

# KNOWLEDGE CO-CONSTRUCTION IN YOUTUBE COMMENTS ON SCIENCE VIDEOS: EMBEDDING POPULAR CULTURE IN STEM

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## THEME:

STEM education in diverse contexts, Engaging students in STEM education

## BACKGROUND AND AIMS

Popular culture (e.g., movies) used in lessons, may increase student interest in science. We examine how YouTube science videos incorporating popular culture might facilitate informal STEM learning. In the emerging participatory culture where people interact socially in asynchronous discussions, there comes an opportunity for cognitive engagement often associated with knowledge construction. This research considers learning beyond video viewing, examining how YouTube educational videos might transcend the transmission model of instruction. In particular, we compare post-video comments between YouTube science videos that incorporate and do not incorporate popular culture:

1. What are the differences in the types of comments?
2. What levels of knowledge co-construction are observed?
3. How do justifications of knowledge claims vary between these videos?

The answers to these questions will be valuable to both science video-content creators who incorporate popular culture and teachers who use YouTube. Examining post-video comments and YouTube video features will evaluate the social construction of science knowledge through social media. Strategic approach in video creation may help facilitate learning after video viewing, without the constant need for moderating thousands of video comments.

## METHODOLOGY

To establish a dataset, we selected two YouTube videos on the same science topic: quantum tunneling. One video is from '[Because Science](#)', a channel which uses popular culture to explain STEM concepts, and another is from '[Up and Atom](#)' which aims to make STEM concepts more transparent without the use of popular culture. We adapt the classification scheme by Madden et al. (2013) and categorize the types of comments on both videos. After identifying comments that exceed the social nature of interaction and engage cognitively with science, we code them for different levels of knowledge co-construction using Gunawardena et al.'s (1997) framework. We also examine how commenters justify their own knowledge claims. By evaluating comments' accuracy and quality, we can gain insight into how embedding popular culture might influence viewers' uses of YouTube comments as a STEM learning space.

## ANALYSIS

We will complete the analysis over the summer prior to the Conference.

## REFERENCES

- Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research*, 17(4), 397–431. <https://doi.org/10.2190/7MQV-X9UJ-C7Q3-NRAG>
- Madden, A., Ruthven, I., & McMenemy, D. (2013). A classification scheme for content analyses of YouTube video comments. *Journal of Documentation*, 69(5), 693–714. <https://doi.org/10.1108/JD-06-2012-0078>

### KNOWLEDGE CO-CONSTRUCTION IN YOUTUBE COMMENTS ON SCIENCE VIDEOS: EMBEDDING POPULAR CULTURE IN STEM

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#### INTRODUCTION

**Background**

Popular culture (e.g., movies) used in science teaching may increase student interest. We examine how YouTube science videos incorporating popular culture might facilitate STEM learning in and out of class.

**Objectives**

- Observe and examine the social construction of scientific knowledge in post-video comments
- Compare the comments between science videos that incorporate and do not incorporate popular culture

**Research Question**

- What are the differences in the types of comments?
- What levels of knowledge co-construction are observed?

**Significance**

Answers to these questions will be valuable to science video-content creators and teachers who use YouTube.

**Methodology**

Two YouTube videos on “quantum tunneling” were selected by criterion purposeful sampling. Comments were analyzed based on grounded theory principles.

Can You Run Through Harry Potter's Platform 9 3/4?  
– Because Science

What is Quantum Tunneling, Exactly?  
– Up and Atom

#### RESEARCH

**Sample**

- 30% most recent comments were selected
- 697 comments for Because Science
- 293 comments for Up and Atom

**Analysis**

Comments were classified into:

- Type 1: Relevant and useful**
- Type 2: Relevant but not useful**
- Type 3: Not relevant and not useful**

Comments were also categorized into 21 categories by adapting Madden et al.'s (2013) classification scheme. Comments were coded in search of emerging themes.

**Results**

**Because Science video**

**Up and Atom video**

#### CONCLUSION

**Discussion**

*For both videos:*

- Conversations and discussions are limited because of low number of replies on comments
- Lower levels of knowledge co-construction observed (Phase I & II of Gunawardena et al.'s (1997) framework) → Limited to agree/disagree with a lack of negotiation

*However, for Because Science (using Harry Potter):*

- Shared scientific insights emerged from individual comments based on the contextualized problem

e.g., “This is supposing you are a big particle, but if you actually tried and worked you may get stuck in the middle”

- Humor and popular culture (besides Harry Potter) were used by commenters to try relate abstract scientific concepts (e.g., extremely low probability for human beings to quantum tunnel through a barrier)

e.g., “Will you go out with me? e to the 10 to the 35 (dumb and dumber scene) – so you’re saying there’s a chance!”

**Implications**

Science videos embedding popular culture contain less formal scientific discourse in the comments. However, YouTube and educators may help students navigate in search of educative comments that may facilitate learning.

Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research*, 17(4), 397–431. <https://doi.org/10.2190/7MQV-X9UJ-C7Q3-NRAG>

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**Results**

BECAUSE SCIENCE

UP AND ATOM

Embedding popular culture produces more “off-science-topic” comments which may not directly contribute to scientific knowledge construction.