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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 education (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:

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: http://dx.doi.org/10.1609/aaai.v39i28.35189 (craft/technology education)

Below we present to more detail two of these tools, GenAI Teachable Machine (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, familiar from Google's teachable machine. 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 of the workflow.

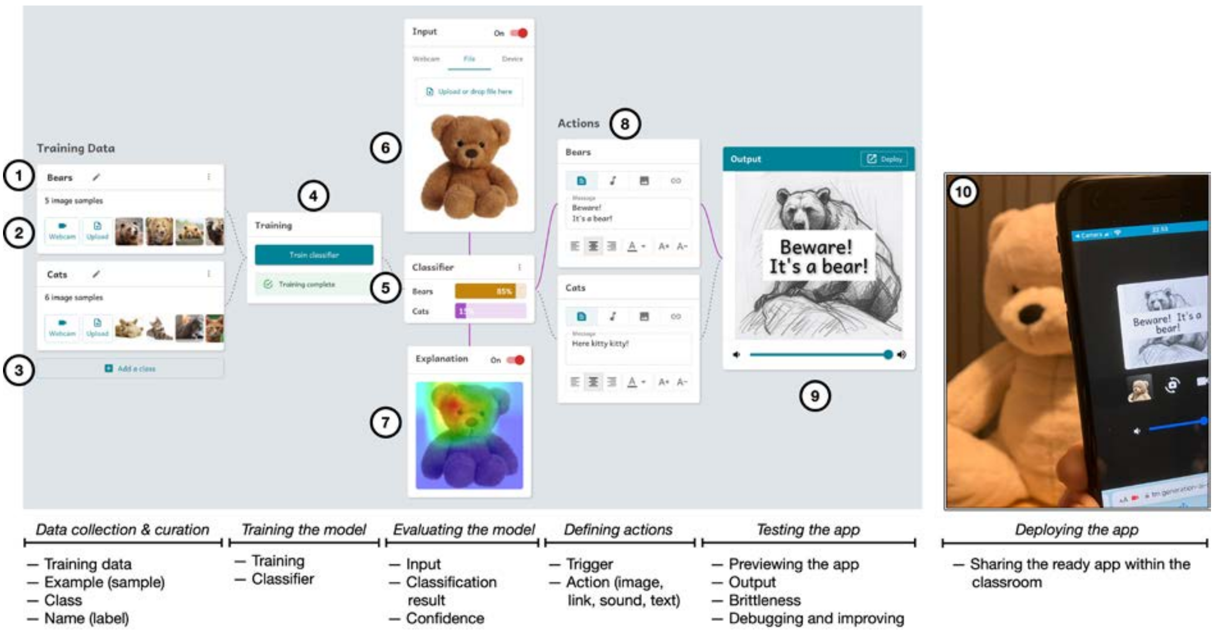

Figure 1: The GenAI Teachable Machine Workflow and Some Concepts Addressed

The first stages of the workflow are similar to many classifier-based AI education apps (Pope et al., 2024): The user names each class ①, and populates it with images either dragging and dropping,

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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 ②. Data can be curated by moving images between classes or removing images ②. Any number of new classes can be added ③. 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 ④.

The tool interface conceptually separates the trained classifier ⑤ and the input mechanism ⑥. 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 to keep the user interface as clean as possible. Using a class activation map (CAM)-based eXplainable AI (XAI) view ⑦, the user can explore which areas of the image contributed the most to the classification result (Pope et al., 2025).

Unlike other tools available, the users can create a standalone app by connecting classifier results to actions (sound, text, image, link). Elements ⑧ to ⑩ are not found in the Google's TM2 or other existing tools. The user defines zero to four actions for each class ⑧. Those actions are triggered by the classifier result ⑤. Images can be uploaded or drag & dropped, and sound actions can also be recorded in the tool ⑧. Users can test their live apps using the preview component ⑨, 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 ⑩. No data are stored or processed outside the classroom.

GenAI Somekone

Somekone (designed and developed by Nicolas Pope and a team of AI and education researchers as well as teachers and children (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. Fig. 2. presents users of Somekone in regular Finnish 5th grade and 8th grade classrooms.

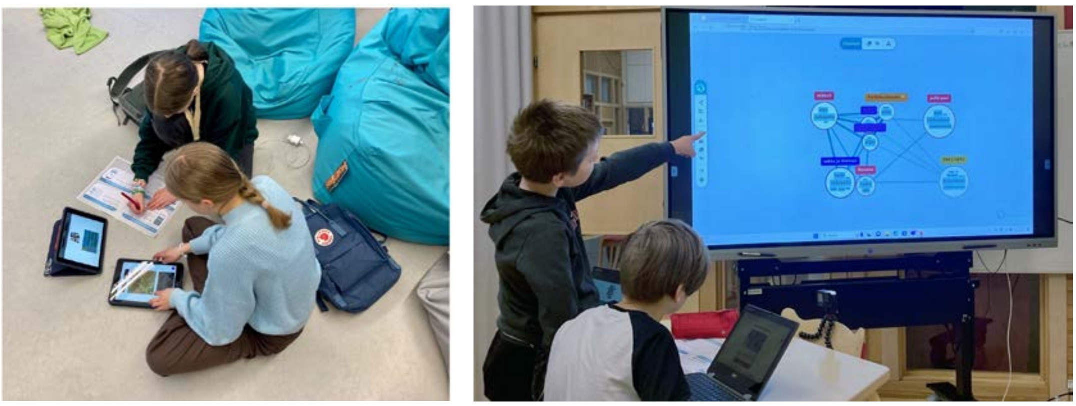

Figure 2: Children working with Somekone social media simulator and the XAI-based data view app (left). Children exploring how their actions affect the classroom's social networks (right).

Fig. 3. shows screenshots of Somekone running on a mobile device. On one device, users run a browser-based social media simulator that offers an Instagram-like infinite scrolling image feed □, with the basic social media functions, such as liking, commenting, sharing, and following ②. To enable

customization to different age groups, cultural contexts, and use cases, the image content can easily be changed. Clicking on “share data” ③, users can pair a second device to run a browser-based data exploration app, which communicates with other devices in the classroom using webRTC. The data exploration app provides a real-time view of data collection from the user’s browsing behavior, as well as engagement metrics and scores calculated for each image the user has seen or skipped ④. Learners can also observe a live view of how browsing on one device shapes their profile ⑤. The profile view shows both the most common tags in the user profile as well as examples of images that best represent those tags ⑥. Those are used for social network analysis by computing profile similarities and clustering similar users, shown on the classroom projector (Fig. 4).

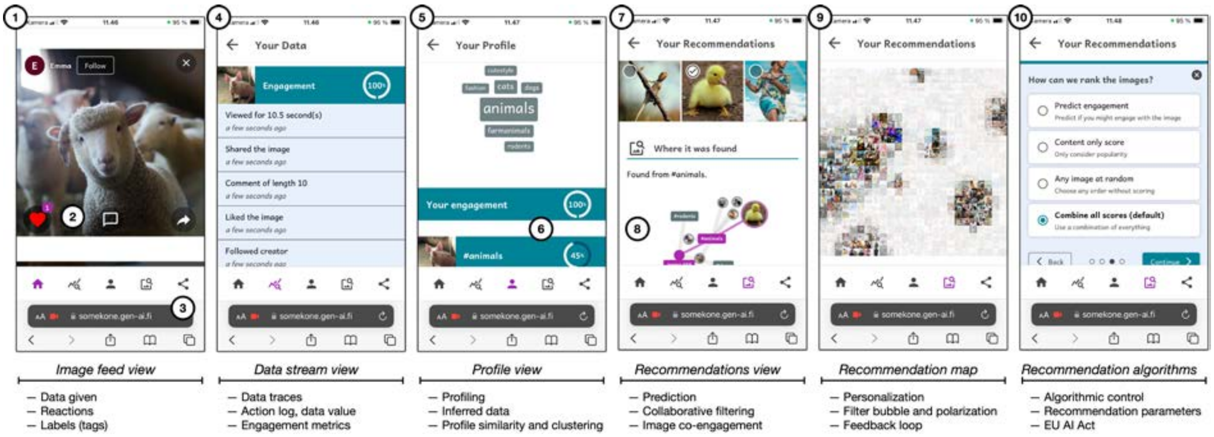

Figure 3: Example views to social media mechanisms offered by Somekone.

The recommendations view ⑦ allows learners to see which images will appear in their feed next, as well as an XAI justification for each recommendation ⑧. Somekone uses four different recommendation mechanisms: collaborative filtering, content-based filtering, image co-engagement, and random selection. Somekone also provides a heat map of the image content, highlighting the most likely images to be seen, given the current recommendation algorithm and parameters ⑨. Teacher can demonstrate polarization and filter bubbles by comparing heat maps of 2-4 students (Fig. 4., right). As EU’s AI Act will require platform providers to give some power to users over the choice of recommendation mechanisms, Somekone lets learners experiment with different recommendation parameters and observe in real-time how those changes affect their feed and their recommendation map ⑩.

Figure 4: Example classroom visualizations. From left: All users’ most engaged images; profiles clustered by similarity; image co-engagement; and comparison of filter bubbles of two students.

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. A delayed post-test showed an improved understanding of social media mechanisms compared to the pre-test, but a slight overall decrease compared to the post-test, suggesting that children can develop more sophisticated and scientifically grounded understandings of data-driven AI mechanisms, but that requires systematic scaffolding and cumulative learning trajectories (Vartiainen et al., 2025).

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 (Vartiainen et al., 2024b).

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