LXD**RESEARCH**
AT CHARLES RIVER MEDIA

Glean

ESSA Evidence Packet

Research Foundation
& Logic Model

Authors:

Rachel Schechter, Ph.D.

Erin Kabba

Kenny Lam

RESEARCH-BASED
DESIGN
ESSA IV
LXD RESEARCH

Prepared for Glean

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RESEARCH-BASED
DESIGN
ESSA IV
LXD
RESEARCH

ESSA LEVEL IV

LXD Research Recognition for Glean

Glean

This product has been rigorously evaluated and is hereby acknowledged for meeting the educational impact criteria of the Every Student Succeeds Act (ESSA), warranting a Level IV for **"Demonstrates a Rationale."**. This recognition is based on its proven effectiveness in enhancing grade-level learning outcomes.

REVIEWED BY THE LXD RESEARCH EXPERT REVIEW PANEL

August 15,2024

Rachel Schechter, Ph.D.
Founder of LXD Research

DATE

What is Glean?

Glean is a cutting-edge online note-taking system that empowers students to capture, organize, and review lecture content efficiently. By integrating audio recordings, notes, and slides, Glean enables students to create comprehensive and searchable study resources. The platform promotes active learning by allowing users to highlight key points, add annotations, and revisit materials at their own pace.

Additionally, Glean supports the collation of various learning materials and provides tools for collaboration and feedback, making it an invaluable asset for both individual and group study sessions. This holistic approach helps students improve their comprehension and retention of information, ultimately enhancing their academic performance.

The Glean Method

Capture everything
- Easily record classes on any device, take notes, and stay engaged without missing anything.

Organise content
- Combine transcripts, slides, and more into a single, easy-to-use workspace.
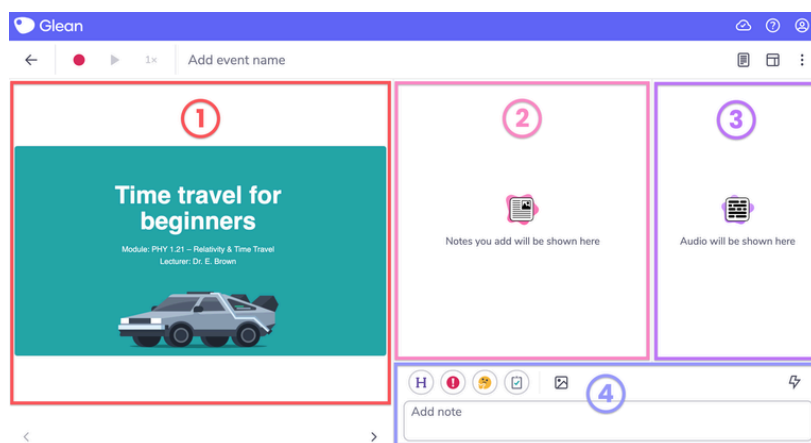
Refine notes
- Review class content at your own pace, add detailed notes, look up definitions, and more.

Apply knowledge
- Plan study sessions with the Focus Timer and test yourself afterwards using our new automated quizzing feature, Quiz Me!

Glean Features

- User-friendly interface
- Seamless integration with Google Workspace, Microsoft Edge, Chrome, and various Chrome extensions
- Comprehensive note-taking with audio, slides, and text in one place
- Cross-disciplinary application for various subjects
- Tools for organizing and reviewing notes
- Support for accessibility features and study strategies

Because I was able to go back and listen to the notes better and go through it more thoroughly it gave me more confidence about what I was hearing from the professor.

-**Thuyvi,**
Student, Texas Woman's University

Students are increasingly anxious, and they're already worried they can't keep up with class. Telling my students they're going to be able to capture the information with Glean reduces their anxiety. It's like a security blanket.

-Patrick Tackett
Instructor at Fresno City College

Handwritten notes didn't work for me. When I was introduced to Glean it really helped. Now I can listen to my teachers fully while Glean is recording my class.

-Justin
Student Glean User

There are lots of issues with the teacher going really fast. It is really hard to listen and write, sometimes when I look back on my manual notes they're not useful at all.
-Qu-Ran
Student, New York University

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Glean Foundational Research Summary: How Glean Aligns to Learning Science Research

The landscape of higher education has undergone a significant transformation in recent years. Online learning platforms have become increasingly prevalent, offering flexibility and accessibility for students (Baynes et al., 2020). However, the digitisation of the lecture experience also presents challenges, particularly in the realm of note-taking. Traditional methods, such as handwriting may have been replaced. Laptop note-takers often become verbatim note-takers. (Luo et al., 2018; Morehead et al., 2019)

Comparing Note-Taking Methods: Handwritten vs. Digital

Studies have consistently shown that students using laptops for note-taking are more susceptible to distractions (Luo et al., 2018). The ease of typing can lead to verbatim transcription; a passive learning strategy that creates a false sense of comprehension without encouraging deeper processing (Morehead et al., 2019). Furthermore, research indicates that the act of writing itself promotes cognitive engagement with the material. The physical act of forming letters and organizing thoughts on paper seems to facilitate a more selective and deliberate approach to note-taking, encouraging students to identify and record key points (Chen et al., 2024). This deeper processing strengthens memory encoding and leads to better recall and understanding compared to the more passive approach of verbatim transcription on a laptop.

Flanigan et al. (2023) observed that computer notes often lack visuals and are less likely to be revised, hindering the crucial process of transforming information into one's own understanding. Consequently, studies like Luo et al. (2018) and Flanigan et al. (2023) report lower academic achievement for students who rely solely on laptop notes. It is important to note that the research on note-taking methods is not entirely conclusive. Some studies haven't found a significant difference in learning outcomes between longhand and laptop note-taking (Wiechmann et al., 2022). Individual preferences may also play a role (Luo et al., 2018).

Studies have highlighted the pitfalls of relying solely on laptops for note-taking in traditional classrooms. Stacy & Cain (2015) found that students using laptops were more susceptible to distractions, hindering their ability to focus on lecture content. Carroll et al.

(2020) further argued that passive note-taking methods, such as dictation or relying solely on pre-recorded lectures, often result in incomplete or inaccurate notes due to students' struggles capturing all vital information. This resonates with the cognitive overload argument presented by Stacy & Cain (2015). Verbatim note-taking demands significant cognitive resources, leaving little capacity for deeper understanding and processing of the material.

Digitizing the lecture experience has often meant transcripts are provided alongside lectures. While these can be valuable resources, they can also become passive learning tools. Rereading, a common study strategy, has been shown to be less effective than active retrieval methods (Roediger & Karpicke, 2006). Students who rely solely on transcripts may not engage in the critical analysis and elaboration necessary for knowledge retention.

In contrast, effective learning strategies emphasize active engagement. Bjork & Yan (2014) advocate for approaches that promote "elaborate processing," where new information is actively connected to prior knowledge and understanding. Passive methods, they argue, hinder information retention. This aligns with research by Chen et al. (2024) suggesting that the act of note-taking itself can be a valuable tool in reducing mind-wandering and enhancing information encoding. However, note-taking effectiveness hinges heavily on the chosen approach.

While the medium of note-taking (handwritten vs. digital) may have some influence, research suggests that the processing of information is more critical. Morehead et al. (2019) highlight the importance of "encoding" information - actively transforming it into one's own understanding. Luo et al. (2018) found that longhand note-taking encourages a "generative" approach, leading to paraphrasing and visual aids. This deeper processing fosters better comprehension and retention.

Despite the challenges, online note-taking offers advantages. Wiechmann et al. (2022) found no significant difference in factual recall between handwritten and digital notes. Additionally, the ease of revising notes on a computer (Morehead et al., 2019) can potentially enhance learning if students actively engage with the process.

Glean's Approach to Enhancing Note-Taking

Glean, an innovative online note-taking system, aims to address these limitations by incorporating features that actively engage students with the lecture content. One such feature is the integration of student notes with
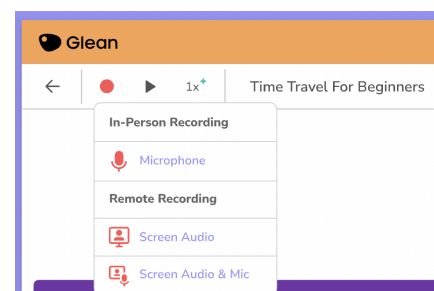
lecture transcripts. This allows students to not only capture key points but also to elaborate on them, fostering a deeper understanding that aligns with the concept of "elaborate processing" discussed by Bjork & Yan (2014).

Glean further strengthens its potential for enhanced learning outcomes through its ability to collate various learning materials, such as slides, definitions, images, and tasks. This aligns with the concept of "spacing" described by Bjork & Yan (2014), where exposure to information from multiple sources distributed over time can lead to better learning and retention.
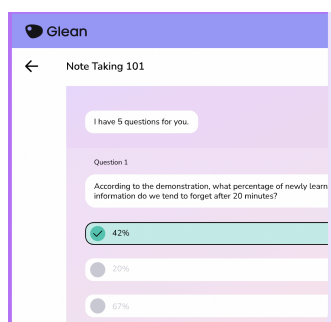
Beyond these features, Glean incorporates multiple-choice quizzing, a form of retrieval practice. Retrieval practice refers to the act of actively retrieving previously learned information from memory, which has been shown to enhance long-term retention and understanding (Roediger & Butler, 2011). By incorporating quizzes directly within the note-taking environment, Glean encourages students to revisit and engage with the material at spaced intervals, strengthening memory consolidation.

Logic Model for Glean

PROBLEM STATEMENT

Higher education students often struggle with effective note-taking, getting distracted on laptops, missing key points, or just transcribing lectures without understanding. This inefficiency and technostress hinder their learning and exam preparation. Glean addresses these issues by converting lecture speech into text and combining it with students' notes and related materials in an organized online space. By making it easier for students to manage and utilize comprehensive documentation of lectures, Glean enables a wider diversity of students to benefit from higher education, ultimately reducing course non-completion rates.

RESOURCES

What resources are or could be available?

- Online platform and software for converting auditory speech to text
- In-person and Remote Recording
- Cloud storage for notes and materials
- Speech-to-text algorithms and AI tools
- Introductory guides and tutorials
- Live webinars and on-demand training sessions
- User data analytics on use, performance and engagement
- Mobile and desktop applications

STRATEGIES & ACTIVITIES

What will the activities, events, and such be?

Students:
- Capture audio from live lectures using their device's microphone, which is then transcribed into text
- Import audio files from previously recorded lectures
- Integrate their handwritten notes, drawings, and images with the transcribed lecture text
- Highlight important points and mark sections for review within the notes
- Import and attach lecture slides directly to their notes
- Gather presentations in a single location
- Create and manage tasks related to their studies (e.g., writing assignments)
- Utilize live captions during lectures for real-time reading along with the audio
- Utilize time-management system to focus on notes

Administration:
- Invite eligible students for platform access
- Track and manage student engagement and usage
- Adjust user permissions and access settings remotely
- Oversee and coordinate peer note-taking activities

OUTPUTS

What are the initial products of these activities?

- Students are able to share and receive lecture notes with other students
- Important sections of the lecture marked for easy review
- Customizable playback speeds and noise reduction settings applied to lecture recordings
- Increased focus on notes during study time with the use of Focus Timer
- Automatically generated quizzes from lecture content for immediate self-assessment
- Ability to quickly search and locate specific information within notes and transcripts
- Notes can be printed for offline use
- Administration has a better understanding of how to support students in their learning

SHORT-TERM AND INTERMEDIATE OUTCOMES

- Improved note-taking efficiency,
- Reduced distractions
- Increased engagement and learning retention
- Enhanced ability to organize and manage comprehensive lecture documentation
- Better study habits and exam preparation

LONG-TERM OUTCOMES AND IMPACTS

- Lower course non-completion rates of Glean users compared to non-Glean users
- Higher academic performance and increased student satisfaction
- Increased digital literacy and technology skills
- More inclusive education, benefiting a diverse range of students

ASSUMPTIONS

- Students have access to a mobile device, laptop, or desktop
- Students are able to use the program during class

Glean

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LXD Research is an independent research firm that evaluates educational programs with ESSA-aligned methods.

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www.glean.co