

Teaching Into the Pause

Prepare the explanation once. Teach it live, one step at a time.

Frank Romero, MS

A LectureGlyph white paper. Written for educators, instructional designers, and anyone who explains ideas at a board. Revised draft, July 2026.

The argument. LectureGlyph lets you prepare the handwritten path of an explanation before class, then teach through it live: the page redraws your work one step at a time, stopping at the pause points you set, so your full attention goes to the students instead of the pen. Because the lesson is saved as strokes, pictures, and pause points rather than as a video, it can be edited, reused, and taught in any modality.

A note on evidence. This paper distinguishes between what the learning research has established and what is, so far, our design reasoning. Section 7 states plainly which is which. We would rather be precise than persuasive.

1 The Problem: Writing and Explaining at the Same Time

Anyone who teaches at a board knows the feeling. While your hand is drawing, your explanation slows down to match it. You end up narrating your own handwriting ("and we bring this term over here...") instead of teaching the idea. You turn to check your work and lose eye contact with the room. The layout takes attention that should have gone to the students.

None of that is a lack of skill. It is built into the situation. Teaching at a board asks you to do two demanding jobs at once:

- **Producing** the visual: writing legibly, placing things correctly, keeping the steps in order.
- **Delivering** the lesson: explaining, pacing, watching faces, answering questions.

Each job takes real concentration. Done together, they interfere with each other, and both suffer.

The strain is greatest in the subjects that lean on the board the most. A derivation, a geometric construction, a chemical mechanism, a graph built up term by term, a mathematics problem worked step by step: these are not finished pictures. Their meaning is in the order they are built. A student cannot understand the final image without seeing how it came to be. So the teacher has to build it live while explaining it live, and the building gets in the way of the explaining.

2 The Two Usual Escapes, and What Each One Loses

Teaching has two standard ways around this problem, and each gives up something important.

Slides solve the production problem: everything is made before class. But a slide shows the finished result, not the path to it. For a photograph or a definition, that is fine. For step-by-step reasoning, the finished result hides the very thing the student needed to see: the order in which the idea was built. Bullet-point "build" animations exist, but they animate text blocks, not the strokes of a worked explanation.

Screencasts and recorded lectures solve a different problem: record once, watch anytime. That is a genuine advance. But a recording freezes everything together: the drawing, the voice, and the timing become one fixed video. It cannot be re-paced for the class in front of you. Fixing one mistake means re-recording. And in most screencasts the teacher was still drawing and talking at the same time during the recording, so the original problem was captured on video rather than solved.

Teachers have also brought the board to the tablet, and many rely on these apps daily. GoodNotes, Notability, and OneNote capture handwriting beautifully. Explain Everything goes further and records the writing as it happens. These are good tools, and Section 6 compares each of them to LectureGlyph directly. For now the pattern is enough: the note apps store ink but do not replay it as teaching, and the recording apps end in exactly the kind of fixed video described above.

What none of these preserves is the thing a live board does best: an explanation that unfolds in the teacher's own hand, at a pace chosen in the moment, in front of the people it is meant for. That is the gap LectureGlyph is built for.

3 What LectureGlyph Is

LectureGlyph is a whiteboard app for iPad that records the order of your work, not a video of it.

A lesson lives in a notebook, and a notebook is made of pages. You prepare each page ahead of time: write the steps in your own hand, draw the diagrams, import pictures where they help. As you work, you place **pause points** at the moments where you will want to stop and talk. The app remembers every stroke and the order it was made.

In class, you press play. The page starts blank and your work redraws itself, stroke by stroke, exactly as you wrote it. At each pause point the page stops and waits. That pause is where the teaching happens: you point, ask a question, check for confusion, connect the step to what came before. When the class is ready, you continue. The page never rushes you and never drags; it moves at the pace you choose, live, every time.

With the writing already on the page, your hands are free and your attention stays on the students. Live drawing is still there whenever you want it: you can pick up the pencil mid-lesson and trace the axes while you talk, circle a term the class asked about, or add a step on the spot. Drawing live

becomes a choice you make at the moments it helps, not a burden you carry through the whole lesson.

The lesson also doubles as the notes. Because the page arrives already written, students do not have to race to copy the board. They can listen, and write their own remarks alongside. A teacher can also plan the opposite on purpose: leave chosen sections of the page blank, or erase a worked step, and give the class time to write it themselves. The reveal pauses, the students work, and the lesson continues when the room is ready. Deciding what to hand students finished and what to make them produce is old, good pedagogy. LectureGlyph makes it deliberate.

Two things LectureGlyph is not. It is not a video tool with extra buttons; the recording is just one possible export, not the lesson itself. And it uses no artificial intelligence; everything the class sees is the teacher's own prepared work, replayed on cue.

4 Why This Should Work: The Research

The design rests on cognitive load theory, the well-established finding that working memory is small and easily overloaded, and that instruction works better when unnecessary load is removed (Sweller, van Merriënboer, and Paas 2019). LectureGlyph applies that lens twice: once to the teacher, once to the student. Most discussions only consider the student; naming both is the point.

The teacher's side. Drawing while explaining is a classic dual-task situation: two demanding jobs competing for one limited resource. The research remedy is *cognitive offloading*, moving part of the burden onto an external aid so the mind is free for the part that matters (Risko and Gilbert 2016). LectureGlyph offloads the production. The work was done earlier, when nothing competed with it. In the live moment the teacher's capacity goes where only a person can spend it: on the explanation and the room. Recent work on digital learning stresses that this kind of extraneous load, load created by the format rather than the material, is precisely what good instructional design should remove (Skulmowski and Xu 2022).

The student's side. Three well-supported findings say the paced reveal helps the learner directly. Each speaks to a different part of the design: the pauses, the stillness between them, and the hand that draws.

- **Segmenting: why the pauses help.** People learn more from material presented in meaningful chunks, with a moment to process between them, than from one continuous stream. A 2019 meta-analysis across dozens of studies confirms the effect (Rey et al. 2019). A pause point is a segment boundary made physical.
- **Transient information: why the stillness helps.** Spoken words and live drawing vanish as they go. When information disappears faster than working memory can hold it, learning drops (Leahy and Sweller 2011). A paused page turns a vanishing stream into stable steps a student can study for as long as the moment needs. The same principle drives current guidance on making instructional video effective (Mayer, Fiorella, and Stull 2020).

- **Watching the drawing unfold: why the handwriting helps.** Students learn more from watching a diagram being drawn than from seeing the same diagram finished, an effect demonstrated directly in controlled studies (Fiorella and Mayer 2016). The unfolding is not decoration; it carries the meaning.

For mathematics in particular. A worked example, a solution shown clearly step by step, remains one of the most reliable tools for teaching novices, especially in math, where a recent meta-analysis confirms its strength (Barbieri et al. 2023). A LectureGlyph lesson is a worked example delivered one step at a time, with a teacher present at every step. There is also growing evidence that handwriting engages the brain differently, and more richly, than typed text (Van der Weel and Van der Meer 2024), which supports keeping the teacher's own hand at the center of the medium.

5 Where It Fits

Subjects. LectureGlyph is strongest where the board is essential: mathematics above all, and any discipline built on step-by-step, symbolic, or spatial reasoning, including physics, chemistry, engineering, economics, and logic. If the meaning of your material lives in the order of its steps, this is the tool's home ground.

Modalities. LectureGlyph is not a teaching modality. It is a lesson that works inside whatever modality your course already uses:

- **In person:** the notebook goes to the projector, and the lesson is taught live in front of the class, pause by pause.
- **Live online:** in a videoconference class, the same lesson is shared to the screen and taught through the same pauses, with the same freedom to stop, take questions, and respond.
- **Recorded:** the lesson exports as a video for students to watch on their own time.
- **Flipped classroom:** students watch the exported lesson before class, so class time can go to practice. And when some arrive without having watched, the same lesson replays live in minutes; the plan survives.
- **Hybrid courses:** part of the course meets in person and part online. One prepared lesson serves both halves without being made twice.
- **Bichronous courses:** a newer model that blends live online sessions with self-paced online work (Martin, Polly, and Ritzhaupt 2020). The same lesson teaches the live session, then stays posted for the self-paced week. Research on these courses finds that live time is best spent on discussion and application rather than first delivery (Martin et al. 2024). That is exactly the time a prepared reveal gives back.

One lesson, prepared once, teaches in every one of these modalities. That reach is not an added feature; it follows directly from storing the lesson as structured strokes rather than as video.

6 How It Compares to Familiar Tools

Every tool below does its own job well. The honest comparison is about what each one makes natural, and what LectureGlyph adds beside it.

Tool	What it does	What LectureGlyph adds
Presentation slides (PowerPoint, Keynote)	Arranges finished visuals frame by frame	A slide shows the result; LectureGlyph replays the making of it. The class watches handwritten steps arrive in order, pausing wherever a step deserves discussion
Screencasts and lecture capture (Panopto, Zoom recordings)	Records a class as a video, as it happened	A recording fixes the pace once; LectureGlyph re-paces the lesson every time it is taught. Strokes, timing, and pauses stay editable, so a mistake never means re-recording
Note-taking apps (GoodNotes, Notability, OneNote)	Captures and organizes handwritten notes	A note app keeps what was written; LectureGlyph also keeps the order it was written in, so a page of notes becomes a lesson that can teach itself back one step at a time
Interactive video platforms (PlayPosit, Edpuzzle)	Layers quiz questions on top of a video	The questions live in the teacher's own pauses rather than in a video overlay, and the explanation underneath stays editable instead of locked in a recording
Recording whiteboards (Explain Everything)	Draws on a tablet and records the result	These tools end in a video take. A LectureGlyph lesson is never a take: the prepared strokes replay live, pause where the teacher chooses, and stay editable afterward

None of these tools is failing at its job. The difference is what each one treats as the finished product. For slides it is the screen, for lecture capture it is the video, for a note app it is the stored page. For LectureGlyph the finished product is the explanation itself: handwritten, ordered, pausable, and ready to be taught again.

7 What We Claim, and What We Do Not

The research findings above (cognitive load, segmenting, transient information, drawing effects, worked examples) are established results from the learning sciences. The claim that LectureGlyph's specific design delivers those benefits in real classrooms is, so far, design reasoning: well grounded, but not yet measured.

There is no efficacy study yet. When we run one, it will compare LectureGlyph lessons against slides and screencasts on the same material, and measure teacher load during class, student comprehension

of stepwise problems, preparation time, and how often lessons are reused and revised across terms. We name this openly because a reader in education deserves to know which statements are evidence and which are intent.

8 Conclusion

The problem is old: a teacher at a board pays a tax, splitting one mind between drawing and explaining. Slides escape the tax by giving up the unfolding. Recordings escape it by giving up the liveness. LectureGlyph's claim is narrow, and we believe it is true: the tax is not necessary. Prepare the handwritten path once. Then teach it live, one step at a time, pausing where the explanation needs to breathe.

The teacher carries less. The thinking shows. And the explanation is finally given the way it was meant to be followed: one idea at a time.

Thinking, made visible.

From the Author

Frank Romero, MS, has taught mathematics at the four-year university level for more than thirty years. Across those decades the classroom's technology kept changing: chalkboards gave way to whiteboards, overhead transparencies to projectors and screens, and paper handouts to course websites and learning platforms. One part of the job never changed. Whatever the decade, the material was still written by hand, live, in front of the class, while the teaching had to happen around it.

LectureGlyph began with a simple question: why not store the strokes? Write the lesson once, precisely, and let class time go to what only a live teacher can do. The notes reach students already made, so they listen instead of racing to copy, and the time recovered goes to working problems together while the material is fresh.

Thirty years of watching where students stumble is also thirty years of learning where the pauses belong. A teacher reads the room, the raised hands, the puzzled faces, and adjusts. LectureGlyph was built to protect exactly that work.

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Notes on the References

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