Triseum Game-Based Learning Validation Study

EVALUATION REPORT

European Schoolnet

triseum™

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WÜRZBURG

EXECUTIVE SUMMARY

Project context and research questions

The game-based learning validation study, conducted by Triseum™ and European Schoolnet, was an international case study project which followed the purpose of testing and evaluating game-based learning with two educational games in European schools. The two games in the study were *ARTé: Mecenas™*, an art history game about the Italian Renaissance, and *Variant: Limits™*, a mathematical game about calculus, both published by Triseum, an educational game studio based in the US.

The project evaluation was carried out by the team of the chair of school pedagogy, University of Würzburg, in cooperation with European Schoolnet. The aim of this project was to research the impact of game-based learning using two Triseum games with respect to motivation and learning outcomes as well as the potential and limitations of their classroom implementation in different international contexts. The research questions were:

- **Does the game-based learning approach increase student motivation to learn and classroom engagement in the pilot project?**
- **How is game-based learning implemented within a K-12 environment in the pilot project?**
- **Do students gain content knowledge from playing *ARTé: Mecenas* and *Variant: Limits*, when these games are integrated into lesson plans?**

The project runtime was from July 2017 to June 2018. The test group was a convenience sample and consisted of 20 teachers who came from Norway, Poland, Greece, Italy, and Portugal. The teachers were trained to operate and implement the games and to design learning scenarios in online webinars and in two face-to-face meetings which were organized in Brussels.

Methodology

The triangular evaluation approach for this case study research included two questionnaires (pretest and posttest) and focus group discussions.

The pretest served to collect data on the composition and characteristics of the test group, e.g. with regards to teaching experience or perceived self-efficacy and beliefs. The posttest provided information on the game implementation and on the effects on students, including motivation, classroom engagement, and knowledge acquisition, as well as on future perspectives and suggestions for improvement. The focus groups explored in greater depth the impact on students and the ways of implementation.

Both the questionnaires and the focus group sessions were developed in accordance with related literature to ensure meaningful and valid results.

Summary of results

Motivation and classroom engagement

Overall, both the questionnaire data and the focus group discussions revealed a strong motivational potential of game-based learning with respect to *ARTé: Mecenas* and *Variant: Limits*. The questionnaire data indicated slightly higher values for the motivational potential of *Variant: Limits*, and the focus group analysis of this game was confirmative in this respect. In case of *ARTé: Mecenas*, the results are not as one-dimensional because while teachers confirmed that *ARTé: Mecenas* had a positive influence on the motivation of most students, there were circumstances and conditions under which the game had a demotivating effect. The direction that the motivational or demotivational potential may take is dependent on a multitude of factors. Some of these may be influenced, e.g., the teaching scenarios and settings in which the game is integrated, and other factors cannot be influenced or only indirectly by the selection of classes, e.g., general student performance. Yet, the teachers' overall impression of the motivational potential of both games and game-based learning can be summarized as positive.

It is consistent with this positive perception of the motivational potential that the teachers also confirmed a mostly high classroom engagement with the students in the project classes, both in the surveys and in the focus group discussions and with a slightly more positive tendency for *Variant: Limits* expressed in the surveys. While again, this observation cannot be applied to each student – which can generally never be expected due to heterogeneous groups –, most students showed behavioral, emotional, cognitive and agentic engagement.

Ways of implementation

The analyses of ways of implementation showed that the teachers faced different preconditions, e.g., in terms of heterogeneous student groups or technical equipment of limited availability, and came up with creative and unique solutions to meet their specific situations and implement the games with their students. They encountered some problems and usually found ways to overcome these. The teachers also described their unique implementation scenarios, which show certain trends: e.g., most teachers preferred to have their students play both at home and at school or in flipped classroom settings, they all designed a variety of teaching and learning activities to accompany the game use, and they experimented with social settings and had their students play in all kinds of combinations, ranging from individual play to teams, groups or even with the whole class.

Knowledge acquisition

The overall impact on knowledge acquisition was perceived as positive with both games and the game-based learning approach, as surveys and focus groups revealed. Students learned things within the scope of learning goals that was predefined by Triseum, and also beyond. In this context, it was central for a number of teachers to point out that *ARTé: Mecenas* helped their students acquire a broader image of the Renaissance times and contextualize their knowledge of contents and relationships, which was mostly understood as more important than learning about single artists or artworks. Likewise, the teachers from the *Variant: Limits* test group explained that the contextualization of limits was a central advantage of the game.

All in all, both the analyses of the questionnaires and of the focus group discussions revealed that the game-based learning approach as implemented by the pilot teachers fostered motivation, classroom engagement and knowledge acquisition successfully, and this classification matches the evaluation of the teachers, who mostly rated the project as "rather successful" or "very successful" in the contexts of both surveys and focus groups.
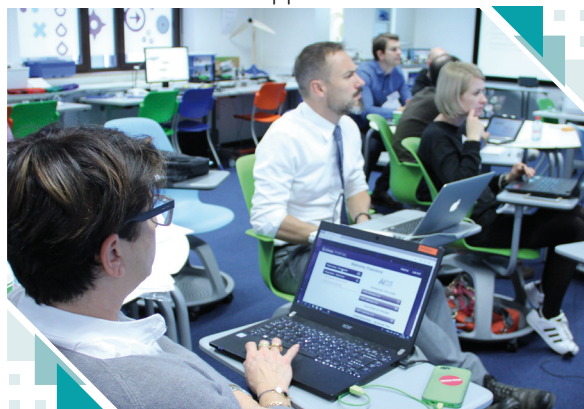
Recommendations

Recommendation 1: Consider and further investigate cross-national differences

Concerning the **cross-national applicability** of *ARTé: Mecenas* and *Variant: Limits*, the pilot project has revealed an overall applicability for Norway, Greece, Poland, Portugal, and Italy, in so far as the objectives of stimulating motivation, classroom engagement, and content knowledge are considered. Yet, there are differences in the perceptions of facets as for example the range of content of *ARTé: Mecenas*, which has been described as less relevant for the curriculum in Norway, but as too restricted for the curriculum of Italy which covers more than the game contents in the context of Renaissance. Also, in the context of different experiences between countries, teachers assessed the fact that both games are in English language differently, and some teachers had problems with the English language and would like to see **translated versions**. However, this is a controversial idea, because other teachers also considered the foreign language an advantage and developed interdisciplinary learning scenarios which combined e.g. arts and language or mathematics and language. It could be a solution to offer a limited number of translated versions for the countries which expressed their interest, as for example Portugal and Italy. It could also be viable to include country-specific dictionaries with important keywords, or to do without translations and provide teachers who want to work with the games with Content and Language integrated Learning (CLIL) oriented approaches and ideas to support their individual learning scenarios.

Against the background of such varying experiences of different countries, it might be advisable to seek further investigations or studies which involve more European countries and employ a variety of further methods to amend the research results.

Recommendation 2: Consider and enhance teachers' preparation and support

The evaluation results showed that a careful **technical and pedagogical preparation and ongoing support** for teachers who intend to implement *ARTé: Mecenas* and *Variant: Limits* is vital for the success of the game-based learning teaching unit. It is strongly recommendable to offer supportive measures such as e.g., videos, presentations, downloadable contents and live support. Another central idea in this context is establishing networks between teachers interested and taking advantage of their experiences and communicativeness. Teachers should be considered stakeholders in the promotion and support of *ARTé: Mecenas* and *Variant: Limits* and be supported in their game-related exchange, e.g. by forums, chats, Twitter chats and other forms of personal learning networks. This is true not only for the context of *ARTé: Mecenas* and *Variant: Limits*, but also for game-based learning in general. The teachers in the validation study took advantage of their preparation and support throughout the project via various activities offered and organized by Triseum and European Schoolnet, such as face to face meetings in the EUN future classroom lab and several webinars, and it is likely that according measures can complement and enhance game-based learning scenarios also in other contexts.

Recommendation 3: Review, amend and add didactic and pedagogical materials

The selection of **didactic and pedagogical materials** which are recommended to accompany the games will have a sound basis if they include and build on the pilot project evaluation results. E.g., the evaluation report revealed the strength of a teaching approach that combines playing at home and at school lessons, as in a flipped classroom approach, because it has proven successful and efficient to accompany the students when playing actively, while giving them room to play freely and minimizing the classroom time needed, which is a requirement many teachers expressed. Also, the pilot project showed that learners' groups are heterogenous and that their characteristics have to be considered carefully to foster motivation, classroom engagement and content knowledge acquisition effectively, and to ensure a successful game implementation. Hence, future game-based learning teachers should be provided with respective scenarios, materials and stimuli to build on these experiences and enrichen them with own approaches.

Recommendation 4: Strengthen and further research game-based learning

Overall, the validation study revealed a strong potential of game-based learning as an approach to teaching and learning in terms of students' motivation, classroom engagement, and knowledge acquisition. The results suggest that game-based learning has proven successful, which leads to the conclusion that this approach should be proceeded with and strengthened in further research and practice, especially in view of a limited transferability due to methodological reasons and the exemplary selection of two games. For the research perspective, this might include e.g. research on further games and more effects beyond these that were focused in the validation study, using various methodologies and including diverse target groups. In terms of practical applications, the results offer a confirmation for developing, using and evaluating more game-based learning approaches in educational settings.

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In May 2017, Texas-based Triseum joined the Future Classroom Lab and became the first industry partner to have game-based learning as its core business. As part of its membership of the Future Classroom Lab, Triseum asked European Schoolnet to run a validation pilot involving use of two of its learning games (ARTé: Mecenas™ and Variant: Limits™) in schools in several European countries. Over the course of almost one year, 20 teachers from schools in Greece, Italy, Norway, Poland and Portugal used the games in their teaching and took part in the evaluation.

Learn more at: http://fcl.eun.org/triseum-validation-pilot

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