

When Do Learners Prefer AI or Human Feedback?

Situation-Specific Psychological Predictors of Feedback Source Preference

Participant-visible method context. Results, discussion, captions, and the target figure are excluded.

4.1 Transparency and Openness

2.4.3 The role of evaluation anxiety. Learners' emotional states in a given feedback situation can also be expected to shape preferences for feedback providers [52]. Learners may experience varying levels of anxiety related to social evaluation, for example due to fears of negative judgment by others. When learners anticipate negative evaluation and experience heightened anxiety, they may be more likely to prefer AI feedback over human feedback, as AI feedback is perceived as less socially evaluative and less personally threatening (e.g., [14, 17, 36]). In contrast, when learners feel confident about their performance and anticipate evaluation with little anxiety, they may prefer human feedback, as it offers opportunities for social recognition and validation of their effort. This interpretation aligns with findings by Peng and Wan [37], who showed that learners tend to prefer AI feedback particularly in situations associated with increased anxiety. More generally, the preference for AI as an interaction partner under conditions of heightened anxiety is consistent with prior research suggesting that learners are more willing to self-disclose to AI than to human teaching assistants due to lower perceived social risk [38].

The present study was designed to test our preregistered hypotheses concerning factors relating to learners' preference for AI or human feedback in different feedback situations, and thereby increase understanding of the circumstances in which human or AI might be more beneficial. This study was preregistered here:

<https://aspredicted.org/vqfr-4dxw.pdf>

4.2

Sample

We collected data from 364 students on Prolific. Students currently enrolled in higher education in the US were eligible to participate (ensured by filters). Participants received £11.40 per hour. This data collection was done as part of a larger study addressing a different research question (see preregistration: <https://aspredicted.org/x5j8sn76.pdf>). Power analyses using G*power showed that for detecting an effect size of $\eta^2 = .10$ with $\alpha = .05$ and power of .95, a sample size of 216 students would have been required. We excluded participants who failed the attention checks ($N = 15$) and the manipulation check for the experimental manipulation as part of the other study ($N = 55$), assuming that these students who failed the manipulation and attention checks in other parts of the study [33] might not have read the vignettes carefully enough. After exclusion, the sample comprised $N = 282$ students (55% female; 40% male; 4% genderdiverse/nonbinary; 0.4% missing). Students reported their ethnic identity (14% Asian, 26% Black or African American, 12% Latinx or Hispanic, and 52% White; multiple options could be chosen). On average, students indicated that they used AI at least multiple times a month for both academic and private use (ranging between never and very often/daily ($M = 3.16$, $SD = 1.26$ for academic, $M = 3.39$, $SD = 1.22$ for private use), suggesting a sufficient experience with AI tools informing their feedback preferences. The data collection procedures were reviewed by the independent ethics committee at the Leibniz Institute for Science and Mathematics Education under Protocol 2025-49-ME. Participants indicated their field of study in an open text box. The sample was heterogeneous with regard to field of study; after clustering the responses, the most frequent categories were computer science and information technologies (26 percent, $N = 74$), Business and economics (18%, $N=52$), health and life sciences (14%, $N=40$), psychology and counselling (11%, $N=32$), and arts and humanities (11%, $N=32$).

The Present Study

Emerging empirical work has documented overall perception differences and corresponding preferences regarding AI or humans as feedback provider. However, few studies have examined predictors of these preferences, mostly using explorative qualitative designs (e.g., [13, 37], see [45] for an exception). We argue based on the idea that feedback perceived as provided by an AI system might have limited social meaning that AI and human feedback can be preferred by learners depending on situation-specific psychological factors. However, to our knowledge,

this idea has not been explored systematically. To address this gap, we draw on theories in educational psychology that emphasize the social meaning of human feedback and its psychological consequences. Building on appraisal-based perspectives [46], we argue that learners evaluate situational cues such as the feedback provider in relation to their current goals, needs, emotions and perceived resources, which in turn shape preferences. Specifically, we assume that learners' preferences for AI versus human feedback depend on (a) prior task effort, (b) the salience of motivational needs such as autonomy versus support, and (c) emotional factors such as anxiety. These factors are hypothesized to determine whether the social meaning of human feedback is experienced as supportive and engaging or as threatening and constraining, and thereby can be assumed to influence learners' willingness to receive and engage with feedback from AI or human providers. We had the following preregistered hypotheses: 1. Higher taskrelated effort prior to receiving feedback increases preference for

4.3

Experimental Design

We employed a vignette-based within-person design to examine situational predictors of preferences for AI versus human feedback. Vignettes are well-suited for examining situational appraisals because they allow for precise manipulation of psychological characteristics that are difficult to disentangle in authentic learning environments [19]. All vignettes were presented to each participant, allowing

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Table 1: Overview of vignette scenarios

preferences to be compared within individuals. In detail, participants were presented with a series of short hypothetical feedback scenarios that systematically varied in current psychological state of the learner in a specific feedback situation prior to receiving feedback. The vignettes manipulated one of the three factors at either high or low levels: perceived task effort (high [Vignette 1] vs. low [2]) and salience of motivational needs (high autonomy need [3] vs. high support need [4]), as well as evaluation anxiety (high [5] vs. low [6]). The vignettes are shown in Table 1. Each participant evaluated all six vignettes. Vignettes were presented in partially randomized order within blocks: effort and need-support vignettes were shown first in randomized order, followed by the high versus low anxiety vignettes. This structure reflects the study design, in which effort and motivational need salience constituted preregistered primary manipulations, whereas anxiety was included as an exploratory factor and therefore administered subsequently. After each vignette, participants indicated their preference for receiving feedback from either an AI system or a human instructor. As manipulation checks, we assessed how much learners had perceived a) effort exerted, b) salience of motivational needs (greater salience of autonomy vs. support needs) and c) anxiety experienced by the learner in the described situation. The anxiety manipulation was preregistered as exploratory but is theoretically relevant to the present research question and is therefore reported alongside the confirmatory analyses.

4.4

Text

You are a student in a teacher education program working on a writing assignment for one of your university courses. The task involves engaging with academic literature while also reflecting on its relevance for teaching practice. You have just spent several hours working on the assignment, and it has been quite a complex process. You tried to structure your arguments clearly and support them with relevant sources. You also made an effort to include meaningful reflections on how the concepts apply to your future teaching. You feel that you have really given it your all—reviewed, revised, and pushed yourself to your limits. You are a student in a teacher education program working on a writing assignment for one of your university courses. The task involves engaging with academic literature while also reflecting on its relevance for teaching practice. You've managed to put together a basic draft, but you know you haven't really gone into depth. You summarized a few points from the readings and added some general thoughts, but didn't spend much time organizing your ideas or refining the text. You're aware that with more effort, you could have made stronger connections or added more thoughtful reflections—but for now, you just wanted to get something submitted. You are a student in a teacher education program working on a

writing assignment for one of your university courses. The task involves engaging with academic literature while also reflecting on its relevance for teaching practice. You've been enjoying working independently on this task and appreciate the freedom to explore ideas in your own way. You spent time thinking through the concepts, structuring the text yourself, and following your own reasoning to connect theory and practice. You felt focused and engaged—precisely because you were able to find your own solutions. You are a student in a teacher education program working on a writing assignment for one of your university courses. The task involves engaging with academic literature while also reflecting on its relevance for teaching practice. You're trying to make sense of the expectations and want to do well, but you're not always sure if you're on the right track. You find yourself wishing for more guidance to help you understand whether your ideas make sense and how to connect them more clearly. You're putting in the effort, but the uncertainty sometimes makes it harder to stay motivated. What you really need is some reassurance and constructive input to help you move forward with more confidence. You are a student in a teacher education program working on a writing assignment for one of your university courses. The task involves engaging with academic literature while also reflecting on its relevance for teaching practice. This particular assignment matters to you a lot because the topic is closely connected to your own beliefs and future teaching plans. Your ideas feel quite personal and central to how you see yourself as a future teacher. As you write, you find yourself second-guessing your wording and wondering how your reflections will come across. You worry about your work being misunderstood and your competence being questioned. The thought of your work being read and evaluated makes you feel exposed and uneasy. You are a student in a teacher education program working on a writing assignment for one of your university courses. The task requires you to connect ideas from academic literature with reflections on teaching practice. You find the topic stimulating and enjoy relating it to your own beliefs and plans for becoming a teacher. As you write, you feel engaged in exploring your ideas and are curious about how they will come across to others. You see the assignment as an opportunity to clarify your thinking and to communicate your perspective. The thought of your work being read and evaluated makes you feel motivated and confident that your reflections will be understood and appreciated.

Materials

4.4.1 Dependent Variable: Preference for AI vs. Human Feedback. Preference for AI compared to human feedback was assessed after each scenario and prior to the manipulation check items. The item was: "In this scenario, would you prefer receiving feedback from a human or an AI". Participants indicated their preference by choosing either human or AI feedback for each vignette; responses were dummy-coded (0 = human feedback, 1 = AI feedback). The instruction was "Please read the scenario shown below carefully and answer the questions as if you were in this situation".

4.4.2 Manipulation checks. To assess whether vignettes were perceived by the participants as intended, we asked them how they perceived the scenario with regard to a) prior task effort ("In this scenario, how much effort was put into the task", Likert scale ranging from 1 "no effort at all" to "very high effort"), b) the salience of motivational needs of autonomy compared to need for support ("In this scenario, to what extent would one prefer to work independently rather than seek support"; Likert scale ranging from 1 "not at all to 5 "extremely"), and c) performance anxiety ("In this scenario, how uncomfortable would one likely feel being judged by others for their work?"; Likert scale ranging from 1 "not at all to 5 "extremely") for each vignette. These items served as a manipulation check.

4.5

No.

separate models for each of the three manipulated factors (i.e., prior task effort, salience of motivational needs, and level of performance-related anxiety). Manipulation checks were analyzed using linear mixed-effects models predicting perceived effort, motivational need support, and anxiety from their respective experimental conditions. Each manipulation check was tested on the vignettes in which the corresponding dimension was manipulated. Differences in preferences for AI versus human feedback were analyzed using mixed-effects logistic regression models with feedback preference as a binary outcome

Analyses

All analyses were conducted in R. Because multiple vignette evaluations were nested within participants, data were analyzed using mixed-effects models with random intercepts for participants. This approach allowed us to examine within-person variation in feedback source preferences while accounting for non-independence of

observations with regard to the manipulated factor. We fitted

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Jennifer Meyer, Melanie V. Keller, and Martin Daumiller

Table 2: Absolute frequency of feedback preferences (human vs. AI) across vignette conditions Vignette

Manipulated aspect

Human (☐)

AI (☐)

Missing (☐)

High effort Low effort High autonomy need High support need High anxiety Low anxiety

Table 3: Predicted probabilities of preferring AI feedback by vignette Manipulated aspect

☐ (AI)

CI ☐ ☐ ☐

CI *h* ☐ ☐ *h*

High effort Low effort High autonomy need High support need High anxiety Low anxiety

0.24 0.56 0.38 0.24 0.61 0.11

0.18 0.49 0.32 0.19 0.55 0.08

0.30 0.63 0.44 0.29 0.66 0.15

Note. Values represent model-predicted probabilities of preferring AI-generated feedback over human feedback for each vignette. Confidence intervals are 95% Wald intervals. Vignettes varied situational characteristics hypothesized to influence feedback preferences.

(AI vs. human). Separate models were estimated for each vignette dimension to assess whether preferences varied as a function of perceived effort, motivational needs, and anxiety. Analyses of effort and motivational needs were preregistered. Analyses involving anxiety were preregistered as exploratory and are reported as such alongside confirmatory results.

5.2.2 H2. Does salience of support vs. autonomy needs predict feedback source preference? A mixed-effects logistic regression revealed that feedback source preferences varied as a function of the salience of motivational needs described in the feedback scenario. Compared to autonomy-focused scenarios, support-focused scenarios were associated with a significantly lower likelihood of AI feedback preference, $b = -0.65$, $SE = 0.19$, $z = -3.49$, $p < .001$ ($OR = 0.52$). Predicted probabilities indicated that participants preferred AI feedback in approximately 38% of autonomy-focused scenarios but only 24% of support-focused scenarios.