

Tempus Alatum: Playing Through the Branches of the Timeline

Peter Mozelius and Andreas Hellerstedt

Mid Sweden University, Sweden

Peter.Mozelius@miun.se

Andreas.Hellerstedt@miun.se

Abstract: Modern history education has largely moved away from rote learning, including the memorisation of dates of particular events. However, in order to understand causal explanation, students still need a good grasp of chronology. Consequently, this is an area where history students currently tend to be particularly weak. In the game *Tempus Alatum*, chronological time is visualised through a combination of a timeline and a technology tree. These two elements are both constructed in game play using cards. The cards, in turn, are based on specific course content. The timeline element uses cards to place historical events in chronological order, in relation to each other. Timelines have seen implementation in historical trivia as well as entertainment games such as the recent *Hitster* series. Technology trees are hierarchical, visual, and often cyclical graphs. They have been commonly used in strategy video games like *Civilization* to represent the progression of research and development, but were also originally conceived using cards. This paper presents and discusses a gameplay design for a card driven game that is aligned to concrete learning objectives in an introductory history course, through the combination of these two elements. With the use of the Design Science Research framework this study had a focus on the initial phases of 1) Explicating the problem, and 2) to define the requirements for the *Tempus Alatum* game. Data were collected in a combination of a literature review, a study of earlier development projects at the university, and a game analysis. The suggested game design is trans-medial, and the initial analogue card game is intended for later implementation as an analogue, digital, and/or hybrid game. The fundamental purpose is to create a game to re-invigorate a neglected, but crucial component in online university courses on history. Moreover, the suggested game is intended as a tool for self-learning with a concrete alignment to specific learning objectives in higher education history courses.

Keywords: Game-based learning, Timeline, Technology trees, History education, *Tempus Alatum*, DIY games

1. Introduction

At the same time as modern history education has moved away from rote learning and memorisation of dates of particular details, the chronology of essential events remains important. This is an area where university students currently tend to be particularly weak since this has not been part of their primary and secondary school history syllabi. As suggested by Hodkinson and Smith (2018), there is a need for research on how the concept of chronology could be learnt in a joyful way that engenders a passion for history. A joyful and motivating learning activity with a long history (Hellerstedt & Mozelius, 2017), is to involve games in educational contexts. Today, the vast majority of the contemporary population plays some type of game (Juul, 2012), while research indicates decreased reading motivation (Jennah & Sholah, 2025; Shepard, 2017).

Current educational games today are inspired by different game genres and popular leisure games, but are also designed to support specific learning objectives. A popular and widely played timeline game is the Swedish music party game *Hitster*, in which the first player to arrange 10 music hits in chronological order wins the game. Strategy games involving historical development such as *Civilization* often implement a technology tree structure to represent various types of chronological progression (Hellerstedt & Mozelius, 2023). The *Tempus Alatum* game presented in this paper is a mix of a timeline game and a technology tree game. It is also a Do-it-yourself (DIY) game, with DIY games being defined as games which are modified or created entirely by the players themselves. In this study, the educational DIY game *Tempus Alatum* is a game created by teachers for further modification and co-creation between teachers and students in playful collaboration.

The aim of this paper is to present and discuss the design and development of *Tempus Alatum*. The suggested educational game that teachers can redesign and tailor to their individual requirements, is card driven and is meant to be aligned to specific learning objectives in history courses. In this paper the focus lies on presenting the analogue prototype of *Tempus Alatum*, but the general game design this is trans-medial. Future work will include the implementation and evaluation of a digital version of the game for self-studies on computers or mobile phones.

2. Extended Background

Educational games today are based on a wide variety of game genres. *Tempus Alatum* combines the tech tree and timeline mechanics. The first analogue implementation of the game has also been designed as a Do-it-yourself (DIY) game for teachers to modify and print out without specialised or expensive technology.

2.1 Technology Tree and Timeline Games

Previous research points to two game-based learning approaches as particularly relevant for history education: timeline games and technology tree games. Timelines have been used as teaching tools for hundreds of years. Timeline *games* have been advocated as a strong tool for teaching not only chronology, but also for facilitating understanding of more complex interconnections and historical causality. Drawbacks are also obvious, as traditional timelines can tend to reinforce Western, Eurocentric or even colonial perspectives on history, and present events as being both decoupled from their immediate contexts and as teleologically pre-determined or deterministic. (Monroe 2023, Denial 2013)

Technology trees have been discussed in similar terms. They have been regarded as representations of a form of theoretical understanding of historical causality, facilitating a structural analysis of the interplay between economy, politics and technology. Criticisms have also been voiced about the risk of reproducing traditional Western narratives of societal progress. (Ghys 2012, Hellerstedt & Mozelius 2023, Slocombe 2019) Previous studies have also pointed to a different type of problem in using game-based learning for history education. While there are many suitable games, these are often ambitious and correspondingly time-consuming. Furthermore, they may not match existing course structures and objectives if used “off the shelf”. (McCall 2016; Wainwright 2014; Hellerstedt & Mozelius, 2023)

2.2 Do-it-yourself Games

Commercial-of-the-shelf (COTS) games are often well-designed, with high-quality graphics. In the domain of history, a wide array of COTS comprising realistic scenarios with correct underlying facts are available. However, as found by Mozelius et al. (2017), many history teachers like the history games that their students play, but do not find them easy to adapt and integrate in their teaching and learning activities. Therefore, game concepts that teachers can modify and co-modify together with their students would seem to be a way forward. This approach has been long since established in the realm of digital games, but requires coding skills (Fine, 1991; Mayuni et al., 2024) rarely found among history teachers.

Educational DIY games defined as games that are modified, or entirely created by the players or instructors themselves open up the possibility of concrete alignment to course content and learning objectives. DIY games range from homemade physical board games using everyday household materials, to video games and hybrids. The common denominators are simplicity and affordability characteristics which also enable adaptation to specific learning objectives. The idea of DIY board games adapted for educational purposes is not entirely new (Fortner, 1988). A recent study by Dumas (2026), brings a new perspective in viewing a DIY board game not as the final product, but rather as an adaptable and continually evolving learning system.

3. Method

The overall approach for the study was to combine Pedagogical action research and Design science in the design and development of the game. In terms of Pedagogical action research one of the authors also has the role of being the main teacher and subject matter expert of the course the game has been designed for. Researchers having these multiple roles brings the duality of a subjective view of the research context. Pedagogical action research has been described as a practical but systematic research approach that “enables teachers to investigate their own teaching and their student’s learning” (Nolen & Putten, 2007, p. 401). The action research design used in this study is inspired by the British branch of pedagogical action research, defined by (Norton, 2009, p. 71), as a strategy “that links research to improvement of practice and is education orientated”.

This study is also the first iteration of a Design science research (DSR) project aligned to the five-fold process outlined by Johannesson and Perjons (2014). As discussed in Humble and Mozelius (2023), small scale studies in software development can be carried out with a focus on selected parts of the five-folded process. The study described in this paper involved all the five phases of the DSR process that are depicted in Figure 1. below, but with a focus on gathering requirements and design. All, or some of the phases in the DSR process should preferably be carried out in iterations to support the idea of reflection-based incremental fine-tuning (Johannesson & Perjons, 2014).

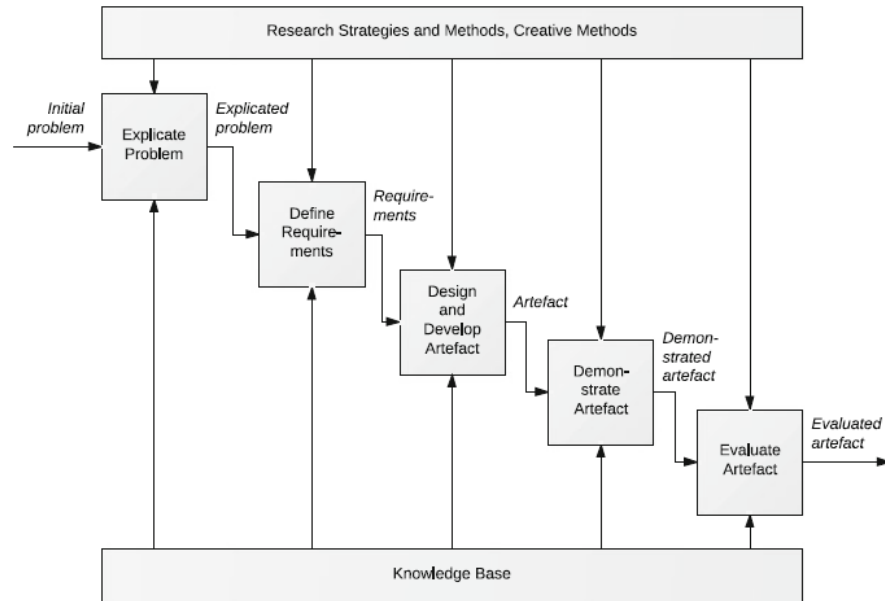


Figure 1: The design science research process as outlined by Johannesson and Perjons (2014, p. 82)

In the first phase, the problem was identified and further explicated by game studies, brainstorming and discussions among the history teachers at the department. This was followed up by further discussions on relevant requirements for the design and development of an educational game for the intended target group and the specific assignment. The further DSR phases of Design and development, Demonstration and Evaluation are described in detail in the next section. To align with the European regulations for data integrity the shared document for writing up this paper was kept private in the Proton Drive (2026) environment.

4. The Tempus Alatum Game

This section describes the design and development of the *Tempus Alatum* game, phase by phase according to the process depicted in Figure 1.

4.1 Explicating the Problem

Mid Sweden university is a regional university in middle Sweden with around 28 000 students of which the majority are enrolled in distance learning courses and programs, with only c. 6000 studying on campus in either Sundsvall or Östersund. In the subject of history, half to one-third of students in the basic course are enrolled in the teacher training program.

First year history students take chronological survey courses covering time periods from the earliest origins of complex societies to the present day. The first of these chronological courses covers the earliest times to the end of the Middle Ages, i.e. a period spanning more than 5000 years of human history, on a global scale – all in one month. Needless to say, students must learn a great deal of basic chronology in a short space of time. Unfortunately, many students also show a weaker grasp of basic chronology for these periods, as a result of current priorities in history teaching in Swedish schools. Consequently, there is an urgent need for tools to teach the chronology of ancient and medieval history efficiently. Preferably, this would be a tool which could be used both in class and as a distance learning app. Also, it would be preferable if this could be adapted to use for teacher training.

4.2 Gathering Requirements

For our purposes, a simple, yet flexible game is required. The game would facilitate learning chronology, but without losing view of the complexities of ancient history. The game would need to be aligned closely with course content and would ideally be playable within the confines of a one-hour lesson. The timeline and technology tree mechanics seem to fit the description.

4.3 Design and Implementation

To match our requirements, we constructed the game which we entitled *Tempus Alatum* (Winged Time). The title was inspired by a 17th century poem, *Io sono il Tempo Alato*, attributed to queen Christina of Sweden (1626–1689), but may have rather been written by her court poet Alessandro Guidi (Fogelberg Rota 2001). The theme of the poem is inexorable fate, heralded by the winged personification of (father) time. The idea for the game is to combine the timeline and technology tree mechanisms, to train chronology in conjunction with higher-level comprehension of ancient history.

Tempus Alatum consists of a single-leaf set of rules, c. 40 small timeline cards in four categories (distinguished by colour), and 12 large themed question cards (in the same categories). To be played, the game also requires a standard 6-sided dice and 2 or more players, either as individual players or teams. The game was made using the diagram function in MS Word (the text of one card typed into each cell). The diagrams were printed onto coloured paper, using a simple home office printer. The cards were then simply cut out with a pair of scissors. In other words, the game can be easily replicated using common materials, which will undoubtedly be available at most if not all modern schools and often at home as well.

The game is played as follows. Each player draws one (small) starting card at random and places it in front of them on the table. The players dice to see who goes first. The first player rolls the dice to determine the category: yellow (society); green (politics); blue (culture/religion); red (economy). The next player draws and reads the appropriate card (without revealing the year of the event described), which the player must place in the correct chronological order in relation to the starting card (or cards, subsequently). If the player succeeds, they may continue with another card. If they fail, it is the next player's turn. The players will take turns and assemble their timeline using as many cards as they succeed in answering.

When a player has collected three small cards of the same colour on their timeline, they may try to answer a large card question (as soon as they roll for the appropriate colour!). The large cards contain broader questions, which are not meant to be placed on the timeline, but just answered in a correct way. A player who has managed to answer two large question cards wins the game.

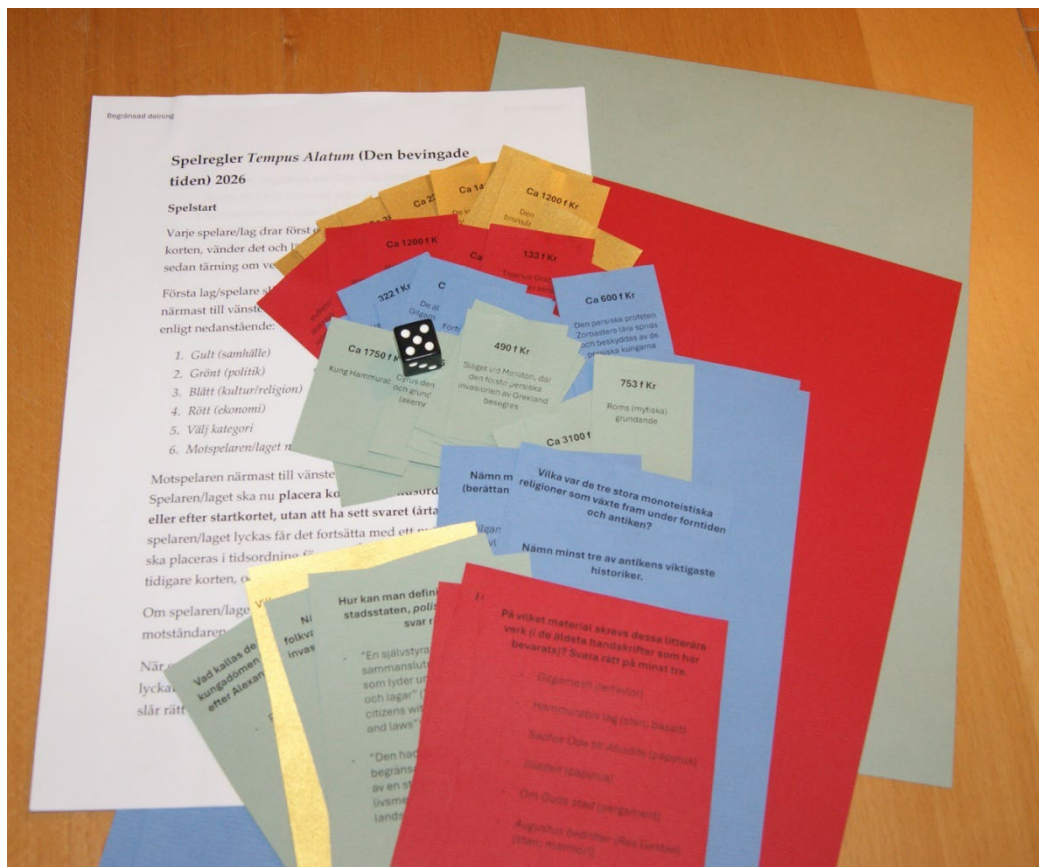


Figure 2: The Tempus Alatum Game

4.4 Demonstration

During the spring term of 2026, *Tempus Alatum* was tested in the context of the History A course. A first version of the game was tested with four teachers at the department, three of whom had experience of teaching on History A specifically. The feedback was generally positive, with some tweaks resulting from minor issues with the specific wording on some of the cards and the dice rolling for categories.

A second version was tested with a group of nine students (5 female, 4 male) who were in their last week of History A. This week had a didactics theme and the students all participate in the teacher training program. First, the students were asked if they had ever heard of game-based learning, but only one of them had. However, when asked about timeline games such as the popular Swedish language game *När då då* (*When was it?*) or *Hitster*, all students answered that they were familiar with such games in one form or another. Consequently, the students immediately grasped the game mechanism. The students were also shown how the game was constructed and how they could implement it themselves in their future teaching, which they appreciated, asking for the template of the game even before playing.

The students were given the cards, a dice and the rules leaf. They were then left to play on their own. The teacher was available for questions outside the classroom at any time during the playing session. However, no questions were asked and the instructions seem to have worked perfectly. The students played for approximately 35 minutes and during that time, they played a game to its conclusion.

After the playing session, teachers and students gathered for a debrief. The first thing the students mentioned was that the game would make for great "exam prep", better than the study questions that are currently used in the course, or simple flashcards. Students found that the small cards worked very well, but noticed details in the questions that were noted down for correction. It was pointed out that a maximum number of cards allowed to be acquired in one turn may need to be set, as a knowledgeable player might be able to collect many before another player is even allowed to have a go.

Regarding the large cards, students pointed out that more of them were required (depending on the number of players). Two students felt that the large cards were somewhat difficult to answer and that there was a leap in difficulty level from the smaller to the large cards. Following on from that, one student proposed a second level of intermediate cards, which could be multiple choice. This student referred to this as a "pyramid structure" of cards, i.e., similar to a technology tree, without this having been mentioned by the teacher previously.

4.5 Evaluation

Developing the game and testing it has been a success. Testing shows that the game is efficient in terms of time and that it has a clear focus on questions relevant to course content. The feedback on the difficulty level of the cards and levels was informative and the suggestion of creating a second level will be taken up in further development and expansions of the game. However, the testing should be seen as preliminary and has been carried out with a limited number of test persons. According to the idea of iterative evaluation in DSR, the game will be further tested next year as sketched for in the section of Future work.

5. Discussion

Both teachers and students immediately perceived the educational value of the timeline mechanism. In particular, the feedback from students and teachers reinforces the impression that the timeline and technology tree mechanisms work well *together*. Using just the small cards on their own works as a study tool in its own right. However, in developing higher level competencies such as explanation and analysis, the larger cards add an important aspect. The two-tiered structure of the game thereby corresponds to a two-tiered set of learning objectives in the course: students need the basic chronology of events (small cards) to be able to explain societal change over time in a broader sense (large cards). In these ways, the game illustrates how the problem of time can be overcome, in more than one sense.

A persistent challenge in constructing a game of this type clearly consists in creating a good link or transition from the first to the second level (and on to the third as the case may be), as was rightly pointed out by our students. The image of a pyramid, as suggested by a student, may be the best way to create this link. The DIY element as well as the adaptability were particularly appealing to teacher training students. Thus, the *Tempus Alatum* project does not only provide a tool for learning history; it instructs future teachers how to create their own teaching materials based on a game-based learning approach. This point is particularly relevant, as a common criticism of teacher training courses, not only in history but other subjects as well, has been that

teachers are provided with too few practically applicable skills in preparation for their future careers (e.g, Swenson 2026).

6. Conclusion

Tempus Alatum shows a potential for how a game can be used as an efficient tool for teaching history in university courses. The game makes one of the most challenging aspects of the subject matter, chronology, fun. But it also integrates higher level skills with the exercise of chronological knowledge. Chronology and causality go hand in hand in history and so they do in *Tempus Alatum*. The main problem that we initially identified was time constraints. By designing the game in the way described this problem has been solved. As the play-testing students said: the game teaches the course content better than the previously used, traditional review questions and better than typical flashcards.

The basic concept which makes it possible for our initial requirements for the game to be met is simplicity. The basic mechanism of the game is very simple. Simplicity allows the game to be played in a short time, while still training the relevant knowledge and skills. Simplicity allows the game to be adapted to different course contents and across different media and platforms. Simplicity also allows teachers to make their own games when they are starting their careers in schools.

7. Future Work

We plan to develop the game further in the fall of 2026 and through 2027. First, the game will be revised in accordance with the feedback received during the spring. The game will be used "live" with students in the beginning of the fall term of 2026. In the fall of 2026, the game will also be thoroughly evaluated by the teaching staff in history at Mid Sweden University. Furthermore, in 2027, the game will be adapted to other sub-courses (i.e., other time periods). The game will also be adapted to an app format for use in distance courses at Mid Sweden University.

Acknowledgements

The authors would like to thank the students of the spring term 2026 Historia A course and the teachers at the department of humanities and social sciences at Miun, Sundsvall for participating in the testing and evaluation of the game. Game-development and testing have been carried out as part of the ViSpel project in the Mid Sweden University HEaD initiative.

AI and ethical Declaration: No ethical clearance was required for this study, and no AI tools have been used in any part of this paper, either for text generation or for language correction.

References

- Denial, C. J. 2013. Atoms, Honeycombs, and Fabric Scraps: Rethinking Timelines for the Undergraduate Classrooms, *The History Teacher*, Vol. 46, No. 3, pp 415–434.
- Dumas, R. 2026. Building Better Learning Through Making Academic Board Games: A Model for Meaningful Fabrication in the Classroom." In *Society for Information Technology & Teacher Education International Conference*, pp 3371–3374. Association for the Advancement of Computing in Education (AACE).
- Fine, M.F. 1991. Going High Tech Computerized Literacy Instruction, *Adult Learning*, Vol. 2, No. 4, pp 11–14.
- Fortner, R.W. 1988. Teaching about local environmental issues with an adapted board game, *Science Activities*, Vol. 25, No. 1, pp 25–30.
- Ghys, T. 2012. Technology trees: Freedom and determinism in historical strategy games, *Game Studies*, Vol. 12, No. 1, pp 143–52.
- Hellerstedt, A. and Mozelius, P. 2018. From Comenius to Counter-Strike, 400 years of game-based learning as a didactic foundation, *12th Proceedings of ECGBL*, Vol. 1, pp 232–9.
- Hellerstedt, A. and Mozelius, P. 2023. Teaching with Technology Trees: Game-based Learning for History Education, *ICERI2023 Proceedings*, pp 53–60.
- Hodkinson, A. and Smith, C. 2018. Chronology and the new National Curriculum for history: is it time to refocus the debate? *Education 3-13*, Vol. 46, No. 6, pp 700–711.
- Humble, N. and Mozelius, P. 2023. Design science for small scale studies: Recommendations for undergraduates and junior researchers", In *European Conference on Research Methodology for Business and Management Studies (ECRM 2023)*, pp. 87–92. ACI Academic Conferences International.
- Jannah, S. and Sholah, H.M. 2025. The Effect of Tiktok Platform on Reading Habits of MA Nurul Ichsan Students, *International Journal on Advanced Science, Education, and Religion*, Vol. 8, No. 3, pp 303–312.
- Johannesson, P. and Perjons, E. 2014. *Design Science*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-10632-8>.

- Juul, J. 2012. *A casual revolution: Reinventing video games and their players*. MIT press.
- McCall, J. 2016. Teaching history with digital historical games: An introduction to the field and best practices, *Simulation & Gaming*, Vol. 47, No. 4, pp 517–542.
- Mayuni, I., Chen, Y., Ratminingsih, N.M., Palupi, T.M. and Halim, N. 2024. Tracking teachers' experience of adopting My English Step to infuse differentiated instruction, *Studies in English Language and Education*, Vol. 11, No. 3, pp 1374–1392.
- Monroe, C. 2023. The Timeline Game: Constructing Historical Narratives in History Survey Courses, *Teaching History: A Journal of Methods*, Vol. 48, No. 1, pp 125–133.
- Mozelius, P., Hernandez, W., Sällström, J. and Hellerstedt, A. 2017. Teacher attitudes toward game-based learning in history education, *International Journal of Information and Communication Technologies in Education*, Vol. 5, No. 2, pp 29–50.
- Nolen, A.L. and Putten, J.V. 2007. Action research in education: Addressing gaps in ethical principles and practices, *Educational researcher*, Vol. 36, No. 7, pp 401–407.
- Norton, L. 2009. *Action research in teaching and learning: A practical guide to conducting pedagogical research in universities*. Routledge.
- Proton Drive 2026. Keep your files safe and private. Accessed 24/04/2026 from <https://proton.me/drive>
- Shepard, C.A. 2017. *The Impact of Past Language Arts Teachers on the Reading Motivation of Twelfth Grade Students* (Doctoral dissertation, Northeastern University).
- Slocombe, W. 2019. Playing Games with Technology: Fictions of Science in the Civilization Series, *Osiris*, Vol. 34, No. 1, pp 158–174.
- Swenson, Jonas, 2026. "Studenterna pluggar och jobbar på skola: borde utökas", *Vi lärare*, 20–04–2026, <https://www.vilarare.se/nyheter/vi-larare-debatt/sa-far-studenterna-uppleva-verkligheten-borde-utokas/>.
- Wainwright, A.M. 2014. Teaching historical theory through video games, *The History Teacher*, Vol. 47, No. 4, pp 576–612.