

## Collaborative reading in the physical-virtual environment: theory, design and software development of a socioenactive system

Rafael Eiki Matheus Imamura\*, Maria Cecília Calani Baranauskas

### Abstract

Collaborative reading is a pedagogical practice that allows discussion of texts while keeping an individual and collective interpretation of it, letting the readers assume an active role. This work proposes a framework, the Collaborative Reading in Physical-Virtual environment (CRPV), to use this type of reading in non-linear texts within a socioenactive system. The model was based on Organizational Semiotics, the structure of hypertexts and the enactivism concept. CRPV system changes the multimedia content in each text depending on how each user and group reads, aiming to be a socioenactive system. This concept can possibly shift the original notion of reading from an individual activity to a more collaborative form of interaction, especially in virtual environments that are the latest birthplaces of new literacy forms. Text structures of this CRPV model and multimodal interfaces matching them were created and scenarios of use case were planned, implementing those design aspects with contemporary technologies, such as augmented reality. One of these scenarios was tested and the first experiment showed that participants got highly motivated and engaged in the reading activity. This research has the potential to impact the education area, the reading process and the studies in multimodal interfaces, offering new, low cost and highly interactive environments.

### Key words:

*Collaborative reading, Socioenactive system, Design.*

### Introduction

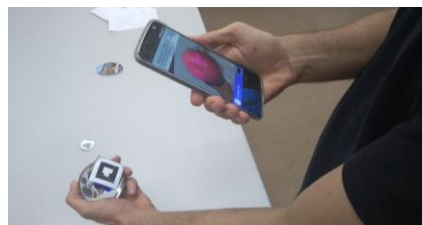
Collaborative reading is a pedagogical practice used to present different points of view over a text using individual reading and a moderator (BRASIL, 1998). It can help the development of critical thinking (ALVES, 2004).

There are systems that bring technology and reading together. LAO is a collaborative reading system in one-on-one reading (BANNAN-RITLAND, 2002) and there are uses of augmented reality (AR) for reading (KIRNER & ZORZAL, 2005). However, there is a lack of collaborative reading practices in groups that mix individual and collective interpretation through technology.

Our objectives are: (1) design a theoretical model of reading and interaction; (2) develop & evaluate CRPV socioenactive systems (BARANAUSKAS, 2015).

### Results and Discussion

CRPV first prototype was a web app using AR - with QR codes on physical objects - and accelerometer (Image 1).



**Image 1.** User with the first CRPV prototype.

The pilot experiment to test the prototype was executed with 4 users and 8 observers, all volunteer graduate students. They were asked to use the Think Aloud Protocol (BOREN & RAMEY, 2000), telling what they were thinking. The observers took notes about users' actions and intentions in the scenario. A simplification of AttrakDiff (HASSENZAHN, 2004) was used. It uses a scale between pairs of words to describe pragmatic and hedonic quality and attractiveness (ATT) perceived by the user. As results,

users fully agreed with the system having high ATT and with the adjectives: creative, captivating, pleasant, inviting and motivating. The system was also too "unpredictable". "confusing-clearly structured" pair received in-between ratings, showing that experience rules and structure must be clearer. Observers notes matched AttrakDiff results.

### Conclusions

This research presents a possibly engaging form of collaborative reading using technology. CRPV framework can help design other pedagogical tools and both enactive and socioenactive systems. The prototype needs more tests but AttrakDiff and observations showed a positive response to reading while keeping everyone's voice heard in a collaborative interpretation during the pilot experiment. The prototype was highly interactive and built with low cost technology.

### Acknowledgement

We thank the support from the Institute of Computing at the State University of Campinas, from PIBIC/CNPq and FAPESP (#2017/23023-7).

Alves, M. C. C. L. *Leitura colaborativa-crítica: A leitura como ato social e político.* Educação e Contemporaneidade, pp. 143-150, **2004**.

Bannan-Ritland, B. *Literacy access online.* TechTrends, v. 46, n. 3, p. 17-22, **2002**.

Baranauskas, M. C. C. *Socio-enactive systems: investigating new dimensions in the design of interaction mediated by information and communication technologies.* FAPESP process #15/16528-0, **2015**.

Boren, T. and Ramey, J. *Thinking aloud: Reconciling theory and practice.* IEEE transactions on professional communication 43.3, p. 261-278, **2000**.

Brasil. MEC. Secretaria de Educação Fundamental. *Parâmetros Curriculares Nacionais: terceiro e quarto ciclos do ensino fundamental: Língua portuguesa.* Brasília, **1998**.

Hassenzahl, M. *The interplay of beauty, goodness, and usability in interactive products.* Human-computer interaction, 19(4), 319-349, **2004**.

Kirner, C. and Zorzal, E. R. *Aplicações educacionais em ambientes colaborativos com realidade aumentada.* Brazilian Symposium on Computers in Education, pp. 114-124, **2005**.