Connecting Mathematics and Arts in AI-enhanced Learning Environments using Narrative Didactics

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Type of communication: Theoretical analysis & Practical examples of interdisciplinary teaching and learning

Description of the objective:

Motivational aspects in mathematics education seem to become more and more important. For Germany, for example, the last PISA study 2022 by the OECD (Lewalter et al., 2023) pointed out that there is a significant decrease of joy, interest and motivation with respect to mathematics lessons in secondary schools, whereby at the same time the most frequent emotion is tiredness and boredom (pp. 12/13).

Facing this challenge, there have been efforts to develop an interdisciplinary and humanistic way of teaching using a holistic teaching strategy by a combination of mathematical contents, historical facts, aspects from narrative didactics and technology (Brandl & Vinerean, 2023). Contextualized learning as the basis of this strategy corresponds to the idea that the "isolation of the [mathematical] topic can be counteracted by making connections to related areas and establishing mental anchor points within those" (p. 2), so the "mathematical contents serve as the basis and the goal of the teaching strategy, didactically and digitally supported by scaffolding methods" (p. 3). Paying respect to context is an important factor for fighting boredom and lack of motivation in classroom as context represents "the entities that connect to or surround a focal entity and contribute to the meaningfulness of the whole" (Klassen, 2006, p. 54). In line with Klassen's Story Driven Contextual Approach (SDCA), the use of elements from Narrative Didactics seems to be promising to allow for a successful

contextualized teaching and learning experience in mathematics lessons (Brandl, 2010). This approach can be utilized and expanded to not only concentrating on written or told motivational stories represented in texts, but also in pictures (Brandl, 2017). In the course of this, a mutually enriching process evolves between the fields of mathematics and arts, serving for contents or scaffolding structures, respectively.

Finally, technology started to play an important role in the support of creating learning environments that comprise of a story driven contextual approach including the use of pictures. Digital learning environments of this kind can be made up quite effectively by applications like “Book Creator” or “Genial.ly”, for example, and the latest rise of AI applications allows now for a very efficient design of suitable pictures that can be used for the framing of mathematical contents and contextualizing stories.

We present two examples of products and their practical design process concerning the successful development of story driven learning environments by the support of AI driven image creators from Eichberger (2025) and Kolb (2024). In Eichberger (2025) the AI tools “Canva” and “ChatGPT” were used to make up a map of an imaginary country named “Geometria”, in which three siblings – representing straight line, ray and distance – live and embody certain characteristics described in a meaningful story serving as a motivating introduction for a geometry lesson with 11/12-year-olds in German secondary school (Gymnasium). Whereby “ChatGPT” failed to deliver convincing results, “Canvas” could be prompted successfully to develop a useful map that was applied in class and worked out satisfyingly. In Kolb (2024) the online presentation software “Genial.ly” was used to create extensive interactive educational escape games for 12/13-, 15/16- and 16/17- year-olds with contents from the geometry, analysis or algebra curriculum, respectively. Concerning the images for the environments, here the choice fell on the AI tool “Bing Image Creator”, which delivered license free products of high quality.

Eichberger (2025) and Kolb (2024) illustrate the continued progression, advancement and expansion of pictorial narrative didactics from Brandl (2017), taking up the circle of resonance concept of the MACAS Symposium 2025 and the vision of a humanistic mode of education of the MACAS initiative in a natural and concept-immanent way. Furthermore, the theme of the proposal connects to the following conference topics:

- The role of technology in connecting mathematics, arts and sciences.
- Theoretical investigations of the relation between mathematics, arts and sciences.
- Mathematical modelling and interdisciplinarity for studying and learning mathematics.

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