#32426 - Educational Techniques for Supporting Learning, Memory, and Understanding

Protocol Information

Review Type	Status	Submission Number	Approval Date
Exempt	**Exempt**	**2**	**Aug 12, 2026**

Continuing Review Date	Expiration Date	Initial Approval Date	Initial Review Type
Aug 06, 2027	**--**	**Aug 07, 2026**	**Exempt**

Approval Comment

Amendment A001
This research is exempt under the following category: Category 1

Protocol Amendment Form

Feedback

Amendment Request

4000
Select your Protocol Type
Exempt

4012
Amendment Number
A001

4004
Describe the changes being made.
Add key personnel to the protocol.

4005
Why are these changes being made (i.e. what is the rationale for these changes)?
The added person will take part in communicating with the course instructor and provide technical support with Terracotta setup.

General Information

Principal Investigator
Motz, Benjamin

Lead Unit
BL-PSY - PSYCHOLOGICAL & BRAIN SCIENCES

Study Title
Educational Techniques for Supporting Learning, Memory, and Understanding

0100
Select your protocol type.
Exempt

Research Personnel

This Personnel list is for Research Personnel Only. For individuals who need access to the protocol but are not research personnel, add them to the **Permissions** tab.
For NEW studies and Amendments changing the PI, you must click on the pencil icon to complete all required information in the person record.

Person

Motz, Benjamin

Email Address

bmotz@iu.edu

Researcher Role

Principal Investigator (PI)

Home Unit

BL-PSY - PSYCHOLOGICAL & BRAIN SCIENCES

IU Faculty, Staff or Student?

Yes

Select IU Role

Tenure Track or Clinical Faculty

Is the researcher affiliated with any of the following? Select all that apply.

None of the Above

Permission Type

Full Access

0142
Training

Behavioral/Social Science Researcher - Stage 4 - CITI	10/04/21 - 10/03/26

0109
COI Disclosure

Status: Approved

For Expedited/Full Board or Request to rely on non-IU IRB protocol types, attach a CV for the Principal Investigator below.

People Attachments

Person

Zhang, Tongyao

Email Address

zhangton@iu.edu

Researcher Role

Key Personnel

IU Faculty, Staff or Student?

Yes

Is the researcher affiliated with any of the following? Select all that apply.

None of the Above

Permission Type

Read-Only

0142
Training

Behavioral/Social Science Researcher - Stage 2 - CITI	01/03/26 - 01/03/31

0109
COI Disclosure

Status: Approved

People Attachments

Person

Fletcher, Noah

Email Address

nfletch@iu.edu

Researcher Role

Key Personnel

IU Faculty, Staff or Student?

Yes

Is the researcher affiliated with any of the following? Select all that apply.

None of the Above

Permission Type

Read-Only

0142

Training

Behavioral/Social Science Researcher - Stage 1 - CITI	08/29/24 - 08/29/29

0109

COI Disclosure

Status: Approved

People Attachments

0259

Are there any affiliated personnel you are unable to add because they were not found in the drop down list?

No

0195

Are you requesting that the IU IRB serve as the IRB of record for any *non-affiliated* researchers?

No

Conflict Of Interest

0110

Do any of the research personnel have a significant financial interest which could affect this research?

No

0114

Are any of the research personnel aware of an institutional conflict of interest which could affect or be affected by this research?

No

Research Basics

0102

Will the study be funded, fully or partly, by any of the following sources (this includes pass through funding)? Select all that apply.

Other external source

0103

List Funding Sources

Gates Foundation (Planning Grant for Efficacy Research on AI Innovations; KC Proposal ID: 00938985)

0833

Do you consider your project to be a community engaged project?

No

0832

Select all of the following participant types that will be included in the research.

None of the above

0800

The research includes: Select all options that apply.

Normal educational practices conducted in established or common education settings. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
Data collection that does not include interacting with subjects

0805

For data collection that does not include interacting with subjects, select all options that apply to the research.

Data not protected by HIPAA

0807

Will information be recorded in a de-identified manner (this includes no direct identifiers or identifiers linked to the subject), and researchers will not attempt to re-identify subjects?

Yes

0806

Confirm a data collection form is uploaded in the Protocol Attachments section below.

Yes

0828

What sources will be used to identify data, records, or specimens?

Other

0830

Name the Other sources.

Terracotta Participant ID. The Terracotta Participant ID is assigned automatically by Terracotta, and uniquely identifies a student who has provided consent to participate in a study.

HIPAA Waiver

Research Design

0150

Provide a brief statement (no more than 2 – 3 sentences) of the purpose of this study, in lay terms.

A common question in educational psychology research is whether and how students benefit from learning material, instructions, and learning environments. For example, investigating what features in a homework assignment cause students to understand and memorize key concepts better could help teachers design assignments that are more effective for learning. The purpose of this study is to experimentally evaluate the effectiveness of enhanced educational techniques (e.g., self-explanation, AI-assisted learning) in students' learning outcomes and experience.

0812

Describe the research interactions or interventions and data collection methods for the study. Include the frequency and duration of each procedure or activity.

OVERVIEW: This study involves making comparisons between different instructional techniques, as implemented in online learning activities in the learning management system (LMS; e.g., Canvas). Online learning activities in this study will be created from three customizable templates that define the basic structure of the learning activities, and the course instructor will populate these templates with their own course materials and configuration preferences. The goal of this study is to compare the effectiveness of these templates as well as the features of the templates, across normal variation in an instructor's use of the templates. ONLINE LEARNING ACTIVITIY TEMPLATES: Any individual learning activity in the current study will be modeled from a set of customizable templates, which outline the structure and basic procedure of the learning activities, and which would be populated with an instructor's own normal course materials. The templates are described in detail in the attachment “Templates - INST - 32426.docx” with illustrated examples. Three features may be manipulated in the activities defined by the templates: (1) The format of responses to practice questions and prompts (e.g., multiple choice vs. short answer vs. dialogue); (2) The format and modality of feedback provided following a student's response (e.g., correctness vs. numeric scores vs. dialogue); and (3) The presence of images, online video, or visual scaffolding in online assignments. In the current study, the role of the researchers is to provide technical implementations of these variations as online activities, to work with teachers to set them up properly with the teachers' provided materials, to ensure that they are implemented faithfully in the course, to confirm that outcomes are selected appropriately in the LMS, and to perform analyses on de-identified data. All templates reflect normal educational practice in established or common educational settings. RESEARCH INTERACTIONS: The research interactions will not happen directly between the researchers and the student participants; Instead, students who consent to participate will experience the research study as part of their routine educational experience, as supported by Terracotta (https://terracotta.education). Terracotta is a research tool that makes it possible to conduct responsible experimental research on what teachers assign within the LMS. Under this protocol, a collaborating teacher will configure Terracotta in their LMS course site to implement an experiment on the experimental templates, customized with their own student learning activities. Based on the templates and in collaboration with the research team, they will create different versions of student learning activities that incorporate their existing materials, and that reflect normal practices in their course. Terracotta will implement informed consent, administer experimental treatments, passively collect research data, filter non-consenting participants, and export de-identified research data, with no direct human involvement. Data collection will be exclusively through Terracotta, where researchers obtain de-identified data of students' performance on course activities such as quizzes and test scores. THE ROLE OF THE TEACHER: In the current study, the participating teacher does not perform research, nor is the teacher acting as a participant. The participating teacher is involved in the study in two ways: (1) creating materials, and (2) facilitating recruitment. While the teacher will have extensive *instructional* interactions with their students, the teacher will have no *research* interactions with their students. To emphasize: No aspect of the teacher's interaction with their students will be manipulated in this study. The research personnel will work with the teacher to ensure that the materials, recruitment, and the experiment setup in Terracotta are compliant with the current protocol. Neither the teacher nor the research personnel will be able to see which students provided consent, or which students are assigned to which condition -- these details are managed by Terracotta, and only deidentified data from consenting participants are exported by Terracotta. For their role in creating materials and facilitating recruitment, the teacher may be included as an author on research publications that emerge from the current study, and if a particular study variation is supported by a funding source, the teacher may also receive financial compensation for their involvement. PROCEDURE: Students who are enrolled in a participating course will learn about the opportunity to participate in the study from their teacher. The teacher may announce the study in class and/or electronically depending on their preference and the format of the course (in-person, hybrid, online), and these recruitment materials are attached (Recruitment - 32426.docx). These recruitment materials will invite students to respond to an informed consent assignment in the LMS. The informed consent assignment is graded, but all students will receive credit for responding, no matter what response they provide (consent or no consent), with the precise grade weight being determined by the teacher. In this consent assignment, potential participants will see the informed consent statement (ICS), and will be prompted to respond whether they agree to participate in the study. Because they are responding in the LMS, students will necessarily be fully-authenticated with their institutional login, and thus they will click to provide consent, rather than providing a physical signature. Students' responses will be hidden from the instructor. Terracotta will record which students have consented and have not consented in a private and secure manner. The informed consent statement (ICS) is in the "Protocol Attachments" section. The ICS clearly instructs any student who is under 18 to respond "No" to the consent prompt. If the student does not consent, the student will not be randomly-assigned to experimental treatment nor will the student included in any exports of the research data; they will, however, have access to whatever version of the study the teacher marks as the "default" treatment (business-as-usual learning activities the instructor intended to provide to the class regardless of this study). As the teacher will have no way of knowing who provided consent or not, the teacher will treat all students the same (providing support, answering questions, offering encouragement), regardless of whether a student is participating in the study. After providing consent, the different assignment versions involved in this study will be incorporated into the learning activities in the LMS (see examples in the templates attachment), and Terracotta will randomly assign students to these versions. In some circumstances, students in the same course who choose to participate may receive different versions of the same learning activity (e.g., seeing visualizations of a math problem vs. seeing step-by-step text explanations) to investigate how to optimize the design of such technical enhancements. The outcome measures will be assessments as part of the normal conduct of the course, practical quizzes and exams as prepared by the instructor. The teacher will select the relevant assessment scores in Terracotta, and students' grades on these assessment will be automatically copied from the LMS into the Terracotta data export, de-identified.

0802

Explain how these research procedures will be carried out in a way that is not likely to adversely impact students’ ability to learn or the assessment of the educators who provide instruction.

Although this is qualifies as an Exempt study, we choose to implement an informed consent procedure, so that only students who explicitly volunteer to participate may experience an experimentally-manipulated version of their assigned coursework. The experimental treatments that consenting participants receive will be instructor-created variations of the materials they would have received if they did not participate in the study. The researchers will cooperate with the teacher to make sure that the provided activities or materials are designed to support students' learning outcomes. For example, one of the possible experimental treatments is to prompt students to do extra self-explanation of the learning materials, and this has been shown by past studies to be helpful for students' understanding and memory. No experimental manipulations that aimed to undermine the learning effectiveness will be conducted, nor will students ever be exposed to any artificially depleted control conditions. Students will minimally experience routine business-as-usual learning activities. The teacher will remain equally accessible and helpful to all students in the class throughout the study to ensure that the students can get any support needed to benefit from the class. The teacher will not be aware of students' consent decisions, so the teacher will necessarily treat all students the same regardless of their participation in the study. The research manipulation in this study is very limited in scope. We aim to examine these techniques to understand how students learn individual facts and highly specific conceptual derivatives from these facts. By keeping the study's scope limited only to a small set of course-relevant ideas, if experimental differences are observed, they will nevertheless be negligible for any individual student's overall learning and performance. To prevent any possibility of negative effects of the experimental manipulation, any classroom implementation of the current study will minimally use one of two different strategies to ensure that there are no adverse impacts on students' ability to learn or on students' assessments: (1) Monitoring and supplement. Treatments will include a measure where students mark their self-reported understanding of the target facts/concepts. We will monitor students' responses to these items during the study, and if students assigned to the experimental version are observed to have credibly lower self-reported understanding, the teacher will distribute a supplemental activity, a version of the control activity, to the full class; (2) Supplement by request. At the end of the experimental treatment, prior to submitting their assignment, students will have the opportunity to request additional material by clicking a button. Upon clicking this button, they will be presented with a supplemental activity, a version of the control activity, in a pop-up window.

Confidentiality & Privacy

0803

Which student records are you accessing for the research?

IU

0352

Is the research intended to study the effectiveness of an instructional technique, curricula, or classroom management method in an IU course?

Yes

0353

Will only IU faculty and staff who have professional responsibilities to conduct such research have access to the IU student records data?

Yes

Transnational Research

0474

Does the research involve any of the following transnational components? ***Select all that apply.***

None of the above

Eligibility and Recruitment

0816

List criteria used to determine that a subject is eligible to participate in this study.

Potential participants will initially be identified because they will have enrolled in a course that is participating in this study. All enrolled students will be added to Canvas sites automatically as in the normal conduct of the course, and will have the opportunity to consent to participate.

Protocol Attachments

Select **+Add** Line to add each attachment
Select **Replace** to replace an existing document

Attachment Type
Other

Attachment
Terracotta_DataCollectionForm.pdf

Description
Data collection form

Attachment Type
Data Collection Instrument

Attachment
Templates - INST - 32426.docx

Description

Attachment Type
Informed Consent Statement

Attachment
Informed Consent Statement - 32426.docx

Description

Attachment Type
Recruitment Materials

Attachment

Recruitment - 32426.docx

Description

Administrative Details Form

Protocol Details

9031

Protocol Type

Exempt

Billing Account #

Study Status

Submission Details

9029

Exempt Category

Category 1: Research in established or commonly accepted educational settings involving normal educational practices

Protocol Determinations

9032

Check all determinations that need to be made.

FERPA (written permission is not required)

9026

FERPA.

The research is designed to study the effectiveness of an instructional technique, curricula, or classroom management method in an IU course.

9028

Other Determinations.