# Teacher-GenAI Collaboration to Enhance Formative Feedback

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**Abstract**

Generative artificial intelligence (GenAI) has the capacity to generate natural language and other types of content to perform a wide range of tasks. GenAI provides several opportunities and challenges for teaching and learning. While many studies focus on how well GenAI performs in educational assessment contexts, there is limited work on how teachers can combine their skills with GenAI to reinforce each other, and provide formative feedback to students. This work presents a GenAI tool called Learny, a transformative tool that brings GenAI-generated formative feedback and teachers together with the goal of enhancing students' feedback. We also report early results with a focus group session conducted with the teachers and our plans for large-scale longitudinal pilot studies in Norway. This line of work aims to contribute to the ongoing discourse on understanding and shaping Hybrid Intelligence, focusing on how teachers can work together with GenAI to synergistically combine their strengths of human and machine intelligence.

**Keywords**

AI in Education, Hybrid Intelligence, Formative Assessment, Generative AI



## 1. Introduction

The emergence of generative artificial intelligence (GenAI) has transformed how people find, use, and interact with information. GenAI can generate content, such as text, images, videos, and audio, and support different stages of the teaching and learning process. Due to its potential to automate and enhance a wide range of tasks, such as classifying data, creating content, summarizing information, and answering questions, there is great interest in how GenAI can be used to support teaching and learning [1].

Recent studies on the use of GenAI have highlighted the importance of the complementary strength of GenAI and educators [2, 3, 4, 1], emphasizing the need for teachers to be able to review and override automated AI decisions to keep a certain level of ownership, agency, and control. When it comes to teachers' feedback, recent works show that students and teachers can benefit from GenAI-generated feedback [2, 3] by saving teachers time for other teaching tasks and providing timely feedback to students. At the same time, it is unclear how teachers interact with the GenAI-generated feedback before sending it to the students and what strategies teachers implement when providing feedback jointly with GenAI tools. This work in progress describes the first steps in understanding how teachers can collaborate with GenAI to provide enhanced formative feedback.

In particular, this paper provides the following contributions:

1. Present Learny, an advanced GenAI tool that allows teachers to reinforce their formative feedback to support students' learning;

*Joint Proceedings of LAK 2025 Workshops, co-located with the 15th International Conference on Learning Analytics and Knowledge (LAK 2025), Dublin, Ireland, March 03–07, 2025.*

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2. A deeper understanding of what teachers think and how they plan to use MyLab to enhance their practice;
3. A discussion on the early insights of the teachers and plans for large-scale longitudinal pilot studies in Norway.

## 2. Background

Hybrid intelligence (HI) is a term describing the combination of human and AI [5]. The aim of HI research is developing intelligent systems that augment, rather than replace human intelligence. Because humans and AI have different strengths and weaknesses, they can complement each other and cooperate to address each other's shortcomings and behave more intelligently together than they would do separately [6]. This augmentation perspective is essential in the context of HI. By working synergistically, humans and AI can achieve goals that were unreachable by either of them alone [5]. Within education, this cooperation is also referred to as teacher-AI collaboration.

Recent studies have shown teachers' willingness to adopt GenAI and AI-based EdTech [4, 7]. This can reduce teachers' workload and assist them with tasks such as personalized learning, feedback, and differentiated instruction, as well as being a collaborative writing partner [8, 9]. However, the adoption of such tools does not come without challenges. A concern that emerged among teachers was that having to learn and adopt new technology would result in an increased workload and force them to change their practice [4]. AI's lack of human characteristics (e.g., judgment and values) was also seen as a concern, as well as the limited explainability of the AI tools. For these reasons, teachers stated that they would put more trust in advice and opinions received from their fellow teachers than from AI-Based EdTech [4].

Recent studies on the use of GenAI in formative feedback showed that GenAI excelled at providing descriptive feedback and summaries, met all the criteria defining high-quality feedback, including affective, cognitive, and constructive dimensions [3], and has the potential to improve student engagement by providing timely and personalized feedback [2]. However, because generated feedback can be impersonal or flawed, both studies suggested that educators and GenAI should collaborate to provide feedback, to ensure they are appropriate and personalized [3, 2]. This work attempts to fill this gap in the literature by better understanding how teachers collaborate with GenAI tools to provide better formative feedback (e.g., personalization that takes into consideration long term goals, values) and enhance this hybrid feedback in their practice. To do so, we collaborated with a large EdTech provider that has already developed GenAI-powered solutions to enhance teachers' formative feedback and initiated a large scale longitudinal study in Norway.

## 3. Hybrid feedback with Learny

### 3.1. Learny

Learnlab is a leading Norwegian EdTech platform with over 250,000 students with active licenses, while an additional 3 million have used the platform as anonymous users. It is designed to revolutionize teaching and learning through engaging, interactive, and creative tools. The platform includes innovative web applications like Colab, Storylab, Idealab, Medialab, and Mylab (https://www.learnlab.net/en/). These tools support everything from interactive teaching and brainstorming to multimodal storytelling and the production of videos, podcasts, and formative assessments.

Through its AI assistant, Learny, both teachers and students receive personalized support and formative feedback, with the goal to enhance the learning outcomes and save teachers' time.

Learnlab's learner-focused AI, Learny, combines four knowledge bases to provide tailored and targeted support for students and teachers. These knowledge bases include:

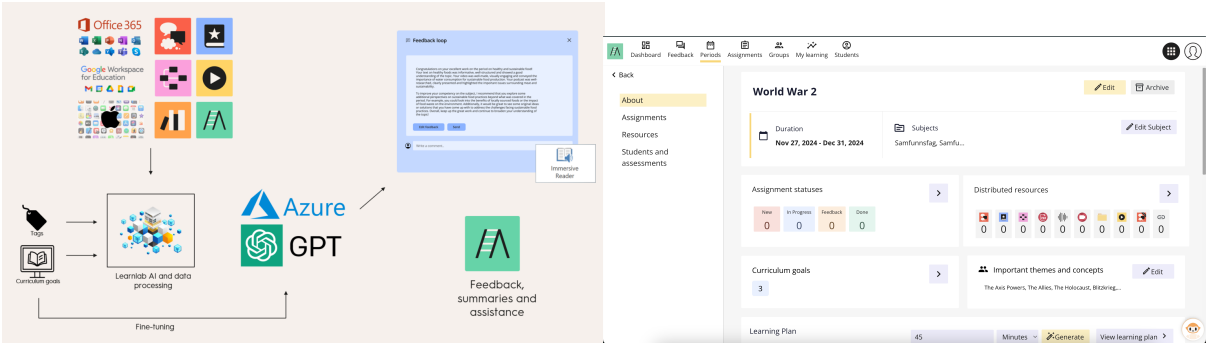
1. **Generative AI:** Utilizing advanced large language models (LLMs) to generate content, provide feedback, and suggest learning materials based on the needs of students and teachers.

2. **Teacher's Planning and Professional Judgment:** Learny automatically derives insights from teachers' assignments and period planning. This ensures that student feedback and guidance for further development align with teachers' pedagogical goals and professional priorities.
3. **Theories and Models, Curricula, and Objectives:** Learny links feedback to pedagogical theories, curricula, and specific learning objectives, ensuring that guidance is rooted in academic frameworks.
4. **Student Products and Needs:** Learny analyzes student work, regardless of format—text, images, audio, or other types of content, and tailors feedback to what the student has produced and their needs.

This is made possible through six distinct AI models that analyze and interpret student creations, regardless of format - text, images, audio clips, or content produced in Learnlab, Microsoft, or Google tools. Figure 1(a) shows the Learn LaB's system architecture. Learny also draws from teacher planning, combined with Learnlab's fine-tuned pedagogical models. Based on this, it generates customized feedback for the student through the MyLab environment that allows teachers to edit the feedback before it is released to the students.

MyLab is the environment where teachers can organize periods and assignments, hand out learning materials, and provide formative feedback in collaboration with Learnly. Figure 1(b) shows what a period in MyLab looks like.

To provide formative feedback in MyLab, teachers can perform the following process: First, create an assignment through "Assignments" in the Navigation Bar Menu, and add a title, description, due date, and resources. Resources are links to content produced in other Learn Lab tools, such as presentations, storybooks, mind maps, audio, or videos, and can be used as examples of a delivery or templates that students can start filling out. Then, connect the assignment to a grade and subject(s) and select the relevant curriculum goals. This helps Learnly provide appropriate feedback.




(a) Visualization of system architecture in Learn Lab

(b) Period plan for the topic World War 2

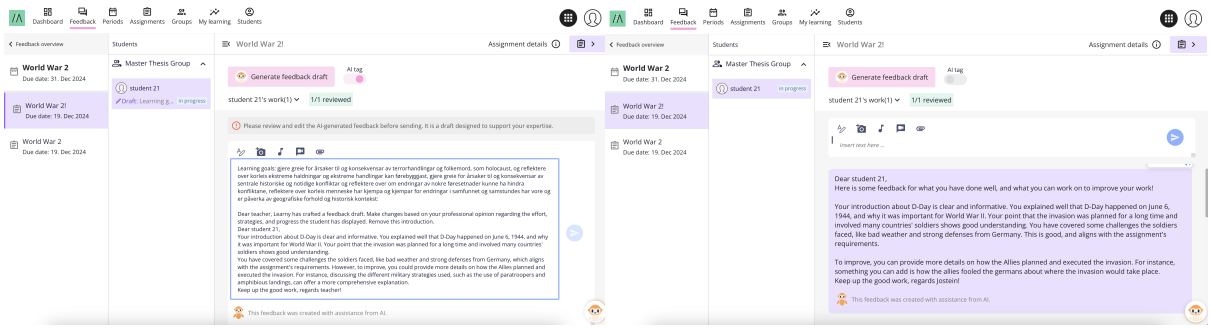
**Figure 1:** Images displaying the system architecture of Learn Lab and the internal MyLab tool

After students have started answering the assignment, visit the Feedback page in the Navigation Bar Menu. When entering the feedback page, the text box is empty to start with. Click on the pink button that states "Generate feedback draft" to add a feedback draft to the text box, and edit it directly by adding or removing text. Figure 2(a) shows how the page looks when Learnly has generated a feedback draft. In this example, the teacher selected the assignment "World War 2!" and "Student 21". To tell students whether AI was used in the feedback provision, use the "AI tag" slider, adding the Learnly icon and the text "This feedback was created with assistance from AI" below the feedback. Finally, post the hybrid feedback to the student after necessary revisions have been made and the quality of the feedback is satisfactory. Notably, the feedback page is designed as a chat between the teacher and the student so that students can ask questions about the feedback or ask the teacher for feedback in the first place.

Also note that Learnly-generated text has a specific structure: First, it shows the curriculum goals for the given period. Second, it asks the teacher to make changes based on their professional opinion.

Third, it states what the student has done well. Fourth, it suggests what the student can improve on and provides a concrete example. Finally, it gives a positive and constructive greeting from the teacher.

When editing generated feedback, teachers should develop some strategies on how to improve it. When providing feedback to students in secondary education, one such strategy can be to remove and replace difficult words to ensure that students understand them. Another strategy is to make the feedback short and precise so as not to overwhelm the students and make sure they read the whole feedback. To make GenAI feedback more personal, teachers can also add specific advice based on the student's strengths and weaknesses and connect their effort and deliverable to their long-term goals.



(a) Example of generated feedback from Learnly (b) Example of generated feedback reviewed by a teacher

**Figure 2:** Images displaying how teachers can revise feedback generated from Learnly

# 4. Early Insights

## 4.1. Participants and process

The approach used to collect early insights has three steps. First, we organized a focus group session with 31 teachers and presented the tool to them. Second, after the focus group we distributed a set of open-ended questions to the teachers and 25 responses were collected, the questions focused on prior experience with GenAI, attitudes and expectations towards using it in their teaching, and perceptions of how it will impact their practice. Third, the corpus of the responses was analyzed via a thematic analysis [10] and identified six themes as important for the teacher.

## 4.2. Important themes on providing GenAI-teacher feedback

The thematic analysis resulted in the 6 themes below.

**Theme 1: Limited experience with GenAI**. The majority of teachers (n=22) stated that they had little to no prior experience with using GenAI tools in their teaching. The areas where teachers mentioned they had tried GenAI were for simplifying texts, asking for explanations and making examples, learning activities and tasks to their students. One of the teachers with more experience (T19) also stated the different purposes (mainly content generation) they used GenAI tools for *"I have used it to create math problem questions, design puzzles for an escape room, and write poems and certain texts"*.

**Theme 2: Mixed attitudes towards the HI of GenAI tools in teaching and feedback.** Many teachers are positive, curious, and enthusiastic about using GenAI in their teaching. T25 said, *"[I'm] Curious! I want to learn how to use it in a more purposeful way*". However, many teachers also show careful skepticism. The following two quotes illustrate this. T22 said, *"I might be a bit skeptical at first, but at the same time, I'm open to the idea that there are many good ways to use it that I'm not aware of or haven't thought of yet"*. T19 stated, *"[I'm] Curious and afraid at the same time too difficult to create good tasks that AI cannot answer to avoid that students can use AI to write their answers"*.

**Theme 3: A lack of knowledge and time to learn how to use GenAI tools are the main challenges in developing HI**. As seen in Theme 1, most teachers have little to no experience using

GenAI tools. A lack of knowledge of how to use such tools properly is often mentioned, as stated by T14, *"I am positive about you, but do not know enough to use it in an appropriate way"*. When asked about teachers' requirements and needs for a successful adoption of GenAI, several teachers mentioned the challenge of finding time to learn about it. As stated by T4, *"It can work well as long as I spend enough time learning it, but for now, it seems overwhelming and confusing"* and T5, *"Finding time for training and trying it out in lessons"*. T10 further mentioned the challenge of managing many different platforms simultaneously, *"...Now there are many learning platforms Classroom, Vigilo, Elevkanalen, Aunivers, etc. so there are many platforms to deal with"*. Other teachers requested more knowledge about how the GenAI tools work, assurances that the privacy of both the teacher and the students were safeguarded.

**Theme 4: Training and experience are crucial for successfully engaging into HI**. Teachers stated that receiving training (n=10) and getting experience using GenAI tools (n=13) was crucial for the successful adoption and proper use of GenAI tools. This would give them confidence and make it possible to support each other. This is illustrated by the following three statements on what would make them confident users of GenAI. T10 said, *"I think it is very important to have courses and training"*, T20 stated *"Opportunity for experimentation. Gradually developing skills with various tools"* and T7 said, *"Training such that we all can support each other"*.

**Theme 5: Saving time is perceived as the main advantage.** Many teachers (n=14) expect collaboration with GenAI to provide feedback to lighten their workload by saving them time. T6 said, *"Hopefully make the work easier and save a lot of time as you get familiar with LearnLab."*, further supported by T2, *"[GenAI] Can assist with complex formative assessment and influence teachers' understanding of learning and new practices"*. This could leave them with time for other work, as stated by T19, *"...Give me time to discuss the feedback they've received with them and how to interpret it"*.

**Theme 6: Reduced quality is the major concern when engaging to HI for providing feedback**. Most teachers were uncertain or did not mention how using GenAI tools would affect their feedback provision. However, some teachers mentioned the possibility of reduced quality. T17 said, *"...the formative assessment will likely be worse than the one the teacher would make themselves"*, supported by T24, *"...AI doesn't "believe" anything, and in formative assessments, one must be cautious that systems providing purely mechanical feedback might not always deliver the best formative evaluations."*

## 5. Discussion, conclusion and the way ahead

The results of the focus group indicate that teachers have limited experience with GenAI and mixed attitudes and dispositions about using GenAI tools to augment their formative feedback capabilities. Although many teachers showed careful skepticism, most were enthusiastic and curious about how GenAI could assist them in providing feedback. This aligns with the findings of Nazaretsky et al. [4] and Shankar et al. [7] and shows the possibility of successfully adopting HI in feedback provision and educational contexts. Another finding was that reducing the time spent producing feedback was considered the most significant advantage of HI. One teacher explained that this would free up time for other tasks and to discuss and help their students understand the feedback they receive. Some teachers also mentioned concerns about the quality of the feedback produced by GenAI and that it would be worse than the one teachers could make themselves. However, this further underscores the importance of collaboration between humans and AI, highlighting the need for teachers to review and improve feedback before giving it to students. Finally, teachers expressed the need to receive training and experience to manage this successfully. This is crucial for successful HI in education and is further supported by the fact that teachers both stated a lack of knowledge and time to learn how to integrate GenAI tools into their practice.

Building on the findings from the focus group, the next steps in this research aim to explore teachers' practical experiences and perceptions of providing hybrid feedback with Learnly. This will be done using a mixed-method approach, combining observations, semi-structured interviews, and a closed-ended questionnaire.

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