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Introduction

This study is part of an international collaboration between Canada, Australia, and Sweden studying the use of social media in science teaching and learning. The specific objective of this phase of the project is to examine secondary and post-secondary physics students' social media learning behaviours through focus group interviews. We used **complexity thinking** as an analytic framework (Davis & Sumara, 2006) to characterize students' learning behaviours for their potential to lead to *connectedness* – the ability to benefit from being connected (OECD, 2012).

Research Question

What social media learning behaviours do secondary and post-secondary physics students engage in and how do these differ among the groups?

Methodology

- Exploratory, interpretive, multiple case study design (Schwandt, 1998; Stake, 1995).
- 12 focus group interviews were held with 34 (21 male, 13 female) physics students in BC:
 - 24 high school students (Grade 11&12) (n=5 focus groups)
 - 7 first yr university students (n=2)
 - 3 upper yr university students (n=3)
- Students were asked to describe their social media use for completing physics homework.
- Interviews were transcribed, frequency of social media learning behaviours were tallied and behaviours were characterized for potential to promote connectedness as limited, moderate, or high.

Analytic Framework: Complexity and Connectedness

As a theoretical perspective in education, complexity thinking (Davis & Sumara, 2006) draws upon **characteristics of complex systems** - self-organizing systems that exhibit intelligent behaviours without a centralized controller (e.g., ant colonies, crowds) - to both understand and prompt learning. The following **conditions of emergence** can be used to understand the structure and dynamics of complex systems:

- Internal diversity and Redundancy
- Neighbour interactions
- Decentralized control
- Randomness and Coherence

An analytic framework was designed such that social media learning behaviours were characterized for their potential to lead to connectedness (i.e., the emergence of new content understandings) based on the extent to which the behaviour promoted the conditions of emergence. It was assumed that where conditions of emergence existed there was a greater likelihood of high potential for connectedness.

Analytical Framework Example: Facebook Chat

In focus group interviews, Facebook chat was frequently mentioned by students as a tool that they used while solving a physics problem. Using chat functions students can see who is online and ask their peers questions. Using the analytic framework, this behaviour was characterized as having a *limited potential* to lead to connectedness due to one-to-one interactions. In comparison, starting a Facebook Group where conditions of emergence such as *diversity* of ideas and *neighbour interactions* exist was a behaviour characterized as having a *high potential* for connectedness.

Results: Social Media Learning Behaviours

Students frequently used social media. Facebook, videos, and online forums such as Answers.com were most frequently used to support their physics learning but not in creative and collaborative ways.

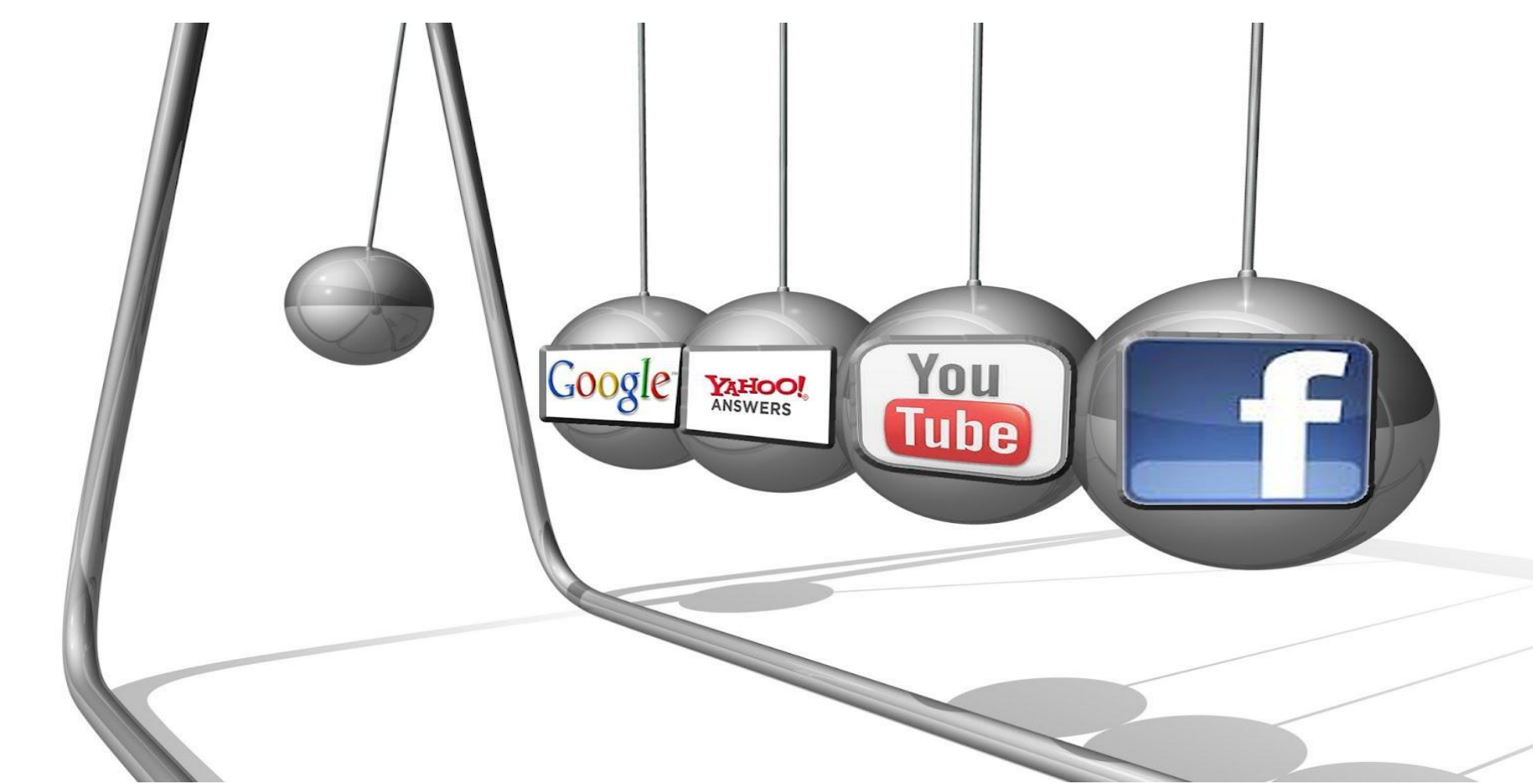


Figure 1: Graphic illustrating common social media tools used by students.

Connecting with peers: Homework chatting on Facebook

- Students primarily used Facebook to chat with individuals (*limited potential*).
- Students did not describe engaging in *high potential* behaviours such as starting a Facebook Group.
- Students suggested that teachers should be available for extra help through Facebook (*limited potential*).

Accessing a diversity of explanations: Watching online videos

- Students looked for videos to find the solution to a physics problem (*limited potential*).
- Few students said that they shared and/or saved videos, but recognized that if videos were organized or selected by a community that it would be a more useful resource (*high potential behaviours* due to decentralized nature of community, presence of neighbour interactions, diversity, and redundancy).

Results: Social Media Learning Behaviours

Looking for the right answer: Online forums and Google

- HS students were more likely than secondary students to say they used online forums to find the answer to a question (*limited potential*).
- Students did not say that they contributed to online forums by answering or commenting on answers (*high potential* due to the emergence of a decentralized network of learners sharing ideas through neighbour interactions)

Results: Overall

- High school and university students used social media differently. High school students seek 'the right answer'.
- University students were more likely to want to deepen their understanding of a physics concept.

You can type in exactly what you want to know and you can find it out.

In HS the teacher gave you a lesson and you just stay there. In university you have to go beyond that. I have to look for other sources to support my knowledge.

Conclusions

Results from focus group interviews support claims from the literature (i.e., Clark et al., 2009; OECD, 2012) that today's students increasingly ask for immediate, easy to find, and surface level solutions and that their use of social media becomes more sophisticated with age (Livingstone et al., 2010).

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