

TEACHING CONTEMPORARY HISTORY TO HIGH SCHOOL STUDENTS: THE AUGMENTED LEARNING ENVIRONMENT OF CZECHOSLOVAKIA 38-89

by

VÍT ŠISLER, TEREZA SELMBACHEROVÁ,
JAROSLAV PINKAS, CYRIL BROM* **

This paper discusses the experimental implementation of a complex educational simulation, Czechoslovakia 38-89, in Czech high schools. The primary aim of this paper is to investigate the acceptance of Czechoslovakia 38-89 by teachers and students as a teaching tool for history education. We examine whether the simulation was successfully integrated into the formal schooling system and, if this was the case, what properties of the simulation contributed most to this success. We have used the theoretical framework of the Augmented Learning Environment (ALE) in the design and implementation of Czechoslovakia 38-89. The formulation of ALE stems from our previous research and has been so far used for the design and implementation of a different educational simulation, dealing with different content and knowledge domains. Therefore, the secondary aim of this paper is to investigate the usability of ALE as a design framework in a new context, i.e. contemporary history education. Thirteen high school and primary school classes evaluated the Czechoslovakia 38-89 prototype in autumn 2013. Nine teachers (5 males, 4 females) overall took part in the evaluation and we received 562 feedback questionnaires from students. The evaluation's key results show that students perceive the simulation to be attractive both in the in-school and out-of-school contexts. For

* All authors are affiliated to the Charles University in Prague, Faculty of Arts. Contact is possible at vit.sisler@ff.cuni.cz.

** This study was supported by the grant project DF11P01OVV030 "Příběhy z dějin československého státu: výzkum a experimentální vývoj softwarových simulací pro výuku historie českých zemí ve 20. století" financed by the Czech Ministry of Culture in 2011-2014.

teachers, it is a learning tool that fulfills its educational goals and motivates students to learn about Czech contemporary history. Finally, ALE has proven as a useful theoretical framework for design and implementation of the simulation, indicating its possible further usability in different contexts and knowledge domains.

KEYWORDS

Educational Simulations, Digital Game-based Learning, Czechoslovakia 38-89, Augmented Learning Environment, History Education

1. INTRODUCTION

It is generally agreed that the traditional process of schooling benefits from the use of computers as supporting tools.¹ One of the possible ways to integrate computer technology into classrooms is through digital game-based learning (DGBL).² Digital games and simulations support the representation of information in new forms, including the visualization of relationships between different objects and simulation of system behavior. They include immersive elements, such as narratives, audiovisual features and game play. Experimental studies suggest that the experience of “play” is particularly effective in preparing learners for labor-intensive, problem-solving or creative tasks, which require a high level of metacognitive skills.³ Recent meta-analyses on the instructional effectiveness of DGBL demonstrated educational games’ and simulations’ modest superiority over a “traditional” type of instruction.⁴ However, several scholars have remarked that teachers often look with skepticism upon the use of digital games in the classroom.⁵ Yet, as De Grove et al. argue, such remarks are often based on beliefs and do not necessarily reflect teachers’ actual opinions.⁶ The research of De Grove’s team suggests that what plays a crucial role in teachers’ adoption of digital games is not primarily their beliefs but rather how the re-

¹ Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C. & Schmid, R. F. 2011, ‘What Forty Years of Research Says About the Impact of Technology on Learning: A Second-Order Meta-Analysis and Validation Study’, *Review of Educational Research*, vol. 81, no. 1, pp. 4-28.

² Whitton, N. 2010, *Learning with Digital Games: A Practical Guide to Engaging Students in Higher Education*, Routledge, New York.

³ Whitebread, D., Coltman, P., Jameson, H. & Lander, R. 2009, ‘Play, Cognition and Self-regulation: What Exactly Are Children Learning When They Learn Through Play?’, *Educational and Child Psychology*, vol. 26, no. 2, pp. 40-52.

⁴ Wouters, P., van Nimwegen, Ch., van Oostendorp, H. & van der Spek, E.D. 2013, ‘A Meta-analysis of the Cognitive and Motivational Effects of Serious Games’, *Journal of Educational Psychology*, vol. 105, no. 2, pp. 249-265; Sitzmann, T. 2011, ‘A Meta-Analytic Examination of the Instructional Effectiveness of Computer-based Simulation Games’, *Personnel Psychology*, vol. 64, pp. 489-528.

spective game fits within the curriculum. As they state, "Teachers are required to teach predetermined learning content and this content needs to be taught within specific time frames. Digital games, however, are not typically designed to fit within these content- and time-related confines."⁷

In the Czech Republic, descriptive methods (the focus of which is the reproduction of extensive knowledge) generally prevail in the teaching of history.⁸ However, curricular reforms introduced in 2007 put greater emphasis on the development of key skills and competencies.⁹ Educational digital games and simulations are oftentimes based on knowledge of factual account of events. Not only do they develop students' skills and abilities to comprehend, compare and analyze factual sources and make their own critical judgments, but they also provide an alternative teaching aid to traditional history textbooks (in accordance with the above-mentioned curricular reform).

We discuss in this paper the implementation of a complex educational simulation called *Czechoslovakia 38-89* in Czech high schools and primary schools. *Czechoslovakia 38-89* was developed at the Faculty of Arts and the Faculty of Mathematics and Physics at Charles University in Prague and the Institute of Contemporary History of the Czech Republic's Academy of Sciences in 2013. The main target audience is students aged between 13 and 19. The simulation's general educational objective is to present students key events in Czechoslovak history during the second half of the 20th century (up to 1989) and enable them to "experience" these events from the perspectives of different individuals. The simulation aims to develop deeper understanding of the complex and multifaceted political, social and cultural

⁵ Baek, Y. K. 2008, 'What Hinders Teachers in Using Computer and Video Games in the Classroom? Exploring Factors Inhibiting the Uptake of Computer and Video Games', *Cyberpsychology and Behavior*, vol. 11, no. 6, pp. 665–671; Ketelhut, D. J. & Schifter, C. C. 2011, 'Teachers and Game-based Learning: Improving Understanding of How to Increase Efficacy of Adoption', *Computers and Education*, vol. 56, no. 2, pp. 539–546.

⁶ De Grove, F., Bourgonjon, J. & Van Looy, J. 2012, 'Digital Games in the Classroom? A Contextual Approach to Teachers' Adoption Intention of Digital Games in Formal Education', *Computers in Human Behavior*, vol. 28, pp. 2023–2033.

⁷ Ibid.

⁸ Šisler, V., Brom, C., Cuhra, J., Činátl, K. & Gemrot, J. 2012, 'Stories from the History of Czechoslovakia, A Serious Game for Teaching the History of the Czech Lands in the 20th Century – Notes on Design Concepts and Design Process', *Lecture Notes in Computer Science*, vol. 7522, pp. 67–74.

⁹ Rámcový vzdělávací program pro základní vzdělávání (Framework Education Program for Basic Education). VÚP Praha (2007). Available online: http://www.vuppraha.cz/wp-content/uploads/2009/12/RVPZV_2007-07.pdf (accessed 16.4.2012) (in Czech),

aspects of this time period. The simulation utilizes gaming elements and stems from the DGBL paradigm.

Thirteen high school and primary school classes evaluated the *Czechoslovakia 38-89* prototype in autumn 2013. Nine teachers overall took part in the evaluation and we received 562 feedback questionnaires from students. This paper's primary aim is to investigate the acceptance of *Czechoslovakia 38-89* as a teaching tool for history education. In other words, we examine whether the simulation was successfully integrated into the formal schooling system and, if this was the case, what properties of the simulation contributed most to this success.

We have used the Augmented Learning Environment (ALE) theoretical framework in the design and implementation of *Czechoslovakia 38-89*. The formulation of ALE stems from our previous research and has so far been used for the design and implementation of a different educational simulation, *Europe 2045*, which deals with international relations and European studies.¹⁰ Therefore, this paper's secondary aim is to investigate ALE's usability as a design framework in a new context and for new content and knowledge domains, i.e. contemporary history education.

Section 2 details the ALE theoretical framework. Section 3 introduces *Czechoslovakia 38-89*'s fundamental features and maps them in the ALE framework. Section 4 outlines the experimental evaluation, while Sections 5 and 6 present and discuss the evaluation's particular results. Section 7 summarizes our conclusions.

2. AUGMENTED LEARNING ENVIRONMENT

The ALE concept was first presented by Šisler et al.¹¹ and further developed by Brom et al.¹² ALE is a methodological framework, which abstracts the key aspects that seem to contribute most to the acceptance and integration of educational digital games and simulations into the formal schooling system. The following paragraphs briefly introduce ALE's key principles; for further details see Brom et al.¹³

¹⁰ Sisler, V., Brom, C. & Slavik, R. 2008, 'Towards a Novel Paradigm for Educational Games: The Augmented Learning Environment of *Europe 2045*', Entertainment and Media in the Ubiquitous Era, Eds. Lugmayr et al., pp. 34-38.

¹¹ Ibid.

¹² Brom, C., Sisler, V. & Slavik, R. 2010. 'Implementing Digital Game-based Learning in Schools: the Augmented Learning Environment of *Europe 2045*', Multimedia Systems, vol. 16, no. 1, pp. 23-41.

¹³ Ibid.

ALE's key principles could be summarized as follows: (1) the educational simulation/game has to combine four conceptually different spaces in which educational activities take place; (2) these spaces have to be connected by grounding links and causal links; and (3) these spaces' educational affordances have to be visible to both learners and teachers.

2.1 CONCEPTUAL SPACES

Principle (1): The educational simulation/game has to combine four conceptually different spaces in which educational activities take place. These spaces are: (a) the game space, (b) the information space, (c) the formal schooling space, and (d) the everyday space. Spaces refer to distinct contexts in which the learning takes place or a learning outcome is utilized.

The *game space* is defined by gaming objects whose internal state changes during the simulation, gaming roles which students assume in the simulated world, goals that the students can/should achieve and gaming rules that transform the states of objects and/or roles. The game space offers intrinsic motivation, curiosity, excitement and other gaming elements thanks to which players want to stay within this space or return to it.¹⁴ Additionally, gaming rules allow and force students to make decisions that influence the simulation and whose consequences are mediated by the simulation.

The *schooling space* presents the formal learning environment controlled and organized by a teacher. From the DGBL perspective, it is important that the schooling space promotes both learning real-world knowledge as well as acquiring knowledge that helps play the simulation (otherwise a gaming/learning tension arises).

The *information space* encompasses all informational resources related to real-world knowledge and also to the simulation: the information should help students make better decisions in the simulation (otherwise the gaming/learning tension once again increases) and teachers prepare lectures.

While these three spaces provide distinct social contexts in which students behave differently and have different expectations, they all have a common bond: they are organized around educational activities. There are many other contexts in which students can find themselves (a sports club, at home, at their job, etc.). We use the term *everyday space* to denote all of these

¹⁴ For a detailed discussion of what constitutes a game, see Egenfeldt-Nielsen, S., Smith, J. H., Tosca, S. P. 2008, *Understanding Video Games: The Essential Introduction*, Routledge, New York.

contexts. The outcome of the lessons will ultimately be employed here, meaning knowledge should be transferred to one of these everyday contexts.

2.2 GROUNDING AND CAUSAL LINKS

Principle (2): The different spaces mentioned above have to be connected by grounding and causal links. By *grounding links*, we mean that the material from the simulation has to be presented in, and made visibly relevant for, a real-world context. This can happen in two ways. First, when students roam around the information space, certain information can bring them to the everyday world. Second, when teachers discuss the simulated issues and give lectures, they have the opportunity to decontextualize these simulated issues and make them relevant to the everyday world. To capture these two means, we define two kinds of grounding links: links connecting the information space with the everyday space and links connecting the schooling space with the everyday space (Fig. 1).

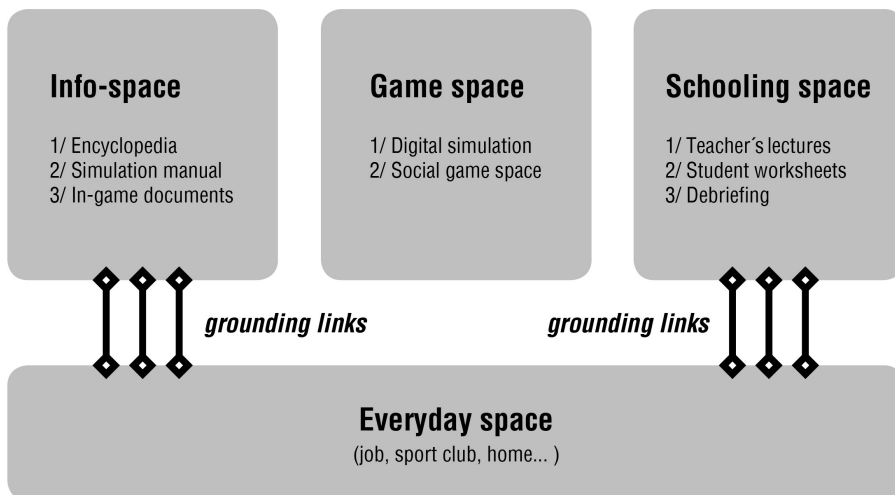


Fig. 1. Four conceptually-different spaces in ALE and the grounding links between the information space and the everyday space and the schooling space and the everyday space.

If the simulation is well designed, students search for information because they need it for success in the simulation. It is important that they are able to find this information, at least sufficiently often, and it must prove helpful to them. Moreover, students need to feel that they have achieved success (to some extent), because they have found the information for which

they were searching. To represent this causal chain, we speak about *bidirectional causal links* between the game space and the information space; and between the game space and the schooling space (Fig. 2).

Students can find information they need via causal links, and this information is grounded via grounding links. Through this mechanism, the system intrinsically encourages students to contextualize the simulation material into the everyday context; or everyday material into the simulation context.

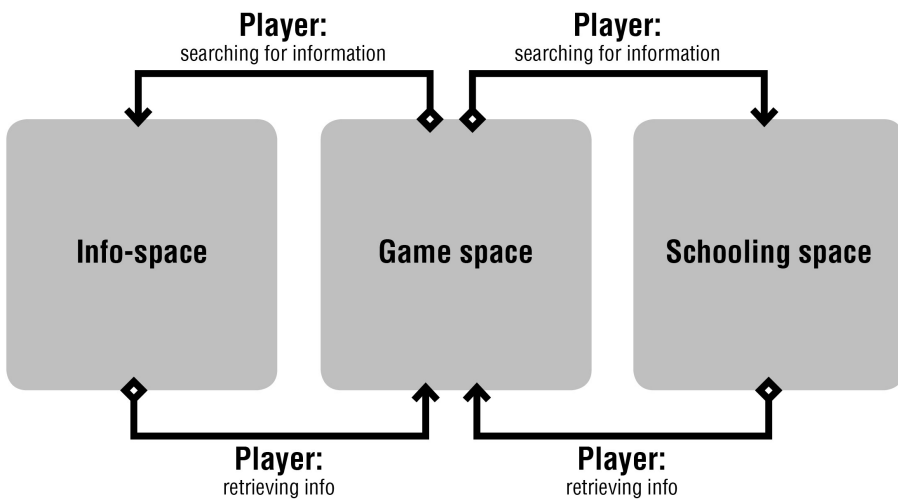


Fig. 2. ALE's information-seeking bidirectional causal links.

2.3 EDUCATIONAL AFFORDANCES

Principle (3): The educational affordances of the above-mentioned spaces have to be visible to both learners and teachers. The term affordance was coined by Gibson¹⁵ and later rearticulated by Norman.¹⁶ According to Norman, affordance refers to the perceived and actual properties of a thing; primarily the fundamental properties that determine how the thing could possibly be used. In other words, affordances provide clues to the operations of things without the need to explicitly instruct the users.¹⁷ The ALE framework conceives the technology as a set of affordances for constructing the educational environment: structuring forms of access to the educational

¹⁵ Gibson, J. J. 1979, *The Ecological Approach to Visual Perception*, Houghton Mifflin, Boston.

¹⁶ Norman, D. A. 1988, *The Psychology of Everyday Things*, Basic Books.

¹⁷ *Ibid.*, p. 9.

material, creating mechanisms for engaging students and teachers and designing possibilities for interaction between these two groups.

2.4 INTERSECTION OF SPACES

ALE's key feature stemming from the above-mentioned principles is the intersection of the game space and the schooling space. They blend in the classroom's real environment; unifying the gaming, learning and teaching processes in the same time-space framework. What does merge is not only the computer-enabled game space mediated by the simulation, but also the *social game space*. By social game space we mean the space (or situation) temporarily created in the classroom where students discuss their roles, set goals and decide their next steps in the simulation moderated by the teacher. The events in the social game space, e.g. students' voting on a solution to a simulated problem, have to directly influence the progress of the digital simulation and establish causal links between these two (Fig. 3).

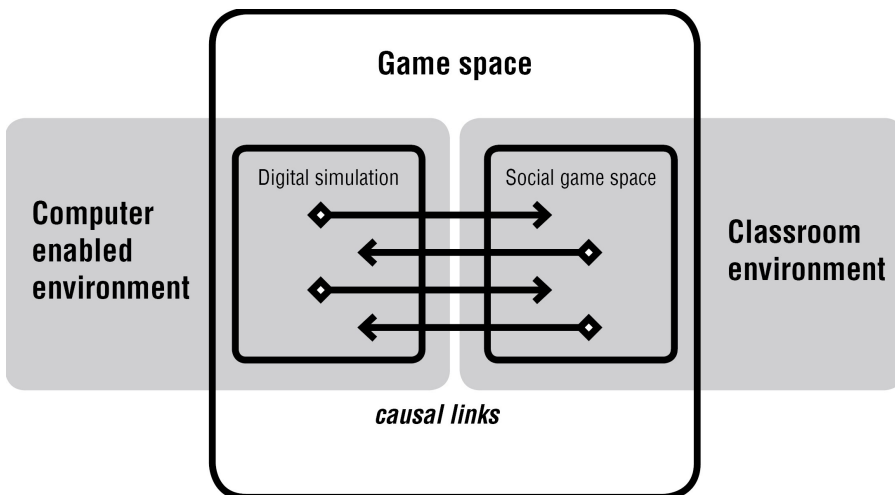


Fig. 3. Blending of the digital simulation and social game space in ALE and the causal links between these two environments.

The social game space redirects students' attention from the simulation's computer-enabled environment to the real environment, while preserving their immersion in the simulation and its gaming challenges. At the same time, the teacher "feels at home" in the social game space, which takes place in the classroom.

3. CZECHOSLOVAKIA 38-89

Czechoslovakia 38-89 is an educational simulation utilizing the principles of DGBL. It features a strong narrative, interactive comics and authentic audiovisual materials (Fig. 4). *Czechoslovakia 38-89*'s main educational goal is to develop a deeper understanding of the complex and multifaceted political, social and cultural aspects of key events in Czechoslovak history between 1938-1989 by presenting these events from the perspectives of multiple individuals. The following paragraphs briefly introduce the simulation (for further detail, see Šisler et al.).¹⁸

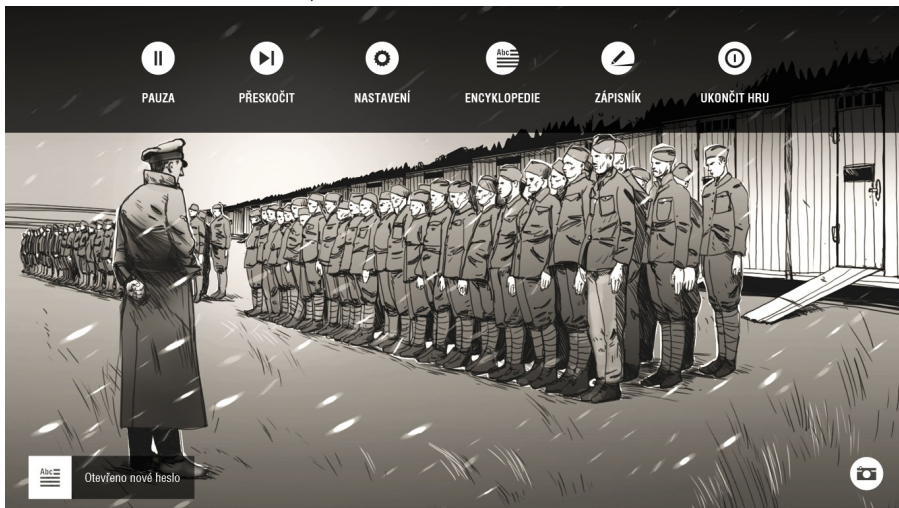


Fig. 4. *Czechoslovakia 38-89*. Interactive comics.

Czechoslovakia 38-89's content stems from historical research on the possible manifestations of experiencing the history of Czechoslovakia during the second half of the 20th century. It is also based on the personal testimonies of eyewitnesses to the above-mentioned periods. Nevertheless, *Czechoslovakia 38-89* does not adapt these real stories in a literal fashion; rather it uses them as sources for constructing realistic and appealing narratives. In doing so, *Czechoslovakia 38-89* enables us to produce appealing stories with a number of authentic details without “gamifying” the real persons’ – oftentimes ethically and emotionally-charged – testimonies.

¹⁸ Šisler, V., Brom, C., Cuhra, J., Činátl, K. & Gemrot, J. 2012, ‘Stories from the History of Czechoslovakia, A Serious Game for Teaching the History of the Czech Lands in the 20th Century – Notes on Design Concepts and Design Process, Lecture Notes in Computer Science, vol. 7522, pp. 67-74.

The simulation is organized hierarchically and is divided into individual modules that can be accessed independently. Each module covers a distinct set of historical events from the perspectives of multiple individuals. For the purpose of this paper, only the first module (1938 – 45), dealing with the dissolution of Czechoslovakia and the establishment of the Nazi Protectorate of Bohemia and Moravia, has been evaluated.

We have used the ALE concept in the design and implementation of *Czechoslovakia 38-89*. The following paragraphs detail how the different conceptual spaces, as envisioned by ALE, are manifested in *Czechoslovakia 38-89* and how the concept of grounding and causal links has influenced our design decisions.

In the *game space* enabled by *Czechoslovakia 38-89*, a student assumes a different role in individual modules, interacts with the “eyewitnesses” in the present and “travels” back in time through the “eyewitnesses’” memories evoked during conversations. The *Czechoslovakia 38-89* game space consists of four types of scenes: (a) animation, (b) interactive comics, (c) interactive games and (d) video interviews. Each type utilizes a different graphical style and design concept. They also provide different educational possibilities for teachers and different affordances for students. Animations and interactive comics essentially serve as vehicles for “pushing” the story forward and providing students with real-world background information; including multimedia and textual materials. Every module features several interactive games, each of which can be based on a different game genre, including point-and-click adventures, logical games, simple strategy games or action games. Each interactive game is intertwined with the module’s learning outcomes and these two do not constitute separate elements. Finally, video interviews represent the simulation’s core element: an interactive interview with an “eyewitness”, whose memories the player just learned about in the interactive comics and interactive game.

The *Czechoslovakia 38-89’s information space* consists of (a) a multimedia encyclopedia that presents the students factual information related to simulated events, (b) a simulation manual and (c) additional in-game textual and audiovisual documents.

Finally, *Czechoslovakia 38-89’s schooling space* is represented by a classroom, where students play and discuss the simulation. The teacher administers the simulation and presents it to the students using an overhead projector. The students discuss their decisions and the next steps they

would take in the simulation, e.g. the questions they would like to ask the “eyewitnesses”. Depending on their collective decision, the simulation progresses in a particular way; setting in turn an agenda for the next round of classroom discussions. After a short session with the simulation, the teacher continues with a lecture and/or the students engage in additional learning activities (e.g. by using supplemental worksheets). In both cases the content is directly related to the content previously seen in the simulation.

Thus, the *Czechoslovakia 38-89* social game space takes place in the classroom, where the digital simulation’s computer-enabled environment intersects with the “traditional” classroom environment. This intersection enables us to establish both grounding and causal links as proposed by ALE.

First, the teacher’s debriefing and short lectures establish the *grounding links* between schooling and everyday spaces. These contextualize the simulation’s content, i.e. the “eyewitnesses’” testimonies and the decisions made in the interactive games, and relate them to the real-world context. The authentic audiovisual documents used in the simulation meanwhile constitute grounding links between the information and everyday spaces.

Second, the students’ collective decisions on how to progress further in the simulation establish the *causal links* between the digital simulation and social game space and vice versa. The simulation development in turn sets the agenda for further classroom discussions.

4. EVALUATION STUDY: OVERVIEW

The study’s primary aim was to investigate the acceptance of *Czechoslovakia 38-89* as a teaching tool for history education. The study’s secondary aim was to investigate ALE’s usability as a design framework for the development and implementation of an educational simulation on contemporary history.

The study had two phases: the first one (Phase 1) investigated the acceptance of the simulation outside the formal schooling environment, while the second one (Phase 2) examined acceptance within the formal schooling environment. In other words, while Phase 1 deals primarily with the game and information spaces of *Czechoslovakia 38-89*, Phase 2 takes into account all the conceptual spaces of the simulation as outlined by ALE.

In Section 5 we describe all findings gathered during Phase 1. The participants were of high school age (15-20 years old), and we mainly gathered

information about how they liked the simulation's graphic design and whether they considered the simulation to be attractive, modern and authentic. We also wanted to know what advantages and disadvantages they saw in learning by simulation (compared to traditional lessons) and if the simulation gave them "something new". Phase 1's main aim was to verify that *Czechoslovakia 39-89's* game and information spaces work well for the participants (technically and socially) – i.e. to eliminate the problem of low acceptance due to poor game space design, poor information space content or lack of grounding links between the information space and real-world context.

Section 6 focuses on evaluating the simulation in 13 Czech primary and secondary schools (attended by students aged between 13-20 years). In this phase we collected both teachers' and students' evaluations. The latter gave us comprehensive insight into the usability and operability of *Czechoslovakia 38-89* in a formal schooling context.

5. PHASE 1: EVALUATION OUTSIDE THE SCHOOL ENVIRONMENT

We presented *Czechoslovakia 38-89* at three events, where participants had the opportunity to interact with it. We recruited a total of 86 participants (51 males, 35 females).

5.1 EVENT 1: GAMEFFEST IN CHOTĚBOŘ

5.1.1 METHOD

The simulation was installed during summer 2013 at the "GameFFest" in Chotěboř. The installation was located in a hall with other presentations/projects, so there was some background noise. Visitors could play the simulation using laptops equipped with headphones and at least 13"-wide screens. The participants could use a mouse or a touch pad to control the simulation.

Participants, who showed an active interest in the simulation, had a chance to play it ($N = 41$; 25 males, 16 females; aged between 15-20 years). Up to four participants could play at any given time and each played for approximately 10 minutes. The participants were afterwards asked to fill in a pen-and-paper questionnaire. A brief informal interview on the topic of

“How did it go? How did you like the simulation?” followed immediately after participants completed the questionnaire.

The questionnaire solicited information about participants’ age and gender. It also asked participants the following four questions based on a 6-point Likert scale:

Like: *How did you like the simulation’s graphic design? (1 - I really like it, 6 - I really dislike it)*

Attractiveness: *Is the simulation’s graphic design attractive to you? (visual aspect) (1 – It is really attractive, 6 – It is absolutely unattractive)*

Modernity: *Do you perceive the simulation’s graphic design to be modern? (visual aspect) (1 - really modern, 6 - absolutely not modern)*

Authenticity: *Does the simulation seem authentic to you? (1 - really authentic, 6 - absolutely unauthentic)*

5.1.2 RESULTS

Quantitative findings show the game was accepted very well (Tab. 1). Relevant comments from interviews were clustered into seven coherent groups; plus one group for diverse other (yet relevant) comments (Tab. 2). The data also support the acceptance of *Czechoslovakia 38-89* by its target audience of high school-age students.

Tab. 1. Event 1: Attitudes toward *Czechoslovakia 38-89*

Questions	mean	SD
Like	1.54	0.71
Attractiveness	1.63	0.73
Modernity	1.88	0.87
Authenticity	1.78	0.82

Tab. 2. Characterization of *Czechoslovakia 38-89* by participants with sample comments (the number of participants, who mentioned this characteristic are in parentheses). An additional 26 comments belonged to the group “Other comments” and 14 comments were irrelevant to the simulation.

Comment Group	Sample Comment
Short positive comment (7)	I like it. It is nice.
Good for teaching (6)	It is an interesting tool for teaching history.

Is it a game? (4)	It is more like an interactive presentation. I would not call it a game.
Too long (3)	The talking was quite lengthy from time to time. I expected a little more action.
Interesting (2)	It has been put together in a very interesting way. It is something new – there is nothing similar available yet. I like that it combines history with the present. I enjoyed it.
Work with questions (2)	I liked that I could ask the person questions on what interests me. Then I see the information right there in that scene. I would not change anything.
Boring (2)	It is boring. For example, you include additional text about history in the simulation/game.

5.2 EVENTS 2 AND 3: FACULTY OF MATHEMATICS AND PHYSICS AT CHARLES UNIVERSITY IN PRAGUE

5.2.1 METHOD

The simulation was presented on two other occasions, where Charles University in Prague's Faculty of Mathematics and Physics demonstrates its activities to high school students and teachers: *Computer Science Day* (CSD) and *Open Day* (OD) (Autumn 2013). The computers and their monitoring was the same as for Event 1.

Participants, who showed an active interest in the simulation, had a chance to play it for approximately 10 minutes ($N = 45$; CSD: $n = 23$; 7 males, 16 females; OD: $n = 22$; 19 males; 3 females). They were asked afterwards to complete a short pen-and-paper questionnaire. The questionnaire solicited information about participants' age and gender. It also asked participants the following two questions based on a 6-point Likert scale:

Like: How did you like the simulation? (1 - I really like it, 6 - I really dislike it)

Something new: Did you learn “something new” from the simulation? (1 - Definitely yes, 6 - Definitely no)

At the OD event two additional open-ended questions were asked.

Advantages: What are the main advantages of using educational simulations compared to classical (frontal) teaching?

Disadvantages: What are the main disadvantages of using educational simulations compared to classical (frontal) teaching?

5.2.2 RESULTS

Students assessed the simulation very positively at both events (*Like* question: Mean = 1.58; SD = 0.54). After approximately ten minutes of playing, they already felt that the simulation offered them “something new”. This is a surprisingly positive result, given that game play for the whole simulation would take much longer (*Something new* question: Mean = 2.36; SD = 1.19).

As concerns the *Advantages* and *Disadvantages* questions, we received a total of 71 (61 by male, 10 by female) educational advantages for the simulation and 26 (22 by male, 4 by female) disadvantages (counting only comments that were related to the simulation). We clustered the advantages and disadvantages post-hoc into twelve categories and an additional category “Other” (Tab. 3). The categories represent the main advantages of using educational simulations compared to classical (frontal) teaching.

Tab. 3. Advantages mentioned by participants (the number of participants, who mentioned the importance of a particular advantage, are shown in parentheses).

The atmosphere at the time (11)
More entertaining (9)
Immersion into the action, getting a feeling for the situation (7)
Using the advantages of games: excitement, adventure, etc. (7)
Arousing interest (6)
“Eyewitness” narrations (6)
Authentic materials (4)
I’m learning without even noticing (3)
Possibility to influence the story in an active way (3)
Better to memorize (3)
Interactive (3)
Illustrative/vivid (3)
Other (6)

Among the 26 negative statements mentioning the disadvantages of simulations compared to traditional teaching, there were 14 comments that contained specific disadvantages of *Czechoslovakia 38-89* and nine comments representing attitudes toward educational simulations in general. The former comments were addressed in further development proposals, while the latter comments are summarized in Tab. 4.

Tab. 4. Full list of negative statements concerning general attitudes toward educational simulations.

The simulation's structure is limited (2)
Delivery of the information takes more time [than in classical lessons]
Availability/accessibility [of a simulation]
Social interaction is missing
Production costs [of a simulation]
It can be difficult for students to know what they must write down/re-member from the lessons when using a simulation
Technical aspects of the simulation's functioning

5.3 DISCUSSION

We can conclude from the results above that the educational simulation *Czechoslovakia 38-89's* game space is accepted well by the target audience. The participants generally liked the simulation (Tab. 1 and Sec. 5.2). They considered it suitable for learning (Tab. 2). The simulation represented and reproduced well the atmosphere of the given time period and it immersed the participants in the process (Tab. 3). We have found no differences in perceptions of the simulation among male and female participants.

6. PHASE 2: EVALUATION IN A FORMAL SCHOOLING ENVIRONMENT

Phase 1's positive results allowed us to proceed with the evaluation of *Czechoslovakia 38-89* in a formal schooling environment. Nine teachers from 9 schools in the Czech Republic took part in the evaluation. For brevity's sake, we present only a portion of our data here. It comes from three sources: the students' feedback after lectures, the teachers' feedback after lectures and the teachers' final reports. We divided the following analysis

into the first part concerning teachers (Sec. 6.1) and the second one concerning students (Sec. 6.2).

6.1 TEACHERS' REPORTS ABOUT THE EDUCATIONAL SIMULATION, CZECHOSLOVAKIA 38-89

6.1.1 METHOD

A total of nine teachers (five male, four female) from six high schools and three primary schools experimentally implemented the simulation. All teachers voluntarily signed up for the project and received monetary compensation for it.

We designed five Exemplary Lessons (EL); each using a specific part of the simulation. We provided additional materials for each lesson (historical videos, caricatures/cartoons, activities for students, historical texts, etc.). The teachers' task, after they had undergone a three-hour training, was to

- 1) integrate *Czechoslovakia 38-89* into their regular teaching,
- 2) explain the simulation to their students,
- 3) teach a pre-selected number of ELs (each teacher could choose the amount of lessons he/she would teach),
- 4) follow the prescribed teaching methodology,
- 5) fill in a detailed feedback report for every EL taught,
- 6) collect and evaluate students' feedback on the simulation,
- 7) write a final report that comprehensively evaluates use of the simulation in their school.

The teachers taught a total of 30 lessons in 13 different classes. They used a *Czechoslovakia 38-89* prototype that we provided, a school computer and an overhead projector. The feedback report for each EL included 26 questions on the following topics: the progress of the individual lesson, students' reactions, evaluation of the usefulness of content taught and an evaluation of the simulation's concept.

Of the questions that were relevant to the topic of this study, only the following question yielded quantitative results:

Interest: *Assess how interested students were in the subject matter presented, compared to the other methodological teaching approaches.*

a) *Compared with other teaching methods the students were more interested.*

b) *The methods used did not have any influence on students' interest in the lesson.*

c) *The students' interest in the lesson was lower using this method than when using other methods.*

d) *Other/comment* _____

Two teachers did not deliver their reports in the prescribed form, and thus we did not analyze their responses to this question.

The other questions relevant to this study yielded qualitative results. We clustered answers post hoc into eight thematic groups:

1. *Czechoslovakia 38-89's usefulness in the school setting*
2. *Function Czechoslovakia 38-89 accomplishes in education*
3. *Significance of activating elements (mini-games, comics)*
4. *Motivation and activation of the students*
5. *Demands on teacher preparation*
6. *Achievement of educational goals*
7. *Student attentiveness*
8. *Overall assessment of Czechoslovakia 38-89*

6.1.2 RESULTS

As concerns the *Interest* question, teachers rated 79 lessons with *Czechoslovakia 38-89* (out of 100) as more interesting for students compared to other teaching methods. They rated none as less interesting.

The qualitative findings, organized around eight topics, are as follows:

1. *Czechoslovakia 38-89's usefulness in a formal schooling setting*: Teachers had a very positive reaction to *Czechoslovakia 38-89*. They saw the potential the simulation has for teaching Czech contemporary history. Simulation gave them the opportunity to teach about the respective historical period in a way that was comprehensible for the students. The simulation helped immerse the students in historical events.

2. *Function Czechoslovakia 38-89 accomplishes in education*: The teachers agreed that *Czechoslovakia 38-89* served as a supplementary educational tool. The simulation was not sufficient without an appropriate historical interpretation by the teacher. The simulation could not provide answers to all the students' questions.

3. *Significance of activating elements (mini-games, interactive comics)*: The educational simulation, *Czechoslovakia 38-89*, links gaming elements with didactic concepts. The teachers rated the use of mini-games and comics to activate students very positively. The students spent the whole day at school

“overloaded” with information. Therefore mini-games helped to regain their attention.

For brevity’s sake, the remaining topics are presented in Tab. 5.

Tab. 5. Five topics, which present teachers’ statements on *Czechoslovakia 38-89* (each row represents one teacher’s answers).

	<i>4. Overall evaluation</i>	<i>5. Achievement of educational goals</i>	<i>6. Motivation / activation of students</i>	<i>7. Amount of preparation for the teacher</i>	<i>8. Students’ attention levels</i>
T1	excellent	yes	really good	same as for the standard lesson	higher
T2	very good	yes	really good	a bit more challenging	higher
T3	excellent – very good	yes	really good	same as for the standard lesson	higher
T4	excellent	yes	N/A	same as for the standard lesson	the same
T5	excellent	yes	N/A	same as for the standard lesson	N/A
T6	very good	yes	much better than normal	a bit more challenging	a little bit higher
T7	very good	yes	good	same as for the standard lesson	higher
T8	very good	yes	really good	more challenging	a little bit higher
T9	very good	N/A	really good	N/A	a little bit higher

6.2 STUDENTS' REPORTS ON CZECHOSLOVAKIA 38-89

6.2.1 METHOD

The evaluation involved students from classes using *Czechoslovakia 38-89* as described in Sec. 6.1.1. Students (aged between 13-20 years) played the simulation either during history lessons, extra seminars or at home; depending on their teacher's preference. Students completed a short pen-and-paper questionnaire at the end of each EL. In cases where they played at home, the final reflection took place in school during the next lesson. Because some students took part in several ELs using the simulation, their opinion appeared in the analysis several times. We received 562 feedback questionnaires overall. Students from two classes did not fill in the questionnaires, so they were not included in the analysis.

The following two yes-no questions from the questionnaire were relevant for this study:

Attractiveness: *In comparison to the 'traditional' teaching methods, this lesson was more appealing / attractive to me.*

Interest: *I am interested in more history lessons that use these materials and methods.*

6.2.2 RESULTS

Students clearly preferred lessons using the simulation and reported that they were interested in more such lessons (Tab. 6).

Tab. 6. Students' comparison of simulation to traditional teaching

Attractiveness:	
4a yes	473
4b no	58
4c other	31
Interest:	
7a yes	501
7b no	61

6.3 DISCUSSION

Phase 2's results strongly indicate that both teachers and students had a very positive reaction to *Czechoslovakia 38-89* (Sec. 6.1.2, 6.2.2). Factors that seem to contribute most to their positive assessments include motivation, immersion and subjectively perceived learning possibilities (Sec. 6.1.2). The teachers considered the amount and difficulty of preparation needed to teach using the simulation to be acceptable (Tab. 5). Students were interested in using the simulation for learning and they considered this learning method attractive (Tab. 6). This outcome corroborates Phase 1 findings (Tab. 1).

The successful acceptance of *Czechoslovakia 38-89* by teachers and students as a learning tool, and its integration into the formal schooling system, indicate that the ALE framework can be successfully used for design and implementation of educational simulations in the context of contemporary history education. In terms of ALE, students positively accepted both the simulation's game space (Tab. 1) and its schooling space (Tab. 6). Similarly, teachers appreciated the game space as immersive, motivating the students and able to keep their attention (Sec. 6.1.2). The results also indicate that students perceived the simulation to be authentic (Tab. 1) and appreciated the use of authentic audiovisual materials and documents (Sec. 5.2.2). In terms of ALE, these materials represent grounding links between the information space and everyday space. Finally, students mentioned the possibility to actively influence the story by their decisions, i.e. the causal links between the digital simulation and the social game space, as an advantage of the simulation (Sec. 5.2.2).

The present study is not without limitations. First, it is important to note that we have not conducted a formal assessment of students' knowledge apart from collecting their own feedback and soliciting final reports from teachers. We plan tests of factual knowledge as part of future work. Second, our experimental evaluation study sample was not unbiased. We can assume that teachers, who voluntarily attended our instructional seminar and implemented *Czechoslovakia 38-89* in their courses, represent a sample of the more avant-garde educators among Czech secondary school history teachers. The educational simulation, *Czechoslovakia 38-89*, is currently being prepared for a second round of experimental evaluation; aiming to investigate

a more traditional and diverse audience. *Czechoslovakia 38-89*'s large-scale integration into the formal educational system remains a future challenge.

Study results seem to indicate ALE's possible further usability as a general framework for design and implementation of educational simulations in different contexts and knowledge domains. However, caution is needed in interpreting the results and lessons learned from this study. First, we have successfully integrated only two educational simulations based on ALE into formal schooling system so far, i.e. *Europe 2045*¹⁹ and *Czechoslovakia 38-89*. More diversified evidence is needed, i.e. more simulations stemming from the ALE framework that use different designs and deal with different knowledge domains. Second, as we have suggested in Brom et al.²⁰, the most straightforward way of finding evidence to support/refute ALE would be to corrupt some of the causal or grounding links in a particular simulation (or cripple either the information space or the schooling space) and compare a group of participants playing this altered simulation with a control group playing the normal simulation.²¹ This remains a challenge for future research.

7. CONCLUSION

This study investigated the acceptance of the educational simulation, *Czechoslovakia 38-89*, as a teaching tool for education in the field of history. It utilized a *Czechoslovakia 38-89* prototype that we implemented experimentally in formal education settings in 13 classes. Both teachers and students evaluated the prototype. First, we asked whether the simulation had been successfully integrated into the formal schooling system and, if this was the case, what properties of the game contributed most to this success. Second, we investigated the usability of ALE as a design and implementation framework in the context of history education. Key findings indicate that both teachers and students had positive acceptance of the *Czechoslovakia 38-89* educational simulation. Students considered the simulation to be attractive in both the academic and extracurricular/free-time settings. We found that, on average, both by girls and boys alike appreciate the simulation. Teachers considered it a learning tool that fulfilled its educational goals. They viewed

¹⁹ Brom, C., Sisler, V. & Slavik, R. 2010. 'Implementing Digital Game-based Learning in Schools: Augmented Learning Environment of 'Europe 2045'', *Multimedia Systems*, vol. 16, no. 1, pp. 23-41.

²⁰ Ibid.

²¹ Ibid.

it as a tool that also activates and motivates students to learn about Czech contemporary history. Factors that seem to contribute most to *Czechoslovakia 38-89's* positive assessment include motivation, immersion and subjectively perceived learning possibilities. Finally, ALE has proven to be a useful theoretical framework for the simulation's design and implementation, indicating its possible further usability in different contexts and knowledge domains.

REFERENCES

- Baek, Y. K. 2008, 'What Hinders Teachers in Using Computer and Video Games in the Classroom? Exploring Factors Inhibiting the Uptake of Computer and Video Games', *Cyberpsychology and Behavior*, vol. 11, no. 6, pp. 665–671
- Brom, C., Sisler, V. & Slavik, R. 2010. 'Implementing Digital Game-based Learning in Schools: the Augmented Learning Environment of 'Europe 2045'', *Multimedia Systems*, vol. 16, no. 1, pp. 23-41.
- De Grove, F., Bourgonjon, J. & Van Looy, J. 2012, 'Digital Games in the Classroom? A Contextual Approach to Teachers' Adoption Intention of Digital Games in Formal Education', *Computers in Human Behavior*, vol. 28, pp. 2023–2033.
- Egenfeldt-Nielsen, S., Smith, J. H., Tosca, S. P. 2008, *Understanding Video Games: The Essential Introduction*, Routledge, New York.
- Gibson, J. J. 1979, *The Ecological Approach to Visual Perception*, Houghton Mifflin, Boston.
- Ketelhut, D. J. & Schifter, C. C. 2011, 'Teachers and Game-based Learning: Improving Understanding of How to Increase Efficacy of Adoption', *Computers and Education*, vol. 56, no. 2, pp. 539–546.
- Norman, D. A. 1988, *The Psychology of Everyday Things*, Basic Books.
- Rámcový vzdělávací program pro základní vzdělávání (Framework Education Program for Basic Education). VÚP Praha (2007). Available online: http://www.vuppraha.cz/wp-content/uploads/2009/12/RVPZV_2007-07.pdf (accessed 16.4.2012) (in Czech)
- Sisler, V., Brom, C. & Slavik, R. 2008, 'Towards a Novel Paradigm for Educational Games: The Augmented Learning Environment of Europe 2045', *Entertainment and Media in the Ubiquitous Era*, Eds. Lugmayr et al., pp. 34-38.

Šisler, V., Brom, C., Cuhra, J., Činátl, K. & Gemrot, J. 2012, 'Stories from the History of Czechoslovakia, A Serious Game for Teaching the History of the Czech Lands in the 20th Century – Notes on Design Concepts and Design Process, *Lecture Notes in Computer Science*, vol. 7522, pp. 67-74.

Sitzmann, T. 2011, 'A Meta-Analytic Examination of the Instructional Effectiveness of Computer-based Simulation Games,' *Personnel Psychology*, vol. 64, pp. 489–528.

Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C. & Schmid, R. F. 2011, 'What Forty Years of Research Says About the Impact of Technology on Learning: A Second-Order Meta-Analysis and Validation Study', *Review of Educational Research*, vol. 81, no. 1, pp. 4-28.

Whitebread, D., Coltman, P., Jameson, H. & Lander, R. 2009, 'Play, Cognition and Self-regulation: What Exactly Are Children Learning When They Learn Through Play?', *Educational and Child Psychology*, vol. 26, no. 2, pp. 40-52.

Whitton, N. 2010, *Learning with Digital Games: A Practical Guide to Engaging Students in Higher Education*, Routledge, New York.

Wouters, P., van Nimwegen, Ch., van Oostendorp, H. & van der Spek, E.D. 2013, 'A Meta-analysis of the Cognitive and Motivational Effects of Serious Games', *Journal of Educational Psychology*, vol. 105, no. 2, pp. 249-265.