero, 2016) that associates gaming mechanics with learning mechanics, we reason that the chosen sandbox videogame is coherent with our pedagogical intention, as its core mechanic is constructing. Moreover, Minecraft core gaming mechanics present congruities with Cohen, Jones, Smith, & Calandra, (2016) model of maker culture mechanics based rely on building, creating, sharing and networking. These mechanics could therefore support historical thinking components such as contextualization, historical empathy, comparing and corroboration of historical accounts. We also consider the meta-gaming concept that argues that learning with digital games can happen outside the game (Bouko & Alvarez, 2016) in designing a Knowledge-Building (KB) learning tool supporting the maker-based activity. The knowledge forum (KF) is therefore considered as a meta-making space where students are learning by discussing about the challenge that is the making of a historical society through historical inquiry.

References

Akkerman, S., Admiraal, W., & Huizenga, J. (2009). Storification in History education: A mobile game in and about medieval Amsterdam. *Computers & Education*, *52*(2), 449–459.

Arnab, S., Lim, T., Carvalho, M. B., Bellotti, F., de Freitas, S., Louchart, S., De Gloria, A. (2015). Mapping learning and game mechanics for serious games analysis. *British Journal of Educational Technology*, *46*(2), 391–411.

Backer, D. I., Balaschak, C., Best, M., Bingham, C., Gilbert, C., Friedland, L. A. (2016). *Truth in the Public Sphere*. Lexington Books.

Bereiter, C., & Scardamalia, M. (2012). Theory building and the pursuit of understanding. *Enhancing the Quality of Learning: Dispositions, Instruction, and Learning Processes*, *160*.

Bouko, C., & Alvarez, J. (2016). Serious gaming, serious modding and serious diverting… Are you serious. *Mapping the Digital: Cultures and Territories of Play, Lindsey Joyce and Brian Quinn, Inter-Disciplinary Press, Oxfordshire, UK*.

Boutonnet, V. (2015). Pratiques déclarées d'enseignants d'histoire au secondaire en lien avec leurs usages des ressources didactiques et l'exercice de la méthode historique. *McGill Journal of Education/Revue Des Sciences de L'éducation de McGill*, *50*(2–3), 225–246.

Brush, T., & Saye, J. (2008). The effects of multimedia-supported problem-based inquiry on student engagement, empathy, and assumptions about history. *Interdisciplinary Journal of Problem-Based Learning*, *2*(1), 4.

Chan, M., & Schoo, T. W. S. (2016). Knowledge Building Pedagogy and Technology: Enacting Principle-Based Design in History Classroom. *Transforming Learning, Empowering Learners*.

Clark, J., & Nye, A. (2017). "Surprise Me!"The (im) possibilities of agency and creativity within the standards framework of history education. *Educational Philosophy and Theory*, *49*(6), 656–668.

Cohen, J. D., Jones, W. M., Smith, S., & Calandra, B. (2016). Makification: Towards a Framework for Leveraging the Maker Movement in Formal Education. In *Society for Information Technology & Teacher Education International Conference* (Vol. 2016, pp. 129–135).

Demers, S. (2011). *Relations entre le cadre normatif et les dimensions téléologique, épistémologique et praxéologique des pratiques d'enseignants d'histoire et éducation à la citoyenneté: étude multicas*. Université du Québec à Montréal.

Duquette, C. (2011). *Le rapport entre la pensée historique et la conscience historique: élaboration d'un modèle d'interaction lors de l'apprentissage de l'histoire chez les élèves de cinquième secondaire des écoles francophones du Québec*. Université Laval.

Foster, A., & Shah, M. (2012). PCaRD: A model for teachers to integrate games in their classrooms. In *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 2525–2533).

Fu, F.-L., Su, R.-C., & Yu, S.-C. (2009). EGameFlow: A scale to measure learners' enjoyment of e-learning games. *Computers & Education*, *52*(1), 101–112.

Hicks, D., & Doolittle, P. E. (2008). Fostering analysis in historical inquiry through multimedia embedded scaffolding. *Theory & Research in Social Education*, *36*(3), 206–232.

Hirst, P. H. (1974). Knowledge and the Curriculum. *London: Rout Ledge and Kegan Paul*.

Koole, M., Dionne, J.-F., McCoy, E. T., & Epp, J. (2017). Makerspaces: Materializing, Digitizing, and Transforming Learning. In *Handbook of Research on Transformative Digital Content and Learning*

Technologies (pp. 211–230). IGI Global.
Kreijns, K., & Kirschner, P. A. (2004). Designing sociable CSCL environments. In *What we know about CSCL* (pp. 221–243). Springer.
Li, D. D., & Lim, C. P. (2008). Scaffolding online historical inquiry tasks: A case study of two secondary school classrooms. *Computers & Education*, *50*(4), 1394–1410.
Limón, M. (2001). On the cognitive conflict as an instructional strategy for conceptual change: A critical appraisal. *Learning and Instruction*, *11*(4), 357–380.
Martin, L. (2015). The promise of the maker movement for education. *Journal of Pre-College Engineering Education Research (J-PEER)*, *5*(1), 4.
Metzger, S. A., & Paxton, R. J. (2016). Gaming history: A framework for what video games teach about the past. *Theory & Research in Social Education*, *44*(4), 532–564.
Molin, L., & Grubbström, A. (2013). Are teachers and students ready for the new middle school geography syllabus in Sweden? Traditions in geography teaching, current teacher practices, and student achievement. *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, *67*(3), 142–147.
Moshirnia, A., & Israel, M. (2010). The educational efficacy of distinct information delivery systems in modified video games. *Journal of Interactive Learning Research*, *21*(3), 383–405.
Patino, A., Proulx, J.-N., & Romero, M. (2016). Analyse des mécaniques de jeu et d'apprentissage selon les principales théories de l'apprentissage. In *Dépassons nos frontières. Actes du colloque CIRTA 2016.* (Vol. 1, p. ##). Québec: CRIRES.
Piaget, J. (2012). *La psychologie de l'intelligence*. Armand Colin.
Rantala, J., Manninen, M., & van den Berg, M. (2016). Stepping into other people's shoes proves to be a difficult task for high school students: assessing historical empathy through simulation exercise. *Journal of Curriculum Studies*, *48*(3), 323–345.
Reisman, A. (2012). Reading like a historian: A document-based history curriculum intervention in urban high schools. *Cognition and Instruction*, *30*(1), 86–112.
Reisman, A. (2015). The difficulty of assessing disciplinary historical reading. In K. Ercikan & P. Seixas, *New directions in assessing historical thinking* (pp. 29–39).
Resendes, M., & Chuy, M. (2010). Knowledge Building for historical reasoning in Grade 4. In *Proc. 9th Int. Conf. Learning Sciences-Volume 2* (pp. 443–444). International Society of the Learning Sciences.
Resta, P., & Laferrière, T. (2007). Technology in support of collaborative learning. *Educational Psychology Review*, *19*(1), 65–83.
Romero, M., Hyvönen, P., & Barberà, E. (2012). Creativity in collaborative learning across the life span. *Creative Education*, *3*(4), 422.
Scardamalia, M., & Bereiter, C. (2003). Knowledge building environments: Extending the limits of the possible in education and knowledge work. *Encyclopedia of Distributed Learning*, 269–272.
Shah, M., & Foster, A. (2016). A Theoretical and Practical Framework for Facilitating Teachers to Use Game-Based Learning. *Proc. the European Conference on Games Based Learning*, *1*, 599–608.
Smith, M., & Breakstone, J. (2015). History assessments of thinking. An investigation of cognitive validity. In K. Ercikan & P. Seixas, *New Directions in Assessing Historical Thinking* (pp. 233–245).
Strong, S. (2017). Alternative Facts and the Post-Truth Society: Meeting the Challenge. *U. Pa. L. Rev. Online*, *165*, 137–147.
VanSledright, B. A. (2013). *Assessing historical thinking and understanding: Innovative designs for new standards*. Routledge.
Vygotsky, L. S. (1980). *Mind in society: The development of higher psychological processes*. Harvard university press.
Wirkala, C., & Kuhn, D. (2011). Problem-based learning in K–12 education: Is it effective and how does it achieve its effects? *American Educational Research Journal*, *48*(5), 1157–1186.
Young, M. F., Slota, S., Cutter, A. B., Jalette, G., Mullin, G., Lai, B., … Yukhymenko, M. (2012). Our princess is in another castle a review of trends in serious gaming for education. *Review of Educational Research*, *82*(1), 61–89.