# GENERATION AI: PEDAGOGICAL FRAMEWORKS AND TOOLS FOR AI EDUCATION

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Focus Topics: Tools, Learning Materials

## Educational Tools

AI education is different from classical CT, and it needs pedagogical approaches specifically tailored and contextualized for the purposes of AI (Tedre et al., 2021). This talk presents the pedagogical frameworks, classroom approaches, and learning material developed and refined through the implementation of four AI-driven tools to support data agency (Vartiainen et al., 2024b):

GenAI Teachable Machine: <https://tm.gen-ai.fi/> (cross-curricular)

GenAI Somekone: <https://somekone.gen-ai.fi/> (AI and media education)

GenAI Profiling Game: <https://classroom.gen-ai.fi/> (AI and media education)

Teachable Robot: <https://www.techrxiv.org/1253118> (craft and technology education)

Below we present to more detail two of these tools, GenAI TM and GenAI Somekone, and outline the pedagogical ideas that drove the development of the tools and classroom interventions.

### GenAI Teachable Machine

The GenAI Teachable Machine (designed and developed by Nicolas Pope et al. (2024)) is a no-code mobile app studio that lets young learners to work with machine learning (ML) by creating their own ML-driven applications. This tool simplifies the complex processes of ML into a user-friendly environment. Students can train models using their own data, experiment with various AI actions, and deploy their creations as standalone mobile apps, fostering a hands-on understanding of supervised learning and AI workflows. Fig. 1 presents the workflow and concepts addressed at each step.

A screenshot of a computer

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Figure 1: The GenAI Teachable Machine Workflow and Some Concepts Addressed

The first stages of the workflow are similar to Google’s popular TM2 (Pope et al., 2024): The user names each class ⓵, and populates it with images either dragging and dropping, uploading, using the webcam to capture images, connecting a mobile phone to capture images, or by adding any number of friends' devices to collaboratively add images ⓶. Data can be curated by moving images between classes or removing images ⓶. New classes can be added ⓷. The data collection and curation stage present four key concepts: training data, example, class, and name. After the data curation, user proceeds to train the classifier ⓸.

The tool interface conceptually separates the trained classifier ⓹ and the input mechanism ⓺. Google TM2's advanced options (like adjustment of epochs, batch size, and learning rate) are hidden for novice users, and also analytics, such as confusion matrix, accuracy, and loss per epoch, can only be accessed through an API.

Unlike other tools available, the users create a standalone app by connecting classifier results to actions (sound, text, image, link). Elements ⓻ to ⓽ are not found in the GTM2 or other existing tools. The user defines zero to four actions for each class ⓻. Those actions are triggered by the classifier result ⓹. Images can be uploaded or drag & dropped, and sounds can also be recorded in the tool ⓻. Users can test their live apps using the preview component ⓼, which dynamically shows the actions triggered by the classifier, enhancing children's understanding of the interrelations between the parts. The ready app is deployable in a new browser tab, and shareable to classmates' devices through a QR code ⓽. No data are stored or processed outside the classroom.

### GenAI Somekone

Somekone (Pope et al., 2024b) immerses students in the realm of social media algorithms. Its Instagram-like interface is designed for exploring key AI concepts, including 1) data collection, 2) profiling, 3) engagement, and 4) content recommendation. In addition to individual views on students' devices, Somekone offers a teacher's view on the classroom projector, which can also illustrate 5) clustering through clustered and color-coded social networks, 6) co-engagement by showing networks of images liked by the same users, 7) topic affinity by grouping #hashtags liked by the same users, and 8) recommendation algorithms through heat maps that visualize how different recommendation algorithms impact what content a user is likely to be shown and what content the user is likely not shown. The tool is aimed at demystifying how social media platforms tailor user experiences, and it provides a platform for discussing the ethical and societal implications of AI technologies in classroom settings.

A screenshot of a football player kicking a football ball

Description automatically generated A screenshot of a phone

Description automatically generated A group of kids looking at a large screen

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Figure 2: Somekone’s Instagram-style interface and some XAI and classroom views

### Pedagogy of AI Education with Somekone and GenAI TM

Our experience with these tools underscores the importance of scaffolding students' conceptual understanding, agentive actions and ethical awareness by providing tools, materials, and tailored pedagogical models that altogether contextualize complex AI concepts and make them concrete, visible, and meaningful (Toivonen et al., 2020; Vartiainen et al., 2024; Lin et al., 2025; Vartiainen et al., 2021).

Grounded in design-oriented pedagogy, the GenAI Teachable Machine positions children as designers and knowledge creators. It scaffolds the development of conceptual understanding of machine learning processes and workflows by enabling them to train models in real-time and to make their own apps and creative projects (Kahila et al., 2024). In this way, new conceptual knowledge is linked to practical applications, grounded in students' ideas and interests.

The Somekone tool fosters collaborative learning and inquiry through hands-on experiences where children are guided to construct their conceptual understanding by testing their prior conceptions, conducting experiments, and explaining their conclusions with systematic evidence. By that way, it engages students in collaborative knowledge construction in which they can actively explore AI concepts, their operations, relations, and connections to everyday life.

The profiling game has shown a low-floor, almost unplugged approach to teaching AI-related data, profiling, and inference (Kahila et al., 2024b).  Through a game-based activity, it encourages students to critically analyze how AI systems categorize and influence human behavior.

Together, such distributed scaffolding- provided through multiple affordances such as educational technology, curriculum materials, peer discussions, and teacher facilitation—is essential not only for cultivating conceptual understanding, but also for supporting critical thinking and curriculum discussions of AI ethics and AI’s societal impacts. By drawing on their own observations and shared understandings, students are empowered to collaboratively question data-driven practices and mechanisms, so that they can also envision and take informed actions toward alternative possibilities.

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