The Reel Deal: LLM-Generated Short-Form Educational Videos

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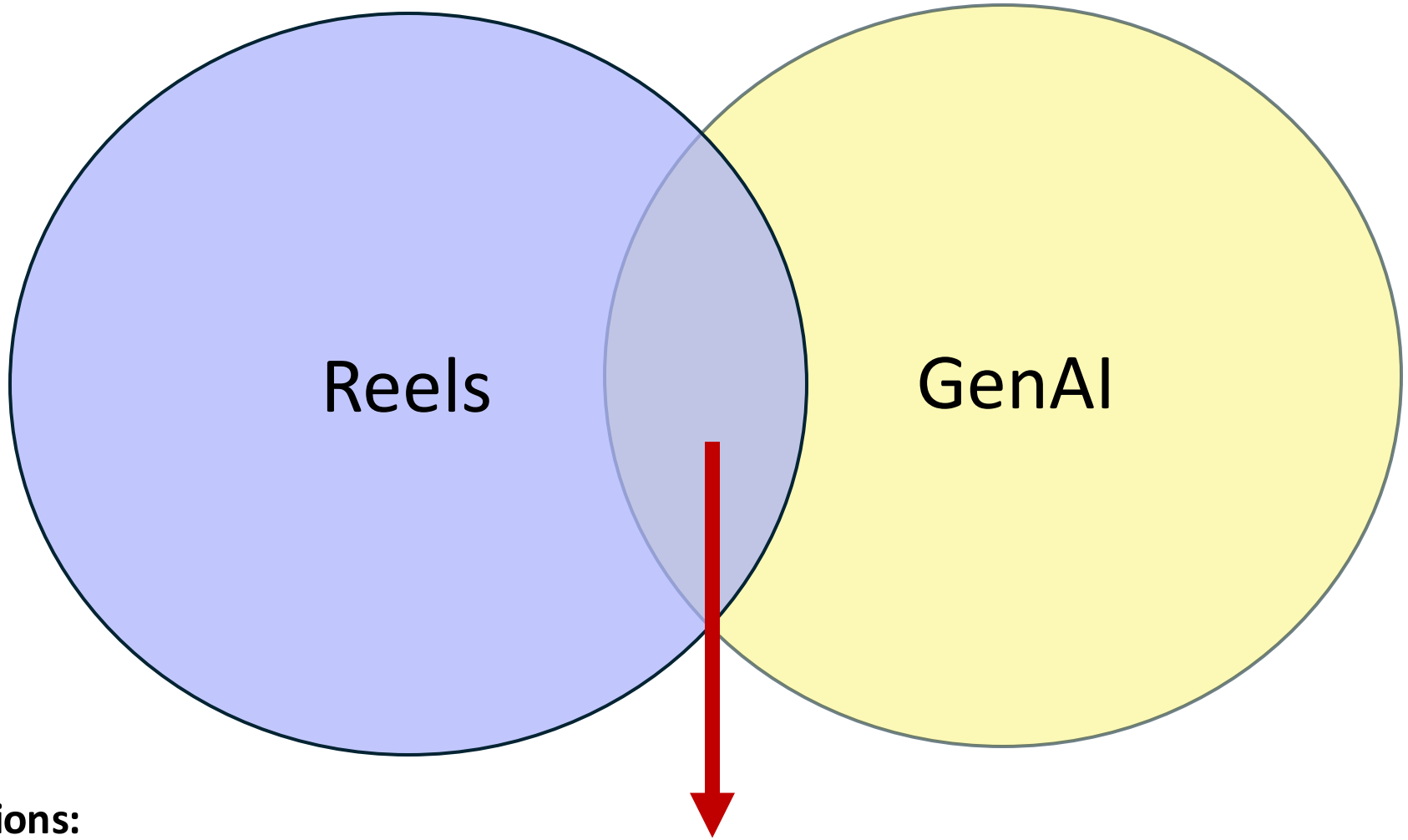
Gen Z prefers short, visual, engaging content… but learning is still stuck in long lectures

what if learning could feel like scrolling reels?

…while staying accurate, useful, and trustworthy?



Contributions:

i) Generate short-form educational videos (“reels”) from long-form lecture content using generative AI while preserving instructor-authored material

ii) Evaluate the effectiveness of AI-generated short-form reels against traditional long-form videos across learning outcomes, engagement, efficiency, and user trust

ReelsEd

Automated Generation Pipeline:

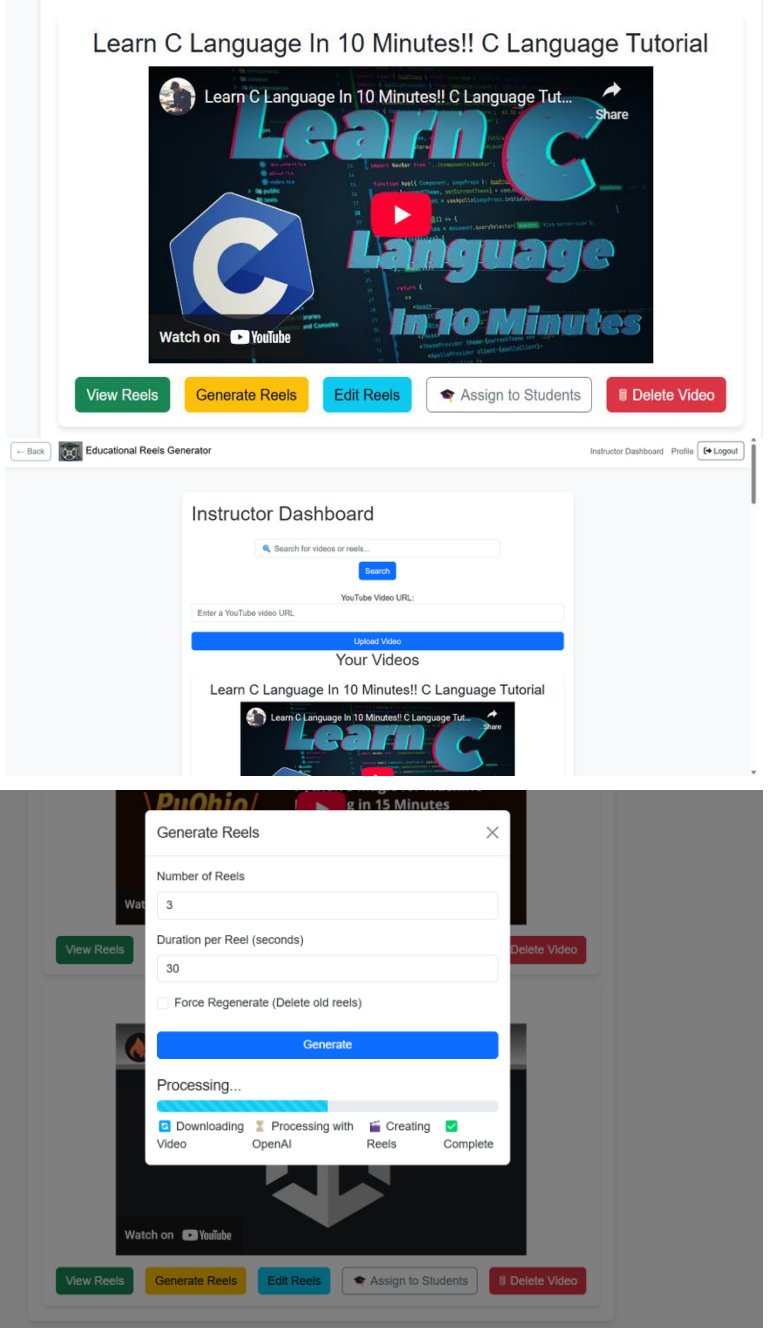
i) Transcripts extraction using the YouTube API

ii) Multi-stage analysis using GPT-4:

a) ***Key Moment Identification:*** GPT-4 analyzes the transcript to find key moments (as timestamps) based on a prompt that highlights the video's learning goals. Instructors use the UI to create reels' length.

b) ***Segment Summarization and Labeling:*** For each key moment, GPT-4 generates a short summary and a label.

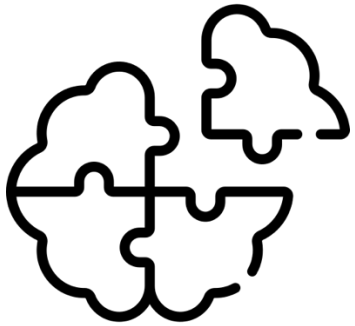
c) ***Video Trimming and Assembly:*** Based on the identified timestamps, MoviePy trims the original video into segments, which are then combined into a cohesive educational reel.



Videos:

- Lecture videos: ~10-15 minutes
- Reels: ~30-60 seconds
- Introductory courses to programming and machine learning

Design Principles



Cognitive load theory

Reduce cognitive load by segmenting long lectures into shorter and thematically coherent reels

Help learners process information more efficiently

Microlearning

Deliver short-form, focused videos that supported “bite-sized” engagement

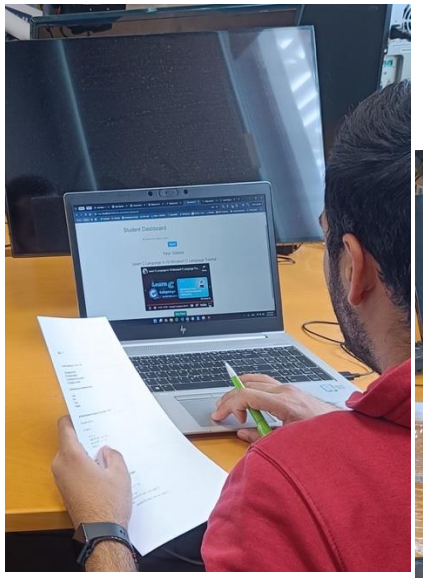
Make content easier to access, retain, and revisit

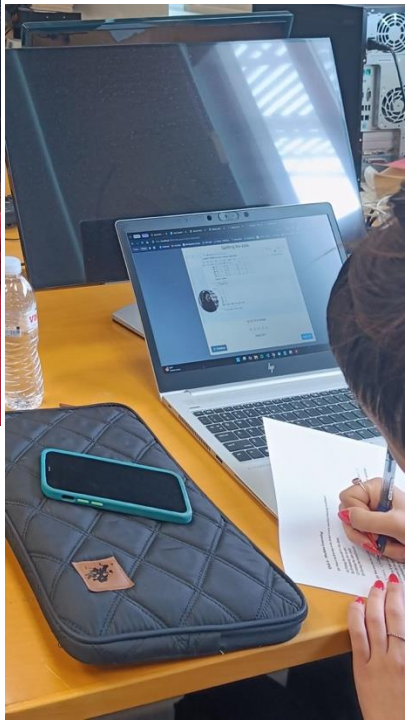
Trust

Align instructor’s video material and maintain transparency in the generation process

Support learners’ confidence in the system

User Study





Participants: 62 students

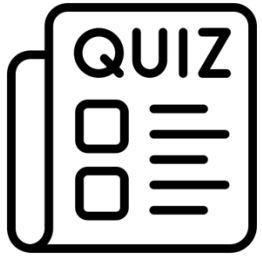
$Mage$ = 22.09, $SDage$ = 1.37; (27 female, 35 male, 0 non-binary)

Procedure:

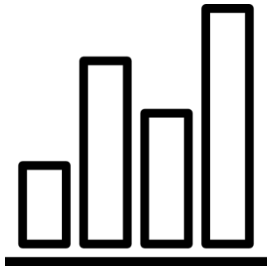
- **Consent** → Participants signed consent forms
- **Pre-Study Questionnaire** → Demographics & familiarity with short-form videos
- **Random Assignment** → LLM group vs. No-LLM group
- **Task** → Watched assigned video(s)
- **Quiz** → Completed comprehension quiz
- **Post-Study Questionnaires** → Completed UX & perceived learning efficacy questionnaire
  - LLM group also completed Trust in AI-generated content questionnaire
- **Researcher Notes** → Quiz completion time & video revisits
- **Duration** → ~20–25 minutes

Measures

User Experience



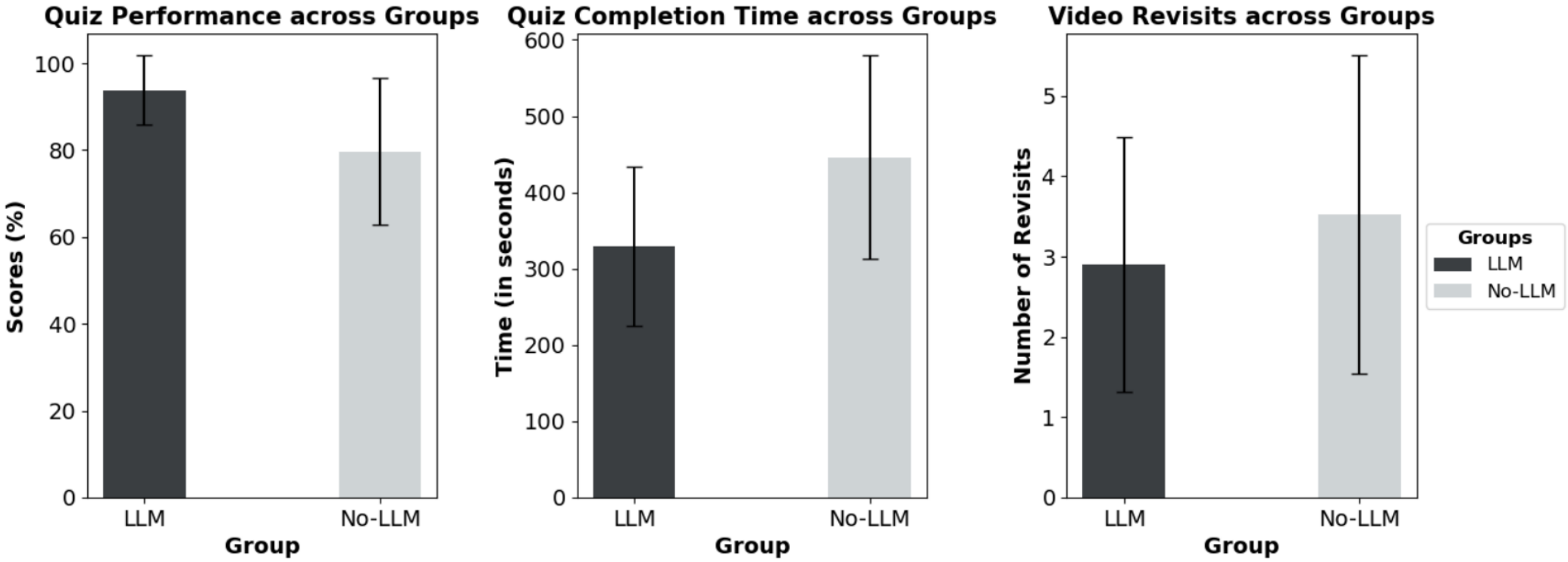
Learning Effectiveness



Perceived Efficacy

Trust in AI

Results: Learning Performance

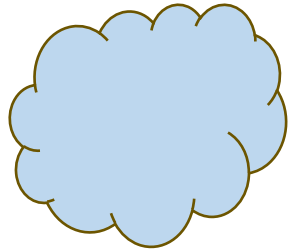


Results: Perceptions & Trust

Dimension	Question	No-LLM vs. LLM Group ($\mu \pm \sigma$)	Test Statistic
Perceived Competence	**I think I am pretty good at this activity.**	5.32 ± 1.35 vs. **6.03 ± 0.84**	U = 624.50, **p = 0.0357**
	I think I did pretty well at this activity, compared to other students.	5.16 ± 1.49 vs. 5.87 ± 0.99	U = 610.00, p = 0.0615
	After working at this activity for a while, I felt pretty competent.	5.29 ± 1.40 vs. **5.97 ± 1.11**	U = 626.50, **p = 0.0336**
	I am satisfied with my performance at this task.	5.42 ± 1.46 vs. **6.52 ± 0.68**	U = 714.00, **p = 0.0005**
	I was pretty skilled at this activity.	5.03 ± 1.54 vs. **6.10 ± 0.87**	U = 690.00, **p = 0.0023**
	This was an activity that I couldn't do very well.	3.87 ± 1.73 vs. 3.71 ± 2.13	U = 453.00, p = 0.7007
Task Load Index	How mentally demanding was the task?	4.10 ± 1.51 vs. 3.71 ± 1.75	U = 426.50, p=0.4426
	How physically demanding was the task?	1.68 ± 1.11 vs. 1.58 ± 0.89	U = 488.50, p=0.9013
	How hurried or rushed was the pace of the task?	3.52 ± 1.39 vs. 3.26 ± 1.34	U = 449.00, p=0.6467
	How successful were you in accomplishing what you were asked to do?	3.39 ± 1.91 vs. 2.81 ± 2.33	U = 376.00, p=0.1325
	How hard did you have to work to accomplish your level of performance?	4.29 ± 1.66 vs. 3.58 ± 1.78	U = 366.00, p=0.1028
	How insecure, discouraged, irritated, stressed, and annoyed were you?	2.81 ± 1.74 vs. 1.97 ± 1.28	U = 356.00, p=0.0677
Perceived Learning Effectiveness	**I was able to understand the topic well through these videos.**	4.71 ± 1.46 vs. **6.29 ± 0.92**	U = 857.50, **p<0.0001**
	The short-form video format helped me retain key information.	4.81 ± 1.55 vs. **6.29 ± 1.22**	U = 805.00, **p<0.0001**
	This format helped me focus better than traditional video lectures.	4.97 ± 1.79 vs. **6.03 ± 1.38**	U = 697.00, **p=0.0099**
	I feel more confident explaining this topic to others now.	4.74 ± 1.80 vs. **5.65 ± 1.18**	U = 661.00, **p=0.0419**
Perceived Learning Experience	**The videos helped me remember key points better than a full lecture.**	4.81 ± 1.49 vs. **6.19 ± 1.11**	U = 732.50, **p=0.0002**
	The format helped break down the topic into manageable parts.	4.45 ± 1.65 vs. **6.45 ± 0.81**	U = 818.00, **p<0.0001**
	I would prefer to learn future topics using this format.	4.26 ± 2.02 vs. **5.87 ± 1.12**	U = 706.50, **p=0.0011**
	This format made it easier to revisit important concepts.	4.00 ± 2.03 vs. **6.55 ± 0.77**	U = 843.50, **p<0.0001**
	I felt more engaged with this format compared to traditional lectures.	4.13 ± 2.08 vs. **6.06 ± 1.46**	U = 739.00, **p=0.0002**

- Felt more competent & skilled
- Easier to focus, remember key points
- Preferred reels for future learning

Qualitative Voices



“Each reel did only a specific task and I could understand it better before watching the next one” P1

“The short videos made the information more memorable and easier to understand” P8

“I knew exactly where to find what I needed compared to watching a full video” P15

Implications for HCI

1. Design for *learner agency + control*

2. Transparency in AI generation

3. Microlearning to support focus and potentially ease cognitive load

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AI-generated reels can make learning engaging, effective, and trusted