SCHOLARSHIP OF TECHNOLOGY ENHANCED LEARNING

SoTEL Symposium 15-17 February 2023

APC Methodology: educational technological design proposal to solve problems.

Carolina Pino, maria.pino@uai.cl
Ronnie Videla, rvidela@userena.cl

Keywords: APC Methodology, Assistive Technology, High Education, Well-Being.

Abstract

Technology Enhanced Learning (TEL) is a teaching and learning approach that uses various forms of technology to enhance the learning experience (Cochrane, Redmond, and Corrin, 2018). One example of TEL is the use of digital fabrication, where we can find various open-source prototyping platforms in educational settings (Gerbic & Maher, 2008). In the present study, we implemented TEL based on a process of observation and prototyping, which attempts to open a space for the design of assistive devices for the elderly to improve their quality of live, at ADAPTA, an assistive tech event in Chile, where elderly people and students participated in a domestic problem-solving activity (Gunn & Peddie, 2008). Following the 2018 OECD objectives that aspire to an education that promotes individual, social and planetary well-being, we pay special attention to the domestic problems experienced by older adults. Considering that 16.2% of Chile inhabitants are over 60 years of age and, according to data from the Casen Survey, some 460,000 elderly people live in single-person households in Chile, it is important to pay attention to how aging creates difficulties in mobility and coexistence with the environment of the domestic space, with the handling of forces and weights, difficult access, unattainable heights, etc...

In our study, we used the Autonomous Project Cell methodology (APC). This is a four-step process that can be used in conjunction with digital design processes and digital fabrication to support TEL (Videla, Veloz & Pino, 2023). The four steps are: (a) Observation: This step involves students observing and documenting their surroundings or a specific problem they want to solve (b) Documentation: In this step, students document their observations and ideas in a clear and organized manner (c) Make/reflect: In this step, students used analog drawing and sketches, digital drawing, and digital fabrication. This can involve programming the Arduino using a variety of programming languages, such as C++ or Python, and connecting various electronic components to the Arduino to create their desired outcome. (d) Show and Tell: In the final step, students present their prototype to their peers and teachers/guides, demonstrating the working of their solution and explaining the process they followed to create it. A relevant aspect of this methodology is that it allows the cultivation of 21st Century skills, through challenging projects that encourage the four Ps – Project, Passion, Peers and Play (Resnick, 2017).

The workshop took place at a municipal space (Hub Providencia) in Santiago Chile, which met every week, showing the elderly a variety of possible solutions to start observing in their homes, how they interacted with space and usability. Through a qualitative methodology of ethnographic design, different solutions that engineering students in design sciences provided to the problems of the elderly were described. Examples of possible 3D printed gadgets solutions: bottle opener, carry 3 bags, separating pages of a book. By following the APC methodology, students were engaged in authentic problem-solving activities and learning valuable skills, such as critical thinking, communication, and collaboration. The students used digital drawing and fabrication, and Arduino in TEL that helped the elder group to start designing from the drawing (pencil and paper) and followed by younger group of students, who were in charge of building the physical prototype. By providing hands-on opportunities for both groups of students to engage in authentic problem-solving activities, they could converge on physical products that were finally given from the younger students to the elder ones, such as a 2-meter tweezer to reach objects at height, bottle opener for lack of strength and take pots for too much weight.

References

OECD. (2018). *The future of education and skills: Education 2030*. Paris: OECD.
Cochrane, T., Redmond, P., & Corrin, L. (2018). Technology Enhanced Learning, Research Impact and Open Scholarship. Australasian Journal of Educational Technology, 34(3). https://doi.org/10.14742/ajet.4640

Gerbic, P. & Maher, M. (2008). Collaborative self-study supporting new technology: The Mahara e-portfolio project. In *Hello! Where are you in the landscape of educational technology? Proceedings ascilite Melbourne 2008*. http://www.ascilite.org.au/conferences/melbourne08/procs/gerbic.pdf

Gunn, C. & Peddie, R. (2008). A design-based research approach for eportfolio initiatives. In *Hello! Where are you in the landscape of educational technology? Proceedings ascilite Melbourne 2008*. http://www.ascilite.org.au/conferences/melbourne08/procs/gunn.pdf

Resnick M. (2017) Lifelong kindergarten: Cultivating creativity through projects, passion, peers, and play. MIT Press, Cambridge MA.

Videla, R., Veloz, T. and Pino, C. (2023). Catching the Big Fish from STEAM Education: Approach to Creativity from 4E Cognition. Constructivist Foundations. https://constructivist.info/special/edu21/