

# **Enhancing Dialogue Through the Use of Social Annotation in Online Collaborative Writing Spaces**

**by**

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Thesis Submitted in Partial Fulfillment of the  
Requirements for the Degree of  
Doctor of Philosophy

in the  
Educational Technology and Learning Design Program  
Faculty of Education

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SIMON FRASER UNIVERSITY

Spring 2023

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## Abstract

This study was designed to investigate the viability of using hashtagged keywords to increase levels of dialogue in online discussions. With a focus on social annotation as a form of manually generated metadata, the design was also intended to function as a form of data information literacy intervention at the post-secondary level. A literature review was conducted at the intersection of three related research areas relevant to post-secondary education, exploring the potential for dialogic pedagogy, online discussions and social annotation. Using the concept of *addressivity* as initially proposed by Yakubinsky and later developed by Bakhtin, a design was developed to utilize hashtagged keywords in the online discussion tool available in Canvas, a popular learning management software system.

Undergraduate students enrolled in a course in Communication took part in the study using hashtagged keywords as part of their work in online discussions that explored course related themes and readings. Data from 25 students were collected to evaluate the effects of the design intervention on the dialogicality of the online discussions. A comprehensive content analysis protocol was adapted from the Cam-UNAM Scheme for Educational Dialogue Analysis (SEDA). Changes were made to the original coding scheme specific to the needs and requirements of a study focussed on the analysis of dialogue in asynchronous online discussions.

Evidence is provided suggesting that there is a viable role for social annotation in the form of hashtagged keywords in online discussions to promote and enhance levels of dialogue in post-secondary learning environments. In particular, a relationship between the depth of reply of posts and levels of dialogue as assessed by the coding scheme employed in the study suggest a promising area of future work. Implications for research and practice exploring the concept of addressivity in online discussions in relation to hashtagged keywords are discussed.

**Keywords:** dialogue; social annotation; hashtags; online discussions; addressivity; Yakubinsky; Bakhtin; data information literacy; content analysis

## **Dedication**

For all members of my long-suffering family who have endured, persisted and persevered through this process. Thank-you for being so supportive!

## Acknowledgements

Completing this journey would not have been possible without the unwavering and incredible levels of support that I have received from so many people. First and foremost, Dr. Kevin O'Neill thank-you for your commitment over the years, it's been quite a journey! Your critical engagement, guidance and perseverance made all the difference and I wouldn't be at this point without everything that you've done for me. Dr. John Nesbit, thank-you for your incredibly piercing and constructive comments accompanied by levels of wit and humor that I didn't know were even possible...

Many other people have been influential along the way. Dr. David Murphy, your advice has been incredibly valuable, thank-you for many insightful conversations at every step of the process. To my long suffering and yet always patient coding partner, Dr. Yi Cui, thank-you, our process was necessarily difficult at times but always productive.

To Nicole, Shaela and Drake, you have been beyond amazing, thank-you for your love and support throughout all of this, there are no words, only hugs. Also for Grandma and Grandpa, Ken, Alice, Colin and everybody else! I can't forget Zuko and Sokka, of course, thank-you for the therapy, I will pay my bill in extra treats and walks...

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## Glossary

Apperceptive Mass	The complete sum of any particular speaker's previous life experiences (Skidmore, 2016a).
Apperceptive Moment	A moment in time where one speaker's understanding of another speaker's utterance is framed by their existing mindset, which is in turn framed by the entire history of that speaker's experiences of speech related interaction (Skidmore, 2016a).
Asynchronous Communication	In the field of online education refers to communication that occurs through the use of email, discussion boards, and other tools where the instructor takes on a larger role as a facilitator of interactions between students (Hrastinski, 2008).
Authoritative Discourse	A type of discourse composed solely of utterances with fixed meaning (Bakhtin, 1981)
Data Information Literacy	A form of literacy that emphasizes the social processes of knowledge building that occur through the use of networked computing resources (Carlson et al., 2011)
Folksonomy	A folksonomy does not define formal systems of relationships between online resources, but instead uses algorithms to assess and present tagging patterns such that categories emerge from the activities of users (Weinberger, 2005).
Hashtag	The combination of the keyboard character # with a keyword (Bernard, 2019).
Initiation-Response-Feedback Sequence	A pattern of classroom discourse where instructors take primary responsibility for the initiation of speech acts, students provide responses, and then instructors provide feedback (Howe & Abedin, 2013)
Metadata	Data about data (Lazinger, 2001)
Social Tagging	An activity where users annotate digital resources with keywords or "tags" (Cress et al., 2011)
Taxonomy	A taxonomy, in its simplest form, is a system of categories that people use to organize their understanding of a particular body of knowledge (Wright, 2007).
Thread	"A hierarchically organized collection of notes in which all notes but one (the note that started the thread) are written as 'replies' to earlier notes" (Hewitt, 2005, p. 568)
Univocal Discourse	A situation where the codes of the speaker and the listener most completely coincide (Wertsch, 2009)

# Chapter 1.

## Dialogic Pedagogy

### 1.1. A plea for pedagogical innovation

On October 29, 1969, a student programmer sent two letters through telephone lines from one computer at UCLA to another at the Stanford Research Institute well over 500 kilometers away. The sending of the two letters 'l' and 'o', the beginning of the word 'login', caused an immediate system crash (Beranek, 2000). This event marked the beginning of a process of electronic communication between computers that has grown exponentially over the past 50 years. That the first letters sent electronically through a computer network accidentally spelt the word 'lo' (a shortened form of the Middle English verb 'loken', to look, an expression associated with exclamations of surprise, grief, or joy) must surely stand as one of the greatest moments of irony in human history. Nothing could be more prophetic of the reality enabled by electronic communication between computers than the inadvertent spelling of the word 'lo' followed by an unpredictable system crash.

Lo and behold our current reality, more than half a century after the birth of networked computing, and a time of great uncertainty that could easily be described with the words 'surprise, grief and joy'. Could Charlie Kline, the student programmer who sent the first letters from one computer to another in 1969, possibly have predicted the future repercussions of his actions? How could he even begin to contemplate the full meaning of the event without the availability of words now commonly used to describe our mediated reality as experienced through our online interactions? From the perspective of the late sixties in North America, terms like *trolling*, *flaming*, *filter-bubbles*, *fake-news*, *hater* or *cyberbullying* either didn't exist or were used in completely different contexts. More than fifty years after the introduction of networked communication between computers, we are now witnessing the implications of radical shifts in the patterns of discourse between human participants.

Some of the changes in patterns of discourse have been beneficial. The #MeToo movement, for example, has brought much needed attention to issues of sexual harassment and assault. On the other hand, consider the lived reality of Amanda Todd,

a 15-year-old Canadian victim of cyber bullying before her eventual suicide in 2012. In a video posted to YouTube, Amanda told a story of how online bullying had impacted her life using a series of flashcards (Bains, 2012). The details of the criminal investigation into her death are complex – they involved the activities of an alleged cyber stalker operating out of the Netherlands, and numerous other 'accomplices' distributed across the Internet both locally and globally. However complicated the details may be, we do know that Amanda Todd was not equipped to navigate the online reality that had been forced upon her. The event of Amanda's suicide has been remembered and her life honoured with the Twitter hashtag #RIPAmanda.

Unfortunately, Amanda Todd's suicide was not an isolated incident; a study from the Nationwide Children's Hospital found that suicide rates amongst females aged 10-14 in the U.S. had tripled from 1999 to 2014 (Ruch et al., 2019). According to the Centers for Disease Control and Prevention, suicide was the second leading cause of death in the United States among 10 to 17-year-olds in 2015 (Hinduja & Patchin, 2019). Much more concerning is that in the timeframe 2000-2015 there was an overall 21% increase (across genders) in the suicide rate among teenagers in this age range. At this point, researchers have not been able to establish a direct causal link between suicide rates and cyberbullying, but research by Hinduja and Patchin (2019) indicates that middle and high school students experiencing either school-based or online bullying were significantly more likely to report suicidal ideation and that these results were in line with previous studies (for example, Hinduja & Patchin, 2010; Van Geel et al., 2014). There are many possible reasons for a rise in suicide rates among young people in the years spanning 2000 to 2015 and surely this is a complicated and multi-faceted phenomenon. It is worth considering, however, that the concurrent rise in time spent using the Internet in this time might have played a role.

Tim Berners Lee, the inventor of the World Wide Web, had an understandably positive (if not naïve) perspective on the implications of his invention:

The vision I have for the web is about anything being potentially connected with anything. It is a vision that provides us with new freedom, and allows us to grow faster than we ever could when we were fettered by the hierarchical classification systems into which we bound ourselves. (Lee, 1999, p.1)

Unfortunately, the new freedoms enabled by Berners Lee's invention also included the potential for practices of *trolling*, *flaming*, *cyber-bullying*, and other forms of online

harassment. According to de Seta (2018), these types of problematic social media practices are part of a wide range of behaviours that have resulted from the popularization of Internet access and the ability to engage in participatory digital media platforms. These are unintended consequences of a technology that holds vast potential for meaningful communication between human participants.

David Bohm, writing in the mid-nineties (a time of rapid expansion of the use of the World Wide Web and consequently the Internet) described the failure of humanity to engage in meaningful dialogue as an inability to extend beyond one's own worldview in order to comprehend the worldview of others (Brinn, 2016). There are many definitions of cyberbullying, and it manifests itself in complex ways, through many related practices (like trolling); but at the core of these activities lies the basic inability to accept the world view of others, and a corresponding lack of empathy. We cannot say that the Internet or the World Wide Web are the sole causes of cyberbullying. As Andrew Feenberg (2001) points out, the medium in which we communicate does not fully determine the nature of our interactions – the social impact of any given technology depends both on how it is designed and how it is used. Addressing issues like cyberbullying will require a proactive approach across many disciplines to imagine new ways of designing and using the Internet.

In many ways, cyberbullying and related forms of problematic online behaviours can be framed within Martin Buber's distinction between an "I-Thou" orientation based on listening and understanding, and an "I-It" orientation based on the objectification of the other primarily for the purposes of control (Guilherme & Morgan, 2017, p. 10). According to Buber, I-It relations can be contrasted with I-Thou relations in the sense that I-it relations involve a separation of self from Other. I-It relations based on the separation of oneself from the Other can lead to a sense of being different, special, and even superior. While it may be difficult to provide direct causal evidence for linkages between a breakdown in I-Thou type relations and online interactions and behaviours, it still warrants concern that as the use of the Internet has expanded so heavily into young people's lives, we have concurrently witnessed a rise in suicide rates. Developing pedagogical initiatives based on the incorporation of dialogue into the fabric of instructional design is one way to provide students with opportunities to develop competencies in the related areas of empathy and trust.

The potential relationship between teen suicide and cyberbullying is a particularly tragic example drawn from a much larger complex of issues brought about by the consequences of networked computing for the nature of discourse in socially mediated societies. Given the enormity of the impact, it goes without saying that education needs to play a major role in helping young people prepare for the reality that they face online. In the early 2000s, roughly thirty years after the birth of networked computing, the implications of the widespread adoption of the Internet were becoming clear. Emanuel Castells (2001) for example, made the argument at that time that the developments associated with the proliferation of electronic networks had led to the emergence of a new form of global social organization, the *Networked Society*. As a result, Castells called into question "the entire education system developed during the industrial era" (p. 279) and advocated strongly for a new pedagogy required to respond to the changing needs of individuals operating within the emerging networked society:

There is no more fundamental restructuring. And very few countries and institutions are truly addressing it because before we start changing the technology, rebuilding the schools, and re-training the teachers, we need a new pedagogy, based on interactivity, personalization, and the development of autonomous capacity of learning and thinking. While, at the same time, strengthening the character and securing the personality. And this is uncharted terrain. (p. 279)

At this point, after roughly half a century of living with the consequences of networked computing, we need to re-assess and re-position our responses to Castells' call for new forms of pedagogy.

## **1.2. Constructivism answers the call**

From the perspective of the field of Educational Technology & Learning Design, Castells' call for pedagogical reform has not gone unanswered. During the 1990s, a series of significant developments were taking place in the field of instructional design (Reiser, 2001b). Constructivism as an approach to learning, for example, has become associated with a number of principles, including an approach to learning and instruction based on employing group work to solve complex and realistic problems, the examination of problems from multiple perspectives, and the development of self-awareness in the process of constructing knowledge (Driscoll, 2005). Jonassen et al. (2007) argue that constructivism has shifted the epistemological and ontological



assumptions about the nature of learning away from an emphasis on instructional communication towards an emphasis on practice-based learning.

Constructivism itself has branched into a diversity of forms ranging from individual or cognitive constructivism, which emphasizes individual meaning-making to social constructivism, a perspective that places an emphasis on the examination of social interactions and how they contribute to knowledge development (Richey *et al.*, 2011). According to Smith and Ragan (2005, p. 20) "learning is collaborative with meaning negotiated from multiple perspectives". As an example, Lave and Wenger (1991) developed a theory of learning based on the social construction of knowledge through social interactions. This theory is based on the following assumptions: humans are social beings, knowledge is based on developing competence in activities that are valued, knowing develops through participation in those activities, and meaning emerges as a result of our ability to experience the world through engagement (Wenger, 1998). It is important to recognize in the context of this dissertation that the ability to negotiate between multiple perspectives is a general principle that is common to both individual and social constructivist perspectives (Richey *et al.*, 2011).

Sfard (1998) used the metaphor of acquisition to describe perspectives on education that view the "the human mind as a container to be filled with certain materials and about the learner as becoming an owner of these materials" (p. 5). She pointed to a confluence of educational terms or products that learners can acquire such as: knowledge, concept, notion, schema, fact etc. and related actions like: reception, attainment, accumulation, acquisition, and transmission (p.5). Wells and Arauz (2006) argue that a transmission mode of education has been the dominant form throughout the history of education. Typically, this involves a characterization of the learner as a passive receiver of knowledge, discrete messages are transmitted from a sender, (the teacher) and a prospective receiver (the student) will either get or receive the message, or not (Wertsch, 2009).

Bednar *et al.* (1992) stated that a key component of constructivism is that learning is regarded as a process of creating meaning from experience. An instructional designer operating with constructivist design principles will be attempting to create possibilities for learners to actively explore complex learning environments. An important component of the process is that learners are encouraged to construct their own

meaning from their personal experiences and then to validate that understanding through social interaction (Ertmer & Newby, 1993). Constructivist learning designs stand in stark contrast to learning designs based on the transmission model. This contrast can be framed in terms of Lotman's concept of univocal vs. dialogic discourse (Wertsch, 2009). If the goal of education is to build accurate internal representations of an external reality that exists independently of all observers, then it makes sense to employ a strategy that employs primarily univocal messages. That is, a situation where the "codes of the speaker and the listener most completely coincide" (as cited in Wertsch, 2009, p. 74). Constructivist learning, however, requires the use of language and text along the lines of Lotman's second function, which serves the purpose of generating new meanings – in other words, a dialogic approach.

Mikhail Bakhtin, a Russian philosopher who developed his own dialogic theory of language, also distinguished between dialogic and monologic or authoritative speech acts. Bakhtin conceptualized authoritative discourse as being composed of utterances with fixed meanings: "The authoritative word demands that we acknowledge it, that we make it our own; it binds us, quite independent of any power it might have to persuade us internally; we encounter it with its authority fused to it" (Bakhtin, 1981, p. 342). Authoritative texts function in this sense as one-way messages, they allow for "no play with its borders, no gradual and flexible transitions, no spontaneously creative stylizing variants on it" (p. 342). As examples, Bakhtin pointed to religious, political and moral texts, but also the "the word of a father, of adults, of teachers, etc." (p. 343). A victim of cyberbullying is a victim precisely because they feel powerless to interact meaningfully with the discourse being forced on them; they have no control. In Buber's terms these are I-It relationships, perpetrated with the sole intention of the control and domination of the Other.

The idea, according to Mikhail Bakhtin, "is inter-individual and inter-subjective – the realm of its existence is not individual consciousness but dialogic communion between consciousnesses... a *live event*, played out at the point of dialogic meeting *between* two or several consciousnesses" (Bakhtin, 1984, p. 88). For Bakhtin, all texts as well as face-to-face discourse are formed from *utterances* which contain traces of many voices working together to create meaning. "Truth is not born nor is it to be found inside the head of an individual person, it is born *between people* collectively searching for truth, in the process of their dialogic interaction" (Bakhtin, 1984, p. 88). He placed all

texts and utterances along a continuum from monologic to dialogic in terms of being more or less "open to the other" (Wegerif, 2007, p. 15). Monologism, in Bakhtin's framework, refers to situations where ideological values, signifying practices and creative drive are subordinated to the hegemony of one particular perspective. A monologic speech act is one that ignores or prevents the individual from producing creative and autonomous meaning (Gardiner, 1992). A monologic teaching style is largely composed of efforts to transmit knowledge to students while remaining firmly in control of the pedagogical goals of the speech acts involved (Lyle, 2008).

### **1.3. Constructivism and dialogic pedagogy**

#### **1.3.1. Historical trajectory of dialogic pedagogy**

There have been many attempts at designing and implementing learning environments based on dialogic patterns of discourse. Paulo Freire, for example, is often held up as an important proponent of the use of dialogue in education in the twentieth century (Fairfield, 2011). Skidmore and Murakami (2016) acknowledge that Freire's work has been tremendously influential in the field of critical pedagogy and claim further that without him a theory of dialogic pedagogy would not exist. Freire made a distinction between education that delivers a fixed curriculum in alignment with monologic patterns of discourse, and a more interactive and responsive dialogic method of education that takes the voices and perspectives of students into account (Wegerif, 2007). Freire (2016) was reacting to a model of traditional pedagogy that he referred to as the *banking model*, a perspective on education that views students as receptive vessels ready to be filled with knowledge:

Banking education resists dialogue; problem-posing education regards dialogue as indispensable to the act of cognition which unveils reality. Banking education treats students as objects of assistance; problem-posing education makes them critical thinkers. Banking education inhibits creativity and domesticates (although it cannot completely destroy) the intentionality of consciousness by isolating consciousness from the world, thereby denying people their ontological and historical vocation of becoming more fully human. (p. 83)

From this quote we can draw out an important distinction between traditional modes of education that rely on hierarchic styles of delivery based on a fixed curriculum and a

transmission approach, and dialogic approaches as proposed by philosophers like Buber and Bakhtin.

As much as Freire can be credited with applying a dialogic approach to his pedagogy, there is also room to be critical of his approach. For example, he was working within a Marxist framework, and as such had a predetermined outcome as a goal – he was trying to raise awareness and consciousness among students of their oppression, and how they could take collective action to address this (Wegerif, 2007). Schwarz and Baker (2017) argue that Freire put strong constraints on the nature of dialogue, in terms of being rigorously focussed on liberation; and that for that reason, his approach was not truly dialogic in that it was ultimately driven by an ideological positioning around the values of Marxism. Freirian dialogic pedagogy has also been criticized by some feminist authors, including Elisabeth Ellsworth (1989), who once asked the provocative question "Why doesn't this feel empowering?" in the title of an essay critical of Freire's dialogical method of teaching. By this she was referring to how the practice of dialogue can also be an exercise in power relations in certain circumstances.

To a certain extent, Robin Alexander, another key figure in the development of dialogic pedagogy, worked to address various critiques that had been aimed at the work of Paulo Freire (Schwarz & Baker, 2017). Unlike Freire, Alexander initiated a different kind of implementation of the concept of dialogue in education. His approach was to keep dialogue open and free from any kind of political agenda (Schwarz & Baker, 2017). Alexander's conception of dialogic pedagogy was based on observations of talk practices in five countries - England, the United States, France, Russia and India. The results of this study led to the development of a typology of "teaching-talk repertoires" ranging from monologic types of talk like "rote" drilling of facts, "recitation" of accumulated knowledge, and "instruction/exposition" to more dialogic forms like "discussion" and "dialogue" (Schwarz & Baker, 2017, p. 103). According to Alexander (2001), all of these forms of talk have their place, but through his research identified that the forms of talk *discussion* and *dialogue* were not witnessed as much as *rote recitation* and *instruction* types of talk.

A proliferation of differing conceptualisations and terms has accumulated around the role of dialogue in educational contexts. For example, the terms *accountable talk*, *dialogic inquiry*, *exploratory talk* and *dialogic teaching* have all been employed to

examine and explore the pedagogical potential of dialogue (Hennessey, 2016). Despite these variations there seems to be a movement towards understanding certain forms of educational dialogue that can be linked to productive outcomes in the field. The common core focusses on attunement to the perspective of others through a continual process of co-construction of knowledge, negotiations that proceed through the exploration and potential reconciliation of similar and contrasting ideas, as well as linkages to events beyond the immediate educational context (Hennessey, 2016). Howe and Abedin (2013) in their systematic review of four decades of research on the topic of classroom dialogue point out that the dictionary definition of dialogue includes a wide range of verbal communication. For the purposes of their review they conceptualized dialogue as "all verbal exchanges where one individual addresses another individual or individuals and at least one addressed individual replies" (p. 326). This rules out some other common uses of the term *dialogue* such as the exchange of oral speech between fictional characters in films or novels, for example. However, it is important to note that their definition was not limited to face to face verbal exchange, and included verbal interactions that occur with separations of time and/or space. This definition includes ICT (Information and Computer Technology)-mediated interactions such as emails and online discussion posts.

### **1.3.2. Alexander's model of dialogic teaching**

Through his extensive research efforts aimed at cataloging different types of talk used in educational settings internationally, Alexander (2018) has developed a model that he refers to as dialogic teaching based on five elements or principles. According to this model speech acts in education are considered dialogic when they have the characteristics of being: *collective, reciprocal, supportive, cumulative* and *purposeful*. The word *collective* is used in the sense that everyone in the class is involved in joint learning activities. The principal of *reciprocity* refers to situations where learners listen to each other by sharing ideas and alternative viewpoints. *Supportive* environments occur when speech partners are able to express themselves freely without risk of embarrassment and where participants help each other to reach common understandings. Alexander also points to the *cumulative* nature of dialogue in the sense that participants are able to build on each other's contributions and link them together into coherent lines of thought. Lastly, Alexander states that dialogic teaching needs to be

purposeful in the sense that even though there is an openness there are always learning goals involved.

### **1.3.3. Dialogic teaching and constructivist learning environments**

Constructivism, as a philosophical stance, is clearly related to more of a dialogic position than a monologic one. The individual principles of Alexander's model of dialogic teaching considered above, for example, are in alignment with the fundamental principles of constructivist teaching and learning activities. Hay and Barab (2001, p. 283) argue that a core characteristic of constructivist learning environments is that they "allow learners to share and collaboratively reflect". Karagiorgi and Symeou (2005) also identify collaborative learning as a critically important component for the building of constructivist learning environments. This involves learners being able to explain and justify their thinking to others for the purposes of negotiation and interpretation. Richey et al. (2011) make the point that collaborative learning environments can involve a variety of group sizes across many types of situations from face-to-face interactions to the use of online discussion boards.

It is important to note, however, that the use of such tools does not guarantee that a learning environment is functioning along constructivist lines – only that it is possible to achieve constructivist goals by using them. In this sense it is important to work towards learning environments where the discourse being generated can be considered collective in terms of Alexander's model for dialogic teaching. Creating the space for constructivist learning by providing technical tools that facilitate the process of collaboration is an important starting point, but we also need to have the capacity to assess whether the discourse being generated in such spaces is actually functioning in a way that could be described as being collective.

A key component of any collaborative learning environment is that it should support and encourage the interaction of multiple perspectives. According to Karagiorgi and Symeou (2005, p. 21) the collaborative learning process is not just "sharing a workload or coming to a consensus, but allows learners to develop, compare, and understand multiple perspectives on an issue". Land et al. (2012) list access to multiple perspectives, resources, and representations as one of the core values and assumptions involved with designing student-centered learning environments (SCLE). This involves a

variety of viewpoints from teachers, experts, and peers mixing together to form a knowledge base that learners can use to evaluate and negotiate many different types of meaning. Collaborative learning environments require an exchange of discourse that can be described with Alexander's reciprocal and supportive principles. Learners need the opportunity to be able to listen to each other and share ideas; but they also need to do so in a supportive talk environment where they feel free to express themselves without the risk of embarrassment or stress about giving a 'wrong' answer.

A quote from Volosinov (1986), one of Bakhtin's collaborators<sup>1</sup>, demonstrates the importance of multiple perspectives for collaborative knowledge making processes:

...meaning is like an electric spark that occurs only when two different terminals are hooked together... In essence meaning belongs to a word in its position between speakers; that is, meaning is realized only in the process of active, responsive understanding. (p. 168)

Wegerif (2011) argues that the difference between self and other is a necessary condition for the creation of meaning. He uses the concept of "dialogic space" to refer to the gap between different perspectives held together in a 'relationship of proximity' (p. 181). Irreducible differences between perspectives are precisely what gives dialogue its force for creating meaning. According to Wegerif, this holds true to the point that if there is no gap, or difference between perspectives, then dialogue itself cannot exist. Further, without dialogue, meaning also does not occur. Lyle (2008) states that monologic talk focuses power on the teacher to the point that it operates to limit the potential for dialogic interactions between students. Dialogic talk, on the other hand, creates space for multiple voices and patterns of discourse that challenges existing power relations.

When examining the core characteristics of learning environments based on constructivist design principles, it is clear that dialogue plays a crucial role. Land et al, (2012) present the tenets of student-centered learning environments as being in alignment with the foundations, assumptions, and methods of a constructivist epistemology. They also make the case that, although there are a wide variety of approaches to learning that can be described as *student-centered*, they all share the following core values and assumptions:

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<sup>1</sup> Here I am taking the position that Volosinov was an actual author working of his own accord and not a pen name for Mikhail Bakhtin as has been argued by many scholars.

(a) centrality of the learner in defining meaning; (b) scaffolded participation in authentic tasks and sociocultural practices; (c) importance of prior and everyday experiences in meaning construction; and (d) access to multiple perspectives, resources, and representations. (p. 8)

Land et al., (2012, p. 3) advocate for the design of SCLEs that facilitate "student- or self-directed learning by enabling students to productively engage complex, open-ended problems that are aligned authentically with the practices, culture, or processes of a domain." It follows that creating SCLEs employing authentic practice is based on constructivist design principles, and that the concept of learning is a process of creating meaning from experience. SCLEs are built on rich, authentic learning environments and contexts (as opposed to isolated, decontextualized knowledge and skill development) as well as supporting personal perspectives over canonical perspectives. Brown et al. (1989) define authentic activities as being coherent, meaningful, and purposeful, in other words, grounded in the ordinary practices and discourses of culture. From this perspective, authentic activity is critical for learners as it provides a framework for practitioners to act meaningfully and purposefully. Alexander's (2018) cumulative principle can be employed to describe the nature of discourse or classroom talk that is required for these kinds of environments to function. Here the word cumulative refers to an aspect of dialogic teaching that allows learners to build on their own experiences and contributions as well as incorporating other students' contributions into coherent patterns of thinking and understanding.

It is important to think about the many types of situations that current students will face in their future professional, social and political activities. For example, they will most likely experience a type of activity that involves high-stakes, face-to-face verbal interaction. From job interviews, to participation in different types of meetings and committees, and a variety of public speaking events, current learners will be expected to generate meaningful speech in a variety of high-stakes and often very stressful situations. If authenticity is accepted as a design principle of constructivist learning design, then it follows that students need to be given opportunities to participate in and develop their potential to generate dialogue across many types of social situations, online or offline.

Alexander's fifth and final principle is concerned with the idea that dialogic teaching needs to be purposeful, in the sense that teachers keep specific educational



goals in mind when they design dialogic teaching spaces. It is important to note that the view that dialogue be purposeful is not shared by all. Kim and Wilkinson (2019) place Alexander's dialogic teaching roughly in the middle of a spectrum of scholarship in this area. They point out that Nystrand, for example, did not explicitly recognize that dialogue in the classroom should be purposeful. He used Mikhail Bakhtin's contrast between monologic and dialogic speech acts to develop the concept of dialogic instruction, as an alternative to teaching styles that rely on classroom discourse that is dictated by the instructor with the purpose of transmitting knowledge to students. Dialogically designed instruction, according to Nystrand et al. (1997), is constructed on the basis of a different kind of relationship between instructors and students, and between the students themselves. This involves designing and supporting learning environments where students are asked to think for themselves, as opposed to being limited to activities that rely solely on rote memorization and recall of information.

According to Skidmore and Murakami (2016) the creation of learning environments that incorporate a form of dialogic pedagogy into their design involves freedom for the learner to move beyond a preconceived script and toward the possibility of improvisation. Matusov (2009) took an even more extreme stance stating that "dialogue is impossible if a participant knows its endpoint in advance" (p. 3). On the other hand Resnick et al.'s (2018) concept of accountable talk is quite clearly based on the idea that teachers have "an end goal in mind in order to guide the discussion toward canonically correct knowledge" (p. 26). In some ways this debate can be compared to broader issues and debates that have taken place in the field of education. Kirschner (2006), for example, framed an ongoing dispute around the role of instructional guidance as a debate between those advocating for unguided or minimally guided learning environments versus more structured environments where students are provided with direct instructional guidance.

#### **1.4. Empirical evidence supports the efficacy of dialogic pedagogy**

In *Opening Dialogue: Understanding the Dynamics of Language and Learning in the English Classroom*, Nystrand et al. (1997) reported the findings of a large-scale study of classroom discourse in 25 American high schools. The authors observed hundreds of eight- and ninth- grade lessons in secondary school English classes over a

two year period. Data were collected through the use of a variety of methods including surveys, interviews, classroom observations, as well as markers of student achievement. Nystrand et al. (1997) concluded that the results of the study provided support for dialogic instruction, and that "time devoted to discussion, authentic questions, uptake, and high-level teacher evaluation had a strong positive effect on achievement" (p. 33). According to Skidmore, (2016a) the results of this extensive research initiative support the hypothesis that dialogic pedagogy is more conducive for student learning than monologic pedagogy.

Howe and Abedin, (2013) note in their extensive review of empirically based studies of classroom dialogue that student-student interactions offer a potentially large benefit for education. In particular, they highlight a number of studies that demonstrate that the open dialogue occurring in small, collaborative groups shows a richness of student contribution that is not present in teacher-led patterns of discourse. Kim and Wilkinson (2019) point to mounting evidence that dialogic teaching can play a role in improving student performance and take the position that it is now increasingly accepted that dialogic teaching has positive effects on students' learning and development.

A meta-analysis carried out by Abrami et al. (2015) examined various strategies for promoting critical thinking (CT) across a range of educational contexts and levels. Their review included 341 effect sizes based on the results of quasi- or true-experimental studies that employed standardized measures of CT. A set of core questions were posed in the study:

(a) Can CT skills and dispositions be taught? (b) What are some promising strategies for teaching students to think critically? (c) Which students benefit from CT instruction? (d) Are there curricular areas for which CT instruction works best? (p.283)

Abrami et al. identified three kinds of pedagogy (the employment of various dialogic activities, an exploration of authentic problems and examples, and mentoring) that facilitated the development of generic CT skills. The dialogic activities included covered a wide range of activities including critical dialogue, debates, as well as whole class and small group discussions. The authors identified dialogue ( $g = 0.25$ )<sup>2</sup> and exposure to

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<sup>2</sup> To correct for bias in small samples in this study,  $d$  was converted to  $g$  as an unbiased estimator.

authentic or situated problems and examples ( $g+ = 0.23$ ) as being especially useful for the development of generic CT skills. The results of this comprehensive meta-analysis provide evidence that a wide variety of types of dialogue, ranging from teacher-led forms to more open forms involving very little or no teacher participation, can play a very important role in the formation of CT skills. Furthermore, the study covers the full range of educational levels from elementary all the way through to undergraduate and graduate students.

Dialogic modes of interaction among students have been shown to promote student participation, support the development of reasoning and creativity, and provide the opportunity to enhance conceptual disciplinary growth (Calcagni & Lago, 2018). In 2011, the American Educational Research Association sponsored a conference involving leading scholars from education, the learning sciences, cognitive psychology, educational psychology, linguistics, and computing science to investigate the role of discussion and social interaction in school-based learning. According to Resnick et al. (2015) the results of the conference supported the use of structured dialogic teaching across diverse learning situations. Empirical evidence was provided that students participating in structured dialogic environments performed better on standardized tests, retained their learning over time, and in some cases, even transferred their academic learning to different domains. Wilkinson et al. (2015), for example, presented the results of an extensive literature review on the topic of discussion-based teaching of reading comprehension. Their summary of the evidence suggests that dialogue-intensive pedagogies can be linked to sizable gains in students' literal and inferential comprehension, but also in the area of higher order thinking about text.

Relatedly, Adey and Shayer (2015) conducted work for over 30 years studying the impact of discussion of science and mathematics problems on the long-term intellectual development of students. They were able to provide evidence that students who took part in science discussions at the age of 12 were later able to outperform control groups three years later on, not only in the science components of British national examinations, but in areas of English and mathematics as well.

## **1.5. Monologic pedagogy is still dominant**

### **1.5.1. The Initiation-Response-Feedback sequence**

Despite mounting interest in the use of dialogic approaches for teaching and learning and a substantial body of evidence to support this interest, it can be argued that the full potential for dialogic teaching has not been realized. Continuing through to the present day, a typical pattern of discourse in schools in North America, from K-12 through to post-secondary education, consists of a teacher or instructor delivering information and asking questions of students (van der Veen et al. 2018). This has come to be known as the Initiation-Response-Feedback (IRF)<sup>3</sup> sequence, where teachers pose closed-ended questions, students respond, and then teachers give feedback about the 'correctness' of the response. Howe and Abedin (2013) undertook a systematic review of empirical studies that examined classroom dialogue in primary and secondary classrooms over the previous 40 years. They examined 225 studies published between 1972 and 2011 to explore the state of research in the area of classroom dialogue. Specifically, they examined how classroom dialogue is organized as part of classroom activities and whether the research has provided evidence for the educational benefit of particular modes over others. They identified the work of Sinclair and Coulthard (1975) as foundational with regard to identifying the initiation-response-feedback (IRF) pattern. They also note the persistence and prevalence of the IRF style of discourse among recent studies in particular.

In general, they found a recurring theme across many of the empirically based studies that they reviewed: instructors were reporting that they found it extremely difficult to promote certain kinds of dialogue in their classrooms, in particular, exploratory talk. Scott et al. (2006), for example, found that at that time dialogic interactions were still notably rare in science classrooms around the world. Calcagni and Lago (2018) point to a number of field studies indicating that the triadic sequence of initiation, response and feedback (IRF) is still the most common feature of classroom talk. Smith et al. (2004) point out that this typically involves the use of a recitation script, where the goal of the instructor is to lead student responses towards pre-established answers. Myhill (2006), in an extensive study of classroom discourse in the UK over two and a half years,

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<sup>3</sup> This pattern of discourse is also commonly referred to as Initiation-Response-Evaluation (IRE).

presented data collected from 54 whole class teaching episodes showing that very little talk was initiated by students, and that in the vast majority of instances the dominant pattern took the form of teacher-child-teacher-child interactions. Furthermore, the teachers tended to use closed or factual questions with the intention of eliciting quick, predefined answers. The use of open-ended, or speculative lines of questioning was found to be rare. Empirical studies involving the observation of classroom practices (for example, Alexander, 2001; Galton et al., 1999) have demonstrated that the transmission-recitation model of teaching has been the dominant form of discourse in schools.

While the IRF sequence has been pinpointed by many researchers as being a source of purely monological discourse in various classroom settings, this view has also come into question. Molinari et al. (2013), for example, challenged the idea that the IRF sequence can only ever be monologic in nature and instead called for a more thorough investigation of the conditions under which IRF sequences operate and the possibility that different forms of the triadic pattern may lead to the generation of a variety of meanings that could be considered dialogic in nature. Molinari et al. (2013) reported on the efforts of researchers working with three primary schools in an urban area of Northern Italy. The purpose of their investigation was to first describe the characteristics of classroom discourse and then to demonstrate the potential of various interactive sequences. They analyzed a total of 587 minutes of video material using a sequential analysis approach in order to identify all of the three-move IRF patterns that took place in the sample. They then coded every utterance in the sample. The results of the study provided evidence that even though the IRF sequence was the pervasive form of classroom discourse and that teachers were in control of the interaction most of the time, there were still forms of dialogue occurring and that a variety of meanings were being generated through chained IRF sequences that moved beyond purely monologic discourse.

The range of possibilities offered by the IRF sequence demonstrate how different types of classroom talk can occur in K12 classrooms. This fits with Alexander's model of dialogic teaching and his focus on repertoire. Looking at the research conducted in this area there are conflicting results, with many authors concluding that the IRF pattern is typically used to constrain dialogic tendencies in K-12 learning environments. Others such as Molinari et al. (2013) have provided evidence that the discourse generated in

IRF sequences is not necessarily monologic. The possibility for dialogue does exist when teachers employ the IRF pattern as part of a repertoire of what Alexander refers to as 'teaching-talk'. In his conception of dialogic teaching there is room for dialogue in the teaching-talk repertoire in terms of moving towards common understanding through structured discussions (Alexander, 2018). A key component of Alexander's model of dialogic teaching, however, involves a careful balancing act that takes into account both teacher and learner agency in terms of the generation of discourse in the classroom. 'Learning-talk' includes considerations of how students listen and talk to each other, becoming receptive to alternative viewpoints in the process (Schwarz et al., 2017, p. 50).

### **1.5.2. Dialogic teaching in post-secondary institutions**

The majority of studies involving empirically-based research on patterns of discourse in educational environments around the world have been conducted at the level of primary and secondary education. The results of these studies indicate that by the time students enter post-secondary institutions they have most likely spent most of their K-12 classroom time participating in discourse built on the IRF pattern. In 1993 Wells estimated that at that time the IRF pattern of discourse accounted for up to 70% of all talk generated by teachers and students in primary and secondary learning environments. This does not necessarily mean that the nature of the discourse was monologic; in certain circumstances teachers are able to use the IRF sequence to generate discourse that would fall under Alexander's category of teaching talk but still be considered dialogic. The results of many studies, however, provide evidence that this is not always the case. Furthermore, it seems that opportunities for *learning-talk*, where students spend time engaged in purposeful discussion with other students in open ended dialogue, are limited.

In post-secondary education it is possible that the potential for students to engage in dialogue either with instructors or other students actually diminishes in relation to K-12. Mulryan-Kyne (2010) pointed out that for students attending university, large classes are the norm in many countries, including France, Holland, Italy and the U.S. Large class sizes at the post-secondary level are a result of many factors, but in particular there has been a large increase in student populations around the world. Phillips (2005) observed that participation rates in higher education have been steadily increasing over the last four decades. In the United States, for example, the proportion

of 18 to 24 year olds enrolled in post-secondary education increased from 25.5% in 1967 to 35.5% in 2000 (Phillips, 2005). As class size increases, the amount of time available for one-on-one verbal interaction between students and instructors decreases. Many studies have highlighted some of the obvious problems with large class sizes, such as difficulties for teachers to elicit student responses and a consequent superficiality of class discussion (Mulryan-Kyne, 2010).

Larger enrollments with larger class sizes put pressure on post-secondary institutions to employ forms of educational delivery that are capable of handling large numbers of students (Laurillard, 2002). The traditional lecture format remains a ubiquitous phenomenon on many campuses because it functions as a convenient and relatively efficient way to “deliver” content to large classes of undergraduate students (Michel et al., 2009). With this in mind, Marin (2020) asks a simple but critically important question: “is the practice valuable for the results it achieves or is it valuable in itself?” (p. 73). In 1971 Bligh had raised a similar question with the provocative title of his book, “What’s the Use of Lectures?” regarded by many as the first comprehensive analysis of the lecture form in post-secondary settings. Since that time Bligh’s findings have been employed to support arguments against the use of lectures, on the basis that they are relatively ineffective in terms of generating ideas, changing attitudes or providing an inspirational experience to students. As French and Kennedy (2017) point out, however, Bligh’s position was actually much more nuanced. It is a more accurate portrayal of Bligh’s position to say that his central point was that relying on any one teaching approach is problematic. From his perspective a combination of lecturing in conjunction with other approaches would be the most effective strategy for improving the value of post-secondary education.

The roots of the word ‘lecture’ can be found in the Latin *lecture* meaning ‘to read’. The historical trajectory of the activity of lecturing has formed strongly around this core meaning reflecting a tradition going back hundreds of years where monks would read text aloud so that scholars could create their own verbatim copies (Exley & Dennick, 2009). There are many current scholars who make the argument that the lecture has served its purpose and should now be retired as an antiquated teaching method (see for example, Biggs & Tang, 2011; DiPiro, 2009). Laurillard (2002) has been a persistent critic of the employment of lectures in universities:

Why aren't lectures scrapped as a teaching method? If we forget the eight hundred years of university tradition that legitimises them, and imagine starting afresh with the problem of how best to enable a large percentage of the population to understand difficult and complex ideas, I doubt that lectures will immediately spring to mind as the obvious solution. (p. 93)

Schmidt et al. (2015) undertook a selective literature review with an emphasis on comparing conventional lecture modes to active learning approaches at the post-secondary level. They came to the broad conclusion that the available evidence supports the conclusion that active learning modes support and foster learning more than conventional formats with a focus on large-group teaching scenarios such as the lecture. Specifically, they identified the following list of general shortcomings of the lecture format: lectures are poor at promoting critical thinking, student attendance of lectures is dropping over time, student engagement in lectures is typically low, students find it hard to focus on the lecture material, and not all subject matter is suitable to be covered in the lecture format. For Schmidt et al (2015) the fundamental problem with the lecture is its basis in the fallacy of information transmission, or the misconception that everything that is taught to a student is actually learned or remembered.

Hackathorn et al. (2011) examined the effectiveness of four teaching techniques (lectures, demonstrations, discussions, and in-class activities) in an undergraduate social psychology course at a Midwestern university in the U.S. A total of 18 male and 33 female students took part in the study. Student learning was assessed through the administration of quizzes and exams on three levels of Bloom's taxonomy (knowledge, comprehension, and application). The quizzes were designed to test material that had been delivered specifically through one of the techniques. Their findings provided evidence that active techniques did increase learning, and that scores for the lecture were the lowest among the techniques examined. Hackathorn et al. (2011), however, are careful to avoid a characterization of the lecture as an ineffective teaching method. Instead they make the case that their findings demonstrate how each teaching technique has a unique set of benefits and that lectures and active techniques should not be seen as competing forces but as parts of an overall strategy to employ a variety of approaches appropriate to the learning goals involved.

In 2014, Freeman et al. conducted a meta-analysis of 225 studies that compared active learning approaches with traditional lectures in undergraduate courses in science, technology, engineering, and mathematics (STEM). Specifically, they compared the



results of experiments that examined student performance in courses that included at least some components considered to be forms of active learning versus courses based solely on traditional lecturing. The results of the meta-analysis provided evidence that students in courses with active learning components performed better than students in courses based solely on traditional lecture-based teaching, with an increase in exam scores of 6% and a decrease in rates of failure of more than 50%. The overall mean effect size for performance on identical or equivalent examinations, concept inventories, and other assessments was a weighted standardized mean difference of 0.47 ( $Z = 9.781$ ,  $P < 0.001$ ). On average, student performance increased by close to half a SD with active learning compared with lecturing. The overall mean effect size for failure rate was an odds ratio of 1.95 ( $Z = 10.4$ ,  $P < 0.001$ ). This means that students in courses with traditional style lectures were 1.5 times more likely to fail than students in courses with active learning components.

Schmidt et al., (2015) assert that while there are numerous shortcomings of the lecture format that can be explored in the literature, this should not be interpreted as a death sentence. Rather, it is important to look for ways to improve lectures through the use of effective techniques such as storytelling, for example. According to French and Kennedy (2017) many scholars and researchers argue that there is still a place for lectures in terms of providing context and inspiration through narrative structure. They also specify the need for a range of teaching methods to provide flexible and diverse approaches to meet the needs of students. In particular, they suggest incorporating more dialogic, active and interactive teaching and learning activities to supplement the traditional lecture form. Due to a confluence of factors it is very likely that lectures will remain an important teaching method at the post-secondary level into the future. Universities around the world are under increasing pressure to simultaneously reduce their costs and yet somehow also serve the needs of large numbers of students (French & Kennedy, 2017). Given this reality it is crucial to consider alternative modes of educational delivery in addition to traditional lectures that allow students to engage with a wider repertoire of speech acts. This range could be described as covering a full spectrum from large lectures with less active participation from students to other forms involving more open-ended and student-led forms of dialogue. From the perspective of the field of Educational Technology and Learning Design, it is worth considering how alternative learning activities such as online discussions can be employed to provide a

broader range of speech opportunities for students in post-secondary learning environments.

## **1.6. Networked computing creates tremendous potential for dialogue**

Andrew Feenberg, writing in 2001, was optimistic about the potential for the development of dialogue through the use of networked computing. “With the Internet, for the first time, we have an educational technology that supports rapid and convenient communication, and there’s every reason to think that Socratic dialogue can flourish in this medium” (p. 84). The potential to use computing technology in positive ways to enhance education and provide space for pedagogical innovation has long been recognized. For example, J.C.R. Licklider, a pioneer in computer networking, and Robert Taylor, a manager at the Advanced Research Projects Agency (ARPA) made the following statement in 1960:

We believe that we are entering into a technological age, in which we will be able to interact with the richness of living information – not merely in the passive way that we have become accustomed to using books and libraries, but as active participants in an ongoing process, bringing something to it through our interaction with it... (as cited in Ryan, 2010, p. 76)

This statement was an astonishingly clear premonition about the future of not only the rise of engagement with networked computing by the general public in the 1990s, but in many fundamental aspects the development of the constructivist approach to learning as well. As early as 1962, Douglas Englebart, most widely recognized as the inventor of the computer mouse, had envisioned a future where many people operating in different disciplines could work on common problems using networked computers and shared data (Ryan, 2010). Beginning in the mid-1980s this vision started to become a reality as computer owners with modems began to form communities of common interest where peers were able to share advice about common problems.

From its very beginnings it has been recognized that networked computing offers large potential to support new forms of dialogic engagement. Within a few years of the initial exchange of the letters ‘I’ and ‘o’ from one computer to another, Ray Tomlinson initiated the first email correspondence in 1971. Within another relatively short timeframe

e-mail had evolved into more than a medium for one-to-one correspondence (Ryan, 2010). In 1975 the first online discussion group was formed around the distribution of e-mail to a large community. One of the original posters to the group had the following to say:

I would encourage a forum-type setup if it is not too difficult to setup, realizing that many (myself included) will have little time to contribute. I worry that such arrangements tend to fragment the overall group but maybe that's good if the fragments report in now and then. (p. 78)

This seemingly casual statement was actually quite prophetic in terms of predicting future problems associated with the development of online discussion forums and online learning in general. Lack of participation and inability to develop and sustain thematic focus are often cited as two of the most important problem areas associated with the use of online discussions.

The history of attempts to employ technological interventions to enhance pedagogical initiatives has demonstrated time and time again that simply having access to technology does not in and of itself improve or determine educational outcomes (Reiser, 2001b). At this point, a full two decades after Castells' initial call to action for meaningful pedagogical change to address a host of challenges introduced by the wide scale adoption of the Internet, we need to develop clear and honest assessments of our progress in this direction. From the perspective of post-secondary teaching and learning, we need to ask ourselves whether we have successfully implemented meaningful change. We have had access to the technology in conjunction with a carefully crafted directive for change (constructivism in various forms and flavours); but has this been enough to overcome the historical forces of social, cultural and institutional momentum that reinforce monologic views of discourse and knowledge?

At this point, we are able to take a rearview mirror look back at decades of experience using asynchronous online discussions to make assessments about how the potential benefits of networked computing, and well over two decades of general attempts to shift towards student centered learning, have actually played out. Ironically, the potential advantages of online learning for students in terms of greater flexibility, autonomy and ability to take the time for thinking, reflecting and responding also introduce challenges for learners as they attempt to maintain focus, self-motivation and initiative in their studies (Xia et al. 2013; Serwatka, 2003; Smart & Cappel, 2006). For

example, Kreijns et al. (2013) offer a theoretical framework based on the three core elements of sociability, social space, and social presence as key factors required for learning to occur. They argue that computer-supported collaborative learning (CSCL) environments based on Web 2.0 technology forms such as weblogs, wikis and many other forms of information sharing such as online discussion forums often lack social interaction. This is ironic given the increased flexibility, autonomy, and opportunity for reflection noted above. In fact, many studies have provided evidence that collaborative learning or active conversational modes of learning have been more difficult to achieve using online discussions than had been imagined in the earlier days of the development of online learning (Janssen et al., 2007; Yang et al., 2008). If a central plank in the arguments supporting online learning and asynchronous online discussions has been built around the potential for enhancing the ability of participants to interact meaningfully, we need to take a hard look at the actual outcomes of decades of attempts to achieve this.

## **1.7. Addressing addressivity with social annotation in online discussions**

### **1.7.1. Dialogue and the apperceptive moment**

In order to examine the reasons why dialogue has not flourished in educational environments despite the affordances offered by networked computing and the availability of Asynchronous Online Discussions (AODs), it is important to consider the ground-breaking work of the Russian linguist Lev Yakubinsky. He has been credited with laying the foundations for what could be called a theory of dialogue that grounded the study of language in the examination of dialogic interaction (Skidmore, 2016a). Yakubinsky compared and contrasted the natural ebb and flow of dialogue to the artificiality of monologic speech. For Yakubinsky, monologic speech represented a form of authoritarian discourse for the simple reason that it did not allow for response. The unruly character of dialogue shows itself in the form of constant interruptibility (Skidmore, 2016a). This stands in stark distinction to the dominant mode of discourse in education, following along the lines of the transmission model of information.

Yakubinsky was primarily concerned with the interval or gap between one utterance and another as a reciprocal interaction space in which each speaker

simultaneously puts effort into decoding the utterance of a speech partner while actively preparing a response. In Yakubinsky's terms this was referred to as the "apperceptive moment", where one speaker's understanding of another speaker's utterance is framed by their existing mindset, which is in turn framed by the entire history of that speaker's experiences of speech related interaction. He referred to this as the "apperceptive mass" that each speaker possesses, the complete sum of their previous life experiences (Skidmore, 2016a, p 17). Dialogue becomes possible when there is enough overlap between the collective apperceptive masses of speakers engaged in speech acts. The more overlap, the better and easier it is for speakers to decode and encode speech. A key component of Yakubinsky's dialogic theory of language is the idea that speakers are constantly tuning into each others' utterances (Skidmore, 2016a). Monologic discourse, on the other hand, does not involve the process of reciprocal tuning into the utterances of the other. A monologue in Yakubinsky's terms occurs when the reciprocal act of multiple speakers tuning into other speakers is bifurcated into separate spheres where one or more speakers engage in the act of decoding speech acts only.

Yakubinsky's pioneering work was foundational for the development of Mikhail Bakhtin's dialogic theory of language in general, and his concept of addressivity in particular. Bakhtin worked to establish the utterance as a base unit of dialogue, as opposed to the sentence. He defined the boundaries of an utterance as being demarcated by changes in speaking subjects (Bakhtin, 2010). In face-to-face conversation this simply refers to the point when one person stops talking and another starts. In terms of online discussions, the boundaries of an utterance are typically marked off by the boundaries of individual posts. For Bakhtin, an essential marker of any utterance, regardless of the medium, can be found in the fact that it is always directed to someone else, an addressee. "From the very beginning, the speaker expects a response from them, an active responsive understanding. The entire utterance is constructed, as it were, in anticipation of encountering this response" (p. 94). Addressivity in this sense, is a defining feature of the utterance to the point that Bakhtin insisted that "without it the utterance does not and cannot exist" (p. 99).

### **1.7.2. Metadata as a form of address**

The potential for online discussions to support dialogic discourse in education is vast. As information systems they provide the opportunity for linking experiences across

different times and places through the use of shared patterns of external representation (Bowker and Star, 2000). The problem, however, is that this potential is often not realized. When examining the complex of reasons for this, it is possible that the underlying issue can be defined as a breakdown in the processes of *tuning into* the utterances of others, and a subsequent disconnect between addressers and potential addressees in the process. Eryilmaz et al. (2013) identified difficulties in establishing and maintaining a common ground among participants as a major problem in the use of online discussions. The lack of a common ground can prevent students from confronting perspectives that differ from their own, or from attempting to reconcile differences of opinion to arrive at shared understandings of course material (Eryilmaz et al., 2013).

Students are often overwhelmed by the number of potential speech possibilities and the time it takes to navigate through interfaces built on linear access modes of representation and meaning making, such as scrolling through long lists of threaded messages. Whether the messages are ever actually received by any potential addressee is often not taken into account. Simply put, posts in online discussions often sit in isolation, with a corresponding lack of connectivity to other posts. They are typically not addressed to other potential speech partners in meaningful ways. It should not come as a surprise then, that there is a large body of research providing evidence that the content of online discussions in many cases is superficial and lacking in dialogic patterns of discourse (see for example, Andresen, 2009; Gao et al., 2013; DiPasquale & Hunter, 2018).

Clark and Brennan (1991) explored the importance of establishing common ground in various forms of human communication. They made the case that through a process that they refer to as 'grounding,' partners in human discourse continuously work towards establishing whether their own attempts at communication have been understood or not:

The contributor and his or her partners mutually believe that the partners have understood what the contributor meant to a criterion sufficient for current purposes. This is called the *grounding criterion*. Technically, then, grounding is the collective process by which the participants try to reach this mutual belief. (p. 129)

The grounding process involves effort on behalf of all speech partners, and as a consequence it can be expected that the process of grounding often proceeds with an

understanding that the least amount of time and effort should be expended in order to achieve this goal. An important contribution of Clark and Brennan's work involved the development of the argument that the principle of least effort should be replaced with the principle of least *collaborative* effort to recognize that human communication acts are generally used to establish collective purposes.

Another key contribution of Clark and Brennan's work is the recognition that while the principle of least collaborative effort is fundamental to most if not all human communication, it necessarily takes different forms depending on the particular medium involved:

By the principle of least collaborative effort, people should try to ground with as little combined effort as needed. But what takes effort changes dramatically with the communication medium. The techniques available in one medium may not be available in another, and even when a technique is available, it may cost more in one medium than in the other. Our prediction is straightforward: People should ground with those techniques available in a medium that lead to the least collaborative effort.  
(p. 140)

This observation in many ways laid the groundwork for an understanding of the nature of online discourse that continues to evolve and adapt to the present day. In particular, we can look at the development of various forms of social annotation as a realization of Clark and Brennan's prediction provided above. It can be argued that social annotation as a form of electronic metadata developed as a response to the particular 'costs' involved with the medium of the Internet for both addressors and addressees in terms of the principle of the least collaborative effort.

The problems associated with organizing and accessing large amounts of textual information in online discussions for pedagogical purposes are an example of a much larger set of issues related to online content. The concept of metadata has emerged as an essential component in the development of online content management strategies. In a most basic sense, "Metadata is data about data" (Lazinger, 2001, p. 139). In the early 1990s, metadata began to be used in the sense of the information required to make computer files useful for human interaction (Caplan, 2003). With the advent of the World Wide Web and networked computing, the term metadata became associated with the information used to describe objects on a network. The title of a YouTube video, its duration, copyright information, keywords etc. are all examples of metadata that are

used to organize a vast collection of online digital video clips. The development of a host of online services related to content management (social media services in particular) has emerged, built on the organizational capacity of metadata.

The transition from Web 1.0 to Web 2.0 has been built around a particular form of metadata related to the use of social tagging systems. Social tagging, also known as social annotation or collaborative tagging, has driven the development of many Web 2.0 services, for example, tagging of photos in Flickr, videos in YouTube or academic papers for CiteULike (Lu et al. 2010). The concept of tagging grew initially out of the use of link managers like Delicio.us and other social bookmarking sites that allowed users to save URLs for websites and provide some form of annotation if desired (Thomas et al., 2009). The potential for shared meaning can be enhanced when a word or small phrase is applied in the form of a “tag”. A tag is a keyword, an open-ended data term that users apply to online resources (Smith, 2008). Although tags are applied by individuals in these contexts, the motivation to do so is bound up in the desire to create meaning for and with other users. For example, the poster of a video to YouTube adds tags specifically for the purpose of increasing the chance that other users will find their video in a sea of millions of other options. On the surface, creating a tag seems like an individual activity; arguably it occurs as a direct consequence of the activities of a single mind operating within one user. Hidden in layers below the surface, however, lies a complex history of the evolution of humans as social beings. Language is never generated *ex nihilo* by individual speakers, it is always a product of the fundamentally social nature of communication (Gardiner, 1992).

While problems with online discussions have been researched and defined in many different ways, it is possible that the majority of issues can be related to a breakdown in the ability of students to meaningfully 'address' their written utterances to other potential speech partners. It would follow, then, that a potential intervention aimed at improving dialogue in online discussions could be gauged by the capacity to allow for potential connections to be formed between the content of individual utterances contained within online discussion posts. From a dialogic perspective, the general question I will ask in this dissertation is whether it is possible to use social tagging of online discussion content as a mechanism to allow learners to *address* their posts in a way that helps to bridge the gap between students using online discussions, by providing a mechanism to bridge the gaps in the apperceptive masses of students, thus



allowing for an enhanced ability to *tune into* (using Yakubinsky's phrase) the written utterances of other speakers.

## **1.8. Research design and questions**

In order to investigate the potential role for social annotation in online discussions to improve dialogue, a sequential, mixed-methods research design was implemented. In 2018, data were collected from the online discussions in a second-year course in the School of Communication at Simon Fraser University, British Columbia, Canada. The course had two separate lab and tutorial sections that took place at different times. In one section, students took part in reading and writing exercises using online discussions in the Canvas learning management system. These discussions entailed picking a reading from a list, and then posting an initial synopsis of the reading. Students were then encouraged to provide a minimum number of responses to other students' synopses per weekly reading and writing session. In the other section, students went through the same weekly reading and writing exercises using a separate online discussion in Canvas. Starting in the fourth week, students in this section started using social annotation to label their posts. A coding protocol was adopted and developed as an instrument to assess the level of dialogue in each separate section of the course as the students progressed through the weekly readings offered over the semester. The following research questions were investigated:

1. Did social annotation (in the form of hashtagged keywords) provide practical ways to enhance dialogue in online discussions in the post-secondary context, as shown through thread depth and the dialogicality of student posts?
2. What design considerations were necessary for the instructor to consider when introducing hashtagged keywords as a pedagogical intervention with undergraduate students?

## **Chapter 2.**

### **Online Discussions**

#### **2.1. Networked computing and the rise of AODs**

Online discussion forums have extended the human potential for dialogue into a virtual space that exists beyond the temporal and spatial boundaries of our normal existence (Hew et al., 2010). In order to begin the process of assessing the extent that this potential has been realized, it is important to first consider the historical context of the development of online discussion forums. As Schindler and Burkholder (2014) point out, two very important shifts in education and technology came together in the 1990s to support a rapid growth of distance education – an early driver of the use of online discussion forums. First, there was a movement towards constructivism and away from previous models of education built on the one-way transmission of knowledge from experts to novice learners. Constructivism itself can be traced back to many different sources, but in particular the work of Piaget. In the 1970s and 1980s work on many educational innovations such as constructivism proceeded based on Piaget's view of the child as an active and constructive learner (Dimitriadis & Kamberalis, 2006). Piaget even went so far as to suggest that social exchanges between children were stronger drivers of cognitive development than exchanges between children and adults (Palinscar, 1998). Second, a technological shift occurred through the more widespread availability of personal computers and access to the Internet. By the turn of the previous century, distance education and Internet-based discussion forums had become fairly common in postsecondary learning environments, following a period of rapid growth in the 1980s and 1990s (Harasim, 2000).

Interest in using online resources in the field of Education started to build soon after the invention of packet switched networks in 1969, and the use of e-mail and computer conferencing in 1971 (Harasim, 1999). Excitement about the potential for online discussions to make a meaningful, and possibly powerful contribution to the project of education ran high throughout the 1990s. In a review of the literature focused on the assessment of the effectiveness of asynchronous discussion forums for learning processes, Andresen (2009) outlines the relatively quick adoption of online courses in

the 1990s. Tucker (1995), for example, reported that the percentage of universities and colleges in the United States offering online courses rose from 3% to 30% between 1990 and 1995. Similarly, Gubernick and Ebeling (1997) reported that the number of institutions offering online education grew from 93 in 1993 to 800 by 1997. By the year 2001, a study conducted by the National Center for Education Statistics showed that 90 percent of public post-secondary institutions in the United States offered distance education courses and furthermore, that 90 percent of those institutions offered asynchronous online courses (Andresen, 2009).

Writing in the late 90s, Hiltz and Wellman (1997) were optimistic about the potential for computer-mediated communication (CMC) to transform social structures in postindustrial societies. They defined community as a form of social network and argued that CMC had the capacity to redefine the nature of community, in particular through the use of asynchronous learning networks. Hiltz and Wellman claimed that “despite the lack of physical space, an ALN’s [Asynchronous Learning Network] virtual facilities allow students to exchange emotional support, information, and a sense of belonging” (p. 44). Earlier in the decade Hiltz and Turoff (1993) had coined the term “superconnectivity” to describe the potential impact of computer-mediated communications (CMC) to redefine relationships between individuals, groups, organizations and society (p.455). Harasim (1999) summarized the essential features of what she referred to as network-mediated collaborative learning as being “asynchronous and place-independent,” and reliant on a “many-to-many, text-based/multimedia, computer-mediated system” (p. 44). In her optimistic view at the time, networked computing offered enhanced opportunities for student communication, interaction, and collaboration. In particular, she identified discourse as a fundamental aspect of learning and a key component of collaborative learning.

The growth of online educational offerings led to a corresponding spike in interest in asynchronous online discussion as being potentially equivalent to face-to-face discussion in traditional classrooms (Andresen, 2009). Harasim (1999) pointed to the difficulties involved with adopting generic network tools like email, computer conferencing and newsgroups for educational activities. She made the argument at that time for the building of an online educational environment that would not only provide instructors with ways to organize course material but also for models to support learning strategies that involve collaborative learning, knowledge building and other important

components of a pedagogy based on the broader principles of constructivism. She contrasted traditional, lecture-based learning with interactive collaborative learning and group knowledge-building processes. Harasim was influenced by the work of Scardamalia and Bereiter and their focus on knowledge building versus knowledge reproduction. Scardamalia and Bereiter (1993) characterized the transmission model of education as being based squarely on knowledge reproduction, "Within the transmission context the dominant discourse activities are presentation and recitation" (p. 38). They took the stance that question-asking in schools is not truly dialogic, as the teacher expects an immediate answer with a predetermined expectation about the correctness of the reply. For Scardamalia and Bereiter (1993) the most important aspect of knowledge building was that it was a social activity pursued through the discourses of a community with shared goals for the exploration and advancement of knowledge. They called for the development of technology that "can help condense the discourse, sustain it through interruptions and across distances and give it continuity over time" (p. 39).

## **2.2. Asynchronous online discussions create potential for dialogue**

Asynchronous communication in the field of online education refers to communication that occurs through the use of email, discussion boards, and other tools where the instructor takes on a larger role as a facilitator of interactions between students (Hrastinski, 2008). While there are a number of different tools that can be used to engage in asynchronous communication, the online discussion board has become a primary site of engagement where teaching and learning occur in online classrooms (Covelli, 2017). Hew et al. (2010) define an online discussion forum as "a text-based computer-mediated communication environment that allows individuals to interact with one another without the constraint of time and place" (p. 572). It is the removal of these constraints in asynchronous online discussions that seems to offer so much potential for human communication and learning capacity. Indeed, this flexibility is often touted as the primary benefit of asynchronous dialogue in terms of the convenience it provides (see for example, Gao et al., 2013). Many studies have been conducted to compare conventional face-to-face discussion to computer-based message systems in the hopes that the benefits of face-to-face discussion could be extended and perhaps even enhanced through the use of asynchronous online discussions (AODs). In terms of

Alexander's model of dialogic teaching, this can be seen as a way to provide new opportunities for classroom talk and for the development of teaching-talk repertoires that extend beyond traditional face-to-face modes of interaction.

### **2.2.1. Simultaneous communication**

A very basic aspect of AODs that surfaced early on in the development of literature in this field is that they provide the potential for simultaneous communication amongst speech partners so that one student's contribution does not necessarily prevent a contribution from another student. Quinn et al. (1983) examined the discourse of 44 students in a class taught at the University of California using a quasi-experimental design. Students in the class were divided into two groups: one group used an electronic message system known as MSG, the other group participated in conventional, face-to-face discussions in a typical classroom setting. In general, Quinn et al. (1983) reported finding a greater variety of discourse patterns ranging from the traditional IRF sequence usually found in face-to-face classroom discussion to other types of patterns of exchange. For example, a comparison between the two groups revealed a higher proportion of student turns of speaking compared to teacher turns in the posts to the online messaging system as opposed to the face-to-face group. When considering Alexander's model of dialogic teaching the concept of simultaneous communication can be seen as a factor in enhancing the potential for establishing a collective learning environment in the sense that everyone in a class has the opportunity to be involved in joint learning activities.

### **2.2.2. Enhanced flexibility**

Moving beyond an initial focus on simultaneous communication many studies in more recent years have explored the potential for enhanced flexibility when using AODs over face-to-face conversation in terms of time management strategies (for example, Blankson & Kyei-Blankson, 2008; Hamann, et al., 2012). In general, these factors are held up in the literature as contributing to an increase in opportunity for all students to engage in discourse, rather than the small number of students who tend to dominate face-to-face interactions (Alamro & Schofield, 2012; Cain & Smith 2009; Rizopoulos & McCarny, 2009). Many researchers have concluded that participation in online discussions provides opportunities for increased student learning (for example, An et al.,

2009; Andresen, 2009; Hew & Cheung, 2013). Moreover, Schindler and Burkholder (2014), point to several advantages of using asynchronous online discussions (AOD) over face-to-face interactions, including increased opportunities for all students to make meaningful contributions and more time for information processing and reflective thinking. Overall, it seems as if AODs could provide the potential for more opportunities for students in a class to participate in course-related discourse and collective learning activities, beyond the possibilities created in face-to-face learning environments.

### **2.2.3. Increased exposure to diverse perspectives**

Gorsky and Caspi (2005), make the case that dialogue is an essential component of human learning, and that this is particularly true in the context of online education. Garrison (2006) states that discourse is the essence of a collaborative and constructivist framework for teaching and learning in post-secondary environments. In particular, he argues that it is when learners are able to build on the comments of others that higher rates of communication and inferential thinking occur. In the view of this author, connecting students across diverse demographic and cultural backgrounds may possibly form the backbone of a healthy dialogic state of interaction, based on challenging established viewpoints and developing an awareness of alternative perspectives. Alexander's conceptualization of dialogue as being reciprocal fits well with the promise of AODs as important sites for exchanging opinions and understanding that other students may have alternative but equally valid points of view. Hewitt (2001) argued that virtual settings allow less assertive learners to compose their thoughts and that this allows them to then reflect on and respond to the discourse of others. In other words, AODs offer the potential to increase levels of dialogic interchange between students and instructors and, more importantly, between students themselves through equitable participation (Harasim, 2000; Zhu, 2006).

In the early 1990s, a time when the World Wide Web was just starting to take its place as the dominant communication medium in the world, Scardamalia and Bereiter (1993) were making the argument that educational computing could mostly be characterized by knowledge reproduction strategies rather than knowledge building processes. From their perspective learning always involves "working toward more complete and coherent understanding" (p. 38). They argued at that time that certain kinds of discourse play a key role in learning based on knowledge building as opposed

to knowledge reproduction and a reliance on the transmission model of education. In 2005, Bereiter and Scardamalia positioned dialogue as the foundation for knowledge creation and construction in a “knowledge society”:

Modern information technology not only provides a means by which such dialogues can overcome restrictions of time and space, it affords means by which dialogue can become more dynamic, democratic, and creative. Dialogue can be seen to underlie all the knowledge-creating disciplines and professions. Thus dialogic literacy, we shall argue, is the fundamental literacy for a “knowledge society,” and educational policy needs to be shaped so as to make it a prime objective. (p. 750)

#### **2.2.4. Creating supportive learning environments**

One aspect of Alexander's model of dialogic teaching that has been explored extensively in the literature involves the notion that the use of AODs could be considered as being supportive in the sense that speech partners feel that they are able to express their opinions and ideas freely and without risk of embarrassment. Many studies provide evidence that AODs can lower entry barriers across a wide range of groups of students who might feel otherwise too intimidated to participate, including students with English as an additional language (Rainsbury & Malcolm, 2003), female students (Caspi et al. 2006), introverted students (Amichai-Hamburger et al., 2002), and students who feel generally nervous about discussion (Majid et al., 2014). In situations where students feel isolated, it is possible that participating in online discussion can help them to feel connected to other students. Chapman et al. (2005) made the case that with the removal of time constraints for speech acts, students using AODs can become more comfortable with their classmates and that this can, in turn, encourage the development of an enhanced sense of community. Using a case study design, Liu et al. (2007) found that the use of AODs can make a contribution towards promoting a sense of community by facilitating “information sharing, idea exchanges, and mentoring” (p. 12). This conclusion was based on interviews with 28 faculty members and 20 second-year MBA students. Downing et al. (2007) found that learners regard online discussion environments as being less pressured, and consequently are more likely to contribute to discussions at their own pace. They employed a case study design to examine the online interactions of 32 students enrolled in an applied Psychology course at City University of Hong Kong. In general, it has been demonstrated that online discussion can facilitate vital social interactions among students (Swan & Shih, 2005; So & Brush, 2008; Andresen, 2009).

Arguably the characteristic of dialogue that Alexander referred to as cumulative might be the area that has been studied the most in the literature on AODs. In this context the term cumulative refers to the way that learners are able to build coherent thinking patterns based on their own experiences and contributions in relation to other students' contributions over time. Pena-Shaff and Nicholls (2004) make the point that the removal of time- and place-based constraints allows for students to take the time to reflect, to search for information and to formulate responses. According to Kent et al. (2016), AODs offer the potential for collaborative knowledge construction through the affordances of sharing ideas, learning from peers, and collective knowledge processes built on reading and reflecting on each other's thoughts. Hew and Cheung (2013) found that text-based online discussions were particularly useful for exploring dissonances and negotiating opinions. Using a case study design across two studies, they compared audio-based versus text-based output in the online discussions of 83 students enrolled in teacher education courses at an Asian Pacific University. They also found that collaborative knowledge-building processes create opportunities for reflexive and critical thinking, and an improved ability to understand concepts as opposed to situations where learners operate individually. Many researchers have found that the facilitation of processes for the co-construction of new knowledge occur in online discussions. Gunawardena et al. (1997), for example, developed an interaction analysis model for examining social construction of knowledge in computer conferencing. This model has been used to assess variations in levels of co-construction of knowledge in online discussions (Hull & Saxon, 2009).

### **2.2.5. Increased opportunities for critical engagement**

The fact that AODs can potentially provide students with more time to read, reflect, and critically engage with course-related topics is often held up as a contributing factor in the development of critical thinking (Putman et al., 2012; Williams & Lahman, 2011). Andresen (2009), in a review of the literature, found that the use of AODs has the potential to support critical aspects of learning as well as higher cognitive levels of knowledge construction. Meyer (2003) compared the experiences of 22 graduate students in a postsecondary setting across face-to-face discussions and online discussions. The authors considered their work as being primarily ethnographic in nature due to the small sample size and lack of statistical testing. They found evidence that



higher-order thinking occurred in both situations. This study was important because it provided evidence for the efficacy of discussion in general and established that similar kinds of benefit can be derived from online and face-to-face discussion. DiPasquale and Hunter (2018) undertook a systematic review of the literature in the area of critical thinking and AODs, which revealed an extensive body of knowledge on this topic. They found that pedagogically rich and strategically structured discussions were important factors in student performance and engagement. There was also a tendency to view broad theoretical approaches to pedagogical development, such as social constructivism, as important in the fostering of critical thinking. An important overarching theme was that both instructor and student facilitation were effective in terms of promoting critical thinking in AODs.

### **2.3. The full dialogic potential of threaded AODs has not been realized**

A vast amount of empirical research has been focused on the assessment of the pedagogical effectiveness of AODs across a wide variety of educational environments. Given the fact that such a large body of work exists, it should not come as a surprise that there are a wide variety of findings related to the topic area. It is possible to find considerable evidence that could be used to either support the use of AODs in post-secondary teaching and learning environments or point to their failure as a viable teaching technology. As Xia et al. (2013) point out, the greater flexibility, autonomy, and control that AODs offer students for generating discussion also present challenges in terms of managing higher levels of focus, self-motivation, independence and initiative. This increases the likelihood that students may find the experience of using AODs impersonal, disconnected and confusing. In this section, I will explore empirical research that points to the limitations of employing AODs for dialogic pedagogy, to make the case that their full potential is not being realized.

The threaded structure of AODs that is often employed in educational environments has been implicated as a possible factor that negatively impacts user perceptions and associated outcomes. The concept of threading in AODs revolves around the way that authors are able to clearly attach newly written notes or posts as responses to previous ones (Hewitt, 2001). This involves the creation of a chronologically organized list of posts, where relationships between posts are indicated

through indentation. According to Hewitt a thread "is a hierarchically organized collection of notes in which all notes but one (the note that started the thread) are written as 'replies' to earlier notes" (2005, p. 568). A threaded discussion design gives users essentially three choices towards the formation of discourse: they can either start a new thread of discussion, reply to an existing starter or initiating thread generated by other users, or reply to a reply. The threaded design of many AODs has been implicated as a potential structural limitation that imposes certain constraints on the nature of discourse that they support. Gao et al. (2013) in a literature review specifically orientated towards exploring how certain properties of threaded forums might affect or constrain the discourse in online discussions group these limitations into four broad categories of concern: maintaining focus, synthesizing ideas, providing emotional cues and timely feedback, and an overall lack of interactive dialogue.

### **2.3.1. Lack of common ground**

Relatively early in the use of AODs in education, Herring (1999) identified a difficulty in keeping discussions focused as a concern and argued that it was the chronological ordering of threaded discussions that was the primary cause. Whitely (2006) identified temporal separation as a key factor in the use of AODs, and the inability of many students to build momentum and focus. A possible reason for lack of participation and collaboration in online discussion forums could be the inability of users to find a shared focus. Lack of perception of common ground or shared focus has been identified by many researchers as a central problem in how students use online discussion forums (Häkkinen & Järvelä, 2006; Cobos & Pifarré, 2008; Engelmann et al., 2009). Thomas (2002) in his study of students' use of online discussions found that, "Students never metaphorically 'came together' to learn, but rather they were isolated by the technology which offered several levels of abstraction from normal discussion" (p. 362). The study employed an evaluative methodology to provide quantitative measures of the quality of work created by 69 students participating in first- and second-year courses at the post-secondary level. Their written work and online interactions in online discussions were analyzed using a content analysis procedure. The level of students' cognitive engagement was assessed using a Structure of Observed Learning Outcome (SOLO) taxonomy. The authors concluded that the results were weaker than expected for students operating at the undergraduate level and also that they actually declined

over the duration of the study as measured by the levels of the SOLO taxonomy. In particular, the authors implicated the structural organization of the threaded discussion forum as a reason for why discourse failed to be both interactive and academic in nature.

Issues related to the use of threaded discussions, such as a general lack of shared focus or convergence have been implicated as important reasons why the content of threaded discussions has been described as inherently divergent (Hewitt, 2001). In a study analyzing the computer conferencing transcripts of 92 students attending graduate-level distance education courses at the University of Toronto, Hewitt (2003) found that these students demonstrated an excessive focus on new notes. A tracking system was employed that logged and date-stamped each time a note was opened by a student and each time a new note was created. An examination of 4330 online sessions revealed that students had a tendency to respond to newer rather than older notes, and roughly 80% of responses were aimed at notes that were less than 48 hours old. Thus, no matter the interest value of the content of a note, if it did not get a response within 48 hours, the likelihood that it ever would dropped dramatically. Hewitt concluded that the threaded nature of the discussions as a structural component of the user interface was a large factor contributing to this tendency. A bias towards the reading of newer posts was seen as problematic as it could play a role in unintentionally shifting attention or focus away from other important course related issues or themes.

### **2.3.2. Lack of synthesis**

Considerable evidence has been amassed regarding problems related to maintaining focus in AODs; but another problem area identified in the literature clusters around a general lack of synthesis of ideas, and a corresponding superficiality of participation. McLaughlin and Luca (2000), for example, offered the following assessment:

Analysis shows that most messages are in the category of comparing and sharing information. There is little evidence of the construction of new knowledge, critical analysis of peer ideas, or instances of negotiation. The discussions do not appear to foster testing and revision of ideas and negotiation of meaning which are processes fundamental to higher order thinking. Only a small percentage of contributions can be categorized as higher order cognition and awareness of knowledge building. (p. 5)

This quote stands in contradistinction to Harasim's (1999) optimistic prediction that students involved with network-mediated collaborative learning would necessarily use the technology to enhance their opportunities for communication, interaction, and collaboration; and a number of subsequent studies have likewise cast such optimism into doubt. Thomas (2002) in his previously mentioned study of students' patterns of interaction in an online discussion forum, found that student contributions tended not to respond to others or build on their ideas – a critically important factor in the development of dialogue. Thomas concluded that the structural organization of the messages in the form of threads was one of the factors inhibiting effective discourse in the study. Angeli et al. (2003), in their study examining the online discourse of 146 pre-service teachers in the United States, found mostly an exchange of personal experiences that did not demonstrate well-supported reasoning. The online discourse was gathered from 35 discussion threads using an asynchronous web-based conferencing tool. The tool employed a hierarchical structure where new messages are posted below older messages in a strict linear sequence. Evidence for this finding was based on quantitative measures such as total number of postings and length as well as an in-depth qualitative analysis of a sample of the discussion threads using a coding scheme to evaluate the quality of students' online dialogue. The authors of this study found that that the threaded online conferencing environment that they were studying failed to maintain students' interest and engagement beyond the first three weeks. They pointed to the need for built-in structural supports that could provide scaffolding for online interactions beyond the tools available at the time.

### **2.3.3. Lack of social cues**

Another broad area of concern that has been identified with the use of AODs in educational contexts is the lack of emotional/social cues and related issues of the timing of feedback. As noted by Gunawardena and Zittle (1997) the lack of social cues in the form of eye contact, vocal intonations, facial expressions and other markers in online learning environments can have an impact on the nature of the discourse in asynchronous discussions. Curtis and Lawson (2001) examined the email messages and postings to a discussion board of 24 students undertaking post-secondary courses in teacher education at a University in Australia. They were investigating the extent to which text-only environments might inhibit or enhance collaboration in small project-

based groups. Their findings point to the nature of mediation in AODs and the subsequent lack of non-verbal cues as a limiting factor in what should or could be semantically rich exchanges. Jeong and Frazier (2008) implicated issues related to the timing of student posts as limiting factors in the development of higher levels of discourse. They undertook a quantitative study of weekly team debates using a threaded discussion forum for 72 graduate students from a university in the southeast region of the United States. The authors found that when students posted later in the week, there was a decrease in responses related to the formation of arguments and challenges of other students' posts. A list of considerations for future interventions aimed at fostering more critical discussion was presented, including: collapsing all threads when students first enter a discussion, providing tools to collapse discussions at specified thread levels, displaying the number of unread responses posted within each collapsed thread, and presenting the newest posts with the fewest responses at the top of the page.

#### **2.3.4. Limited participation**

Limited student participation has also been identified as a sticking point in the implementation of AODs across a variety of learning environments. Angeli et al. (2003) in their study examining the online discourse of pre-service teachers discussed above, noted that extensive communication amongst participants did not occur, and that overall the participants' interest in using the electronic conferencing system diminished over time. Hewitt (2005) investigated the conditions under which activity in online discussion threads can slow and then eventually shut down. Three separate studies investigating the online discussion activities of 14 graduate students at the University of Toronto provided evidence that a discussion thread's longevity was not necessarily tied to content, and that activity in online discussions can slow to a halt simply through the activity of only reading new notes and ignoring older ones. Liu et al. (2007) found that lack of participation in AODs resulted in superficial levels of dialogue, leading to a lack of continuity and a general fragmentation of the online community. A case study approach was used to explore the perceptions of students towards building learning communities in an MBA program in a large top-ranked Midwestern university in the United States. Data were collected through interviews, a survey of student satisfaction as well as a content analysis of selected courses in the program. An important finding from this study was that both students and instructors felt a low level of social presence in online

courses and that this was attributable to the asynchronous and text-based nature of the technology employed.

### **2.3.5. Lack of interactive dialogue**

Gao et al. (2013) argued that the structure of threaded online discussion forums can make it difficult to promote interactive dialogues. Pena-Shaff and Nicholls (2004) in their analysis of threaded electronic bulletin board posts generated by 35 post-secondary students in a communication course at Cornell university, found that most posts took the form of reflective monologues as opposed to truly interactive and dialogic exchanges between posters. A total of 152 posts were analyzed using a mixed methods design involving both qualitative and quantitative analysis. It was found that very few threads of discussion showed a dialogical process involving conflict or negotiation. Subsequent studies have pointed toward the fact that many students participating in online discussions are often completing tasks simply to meet the minimum standards for assessment, and not engaging in truly active dialogues that promote knowledge construction. Palmer et al. (2008), for example, conducted a case study of an undergraduate engineering management unit at Deakin University in Australia and found that the majority of posts occurred at the minimum level of requirement to qualify for assignment marks. This assessment was based on quantitative data collected from 645 posts generated by 86 students. The authors of the study observed that there was a significant relationship between the final unit mark and the number of new postings made to the online discussion. There was not, however, a significant relationship between the number of posts read and the final unit mark, suggesting that passive or 'lurking' type strategies did not significantly contribute to student learning outcomes as formally assessed.

## **2.4. Instructional design interventions aimed at improving AODs by providing alternatives to threaded discourse**

A common organizing principle of asynchronous online discussion environments is that they tend to be designed around a threaded discussion format. As mentioned above, threaded discussion organizes posts according to a chronological ordering, as well as a reply structure by poster (Eryilmaz et al., 2013). Despite the ubiquity of threaded discussion formats, their pedagogical value has been questioned. Thomas

(2002), for example, stated that they “might not be the best technology to support the interactive and collaborative processes essential to a conversational model of learning” (p. 364). Many of the challenges associated with the use of AODs in general can be linked to the particular kind of structure that they impose on discourse in online learning environments, specifically through the use of the threaded design format. As a result, many different instructional approaches to the design of online discussions have been explored. Scardamalia and Bereiter (2005), for example, offer an alternative to threaded discussion through the use of their Knowledge Forum software, in which posts or notes can be dragged around on the screen and organized graphically in a variety of different ways. They make the point that threaded discussions are related closely to the way that email messages are organized and this structure is not conducive to practices that promote exploration and inquiry in educational environments:

In fact, our experience is that threaded discussion militates against deepening inquiry; instead, it is much more suited to rapid question-answer and assertion-response exchanges... As the number of postings increases, what appears on the screen becomes an increasingly incoherent stream of messages, leading discussion monitors to impose arbitrary limits on thread length and to erase threads of a certain age. Thus a cumulative advance in the state of knowledge is hardly conceivable. (p.106)

Scardamalia and Bereiter designed the Knowledge Forum learning platform around the concept of a multimedia database as opposed to an email-like structure. From a user's perspective the main components of a Knowledge Forum database are notes and “views.” Views provide an organizational background for notes and they can take the form of concept maps, diagrams and other forms of visualization. They argue that this difference allows for high levels of 'epistemic agency' or the amount of collective control students have over a wide range of knowledge building components.

The structural constraints of threaded discussion formats can operate to impede meaningful interactions in simple but powerful ways. For example, many threaded forums highlight or emphasize unread posts or more recent posts as part of the design structure. This can have the unintentional consequence of shifting attention away from material that is potentially much more relevant and meaningful. In a review of the literature, Gao *et al.* (2013) examined studies of alternative designs for asynchronous online discussion environments. They note that limited progress has been made and stress the importance of future work in this area. Based on the results of their review,

they categorized alternative design attempts along the lines of four categories: visualized, anchored, constrained and combined environments involving combinations of these different design elements.

### **2.4.1. Visualized environments**

Gao et al, (2013) refer to discussion environments that use maps, tables, or any other kind of graphical representation as visualized environments. A pioneering effort to explore how the design of graphical user-interfaces can impact content creation patterns by students was undertaken by Kear in 2001. A comparison of the messages written by post-secondary students in an Open University course using two different computer conferencing systems provided evidence that the addition of small graphical elements made it easier for students to navigate the discussion. Computer conference discussions from two separate years were compared. Both were based on the concept of threads but one interface indicated threaded relationships with the addition of L-shaped lines. The other version employed message headers to indicate thread initiating posts and subsequent replies. Data from the study demonstrated that the discussions that employed the graphical element had a much lower proportion of isolated messages (5% versus 25%) and that the average thread size was larger (7.8 messages per thread versus 5.2). Kear concluded that a well designed graphical interface can help students to organize their messages and that this can lead to more coherent discussions.

Marbouti and Wise (2016) suggested that a core problem with threaded discussions is that the structure provided by a long list of written speech acts does not present the discourse in a visually salient fashion, and that this creates a bias towards newer posts. This has been pinpointed as a limiting factor in students' ability to navigate through discussions effectively (Dringus & Ellis, 2005). Suthers et al. (2008) investigated the potential benefits of a visually based knowledge mapping process using an experimental method. They compared one condition where students used a conventional threaded discussion tool with another condition employing knowledge maps as an organization structure for students' posts. The research participants consisted of 60 students recruited from introductory courses at the University of Hawaii. Students using knowledge maps created more hypotheses earlier in the beginning stages of the assignment and also elaborated more than the users of the threaded discussions. They also scored higher on post-test questions, demonstrating a higher



level of integration of content and collaboration. Marbouti and Wise (2016) similarly found that the use of a graphical interface (Starburst) was successful in supporting the purposeful selection of threads to read and then reply to. They analyzed the posts of 7 masters level students taking a blended graduate course on educational technology employing a hybrid experimental/naturalistic design. Students' participation using the graphical interface was compared to their patterns of usage interacting with the same content but in a traditional, threaded, linear forum structure. Evidence was provided that students were more selective in their decisions about which threads to view using the graphical interface as opposed to the traditional interface. Students were also more likely to re-read higher-level posts from previous sessions. Overall, there is a base of empirical evidence to support the use of graphical representations of content in online discussions as an alternative to threaded designs.

#### **2.4.2. Anchored discussion**

In addition to attempts to use visualization Gao et al. (2013) list anchored discussion as another alternative to threaded online discussion designs. Guzdial and Turns (2000) offered the concept of anchored discussion as a means to achieve the end goal of sustained, on-topic discussion in online learning communities. They cite ease of integration, flexibility of design, and large potential for collaboration as some of the reasons for why online discussions had become so popular over the 1990s. They also put forward two very basic reasons for why online discussions might, in and of themselves, fail to promote learning: lack of participation and thematic fragmentation. These core problems resonate quite directly with the concerns of the poster to the first online discussion in 1975 presented earlier. Even after 25 years of development, online discussions were still suffering from the same basic problems around differential rates of participation and lack of focus. An anchor, in the sense proposed by Guzdial and Turns (2000), is comprised of a document or topic that is simultaneously relevant to the students and to the context of the learning situation involved. The authors argue that an anchor needs to be relatively accessible to students, both in the nature of the content but also in terms of interface design. The discussion forum attached to an anchor should be accessible to students such that the connection between these is easily maintained. In a direct sense this can mean that the anchor and the discussion are visible at the same time. Guzdial and Turns (2000) put forward the following three goals as necessary but

not sufficient conditions to associate discussion forum activity with learning: the discussion should be sustained, the discussion should have broad participation, and the discussion should focus on class topics.

Brush et al. (2002) compared the use of a shared annotation system that supported anchored discussion of online web pages (WebAnn) with EPost, a discussion board tool featuring threaded organization of students' posts. WebAnn is considered to be a form of anchored discussion because it allows students to attach and share comments directly to a paper being discussed in the sense that the paper and the comments are viewable simultaneously. Participants for the study were 11 students taking a graduate-level course in Human-computer Interaction at the University of Washington in 2001. The class alternated between use of EPost and WebAnn in two-week segments over the duration of the class. A comparison of user metrics across both systems showed that when students were using WebAnn there were significant increases in the mean number of reply messages per author per paper (1.58 for WebAnn versus 1.15 for EPost) and length of post measured by number of characters (4401 for WebAnn versus 2485 for EPost).

The blessing of AODs as a technology is that they afford the potential to accumulate a large volume of contributions through ease of use and the removal of time and space as barriers to dialogue. This is simultaneously a kind of curse, as the accumulation of large amounts of text without focus obscures and fragments the learning process. Anchoring as an innovation in online discussions was a natural next step in the evolution of the form. It was an attempt to deal with a central paradox of the technology: online discussion can fail to support learning in conditions where there is not enough written input generated through lack of participation, but also when there is too much. Anchoring a discussion around a central document or topic provides a structure aimed at solving both problems simultaneously.

### **2.4.3. Constrained environments**

Constrained environments are another type of alternative to threaded online discussions that have been explored in the literature. The use of constrained environments involves an attempt to scaffold the learning of posters by providing a structure for organizing and navigating through posts (Gao et al., 2013). Oh and

Jonassen (2007) used a two-group comparison to examine the effects of a constraint based environment versus threaded discussion. The study involved 58 undergraduate students enrolled in a Teacher Development Program at a large Midwestern university in the United States. Students were asked to use labels conforming to a set list of post types, such as evidence or elaboration. The results of the study indicated that the students working in the constrained environment produced more evidence-based messages than those using the threaded discussions. The authors concluded that this provided positive evidence for the effects of argumentation scaffolding over those of online threaded discourse. The theoretical rationale for this type of structured learning environment is that it promotes metacognitive thinking by participants (Scardamalia & Bereiter, 1994; O'Neill & Gomez, 1998; Jonassen & Remidez, 2005).

Self-labeling of written messages in online discussions is related to the use of anchors in that both interventions are aimed at helping students to focus their input. As Bures et al. (2009) point out, labeling features allow and/or force users to label the messages that they construct in online learning environments. Reasons for labeling include: reducing off-topic messages (Weinberger et al., 2007), clarifying the structure of argumentation (Jeong & Joung, 2007), facilitating critical thinking (Schellens et al., 2009), enhancing reflective learning (Xie & Sharma, 2011), and scaffolding argumentation (Oh & Jonassen, 2007). Jeong & Joung (2007) explored the use of embedded constraints within an online discussion environment using an experimental design. They wanted to investigate the potential for message constraints to scaffold processes of collaborative argumentation. A total of 38 pre-service teachers taking part in an introductory educational technology course were restricted to a prescribed and stringent set of message categories that they could label their posts with. Unfortunately, the main finding in this particular study was that message labels used in this way actually inhibited the students' capacity for critical argumentation. Schellens et al. (2009), on the other hand, found that asking students to label their own discussion posts from a fixed taxonomy related to De Bono's (1991) thinking hats extended the overall depth of critical thinking in the discussions that they investigated. An experimental research design was employed to examine the difference between 35 post-secondary students randomly assigned to either a treatment or control group. Based on differences in scores of coded critical thinking indicators, students in the experimental condition were more likely to engage in in-depth and focused discussions than students in the

control condition. These two examples of self-labeling in online discussions are relevant because they highlight the importance of finding a balanced amount of structure in the expectations for students using online discussion. Self-labeling in discussions can be used to provide even more structure than anchoring; but when taken to an extreme, it is possible that this can actually diminish the capacity for learning and dialogue.

#### **2.4.4. Combined environments**

According to Gao *et al.* (2013), design attempts to overcome some of the structural limitations of online threaded discussions can be grouped into three broad categories: visualized, anchored and constrained as discussed previously. A combined environment, however, refers to design interventions that attempt to integrate more than one of the three types. Scardamalia and Bereiter's Knowledge Forum is an example of a combined environment as it draws on features from visualized, constrained and anchored discussion designs (Gao *et al.*, 2013). Student messages are constrained by post labels, called scaffold supports. Notes can also contain links to notes or artifacts, and in later versions a graphical view was available to help students navigate through posts. Based on the empirical evidence that has been conducted it would seem that alternative formats that move beyond threaded discourse in online discussions hold promise for improving the nature of discourse in AODs. Combined environments, such as Scardamalia and Bereiter's Knowledge Forum, in particular, would seem to offer tremendous potential for generating educational value.

## Chapter 3.

### Social Annotation

#### 3.1. Addressivity and social annotation

Debates about the role of technology in the structuring and support of human dialogue can be sourced back to at least Plato in the fourth century BCE. In that time Plato presented a written account of Socrates' original critique of the technology of writing. A central component of the argument was that reading and writing are a passive rather than a truly active and dialogic form of interaction (van Oostendorp & de Mul, 1996). In Plato's time, texts written and preserved on papyrus or clay tablets did not have the capacity to immediately change in response to an argument made by the reader. In *The Phaedrus*, Plato provided a written account of a face-to-face conversation between Socrates and his speech partner Phaedrus:

Yes, because there's something odd about writing, Phaedrus, which makes it exactly like painting. The offspring of painting stand there as if alive, but if you ask them a question they maintain an aloof silence. It's the same with written words: you might think they were speaking as if they had some intelligence, but if you want an explanation of any of the things they're saying and you ask them about it, they just go on and on for ever giving the same single piece of information... (Plato, 2009, p. 70)

Regardless of the legitimacy of Socrates' argument, we are aware of it through the capacity of the written word to preserve dialogic interactions across time.

What Socrates could not foresee from his perspective was the evolution of new forms of dialogue afforded by successive technological developments involving the written word. These innovations supported patterns of dialogic exchange capable of existing across previously unimaginable stretches of time and space. As an example, the widespread adoption of the printing press in Europe has been credited with an explosion of intellectual options including a massive potential for dialogic interaction (van Oostendorp & de Mul, 1996). The development of successive forms of writing and their associated power to shape the trajectory of entire civilizations has been well explored by historians and philosophers. McLuhan (1974) noted that the capacity of the printing

press to speed up communicative acts “created vast new political spaces and power structures based on the creation of new reading publics” (p. 50).

Socrates' argument against the written form was, in part, an argument based on temporality. It has always been possible to use writing to engage in processes of dialogue. The key difference is that writing, compared to face-to-face exchanges of utterances, takes place over extended periods of time, and the exchanges take place between actors operating in different contexts separated by time and space. An exchange of letters may have taken weeks, months or even years to complete. Networked computing, introduced in the late 1960s, introduced the potential for radically different forms of dialogic interaction, with a full range of temporal interactivity ranging from ‘real time’ to exchanges that take place over minutes, hours, days or even decades in a vast multitude of different contexts. From Socrates' perspective, the pedagogical capacity of online discussions currently used in many educational environments to support dialogic exchange would seem completely fantastic or even magical. Electronic forms of communication have allowed written words to ‘come alive’ in the sense evoked by Socrates' now infamous quote from the *Phaedrus* discussed previously.

Socrates' specific critique of writing as an inferior version of dialogue based on the fixity of the form has to some extent been addressed by the affordances of networked computing and the capacity to exchange written dialogue across a gradient of temporal exchange, from asynchronous to synchronous. Socrates, however, was also making a much more sophisticated argument about writing that is often overlooked; the critique that writing is not personalized due to the fact that in many cases the writer has no detailed knowledge of the soul of the listener. We see this point covered in the second half of Socrates' reply to *Phaedrus* comparing writing to a painting quoted above: “...once any account has been written down, you find it all over the place, hobnobbing with completely inappropriate people no less than with those who understand it, and completely failing to know who it should and shouldn't talk to” (Plato, 2009, p. 70). In other words, Socrates was making the point that the lack of contextual knowledge of other speech partners is an impairment to dialogue. There is another component of Socrates' critique that remains - the problem of addressivity. As Rabbås (2010) argues, Socrates uses the analogy of the painting to make the argument that writing is an inferior form of communication because “the written logos isn't addressed to anyone in particular” (p. 36). As it turns out, this is a much more difficult problem to overcome

when compared to the task of creating forms of technology that allow real-time exchange of written utterances across vast distances.

Bakhtin's concept of addressivity can be viewed as a reply to Socrates' critique of writing – specifically the point that the written word is an impairment to dialogue because it strips away knowledge of the soul of the listener. The written word, according to Socrates, creates situations where the dissociation of the context of the original speech act and the context within which a reader understands the written word creates a fundamental disconnect that cannot be overcome. Bakhtin (2010), however, makes it clear that dialogue can allow for the removal of speech partners in time and space:

This addressee can be an immediate participant-interlocutor in an everyday dialogue, a differentiated collective of specialists in some particular area of cultural communication, a more or less differentiated public, ethnic group, contemporaries, like-minded people, opponents and enemies, a subordinate, a superior, someone who is lower, higher, familiar, foreign, and so forth. And it can also be an indefinite, unconcretized other... (p. 95)

The phenomenon of the exchange of letters via a postal service provides a productive analogy for Socrates' original critique of writing made in the fourth century BCE and Bakhtin's answer thousands of years later. In this case, exchanges of letters supported legitimate forms of dialogue by Socrates' original conception, in a very slow-motion version of face-to-face speech. The critical component was the use of alphanumeric characters in the form of a postal address written on a sealed envelope to prevent the specific speech acts contained within from "hobnobbing with completely inappropriate people" (Plato, 2009, p. 70).

Socrates' critique of writing, as preserved by Plato in the written form, was developed in a time when the technology of writing was still relatively new in Greek society, and the concept of a large-scale postal service capable of organizing and delivering written utterances between large numbers of people was inconceivable. In our time, networked computing has introduced many new possibilities for the exchange of utterances in various forms, and a corresponding potential to support new forms of dialogue. This has also introduced many constraints and challenges as we struggle to deal with the unintended consequences unleashed by that potential. In particular, we need to find ways to meaningfully 'address' our written speech acts in order to facilitate and realize the dialogic potential of the medium. In 1993 Hiltz and Turoff had formed the

following rough formula to describe the impending impact of computer-mediated communications (CMC) on individuals, groups, organizations, and society:

Take the number of people that you feel you can work with actively on a day to day basis, using the common forms of communication: face-to-face meetings, telephone, etc. Whatever that number is (5-15 for most people), multiply it by a factor of five to ten. The result of this calculation is the expansion of co-workers and friends that takes place when the computer is introduced to mediate (organize, filter, summarize, categorize, direct, sequence, regulate) the human communication process. (p. 455)

When observing the full impact that networked computing and various forms of social media have had it is possible that Hiltz and Turoff's original formulation actually underestimated the implications of "superconnectivity" (p. 456). They did, however, also draw attention to an important implication of superconnectivity that has emerged as a fundamental consideration of how individuals have been able to cope with and navigate through such a vast expansion of human networking possibilities: "only with CMC technology can the content of the communication serve to establish the addresses of appropriate recipients" (p. 456).

As discussed in the previous Chapter, there is an immense amount of unrealized potential for online discussions to support dialogic discourse in post-secondary learning environments. This is an affordance of the technology that simultaneously becomes a constraint when the amount of textual material available in any given discussion becomes too large. In many ways Socrates' critique of the written form has become much more relevant with the shift to electronic forms of discourse exchange. When students using an AOD are overwhelmed with large amounts of textual material their capacity for understanding the context (or the 'soul' of other readers from Socrates' perspective) is diminished and this can be associated with decreasing levels of dialogue. It seems that we take for granted that dialogue in a written form through the exchange of letters was afforded through the use of envelopes marked with a unique address. This served the function of preventing written accounts from "hobnobbing with completely inappropriate people" (Plato, 2009, p. 70). This relatively simple system functioned well for paper-based letters and has found a digital equivalent in the form of email addresses. AOD's on the other hand, as a particular form of technology for exchanging textual material, seem to require a different kind of solution.



### 3.1.1. Data management strategies

Problems with data management occur in any situation where relatively large numbers of users of a system generate large amounts of available data. Traditionally the task of organizing and maintaining large-scale information systems was handled by trained professionals such as librarians and archivists. They typically employed standardized data schemes and rules, using taxonomies in order to establish systems aimed at increasing the possibility of finding and accessing relevant information or content. According to Wright (2007, p. 23) “A taxonomy, in its simplest form, is a system of categories that people use to organize their understanding of a particular body of knowledge”. A taxonomy, in this sense, consists of a controlled vocabulary of terms that establishes a hierarchy of parent-child relationships (Smith, 2008). Librarians, for example, organize resources in a library using the Dewey Decimal system in accordance with standardized professional practices.

With the widespread adoption of the World Wide Web the volume of exchange of digital files and related information enabled through networked computing applications quickly became unmanageable using traditional data management strategies. As Gillespie (2014) observed:

We live in a historical moment in which, more than ever before, nearly all public activity includes keeping copious records, cataloging activity, and archiving documents—and we do more and more of it on a communication network designed such that every login, every page view, and every click leaves a digital trace. (p. 170)

These traces are inevitably transformed into information stored in databases involving a wide range of information practices. In the beginning stages of the Internet and the World Wide Web attempts were made to classify information with traditional methods employed by library and information sciences. The standard for data management on the Web, however, has clearly moved to fulltext indexing exemplified by Google's PageRank algorithm developed in the 1990s (Voss, 2007).

Fulltext indexing has proven to be an incredibly important and functional data management system capable of handling vast and ever increasing amounts of online data. It has been so successful, however, that concerns have been raised that the full impact on our cultures and societies might reach far beyond simply being able to find

relevant information online. Gillespie (2014), for example, considered the implications of our use of computers as being essentially algorithm machines:

...as we have embraced computational tools as our primary media of expression, and have made not just mathematics but all information digital, we are subjecting human discourse and knowledge to these procedural logics that undergird all computation. (p. 168)

This brings up a primary concern with the use of fulltext indexing and associated algorithmic analysis of online data around the intertwining of human and machine agency (Beer, 2017). In particular, a growing interest in how algorithms, "shape organisation, institutional, commercial and governmental decision-making" (p. 5). Arguably, the abandonment of traditional methods of archiving and information management towards a reliance on fully automatic machine indexing has shifted the balance of power squarely into the realm of machine agency in our online interactions with the Internet.

### **3.1.2. Social Tagging**

As the amount of data generated by the Internet continued to grow in the late 1990s and early 2000s a threshold was crossed somewhere around the year 2004 with widespread access to faster broadband connectivity, web-enabled phones and digital cameras that set the stage for a particular digital cultural phenomenon known as Web 2.0 (Bernard, 2019). In this environment the possibility for users to access vast inventories of user-generated content of other users, "the early idea of keyword-driven indexing was revived, though now no longer in the sense of a central supervisory committee" (p. 44). As a result, users and designers of systems such as Flickr and Delicious were motivated to develop data management strategies to facilitate the exploration of massive databases containing external representations of human experience. Social tagging emerged as another potential solution to the problem of organizing vast amounts of ever-changing digital files and text where the ability to find relevant resources online could be enhanced by outsourcing the creation of metadata from professional sources to the everyday users of a system.

The strictly controlled, hierarchical and top-down structure of a taxonomy sits in direct contrast to the reality of how resources are typically organized in a network. A network consists of nodes that emerge through the interaction of users and resources

(Wright, 2007). In this context, the concept of applying rigid metadata schemes, rules or values is impractical due to the sheer volume of data involved and the fact that the resources and uses are constantly changing. In the tagging systems developed in various Web 2.0 applications, users can spontaneously create and add tags to resources for the purpose of developing an emergent and bottom-up system of organization. The term “folksonomy” was coined in 2005 to refer to the phenomenon of the emergence of categories from large amounts of tags generated by normal “folks” as opposed to trained professionals (Weinberger, 2005). A folksonomy does not define formal systems of relationships between online resources, but instead uses algorithms to assess and present tagging patterns such that categories emerge from the activities of users.

Mikhail Bakhtin’s understanding of dialogue is based on the perspective that every situation where language is used exists as a site of contestation and struggle between the chaos of reality and the ordering potential of language (Holquist, 2002). The act of tagging is, in a parallel way, driven by a need to establish meaning when individuals are confronted with vast and chaotic amounts of information online. From Bakhtin's perspective we could say that although individuals create and apply tags, as a form of linguistic utterance they are not actually created individually. "Truth is not born nor is it to be found inside the head of an individual person. Instead, truth is born *between* people collectively searching for truth, in the process of their dialogic interaction" (Bakhtin, 1984, p. 110). Bakhtin did not acknowledge an absolute separation between selves and others; instead he saw these as being mutually constructive (Holquist, 2002). The very existence of the words and phrases employed as tags depends on mutually constructed categories of understanding created by groups of people over time. Similarly, a group of sounds or alphanumeric characters cannot be a *word* unless its interpretation is shared (Holquist, 2002). The consequence of this element of dialogue is that individuals are always perceiving others within the scope of shared categories that mutually fix reality in time and space.

Users of social media sites like Twitter, Pinterest, Instagram or TikTok have been engaging in various forms of tagging for many years. From an educational perspective, it is worthwhile to examine the motivational impetus for individuals to engage in social tagging activities, especially in consideration of the fact that in many cases there are no obvious forms of remuneration involved. It is possible that from an individual’s

perspective, the work of tagging is motivated by a desire to proactively increase the potential for linkages of their experiences to other users' experiences. Tags function to increase the potential of establishing semantic similarity between an individual's experiences and the experiences of others. In other words, tagging is a dialogic process. Although dialogue is a multi-faceted and complex phenomenon, it can be reduced to three elements that are related to the triadic nature of signs as understood by the American philosopher Charles Peirce. A dialogue in its simplest form consists of an utterance, a reply, and a relation between the two (Holquist, 2002). Social tagging has emerged as a useful strategy to establish relations between utterances and replies in online environments that offer access to vast amounts of data made available through the processes of online exchange. Tagging is an innovation in language technology necessitated by large collections of mediated artifacts and is motivated by the need of humans to work in groups through the process of sharing meaning.

### **3.2. Social annotation as a form of data information literacy**

In order to take Emanuel Castells' (2001) call for a new pedagogy capable of adequately supporting the needs of individuals operating within a networked society seriously we need to embrace forms of literacy that take into account the full implications of the shift towards a networked society. Dobson and Willinsky (2009) described a rough chronology of the conceptual shifts in literacy that have occurred as a result of the development of networked computing under the general term *digital literacy*. They see networked computing as having developed in roughly three stages: the large-scale adoption of personal computers in the 1980s; the rise in hypermedia and the World Wide Web in the 1990s; and the subsequent development of a networked information economy. It is possible to envision subsequent stages in Dobson and Willinsky's progression that take full account of the rise in usage of social media and related applications often referred to as Web 2.0. Land et al. (2012) conceptualized Web 2.0 based applications as, "emerging, democratic Web capabilities for users to collaboratively construct and share new information online in varied forms (e.g., user-contributed videos, reflective blogs, collaborative wiki pages)" (p. 20). Bawden and Robinson (2002) used the term *information literacy* to refer to a cluster of related terms like: *computer literacy*; *library literacy*; *media literacy*; *network literacy*, *digital literacy*, and *informancy*. They argued for a broad-based understanding of the concept of

information literacy, one that takes into account the complexities of the information environment within which students are currently operating. In the current context, this would include the use of various social media applications such as Instagram, TikTok, and Twitter that rely heavily on the use of user-generated annotation in the form of hashtags.

Qin and D'Ignazio (2010) point to the rapid development of information and communication technologies as a factor that has radically changed the practice of science. They argue that developing data literacy amongst science students is a critical move towards developing data managers capable of understanding metadata standards and practices. Love (2004, p. 22) defined data literacy as “the ability to examine multiple measures and multiple levels of data, to consider the research, and to draw sound inferences.” Carlson et al. (2011) identified a number of deficiencies in data management practices amongst graduate students, including the use and creation of metadata. In particular, the researchers stated that their students needed to know how to annotate and describe data to increase the chances that the data could be understood by others and remain valuable over time. Data literacy is one form of literacy that has been identified in a cluster of related literacies including other forms like information or statistical literacies. Carlson et al., (2011) propose the use of the term *data information literacy* to include related forms like data literacy, but also to put an emphasis on the social processes of knowledge building that occur through the use of networked computing resources. This approach values the contributions that individuals make towards building knowledge structures, and not just drawing from existing resources.

Navigating the overwhelming complexity of current information environments made available through networked computing services requires a new approach to literacy. Rader (1991) defined an information-literate citizen along the lines of one who is able to acquire and use information across a wide variety of situations. This approach understands information literacy as going beyond basic computer skills and puts an emphasis on understanding, meaning and context (Bawden & Robinson, 2002). In 2013 Goldman and Scardamalia identified an instructional challenge for students in terms of not only understanding and integrating large amounts of information but being able to make productive use of those resources to create new knowledge. In particular, they pinpoint the urgent need for citizens to be capable of creating coherence from multiple sources of information that contain conflicting as well as complementary information.

Metadata might be a notoriously difficult concept for lay people outside the fields of Library and Archival Sciences to understand but it has been firmly established as an essential component of data management strategies as well as broader approaches to literacy based on the use of large collections of information and data available on computer networks. Goldman and Scardamalia (2013) argue that the productive use of metadata hinges on the development of community norms and further, that traditional pedagogical approaches have not provided realistic contexts for the use of information resources for the purposes of knowledge generation and reproduction.

The concept of information and related literacies have long been associated with democratic participation and basic civil rights (Prado & Garcia-Quismondo, 2013). The Cambridge Analytica scandal surrounding the US election in 2016 provides a poignant example of the power of data and metadata to influence political reality in a networked society. Information about US citizens was gathered from personality quizzes available online in combination with a wide range of data and metadata gathered from social media platforms. This data was then used illegally to develop micro-targeted messages as part of a strategy to elect Donald Trump (Isaak & Hanna, 2018). Users of the online services in question were unaware of the consequences of taking seemingly innocent online personality tests, and also unaware that Cambridge Analytica had managed to assemble over 5000 data points on 230 million American adults (Isaak & Hanna, 2018). Developing data information literacy initiatives in educational environments should now be considered an essential component of any democratic system given the potential to easily collect data about citizens through metadata, and the potential effectiveness of using metadata in election campaigns and other initiatives. Social annotation in the form of tags is a particular form of user-generated metadata that is already used extensively by users of various social media platforms. Developing pedagogical initiatives that leverage the value of the existing practices of students is a pragmatic starting point towards the broader goals of developing data information literacy.

### **3.3. Historical Trajectory of Annotation in the Field of Education**

The roots of textual annotation can be traced back to medieval times within the European context, and much further still in other cultures such as the Liu-Song dynasty in China (420-79 CE) (Nicoll-Johnson, 2018). Before the wide spread adoption of the

printing press scholars would make notes in the margins and spaces between lines of text as a process of establishing dialogue with other scholars through the copying process (Wahlstrom & Scruton, 1997). Moving into the print era, Jackson (2001) examined the motivation for readers to write marginalia in the margins of printed books:

Those who choose to make the effort to register their responses must foresee some advantage for someone; so the question of motive resolves itself into another question, *cui bono*? For whose benefit is it done? And that in turn leads to the question of the addressee. (p. 82).

The author argues that the motivations for writing marginalia exist at a confluence of factors that are not limited to personal factors such as convenience or organizational capacity. Jackson considers the act of readers inscribing notes in the margins of books to be the result of a relationship between not only readers and writers but also an attempt to address "the silent audience that will sooner or later witness the performance" (p. 95).

The value of annotation has a long history in the field of Education. Kiewra (1985), for example, conducted a review of the research stretching back to the 1920s and found a consistent relationship between learning achievements and the act of taking notes. In 1990, Simpson and Nist employed an experimental design to assess the effectiveness of annotation for first year undergraduate university students. Sixty students were randomly assigned to either a textbook annotation treatment, or an alternative preview-question treatment. Based on an analysis of the difference between quiz scores and self-reported studying time, they found a significant difference between the two groups. Students that annotated outperformed students that did not based on the raw scores on three multiple-choice tests as well as self reports of amount of time spent studying. Annotation in the form of taking paper-based notes on readings has long been used by teachers in the K-12 system. Porter-O'Donnell (2004) for example, noted that "Annotating helps readers reach a deeper level of engagement and active reading" (p. 81) when teaching High-School English classes. In particular, she described how the visible record of thoughts produced through annotation supports a dialogic process of engagement with the text.

Many studies have supported the concept that reading comprehension is improved when students underline text, take notes, and summarize material, as these activities are more likely to lead to active engagement at deeper cognitive levels. A

quasi-experimental design was employed by Slotte and Lonka (1999) to compare the text comprehension of high school graduates (N = 226) applying to a post-secondary institution in Finland. They found evidence for a statistically significant positive relationship between amount of notetaking and level of text comprehension. O'Hara and Sellen (1997) employed an experimental design to examine the difference between paper-based reading and reading on-line. They randomly assigned 10 adult volunteers to one of two groups: a 'paper' condition or an 'on-line condition'. Although the small numbers of participants in the study precluded any kind of statistical analysis, a number of important observations were made. Most important, they highlighted the fact that at that time (1997) the research subjects in the paper-based reading condition were at an advantage due to their ability to quickly and flexibly employ annotation in the medium of paper, as opposed to subjects in the on-line reading condition. They recommended, specifically, that building support for annotation processes in on-line reading situations would be an important component for supporting basic reading skills (p. 340).

In the time since 1997, advances in software development, raw computational power and increases in Internet bandwidth have improved the potential to address O'hara and Sellen's recommendations for enhancing on-line reading tools by supporting annotation in digital forms. Novak et al. (2012) carried out a systematic review of empirical research related to the use of social annotation tools in post-secondary settings. In comparison to hand-written annotation, social annotation with tools utilizing networked computing allows learners to work continuously and collaboratively on shared documents, with annotations and comments automatically stored in online databases. Shared annotation technologies support online bookmarking activities like adding comments, highlights, sticky notes, or tags (Novak et al., 2012). Social annotation tools have developed to the point where they can successfully support collaborative learning processes by eliminating the time and space constraints of paper-based notes and allowing for the real-time exchange of information (Su et al. 2010). In particular, the practice of social tagging has emerged as a data management strategy in cases where the resources required to professionally archive large collections of electronic files available online have become impractical. Users practice social tagging as they annotate digital resources through the use of keywords or tags. A wide range of digital resources can be annotated in this fashion, such as bookmarks, photos, videos, blogs etc. (Cress et al., 2013).



### **3.4. Social annotation and social constructivism**

The removal of the top-down constraints of taxonomic data structures and the subsequent embrace of an emergent, bottom-up, and collaborative activity like tagging, can be seen as a practice-based design intervention that enhances student agency. It wrests the power to categorize and organize knowledge away from authoritative figures like archivists and librarians and distributes that power, potentially, to all users of an information system. According to Richey et al. (2011), individual constructivism is positioned around individual processes of meaning-making. Social constructivism, on the other hand, stresses the role of social interactions in the process of developing knowledge. Both approaches start from a common view of learning; knowledge is constructed from experience, and consequently, learning is an active process through which meaning is created through experience and a personal interpretation of knowledge (Smith & Ragan, 2005). Social constructivists, however, assume that "learning is collaborative with meaning negotiated from multiple perspectives" (p. 20). Duffy and Cunningham (1996) make the case that this framework considers social and cultural processes as paramount, so learning can be considered as a process of acculturation.

From the perspective of developing student-centered learning environments grounded in the "foundations, assumptions, and methods associated with a constructivist epistemology" (Land et al., 2012, p. 4) the development of a folksonomy based on social tagging can be seen as a quintessentially socially constructivist form of pedagogy. Social tagging activities have the potential to place the learner in the driver's seat of the construction of knowledge systems, alongside other learners. This is reflected in a consideration of the core values of student-centered pedagogy: the centrality of the learner in defining meaning; scaffolded participation in authentic tasks; establishing the importance of prior and everyday experiences in meaning construction; and access to multiple perspectives, resources and representations (Land et al., 2012).

### **3.5. Exploring the pedagogic potential of social annotation**

Many aspects of annotation have been explored in the literature, including considerations of the benefits of personal annotation versus social annotation. Marshal (1997) conducted an unobtrusive measures study of the annotations that students made

in textbooks by examining used textbooks offered in a university setting. Over 150 used textbooks were analyzed in this innovative and exploratory study of personal or individual annotation practices using paper-based media. Many of the questions generated by Marshal in the late nineteen-nineties continue to be of relevance through to the present day. For example, she asked: will digital annotations be as valuable as paper based annotations, will they require more attention or work, and most important, what will happen to private annotations in a digital world?

Since the initial rise in use of hypermedia and the World Wide Web in the 1990s, many studies have been conducted to attempt to answer Marshal's important questions. Hwang et al. (2007), for example, developed a quasi-experimental research design to test the viability of a shared annotation tool in post-secondary courses. Seventy-two first year college students enrolled in two different classes took a standardized pre- and post-test to assess learning. The experimental group had access to an online annotation tool and could employ both individual and group annotation as part of the learning design. Students in the control group did not have access to the online annotation tool. The results of the experiment provide evidence that the influence of annotation on learning performance became stronger with the use of shared as opposed to individual annotation. This is not to say that various forms of personal annotation have somehow become invalid with the use of networked computing. Rather, the point is that social annotation offers the potential for new and innovative forms of collaborative knowledge construction built on the affordances of networked computing.

In order to establish social annotation as a valid form of pedagogical practice, we need to evaluate the empirical evidence that has accumulated in this area. While it can be said that a substantial body of evidence exists to support the use of social annotation in educational contexts it is also clear that this is still an emerging field to some degree. The case has been made, however, for a general recognition of the relevance of social annotation for effective collaboration in online learning environments. Yang et al. (2004), for example, argued for the importance of effective knowledge management strategies to facilitate collaborative learning in virtual learning communities.

### **3.5.1. Resource identification**

An important component of data information literacy involves the basic ability to successfully identify and access relevant digital resources available online. The Association of College & Research Libraries' "Framework for Information Literacy for Higher Education" (2015) identifies the importance of the development of various searching strategies, including the use of keywords, for learners to develop proficient information literacy strategies. Hammond et al. (2005) point to the potential benefits of social tagging for search and retrieval functionality. They argue that social tagging is possibly even more effective than (typically keyword-based) search engines:

This ability to sort out the wheat from the chaff is an important win over a web-based search engine. Search engines, at this point, tend to index and search a global space – not my local space. My space comprises the documents I am interested in and the documents of other users that I want to follow. (p. 1)

Dennen et al. (2018) examined the tagging efforts of 99 undergraduate students enrolled in an educational technology class for pre-service teachers. Using a quasi-experimental method they found that students became proficient taggers with relatively little instruction. They were capable of generating tags in a way that expanded the knowledge base of the class and helped learners to identify relevant subtopics within the course, "so long as they are sufficiently meaningful to others" (p. 117). Lin and Tsai (2011) observed how 127 junior high students in Taiwan interacted with a social bookmarking application 'WeShare.' They analyzed a variety of forms of social annotation used by the students, including tags, and came to the conclusion that the personal contributions of the students had enhanced collective information searching and improved the chances of students finding quality information from online sources.

### **3.5.2. Providing motivational structure**

One of the most important aspects to consider when designing and implementing a course design based on social annotation is students' attitudes towards the exercise. As previously discussed, Marshal (1997) brought attention to some key aspects of the transition from paper-based to digital annotation, including the amount of work and attention that this would require. If learners feel overwhelmed by the task of social annotation it is possible that they might develop negative attitudes towards the exercise.

Su et al. (2010) explored the attitudes of 86 post-secondary students from the National Central University of Taiwan towards the use of a Web 2.0 collaborative annotation system. A quasi-experimental design was employed to examine the students' attitudes towards the use of the system, as well as to investigate whether a positive relationship existed between quantity of annotation and learning achievements. The results from a questionnaire employed in the study indicated that students in the experimental annotation group were satisfied with the use of the annotation system. Similarly, Mendenhall and Johnson (2010) reported that student perceptions of using a social annotation model learning system that employed tagging were positive. They based this finding on the results of 3 separate studies using a variety of methods (interviews, non-experimental comparisons, and a quasi-experiment) over multiple semesters with undergraduate students. Gao (2013) used a case study design to observe how 33 pre-service teachers interacted with Diigo, a social annotation tool. A survey of student attitudes towards using the tool was conducted, and it was found that a majority of the students had a positive attitude towards using Diigo.

Razon et al. (2012) investigated the potential for social annotation to provide a motivational impetus for learning through the use of the tool *HyLighter*. They collected data from 27 undergraduate and 40 graduate students using a quasi-experimental research design. While the quantitative analysis did not support a relationship between students' use of social annotation and their motivation to learn, descriptive comparisons between the experimental and control groups suggested that students who used *HyLighter* reported higher levels of excitement, optimism, and motivation to read relevant course material. Another study by Samuel et al. (2011) used a design-based research (DBR) strategy to examine whether social annotation was a factor in providing motivation for students to engage in learning activities. Twenty students enrolled in a sport psychology course in a public university in the US took part in the study. A survey consisting of 86 items was developed and implemented to explore various factors including the students' motivation to take part in the course. The results did not provide supporting evidence that student motivation changed as a result of the use of the social annotation tool *HyLighter*. However, Hwang et al. (2007) in their study (described in a previous section) obtained survey data that supported the use of a social annotation tool as a positive motivational factor for learning. Nokelainen et al. (2005) in their work with EDUCOSM, a shared annotation system, found higher levels of self-rated motivation to

complete work among the 43 post-secondary students in Finland that participated in the study. These findings were based on log data from the EDUCOSM system, and an email survey conducted after course completion.

Evidence from Hwang et al. (2007) in their study involving a series of experiments with an annotation system (*VPen*) found "that use of the *VPen* annotation system can raise students' learning achievements in most scenarios" (p. 697). Su et al., (2010) in their quasi-experimental research described previously, used a number of different scenarios to examine a potential relationship between the number of student annotations and general learning achievements. They found evidence for this relationship in two of the five scenarios employed in the study. Nokelainen et al., (2005) in their work with EDUCOSM, a shared annotation system, found not only higher levels of self-rated motivation to complete work as previously mentioned, but also higher grades in general among the students involved with the study. Similarly, Mendenhall and Johnson (2010) reported that student perceptions of using a social annotation model learning system that employed tagging were positive. They reported the findings of three separate studies using a variety of method (interviews, non-experimental comparisons, and a quasi-experiment) over multiple semesters with undergraduate students. In general, a positive relationship was found between the number of annotations and learning achievement.

### **3.5.3. Critical thinking**

Critical thinking is a more specific aspect of annotation that has been researched extensively. For example, self-labelling by students of their discussion posts was explored by Schellens et al. (2009). A total of 35 University students taking an educational science course took part in the study. The authors developed a content analysis scheme to analyze students' discussion posts. They found that when students applied a closed set of labels or tags (De Bono's thinking hats) to their own posts, the depth of critical thinking during stages of discussion, problem identification, and problem exploration was enhanced. Mendenhall and Johnson (2010) found that the use of student-generated annotations and tags may enhance the students' abilities to employ critical thinking skills but called for more research to substantiate this claim. Wolfe (2008) analyzed the output of 7 first-year university students on a written task after having read through material with annotations attached and available for use in alternating

paragraphs. Analysis indicated that annotations appeared to provoke students to think more critically about the text that they had just read. Interestingly, Wolfe found that the effect was particularly strong in cases where students encountered annotation in pairs of conflicting viewpoints. Subsequent interviews with the student participants suggest that annotation was most useful when it encouraged readers to consider different viewpoints (p. 155). Bures et al. (2009) discuss the use of in-line labeling by students, where labels or tags are inserted within blocks of their own or others' text. A total of 53 graduate students took part in their mixed-methods exploratory study. They argue, based on their findings in the study, that in-line labeling or tagging helps students to clarify the structure of their own arguments as they write.

### **3.5.4. Metacognition**

The purpose of tagging in online discussions from a group perspective can be framed around the enhancement of metacognition. Bransford et al. (2000, p. 47) define metacognition as, "the ability to monitor one's current level of understanding and decide when it is not adequate." According to Pifarre and Cobos (2009), socio-cognitive perspectives have expanded researchers' theoretical base to view metacognition as an essential part of socially shared discussions. It is possible to view metacognition not only as an individual activity but as a collaborative and group level activity. Johnson et al. (2010) examined an approach known as the Social Annotation Model-Learning System (SAM-LS) in tandem with the use of a social annotation tool (HyLighter). Two studies were conducted, both involving 267 students enrolled in an English course in a community college in the U.S. A quasi-experimental research design was employed, using a Meta-cognitive skills instrument (MCSI) to assess metacognitive skills. While the findings in the first study provided insufficient evidence linking the use of the SAM-LS to superior learning outcomes the results of the second study did provide evidence to support the hypothesis that completing an annotation task was of benefit to the students in terms of reading comprehension and metacognition. Li et al. (2015) examined a number of forms of social annotation (bookmarks, highlighted text, and sticky notes) created with the social annotation tool Diigo. The social annotations were associated with discussion posts from 48 students enrolled in a teacher education program. A time series analysis of different cognitive and metacognitive activities was conducted, with the

finding that group collaboration through the generation of social annotations was conducive to fostering high-level cognitive and metacognitive activities.

### **3.5.5. Collaborative learning**

The potential for using social annotation to enhance collaborative learning has been the emphasis of many studies in this area. Hwang et al., (2007), for example, concluded in their study (previously described above) that the influence of annotation on learning performance grows stronger when the annotations are shared. A study conducted by Mendenhall and Johnson (2010) examined how students used a social annotation tool (HyLighter) to support peer-critiquing activities. They found that the tool provided a supportive environment for the process of peer critiquing by affording easy access to specific parts of students' writing efforts. Specifically, annotation practices have been found to support collaborative learning efforts by allowing learners to focus attention towards specific content, organize and discuss new material, review the contributions of others, and improve through constructive feedback (Su et al., 2010).

Yang et al. (2011) utilized an online annotation system (PAMS 2.0) to examine how students engaged collaboratively in group reading and commenting activities. They employed an experimental design with 94 post-secondary students in a Taiwanese University, randomly assigned to either an experimental group that used the online annotation system or a control group that did not. It was found that the experimental group's scores on a reading comprehension test were significantly higher than the control group's scores. The results of a follow up survey also indicated that students in the experimental group had a generally positive attitude towards using the group annotation interface employed in the study. Gao (2013) concluded in her case study, previously described, that the social annotation tool Diigo was effective in supporting the sharing of ideas by students. Specifically, Gao reported that the tool facilitated student competencies in examining and sharing ideas (p. 81).

### **3.5.6. Reading comprehension**

A significant amount of research has also been conducted in the area of examining attempts to employ annotation to enhance basic reading abilities and comprehension. Xin et al. (2010) argue that critical engagement with a text requires

shifting back and forth between the modes of reading and writing, and that reflections are likely to be lost if this does not happen. Using tags could give the individual reader an option of moving into a more active mode than just reading. Wolfe and Neuwirth (2001) point out that annotation interfaces provide opportunities for better conversations about texts used as resources in classrooms. Specifically, that the learning value of annotation can be defined around the support of abilities to consider and weigh differing perspectives on primary texts. Similarly, Slotte and Lonka (1999) found that the act of taking notes while reading functions in a dialogic fashion between reading and writing, and that the process helps students to understand, evaluate and compare ideas while reading.

Yang et al. (2011), in their work previously discussed, found evidence that the use of an online annotation system (PAMS 2.0) did improve the reading comprehension of post-secondary students. Yang et al. (2013) further demonstrated that students' reading comprehension abilities improved when using a social reading annotation system called SURF (Sharing Unique Reading Feeling). SURF operated as a collaborative annotation tool that was developed specifically to improve classroom reading activities and instruction. Their experimental study involved the analysis of papers written by 66 grade 6 students in Shenzhen province in China. The students were assigned to experimental and control groups based on the results of a province-wide formal reading test. Students' scores were ranked, and a systematic sampling strategy was employed such that even-numbered students were assigned to experimental groups and odd-numbered students to control groups. Students in the control groups could not use SURF to annotate their work. Statistically significant differences were found between the groups, providing supporting evidence for the hypothesis that use of the collaborative annotation tool promoted primary students' reading performance.

Social annotation tools have also been shown to help students improve their reading strategies. Chen and Chen (2014) employed an interactive discussion scaffold with collaborative reading annotations with 53 grade 5 students in Taiwan. They used a quasi-experimental research design to explore the differences between an experimental group that used the collaborative reading annotation system and a control group that relied on paper-based reading annotation and face-to-face discussions. The experimental group significantly outperformed the control group in terms of direct and



explicit comprehension, inferential comprehension and use of reading strategies. Chen et al. (2020) followed a gamification strategy with 55 grade 5 students in Taiwan. They used a quasi-experimental design to examine the potential effects of the use of a web-based reading annotation system with gamification mechanisms. The experimental group did show significantly higher numbers of annotations and social interactions, but their reading comprehension performance was not significantly different from that of the comparison group.

Johnson et al. (2010) make the point that one of the benefits of social annotation tools is that they allow users to target very specific sections of text with ease. In their study of 254 post-secondary students enrolled in an English class, Johnson et al. (2010) found that students benefited in the area of reading comprehension after they took part in tasks involving social annotation. Studies have shown that students using annotation tools become more reflective and more likely to engage in deep reading activities (Jan et al. 2016; Li et al. 2015). Bateman et al. (2007) make the case that social annotation in the form of tagging is by nature a reflective process that gives students the opportunity to summarize their ideas. The advantage of tagging in this sense is that writing improves with the self-reflexive activity of tagging. The use of annotation tools has also been associated with more actively engaged discussion and enhanced ability to make meaningful contributions to discussions (Chen & Chen, 2014; Van der Pol et al. 2006; Wolfe, 2008).

In this section an overview of the potential benefits of social annotation has been presented. When reflecting on this body of work it is clear that even though social annotation practices have become ubiquitous through the use of many large-scale Web 2.0 applications and social media platforms, this area of study is still relatively emergent when it comes to the use of social annotation in designing courses at the post-secondary level. It is evident from many of the studies discussed previously that there is potential for social annotation to become a meaningful and productive aspect of the pedagogical practices of teaching and learning, in general. What is perhaps less clear, or left relatively unexplored in the research, are considerations of specific design strategies that clearly map out how to proceed when attempting to use social annotation to achieve very specific goals such as enhancing the dialogic capacity for online discussion in courses at the post-secondary level.

### **3.6. Acknowledging the challenges of using social annotation in educational contexts**

In order to develop a realistic assessment of the potential for social annotation to make a contribution to the field of educational technology and learning design it is important to consider disconfirming evidence and to be open to a healthy dose of skepticism. For example, the act of applying labels or tags to various digital artifacts is a form of intellectual labour, which takes a considerable amount of time and effort. It is possible that social tagging might actually impede the willingness and motivation of individual students to participate in related activities. Novak et al. (2012), in their literature review of empirical studies examining the use of social annotation tools in post-secondary learning environments note that there is an initial performance cost that must be accounted for. Gao et al. (2013), in their study of a social annotation tool, collected feedback from students that indicated a potential problem with adding a layer of difficulty that prevented a true 'back and forthing' of discussion. This point relates to the earlier suggestion about social annotation in the form of tags adding work and complexity to online discussions from an individual perspective. This becomes a group problem when all the annotations, including tags made by individuals, prevent group activities simply through the accretion of complexity.

#### **3.6.1. Cognitive burden**

Kawase et al. (2009) found evidence that, on the one hand, paper-based annotations did support learning processes, and yet on the other hand, students using an online annotation tool were faced with a cognitive burden that actually reduced the effectiveness of the tool. A total of 40 participants took part in two different studies comparing the use of paper-based and online forms of annotation. In one study, a web-based tool called SpreadCrumbs was used to gather data about shared annotations generated by 22 PhD students and postdoctoral researchers. The annotations consisted of an electronic post-it style note with a topic and short comment or keywords attached to various web resources. The authors concluded that annotation can present itself as an additional cognitive burden, and that this must be taken into account in terms of designing effective pedagogical initiatives that aim to employ social annotation. Jeong and Joung (2007), in their work with message constraints or self-labeling of online posts, bring up the possibility that too much structure can actually inhibit dialogue and student

interaction. An experimental design was employed in a study that examined the posts of 38 undergraduate students in an introductory educational technology course. Students in one of the experimental groups (constraints with labels) used labels chosen to represent Toulmin's (1958) model of argumentation. Students in this group were (unexpectedly) significantly *less* likely to challenge other students and/or respond to challenges from other students.

### **3.6.2. Individual differences**

Individual differences among students also highlight some potential problems or challenges associated with the use of tags in online discussions. Bures et al. (2009) developed a rough typology of non-users in an online tagging environment where users could tag parts of their online messages. Data were obtained from 53 students in four sessions of a graduate education course. The mixed-methods exploratory study found that students categorized as "surface coasters" and "fringe participants" were not participating through lack of motivation (p. 330). This is a problem that has been identified in other kinds of online tagging situations as well. Halpin et al. (2007) analyzed the bookmarks from the tagging driven site del.icio.us. They found that a very small minority of users actually took part in tagging activities, generating the vast majority of tags used to run the site. Hwang et al. (2007), in their study to assess the effectiveness of a shared annotation tool in post-secondary courses, noted this problem as well. They identified the possibility that students become less motivated to make annotations when they are aware that they can easily access annotations from other students.

### **3.6.3. Social proof**

Bures et al. (2009) discuss how labeling of posts in online discussions can become a 'family affair' meaning that, in general, groups either used labeling or not. The authors point out the complexity of trying to disentangle complex relationships between individual characteristics and group membership. In this case, they were referring to the tendency of group dynamics to dominate or override the tagging preferences of individuals. It is possible that the use of labels or tags can serve to reify a particular ontological position in online discussions. This can lead to the imposition of an ontological order that suppresses new ideas or potential relationships between ideas. This phenomenon has been referred to as a form of 'social proof', the tendency of actors

to base their determinations of what is correct on the opinions of others (Smith, 2008). In terms of tagging, this could lead to a habit of students adopting other peoples' tags instead of their own. Jeong and Joung (2007) discuss the possibility that some ideas are more difficult than others to label or attach tags to. This can set up a differential of attention in the group, where ideas or themes that are difficult to tag drift into the background while ideas or themes that are more amenable to being tagged move into the foreground and receive a disproportionate amount of group attention. Golder and Huberman (2006) in their analysis of the bookmarking site Del.icio.us, point out that there is a potential tension between tags generated by users that are useful to the community of users at large, and tags created for personal or even egocentric reasons. Another consideration to be considered is that some users might try to influence the tagging system for their own gain, or as a vehicle for expressing their discontent (Smith, 2008).

#### **3.6.4. Uncontrolled vocabularies**

There are some particular problems associated with the use of social tags that can be related to the use of uncontrolled vocabularies. The lack of a controlled vocabulary in situations where users are able to tag freely (folksonomies), as opposed to more formal systems of classification and use of taxonomies, introduces the possibility of ambiguity in many forms (MacGregor & McCulloch, 2006). As Thomas et al. (2009) point out, "All uncontrolled vocabularies have the following problems: ambiguity and polysemy; synonymy or synonym control; basic level variation; and variations or lexical anomalies in the form of tags" (p. 414). Ambiguity and polysemy occur in situations where users may use the same tag to refer to different things. Polysemy is a particular type of ambiguity where one word may have different meanings depending on the context. Issues also exist around synonym control. This is where users can choose different tags to refer to the same thing. For example, "cell phone", "mobile phone", or "iPhone", could all be used to refer to the exact same device. Basic level variation is another problem that can occur as a consequence of the lack of a formal taxonomy of controlled terms to indicate broader, narrower or related terms using a set of prescribed rules or determinations. The term lexical anomalies covers a variety of differences that can pop up, including singular vs. plural, spelling variations, etc. MacGregor and McCulloch (2006) point out specifically that controlled vocabularies are designed

specifically to deal with these kinds of issues, all of which can potentially reduce the positive impact of social tagging in a learning environment.

### **3.7. Enhancing dialogue through the use of social annotation**

Becoming aware of the potential problems associated with social annotation is an important step towards the successful implementation of annotation-based teaching and learning designs in post-secondary learning environments. After considering both pros and cons it is clear that a tremendous potential to facilitate learning from a social constructivist perspective remains. Zhang et al. (2009) use the term *collective cognitive responsibility* to refer to the concept of students taking responsibility for the state of public knowledge. Increasing collective cognitive responsibility is a goal that can be supported by tagging and other forms of annotation. This includes but is not limited to sharing and synthesizing multiple perspectives, collectively defining knowledge goals, and reviewing and understanding the state of knowledge in the broader context (Zhang et al. 2009). Seen from this perspective, it is clear that the development of dialogic pedagogy forms an essential foundation of support for a broad range of learning activities and perspectives, including the enhancement of collective cognitive responsibility.

Wise et al. (2013), put forward the concept of online ‘listening’ (interacting with others’ posts) and ‘speaking’ (writing posts and responses) behaviors as a frame to examine the issue of lack of quality student interactions in online discussions. Wise et al. (2012a) found that students spend the majority of their time in online discussions engaged in the act of ‘listening,’ or actions that are related to existing posts rather than the generation of new ones. Differences among students were also analyzed and patterns identified that could be linked to more engaged listening patterns. These patterns included students who engaged with a broad range of messages, students who developed an orientation towards specific authors, and others that focused their participation into relatively few but intense posts. Having access to an emergent archival structure based on tags could support students’ abilities and practices of engaging in a wider range of messages and finding messages by specific authors through thematic tags. As mentioned previously, dialogue in its simplest form consists of an utterance, a reply, and a relation between the two. Tags are a special form of utterance because their

purpose is to build relationships between other utterances and replies. The value of tagging in online discussions can be framed around improving the online *listening* and *speaking* behaviors of students as foundational elements of dialogic pedagogy.

Online discussions offer a particular form of affordance for processes of mediated dialogue. As discussed in the previous Chapter, this potential affordance has yet to be fully realized in many teaching and learning environments. Xin et al. (2010) put forward a number of problems with online discussions or forums that could be hindering students' capacity for developing active dialogue. These include problems shifting between the modes of reading and writing, a lack of visual connection between semantically related posts, a tendency of students to focus on the most recent posts, an under-utilization of the archival capacity of online discussions, and most important, a lack of sustained dialogic back and forth exchange of utterances, or *weaving* between texts. They specify social tagging as a potential design feature that could ameliorate many, if not all of these problems. When students apply tags to other students' posts, they contribute to the construction of a potentially meaningful network of connections between posts. These connections can be utilized to create visual connections between related posts and to contribute to an overall archival structure that, if successful, could help overcome temporal ordering effects, and the general tendency of students to only pay attention to recent posts. Jeong and Joung (2007) state that the ability to better visualize the content of complex discourse structures like online discussions can support group problem solving, communication and learning. The power of tags to facilitate and support group learning in online discussions lies in their capacity to shape group processes while simultaneously being shaped by the cumulative output of the tags of the group. In many ways, social tagging as a particular form of social annotation has the potential to support teaching and learning designs based on the core principles of dialogic pedagogy.

The importance of moderation in online discussions has been identified as a critical factor in determining the quality of learning in these contexts (Xin & Feenberg, 2007). Xin et al. (2010) argue further that discussions tend to be more successful when this responsibility is shared among participants. It is possible to use tags to support not only individuals who are placed in the position of being a moderator of a discussion, but also to potentially distribute aspects of the moderation task amongst multiple participants. Razon et al. (2012) argue that annotation practices like tagging help

facilitate collaborative learning by: drawing attention to specific content, organizing, indexing and discussing relevant material, reviewing others' written contributions, and improving feedback and assessment mechanisms from instructors. These can all be considered as aspects of moderation that could be supported by student tags. Tags can also be used to form concept maps that facilitate group processes. Scardamalia (2003) argued that having students visually map their postings through tags helped social co-construction of knowledge. Lampe et al. (2014) identified characteristics of online communities that could help to facilitate issues of managing information and users that have come to be known as "crowdsourcing." There is potential to adopt the concept of crowdsourcing to educational contexts. Students could, for example, be asked to post all of the examples of a particular phenomenon related to course materials that they can think of. As an example, a list of all social media platforms that they currently use could be generated. By applying tags to other students' posts and then going through a process of grouping these tags together into categories, a typology would be created. This is an extremely important step in knowledge generation that can be facilitated through crowdsourcing, or online collaborative processes.

McCombs and Vakili (2005) make the point that a healthy learning community encourages diverse perspectives, with the result that inclusive dialogue becomes a process for learning. Luo et al. (2013), in a review of several studies, indicate that there is evidence that forms of social annotation like tagging can impact individual student learning in terms of student engagement, participation and motivation. Lu and Deng (2012) argue that social annotation can support not only individual learners but groups of learners as well. For example, readers can benefit from the ideas contained in the annotations of other readers, and writers can improve their writing through feedback from other students. From an individual learning perspective, social tagging affords a process where each learner can maintain their own perspective by choosing their own tags, while at the same time making a contribution to the collaborative dialogue of the overall discussion and group process. Johnson et al. (2010) found that reading comprehension and the meta-cognitive skills of learners were greater for those who annotated collaboratively than those who annotated on their own.

In sum, there is a relatively small but impressive body of literature that explores the use of social annotation across a broad range of educational environments and situations. While not all studies are conclusive in terms of providing empirical evidence

for the benefits of annotation, there is still a substantial amount of research that documents potential benefits for learners. In particular, it would seem that social annotation has the capacity to enhance the affordance of dialogic pedagogy in online learning situations in the key areas of: motivation, reading comprehension, critical thinking, metacognition, and collective cognitive responsibility. Many of the problems and challenges associated with the use of online discussions, for example, can be collectively reframed as essentially constraints to the free flow of dialogue in that specific medium. In order to contribute meaningfully to teaching and learning designs capable of effectively leveraging the potential teaching and learning power of online discussions, it makes sense to focus on dialogue as the root or core that has implications for many other types of approaches. Social annotation is a potential design intervention that has potential to improve the experience of learners as they navigate increasingly complex online learning environments, through the affordance of dialogic processes. It is a practice-based learning activity that intersects with a plurality of educational approaches, as well as broader concerns about what it means to be data information literate in the 21st century.

### **3.8. #HashtagEmergence**

Regardless of the pedagogical potential of social annotation in the field of Education, the vast majority of students in post-secondary institutions are very likely to have access to an existing set of practices related to the generation of various forms of shared annotation developed through their everyday navigation of the Internet. These can take various forms ranging from the simple binary labels of 'like' and 'dislike' to more sophisticated examples involving the application of hashtags. Hashtags are a type of conversational tag that spontaneously came into being through community use on the social media platform Twitter (Huang et al., 2010).

A full-blown historical treatment of the development of the # symbol for tagging is beyond the scope of this text. That being said, it is worth considering that this character was included in the layout of the 'universal keyboard' at a conference of stenographers in Toronto in 1888 (Bernard, 2019). This is in and of itself an indicator that by the late nineteenth century this symbol had achieved a usage base wide enough to be considered worthy of the title 'universal'. In the early days of text-based, online chat platforms the # symbol was used to designate specific communicative channels which



combined the # symbol with a keyword. Interestingly enough, this usage was first deployed in an online service known as Internet relay chat developed in 1988, precisely 100 years after the widespread adoption of the hash or pound sign as part of what we now consider a standard layout for the keyboards of typewriters (Jacobs, 2018).

It is generally accepted that use of the hashtag on Twitter began on August 23rd, 2007 when Chris Messina, an Internet activist and product-designer proposed the use of the hash or pound sign<sup>4</sup> to indicate groups formed around specific topics. A few days later he posted the following comment in a blog, "I do think that there is certainly some merit to improving contextualization, content filtering, and exploratory serendipity with Twitter" (as cited in Bernard, 2019, p. 9). By the end of 2007 use of hashtags (the combination of the keyboard character # with a keyword) had become a popular component of Twitter posts and in April 2009 were officially adopted as a feature of the platform, with Instagram following suite in 2010. In 2013 the American Dialect Society chose the term "hashtag" to be the word of the year, and in 2014 the word had been accepted into the Oxford English Dictionary (Bernard, 2019). In the current context hashtags are a vital organizational component of TikTok videos and a major factor in the spread of memes and other viral content. TikTok is the fastest-growing social media application with an audience estimated at roughly 1.5 billion users (Weimann & Masri, 2020).

According to Zappavigna (2012) the use of online search functions has resulted in a cultural shift away from a focus purely on content retrieval and towards a more interpersonal function. From this perspective the emergence of searchable talk through the incorporation of metadata directly into language for the purpose of enhancing 'findability' has become a powerful affordance for the building of online communities through shared values. It is through the use of linguistic markers such '#' or '@' that the facilitation on a mass scale of what Bakhtin referred to as 'heteroglossia' has occurred (Zappavigna, 2012). From Bakhtin's perspective language as dialogue is not simply confined to a change or interchange of speaking subjects, it necessarily involves an active acknowledgement of each utterance from the perspective of other speakers (Zappen, 2004). In this sense, hashtags exist somewhere in between text and metatexts

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<sup>4</sup> Although these terms are often used interchangeably it is worth noting that the # symbol is typically referred to as 'hash' in British English and as 'pound' in American English (Bernard, 2019).

and perform the function of making the relations between statements more explicit (Bernard, 2019).

Bernard (2019) argues that the democratizing potential of hyperlinks promised by the development of the World Wide Web has been fulfilled by the use of hashtags in part because of the ease with which any Internet user can create links between ideas and signs without any knowledge of programming. All that is required is the ability to hit the 'shift' and '3' keys simultaneously. This potential for any user to employ the search function now ubiquitous in online environments to create linkages between ideas, texts and other forms of electronic documents has created an entirely new form of dialogic potential. Users of Instagram, Twitter and any number of other platforms are free to index and construct meaning how they see fit. The shared understanding of the meaning and function of hashtags has enabled a radical expansion of the sphere of users capable of assigning keywords. For better or for worse, the adoption of the hashtag has created a potential for political and ideological mobilization on a scale previously unimaginable. Weimann and Masri (2020), for example, have found a disturbing trend in the presence of Far-right extremism on TikTok. Their study showed how hashtags are being used to enable videos with hateful content to trend on the app. On the other hand, Yang (2016) has argued that a form of narrative agency is at play with hashtag activism in the case of the #BlackLivesMatter. It is now the responsibility of the field of Education to foster and develop new forms of literacy with the hope of harnessing this potential in creative and productive directions, hopefully avoiding the possible negative manifestations of power and control that this technology also makes possible.

## Chapter 4.

### Methodology

#### 4.1. Introduction

The research that I will report involved the design of a pedagogical intervention aimed at introducing the use of tags in online discussions. Although, as discussed in previous Chapters, some empirically based research has been conducted in related areas, many of the specific design elements of the intervention reported on move into unexplored territory.

The strategy that I have pursued can best be described as exploratory rather than explanatory. The goal is to explore an area of research and an instructional design that is still in the early stages of development. Wise and O'Neill (2009) have argued for the development of an alternative strategy to that of rigid experimentation in the field of educational research, one aimed at finding and establishing potentially useful *considerations* instead of specified *prescriptions* capable of fulfilling the strict requirements of generalizability and reliability. Rather than attempting to sort through a multitude of potential independent and dependent variables before conducting an experiment, knowing that the likelihood is high that some critical variables of interest will be unknown from the outset, it makes much more sense to first identify a broader set of relevant design considerations. The results of this process might not deliver direct causal accounts of relationships between independent and dependent variables or generate theory that is strictly generalizable across many different contexts. It will, however, be useful for identifying relevant variables and factors involved, identifying how these variables can be manipulated for the purpose of designing instruction using tags in online discussions, and developing situational theories based on these observations. It can be described as a process moving from a situation fraught with unknown unknowns towards establishing the boundaries of known unknowns and eventually developing a solid theoretical base from the identification of manageable sets of variables established through rigidly controlled experiments.

## **4.2. Ethics**

A key issue in securing ethical approval for this study related to the fact that I was operating in the capacity of both researcher and instructor for the students involved. Safeguards were put in place to ensure that there would be no potential for conflict of interest to negatively impact research participants. A conflict of interest disclosure form was filled out, including a management plan to mitigate any potential risks to students in the form of identity disclosure. This included having the Teaching Assistant take on the responsibility for distributing and collecting consent forms. A neutral third party was designated as the contact point for anyone wishing to withdraw from the research at any time. In this case this function was carried out by a Production Technologist working in the School of Communication who was not involved with the grading of the course in any way. They kept all the disclosure forms in their care for the duration of the course and only released them after all grading had taken place. In this way neither the TA nor the Instructor for the course were able to know if any particular student decided to opt out of the research. As another precaution the Teaching Assistant in the course was responsible for marking the final written assignment in the course. These steps were taken to ensure that there would be no negative repercussions involved for any student not choosing to take part in the study or for the potential of the research process to impact students' grades in the course. Further, there were no formal assessments of the students' activities in the online discussions.

## **4.3. Statement of purpose and research questions**

The purpose of this study was to explore the possibility of enhancing dialogue in online discussions through a specific type of intervention involving social annotation using hashtags. The research was guided by a theoretical approach to dialogue based on the works of Yakubinsky and Bakhtin as discussed in Chapter 1. For Yakubinsky, dialogue is made possible in the 'apperceptive moment' when potential speech partners are able to encode and decode speech based on a complex interaction of perceptions of the other speaker and the potential for sharing life experiences. In Bakhtin's terms the 'utterance' is a base unit of dialogue that is defined by changes in speaking subjects (Bakhtin, 2010). Dialogue depends on the ability of speech partners to effectively 'address' their speech acts or utterances to someone else. When examining the efficacy

of online discussions to support various forms of dialogic pedagogy it is possible that addressivity could be established as an important design consideration. If students are able to effectively address their utterances in the form of online discussion posts to other students, is it possible that this could provide a potential affordance for dialogue in that particular medium?

This study was designed to investigate the following research questions:

1. Did social annotation (in the form of hashtagged keywords) provide practical ways to enhance dialogue in online discussions in the post-secondary context, as shown through thread depth and the dialogicality of student posts?
2. What design considerations were necessary for the instructor to consider when introducing hashtagged keywords as a pedagogical intervention with undergraduate students?

#### **4.4. Research design**

To investigate the research questions posed above, an intervention designed to increase dialogue in online discussions was introduced to a second year Communication class in the School of Communication at Simon Fraser University in 2018. The course, “Digital Media Communication Techniques” is designed to be an introduction to the field of media analysis and production. A pedagogical strategy aimed at bridging the gap between theory and practice forms the foundation of the course. This means that students are expected to engage with selected course readings as well as achieve other learning objectives like learning new software and producing video content. Students completed a final written assignment based on their interaction with course readings that were explored in weekly online discussions. The written assignment was designed to complement the creation of a final video project based on a general theme of the explorations of the self in relation to the Internet.

The class was divided into two separate sections of 18 students each, for a total of 36 students across both sections. As part of the ethics approval process discussed earlier, permission forms were obtained for 24 of the students, and data was only

collected for those students. Of the total number of students participating in the study, 16 were female and 8 were male.

Each course section was assigned to a separate tutorial and lab room. The total number of students participating in the study in the section that engaged in the tagging intervention was 15, the remaining 9 students were in the section that did not employ tagging in the online discussions. Time during the tutorial component of the class was given to complete course readings and to participate in weekly online discussions. This particular design of giving students time to read in-class had been used in previous offerings of the class and was intended to support the development of effective reading and writing strategies at the second year level. Students were free to pick one short reading from a list that fluctuated from four to fourteen choices each week. Students completed the reading and then posted a synopsis of the reading to a weekly online discussion. Subsequently, they were asked to read a certain number of other students' posts and to leave replies. Altogether there were nine online discussions conducted in this fashion throughout the semester.

In order to explore and evaluate the effectiveness of introducing a pedagogical design intervention aimed at increasing levels of dialogue in online discussions, students in the two sections performed slightly different tasks during the semester. Students in one section proceeded in a way that was typical for the class in previous semesters. Students in the other section began to employ social annotation (in the form of tags) from the fourth week. This was not an attempt to employ a quasi-experimental methodology, but to provide a continuously running baseline of comparison.

## **4.5. Content analysis**

As noted by Mason (1992), many early studies of interactions in computer conferencing environments focussed solely on the quantitative analysis of variables like the number of messages sent, frequency and duration of logons or message maps showing numbers of replied. Marra et al. (2004) also noted that in the past most assessment strategies for the use of AODs relied on analyses of quantitative measures rather than qualitative ones. A variety of methods have been employed including surveys, interviews, case studies, experiments and statistical measurements to evaluate the quality of learning taking place using computer conferencing. Mason, however,

advocated for the implementation of the content analysis methodology as the best way to answer questions specifically about the quality of learning and the nature of knowledge construction that occurs in computer-mediated conferencing. This is a position shared by Henri (1992), who argued that the content analysis method could be a highly effective one for assessing the quality of content contained in AODs. In 1997 Gunawardena et al. made the case that neither quantitative analysis of participants' online activities nor reports of levels of satisfaction (data obtained through interviews or surveys) were sufficient forms of evidence for assessing the quality of interactions and subsequent learning experiences in a computer mediated conferencing learning environment. They put content analysis forward as a challenging but essential method for studying computer mediated conferencing, in line with the positions adopted by Mason and Henri earlier in the decade.

Since the early 1990s the use of the content analysis method for the purpose of evaluating the pedagogical benefits of AODs has proliferated. De Wever et al. (2006) in their review of the use of various content analysis schemes to analyze AODs, found a wide range of approaches in the works that they reviewed. These included cognitive and metacognitive approaches (Henri, 1992; Zhu, 1996), critical thinking (Newman, 1995), knowledge construction (Gunawardena et al., 1997; Veerman & Veldhuis-Diermanse, 2001; Jaervelae & Haekkinen, 2002; Pena-Shaff & Nicholls, 2004; Weinberger & Fischer, 2005) as well as Social Network Theory (Fahy et al., 2000). In another systematic review of the literature Weltzer-Ward (2011) identified 51 different coding schemes employed between the years 2002 and 2009 to analyze the content of AODs. The author found that the Community of Inquiry framework examining social, cognitive, and teaching presence dominated the literature, but that many other theoretical frameworks had been employed such as variations on Henri's (1992) critical thinking phases. Interestingly, none of the works cited in either review focussed specifically on dialogue, although it could be argued that important components of dialogue are necessarily embedded in any of the areas listed above.

A definition of the method of content analysis is provided by Krippendorff (2019): "Content Analysis is a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use" (p. 24). This definition is important because it contains two essential components of the method. The first of these is reliability – the findings should be replicable or repeatable by researchers

working at different points in time or place. This means that the researchers should get the same results when applying the same technique to the same phenomena (Krippendorff, 2019). This technique should also be valid in the sense that the research process is open to scrutiny and that the resulting claims can be substantiated by comparison to other, independent sources of evidence.

The tradition of content analysis as a method can be traced back to at least 18th century Sweden. A collection of religious hymns (Songs of Zion) were analyzed quantitatively for the purpose of providing evidence that the content of the songs were somehow supporting the activities of a dissenting group, and as such undermining the orthodox clergy of the Swedish state church (Dovring, 1954, as cited in Schreier, 2012, p. 9). By the end of the 19th century, quantitative newspaper analyses were being conducted to answer such questions as "Do newspapers now give the news?" (Speed, 1893, as cited in Krippendorff, 2019, p. 11). These efforts were being conducted in response to demands for ethical standards for journalism based on a foundation of scientific objectivity. Empirical research at that time involved the measuring of column inches devoted to various subject matter, such as religious and scientific matters, as opposed to coverage devoted to gossip, scandal or sporting events.

In 1952, Berelson provided a definition of content analysis that was in alignment with prevailing notions of quantitative and objective standards of social science research of the time: "a research technique for the objective, systematic and quantitative description of the manifest content of communication" (p. 18). Kracauer (1952) found objection with Berelson's definition, arguing against the purely quantitative application of the content analysis method. According to Schrier (2012) his objection was based on three main arguments: meaning is often complex and dependent on context, meaning is not always manifest or clear at first glance, and lastly, while some aspects of meaning may occur infrequently they might still carry the importance of more high frequency aspects. As Krippendorff (2019) also points out, Berelson's definition of content analysis as a method is problematic in many ways: "I question the validity and usefulness of the distinction between quantitative and qualitative content analyses. Ultimately, all reading of texts is qualitative, even when certain characteristics of a text are later converted into numbers" (p. 21). This is a perspective shared by other researchers as well. For example, Schedler & Mudde (2010) regard the division between quantitative and qualitative as "a rather thin and discreet line.... Even the most sophisticated piece of



quantitative research remains dependent on natural language (words), while most qualitative studies do contain some kind of quantitative information (numbers)" (pp. 418-419).

An important component of Berelson's (1952) original definition of content analysis is that it necessarily requires the use of *manifest content*. Manifest in this sense, refers to "elements that are physically present and countable" (Gray & Densten, 1998, p. 421). Manifest analysis is focussed on the search for obvious and very clear-cut aspects of content that can be quantified in the same way reliably and consistently (Neuendorf, 2017), for example examining a body of text and counting the number of times that a specific word or phrase was used. The term *manifest content* can be contrasted with the concept of *latent content*. Latent content consists of concepts that are not directly observable, they "cannot be measured directly but can be represented or measured by one or more ... indicators" (Hair et al., 2010, p. 614). In order to examine latent content it is often important to take context into account (Schreier, 2012, p. 15). The application of a strict manifest-latent dichotomy has been criticised on the grounds that the boundary between the two concepts is often blurred and difficult to apply in practice. For this reason, Neuendorf (2017) has proposed thinking about the distinction between manifest and latent content as existing on a continuum moving from 'highly manifest' to 'highly latent'. The strategy for employing a content analysis method in this study is best described as being much closer to the latent side of the continuum.

## **4.6. Data Collection**

Data were collected throughout the semester as part of the online discussion feature in Canvas, the Learning Management Software employed at Simon Fraser University. At the end of the semester all relevant posts generated by students who had filled out permission forms were collected and input into Microsoft Excel. Excel was used to automatically generate a word count per post based on the text. For the purposes of this study, only students' replies were employed in the dataset, the original synopsis-style posts that began threads were not included. This resulted in the collection of 578 posts, 356 of which were from the section that engaged in the tagging intervention and 222 of which were from the section that did not employ tagging in their online discussions.

## 4.7. Data analysis

As discussed in the previous section, the text generated by students in AODs examined for this study was analyzed in a way that leaned towards a description of latent rather than manifest content. This introduces a potential problem, as some scholars have identified a tendency towards low reliability when it comes to human coding of latent content (Neuendorf, 2017). In the following section the implications of this concern will be addressed through a careful consideration of the specific procedures followed in the analysis of the data. This will entail a full description of the coding scheme employed in the study as well as the strategy used to maximize reliability through the establishment of inter-coder reliability.

A content analysis of the online discussion posts across both sections was conducted using an adaptation of the Cam-UNAM Scheme for Educational Dialogue Analysis (SEDA). This scheme is made freely available under a Creative Commons Attribution licence and can be altered and adapted under the condition that the original research team is attributed with the following statement:

The Cam-UNAM Scheme for Educational Dialogue Analysis (SEDA: ©2016) was developed by a research team from the University of Cambridge, UK, and the National Autonomous University of Mexico, led by Sara Hennessy and Sylvia Rojas-Drummond and funded through a grant from the British Academy. The original scheme and list of co-creators are available at: <http://tinyurl.com/BADialogue>. (Hennessy et al., 2016, p. 42)

The original coding scheme (SEDA) was developed for a wide range of application but was intended to be used primarily for the analysis of transcripts of verbal, face-to-face interactions. For the purposes of this study the original scheme was adapted and tailored towards analyzing textual material from asynchronous online discussions. This process was also informed by the inter-coder training process and the requirements of inter-coder reliability. A detailed coding guide was developed to facilitate the coding process (see Appendix A). It includes a full list of codes, a detailed description of each, as well as examples used to demarcate the boundaries of the codes as clearly as possible. A less detailed description of the codes is provided in Table 4.1.

**Table 4.1 List of Codes to Assess Dialogue in Online Discussions**

Code	Communicative Act	Description
C1	Connect to existing content in thread	Making a specific reference to material contained in existing posts within the thread. To count for a C1 learner needs to make a clear reference to the material in a thread through direct repetition or paraphrasing.
C2	Connect to any other material beyond the immediate thread but limited to the online discussions within the class and associated readings	Making a specific reference to material from any other post from any discussion in the course beyond the immediate thread. In order to count a specific post must be mentioned. If it is the synopsis from an initial post in a different thread the title or author does not need to be included.
C3	Connect to any other resource in class	Making a specific reference to any knowledge or learning resource used in this particular class, including lecture materials and multi-media sources.
C4	Connect to any other class in Post-Secondary experience	Making a specific reference to any knowledge or learning resource used in any class from the students' experiences in the University, including lecture materials and multi-media sources.
C5	Connect to wider contexts	Bringing knowledge from outside of the classroom or school (i.e. beyond, before or after the current lesson) into the discussion of what is being learned, relating previous experiences outside of the post-secondary experience, linking given and new information. This may include personal experience/memory, or anecdote.
R	Explain or justify	Posts coded <b>R1</b> should indicate a <b>clear attempt</b> at reasoning, typically (but not necessarily or sufficiently) through key words such as 'because', 'so', 'therefore', 'thus,' 'in order to', 'if...then', 'not...unless', 'it's like...', 'imagine if...'
I	Invite elaboration or reasoning	Ask other(s) for justification/evidence or explanation of reasoning or the process of arriving at a solution.

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P1	Synthesise ideas	Bringing multiple perspectives or ideas into inter-relation and drawing out or distilling a key idea(s) / conclusion / implication. May include ideas from immediately preceding discussion or earlier in lesson / lesson sequence.
P2	Compare/ Evaluate alternative views	Compare/evaluate at least two arguments / positions (may include own or other's), with explanation or justification.
P3	Propose resolution	This act includes the result of seeking consensus/ agreement, either by suggesting a solution that could be shared by all, or by suggesting that participant should partially agree, or disagree entirely, after discussing a task, issue or problem.
P4	Acknowledge shift in position	Participants acknowledge that they have shifted their position in response to the preceding dialogue. It includes clarifying a misconception or changing opinions/ideas/beliefs.
P5	Challenge or Disagree with position taken	Challenge/confront others' view/assumption/argument. The challenge must be evident through verbal (or nonverbal) means.
P6	Agree with position taken	One or more participants state that they agree with one other or a point made in one of the readings.
B1	Answer a question	Answering any direct question previously coded as an I
B2	Build on own contribution from a previous post	Clarify, elaborate, exemplify or extend own opinion/idea/belief or question.
RD	Reflect on learning process/purpose/value	Comment/talk about the process of carrying out the collective activity or evaluate own performance. Or reflect on the importance, usefulness, purpose or outcomes of learning or of the task, as part of a collective activity.

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### **4.7.2. Unit of analysis**

The choice of unit of analysis was guided by a careful consideration of previous studies conducted using the content analysis method, as well as Bakhtin's theoretical concept of the utterance as the base unit of dialogue. According to De Wever et al. (2006) the unit of analysis is a determining factor in how an online discussion can be processed into manageable items useful for the coding process. In their comprehensive review of content analysis schemes specifically for the purpose of analyzing the content of asynchronous discussion groups, they note that a number of different units of analysis have been employed, including thematic units, complete messages or posts, sentences within posts, and in one case the entire discussion was considered the unit of analysis (Jaervelae & Haekkinen, 2002).

De Wever et al. (2006) raised the point that the choice of unit of analysis was rarely linked to any kind of theoretical base employed in the studies that they reviewed. When considering the work of Bakhtin it seems clear that the most appropriate unit of analysis for this study would be the entire message or post. This is in alignment with Bakhtin's concept of the utterance as the base unit of dialogue as opposed to the sentence. The entire post was chosen as the unit of analysis in this study because it is the equivalent of a conversational turn in spoken dialogue. As discussed in Chapter 1 the defined the boundaries of an utterance are set apart by changes in speaking subjects (Bakhtin, 2010). Keeping Bakhtin's definition of the utterance in mind it was decided that the most appropriate unit of analysis would be the entire post or reply as written by students in the online discussions. It is also worth noting that De Wever et al. (2006) found that the majority of studies that they reviewed opted for the complete message as the unit of analysis as opposed to the sentence.

### **4.7.3. Inter-coder reliability**

Krippendorff (2019) makes the case that content analysis can be used as a scientific tool for providing new insights and increasing a researcher's understanding of particular phenomena. As such, it is important that a research technique such as content analysis be reliable and lead to results that are replicable across different circumstances and conditions. Krippendorff (2019) also stresses that the results obtained during scientific research be valid in the sense that the resulting claims are in alignment with

other forms of available evidence. For these reasons, a rigorous process of coder training was employed to prepare for the double coding of 20% of the total data entries.

A sample of 20% of the available data was generated at the thread level, excluding the hashtags generated by the tagging section to keep second coder 'blind' to the particular condition in which posts were generated. Two rounds of coder training were conducted, at the end of which inter-rater reliability (calculated using Cohen's kappa) reached an acceptable level of 0.7 or more across most of the coding categories (of which more below). The remaining 80% of the posts were single coded based on what had been learned from the double-coding.

Looking at Table 4.2, we see that inter-rater reliability rates were maintained across most of the variables, though in some cases Krippendorff's Alpha was low despite a very high percentage rate of agreement. A decision was made to drop variables from the final analysis with low inter-rater reliability (Krippendorff's Alpha score of under 0.65) in either of the two rounds of double coding. For this reason, coding categories C3, C4, P2, P3 and RD were dropped from the final analysis. These codes happened to be used relatively infrequently, and as a result had little bearing on the overall results.

**Table 4.2 Results of Double Coding Process to Assess Inter-Coder Reliability**

	Round 1		Round 2	
	Percent Agreement	Krippendorff's Alpha	Percent Agreement	Krippendorff's Alpha
Variable 1 (C1)	97.96	0.85	98.11	0.85
Variable 2 (C2)	100	1	100	1
Variable 3 (C3)	100	1	98.11	0
Variable 4 (C4)	100	undefined*	98.11	0
Variable 5 (C5)	91.84	0.73	92.45	0.71
Variable 6 (R1)	89.8	0.68	88.68	0.72
Variable 7 (I)	100	1	94.34	0.85
Variable 8 (P1)	100	undefined*	100	undefined*
Variable 9 (P2)	97.96	0	96.23	0.49
Variable 10 (P3)	97.96	0	100	undefined*
Variable 11 (P4)	100	undefined*	100	undefined*
Variable 12 (P5)	100	undefined*	98.11	0.66
Variable 13 (P6)	95.92	0.91	96.23	0.9
Variable 14 (B1)	100	1	100	1
Variable 15 (B2)	97.96	0.79	100	1
Variable 16 (RD)	93.88	0.54	98.11	0

#### **4.8. Overview of the Quantitative Data Across All Discussions**

In Chapter 1, a case was presented for the inclusion of dialogue as a critically important concern in post-secondary teaching and learning designs. An argument was made that dialogic pedagogy is a basic requirement of constructivist learning environments. In this study, data were collected as part of a teaching and learning design aimed at enhancing levels of dialogue in the online discussion feature of the LMS Canvas, as students collectively read and wrote about a selection of reading resources in a post-secondary course in Communications. This experience was intended to support individual student work towards a final written assignment based on the readings offered in the course. Social annotation, in the form of hashtagged keywords accessible

through the search function, was proposed as a mechanism potentially capable of enhancing dialogue in online discussions at the post-secondary level of instruction. A design trial involving hashtagged keywords was evaluated as part of this study.

Across eight discussions that took place during the semester, there were a total of 578 posts available for analysis. The ninth discussion was excluded from analysis due to a technical problem that prohibited students from using the search function, meaning that it was not possible to use a search to look for hashtagged keywords in the tagging section's discussion in that week.<sup>5</sup> Posts from students who did not sign a consent form as part of the ethics procedures for the study were not included in the data set. Of the 578 posts included in the study, the mean number of words per post was 55.96, with a standard deviation of 28.43.<sup>6</sup> The minimum number of words was 3 and the maximum was 252. Considerations of depth are another area of quantitative measure of interest in this study. For example, the overall depth of a discussion or group of discussions can be measured by the mean depth of all threads contained within the sample. Another consideration is the depth of any single thread measured by the mean depth of all replies in the thread. There is also the depth of any single reply, which in this study was scored with a value of 1 for an initial reply to another student's initiating post. Replies to those replies were scored as 2, up to a maximum value of 4 recorded in the data. The mean thread depth of all posts in all discussions considered for the study was 1.21, with a standard deviation of 0.44.

Posts were scored using the content analysis protocol provided in Appendix A and summarized in Table 4.1. As discussed previously, a post was considered the unit of analysis as opposed to the sentence or other unit. Scores were assigned for each category of the protocol on an all-or-nothing basis, meaning that any individual post was assessed for the presence or absence of each characteristic. This resulted in a score of either one or zero in every case. The mean dialogue score across all posts considered for the study was 1.90, with a range from 0 to 6 and a standard deviation of 1.09. The distribution of dialogue scores across all 578 posts is shown in Table 4.3. From the table

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<sup>5</sup> The problem was investigated by technical staff at SFU. They found the settings were correct but were unable to identify the cause.

<sup>6</sup> The word count per post was calculated in Excel using a formula using the formula: =LEN(L3)-LEN(SUBSTITUTE(L3," ",""))+1. This is a very close equivalent to using the word count function in Microsoft Word.



we can see that 40 posts received a score of 0, and that only one post received a score of 6, the top score of all posts in the study.

**Table 4.3 Frequency Distribution of Posts over Dialogue Scores**

Dialogue Score	Frequency	Percent	Cum. Percent
.00	40	6.9	6.9
1.00	190	32.9	39.8
2.00	190	32.9	72.7
3.00	113	19.6	92.2
4.00	36	6.2	98.4
5.00	8	1.4	99.8
6.00	1	0.2	100.0
Total	578	100.0	

Here are some examples of posts that received scores of zero for dialogue using the content protocol method:

Really great quotes pulled from the reading here, thank you!

Cool! It really is an interesting reading.

Here is an example of a post with a score of four:

Kiara, I see where you're coming from and I agree! I think charging people for internet based on timed usage is absurd, and is just another made up scheme for mega media companies and conglomerates to build maximum profits! Especially since the Internet is almost required for people to survive jobs, etc. it would be unfair to those who are unable to afford Internet usage. For example, a friend of mine does not have a cell phone plan, and only uses free internet at work, and Internet at home for Facebook. That is our only contact with her on any day. Imagine if she was unable to afford the bare minimum of communication with her employer!

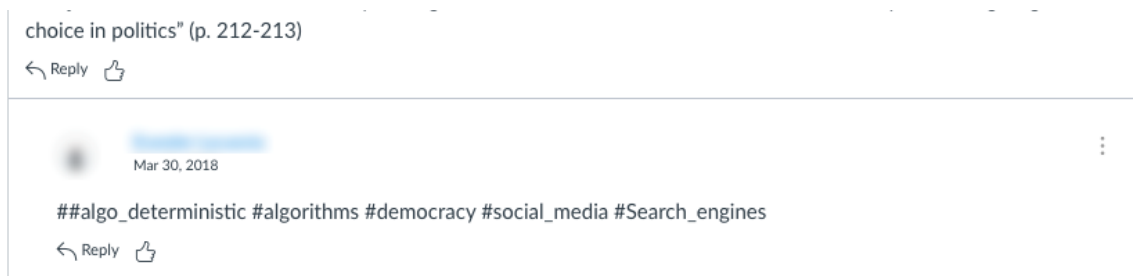
## 4.9. Search functionality in the tagging group

In week 4 of the course, tagging was introduced to students in one of the course sections. Students were instructed to include at least three hashtagged keywords along with their original posts containing a synopsis of the reading that they had chosen for the

week. Although discussions in Canvas have no official tagging functionality<sup>7</sup>, students were able to use the search function in each discussion to search for hashtagged keywords. The principle that allows this to work is very basic. Use of the hashtag (#) character in written text is generally quite rare. There are other characters that could have been used for social tagging, but hashtags were chosen for this study because students were already accustomed to using them in various social media platforms.

Students were instructed to post their keywords in a separate reply to their own post, as shown in Figure 4.1:

**Figure 4.1 Posting Hashtagged Keywords in a Separate Reply**



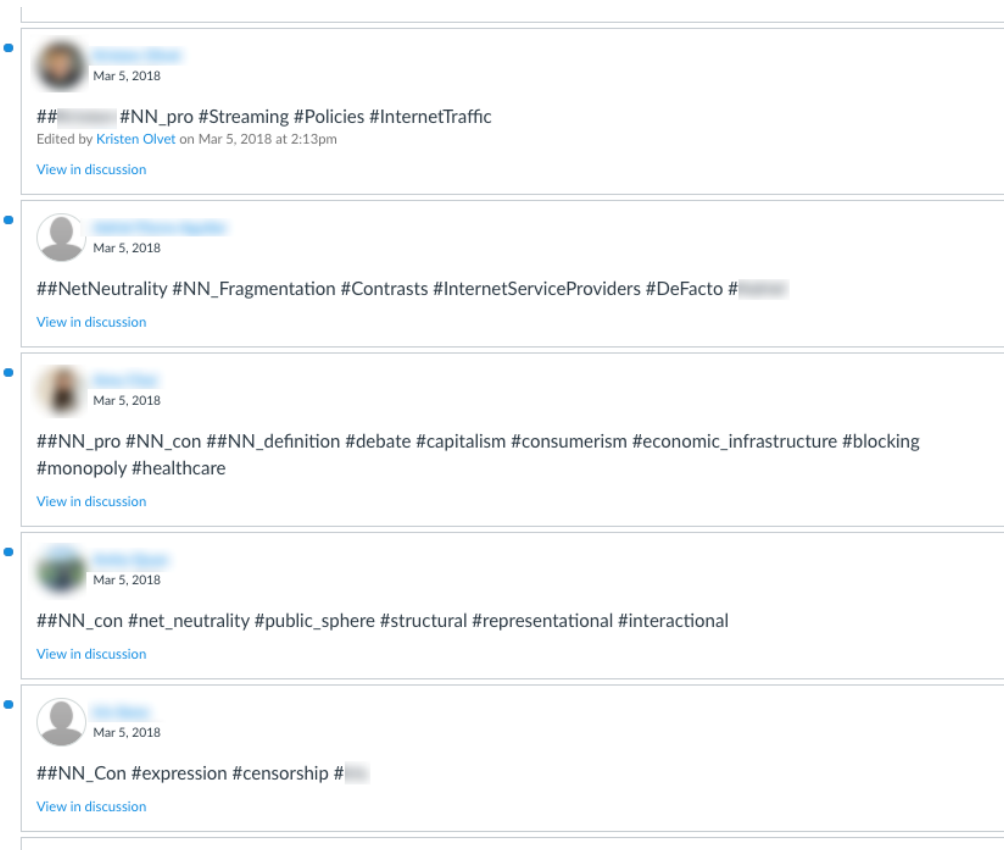
Although each tag generated by students in this way was not automatically converted to a clickable link, this system for labelling posts did allow students to quickly access information about the posts in a discussion to decide which ones they wanted to read. Rather than having to scroll through the entire discussion to find relevant points of engagement with other students, they were able to use the search function to deliver a result as seen in Figure 4.2<sup>8</sup>:

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<sup>7</sup> Many attempts were made to find an appropriate online discussion tool with tagging functionality. After more than a year of intense effort working with technical support staff at SFU to find a solution it became clear that this was not going to be possible. The decision was made to use a form of labelling using hashtags and the search functionality to best approximate tagging functionality in online discussions.

<sup>8</sup> These posts have been altered in Photoshop to conceal the identity of research participants.

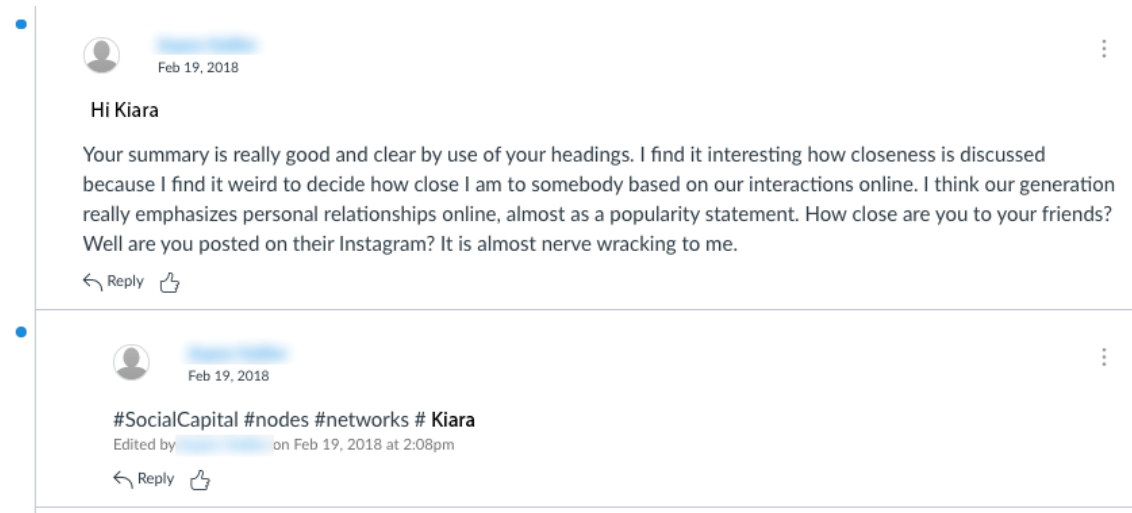
**Figure 4.2 Search Result Generated by Typing "##" into the Search Bar**



Students in the tagging section of the course were instructed to include a double hashtag (##) at the front of their list of hashtagged keywords accompanying their initial synopsis-style post in each discussion. This allowed the generation of a list of tags for original posts by the simple filtering of results in the search using a double hashtag. They could select a post to read by clicking one of these posts containing a list of keywords, and then be taken to that point in the discussion without having to scroll through all of the posts. To be clear, this was a work around that did not provide the full range of functionality I had desired as a course designer. On the other hand, it was a robust and functional system that allowed students to label their posts in a way that other students could access very quickly and easily.

Students in the tagging section were also instructed to 'address' their post with the hashtagged name of the student that they were replying to<sup>9</sup>. An example of this is shown in Figure 4.3:

**Figure 4.3 Addressing Potential Speech Partners**

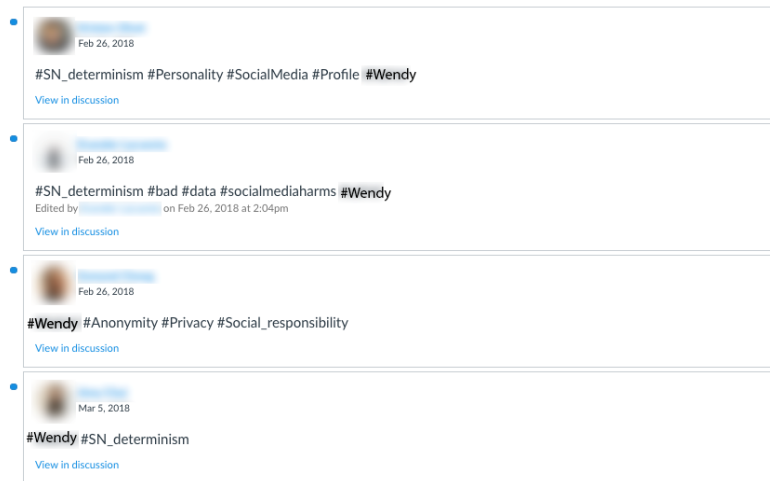


Throughout the semester, students in both sections were encouraged to reply to previous posts as much as possible. In the tagging section students were shown how to use the search function to search for their own name with a hashtag in front. This simple step allowed students to quickly search for instances in a discussion where they had been addressed with their hashtagged name. Figure 4.4 is an image of what this looked like in the online discussion. In this case Wendy could quickly check a discussion to see if anyone had replied to their post by typing #Wendy in the search box. The resulting list of posts gives any student the ability to check for responses without scrolling, but it also includes information about the specific topics of available posts in the form of keywords. This allowed students to reduce the time required to reply to posts, at the same time as it increased the chances of meaningful exchange based on an assessment of the relevance of the content of the post.

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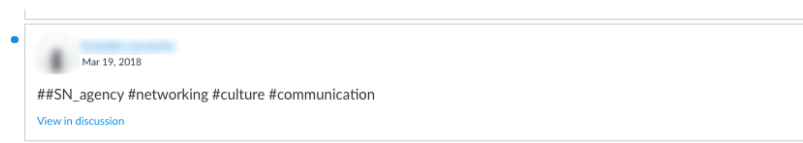
<sup>9</sup> This image has been altered erase the name of the research participants involved, Kiara is a pseudonym used to protect the identity of the student.

**Figure 4.4 Search Result Generated by #Wendy**



In discussion number six, students were encouraged to reflect on lecture material for that week that had been presented on the topic of the formation of social networks through the use of social media. Students in both sections were encouraged to reflect on whether the reading that they picked was making a case that the technology was providing agency to users or making a case for technological determinism, one of the core themes of the course. Students in the tagging section were instructed to employ one of two hashtagged keywords, either #SN\_agency or #SN\_determinism<sup>10</sup> to indicate whether they thought the reading was leaning in either of those directions, as shown in Figure 4.5.

**Figure 4.5 Labelling Threads with "SN\_agency" or "SN\_Determinism"**



The goal of this particular instructional intervention was to encourage as much dialogue as possible on the topic by using keywords to quickly identify a list of students' posts that had been labelled with a particular position.

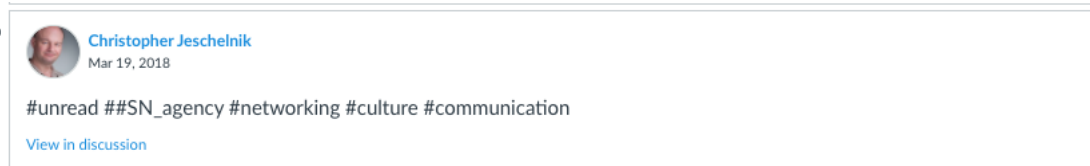
In order to address the issue of students mostly reading posts contained in the beginning of discussions (leaving many posts unread near the end simply because they

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<sup>10</sup> The SN stands for Social Networking.

take more effort to reach through the act of scrolling), a special hashtag was employed in the tagging section to mark any posts that had not been read. This was a time-consuming process from the instructor perspective, as it required manually scrolling through the discussions and replying to any post that had not been read<sup>11</sup> as in this case shown in Figure 4.6:

**Figure 4.6 Use of the "#unread" Tag to Reduce New Post Bias**



In future discussions, students in the tagging section were asked to go back to previous discussions and search for '#unread' and reply to at least one. Tags generated by the student in their post were incorporated into this Instructor-generated tag. This allowed students to quickly gain some kind of overview of the topical nature of the post, and to assess the relevance of the post for their own areas of interest.

As discussed previously, a baseline for comparison across the sections was established in the beginning three weeks of the semester. Even though the students participated in separate discussions throughout the semester, discussions 1 through 3 were conducted in the same fashion for both the tagging and non-tagging sections and will be referred to as the pre-tagging phase. The intention behind this phase from an instructional perspective was to allow time for students to familiarize themselves with how the discussions would function in relation to the expectations for the course. In week 4, students in the tagging section were instructed to employ tags as part of the procedures involved. This was considered a training session, and was in many ways a transition phase for the tagging group. Discussions 5, 6, and 8<sup>12</sup> are referred to collectively as the tagging phase, as this is when the section that engaged with tagging had moved beyond the training phase.

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<sup>11</sup> This is a good example of how simple changes to the online discussion structure could have large implications for the quality of dialogue.

<sup>12</sup> For logistical and organizational reasons, there was no Discussion 7 in the course.

# **Chapter 5.**

## **Results**

### **5.1. Introduction**

In Chapter 1, a case was presented for the inclusion of dialogue as a critically important concern in post-secondary teaching and learning designs. An argument was made that dialogic pedagogy is a basic requirement of constructivist learning environments. In this study, data were collected as part of a teaching and learning design aimed at enhancing levels of dialogue in the online discussion feature of the LMS Canvas, as students collectively read and wrote about a selection of reading resources in a post-secondary course in Communications. This experience was intended to support individual student work towards a final written assignment based on the readings offered in the course. Social annotation, in the form of hashtagged keywords accessible through the search function, was proposed as a mechanism potentially capable of enhancing dialogue in online discussions at the post-secondary level of instruction. A design trial involving hashtagged keywords was evaluated as part of this study.

In this Chapter, an overview of the data collected in the study will be presented, followed by a more in-depth comparison of the mean word count, dialogue and depth of reply scores between the tagging and non-tagging sections of the course, both across the entire semester and in the tagging phase of the trial. Descriptive statistics will also be provided to document the process of tagging as undertaken in the tagging section. The data collected in this study form a body of evidence to investigate the viability of using hashtags to enhance dialogicality in online discussions at the post-secondary level.

### **5.2. Overview of quantitative data by course section**

In order to give an overview and a sense of the characteristics of each section, data for all discussions considered as part of the study across the entire semester (discussions 1 through 6 and 8) will be presented in this section. When seen from this perspective the groups are quite similar in terms of post length, as measured by a mean word count of 55.14 per post across all students in the tagging section and 57.28 across

all students in the non-tagging section. Mean dialogue scores as measured by the content analysis protocol were also quite similar between the two sections when considering all posts in the study. The mean dialogue score for the entire semester was 1.88 across all students in the tagging section and 1.94 across all students in the non-tagging Section. Mean depth of reply did differ somewhat, at 1.27 for the tagging section and 1.12 in the non-tagging section. A summary breakdown of these results is presented in Table 5.1.

**Table 5.1 Means for Dialogue Score, Thread Depth and Word Count for all Posts in the Study**

Section	Statistic	Word Count	Depth of Reply	Dialogue Score
1	Mean	55.14	1.27	1.88
	N	356.00	356.00	356.00
	Std. Deviation	27.00	0.48	1.06
2	Mean	57.28	1.12	1.94
	N	222.00	222.00	222.00
	Std. Deviation	30.61	0.35	1.14
Total	Mean	55.96	1.21	1.90
	N	578.00	578.00	578.00
	Std. Deviation	28.43	0.44	1.09

### 5.2.2. Overview of quantitative data by student and section

In order to provide a sense of the characteristics of each section the following tables will provide a breakdown of the mean word count, depth of reply, and dialogue score per student across all posts considered for the study across all discussions. These data are presented to demonstrate the range of individual student output in terms of the basic quantitative considerations of number of posts and mean word count, but also a sense of the dialogic quality of output in terms of the mean dialogic score per student. While it should be said that considerations of the development of individual students over the semester is beyond the scope of this dissertation it is possible that this could be a promising area of future research efforts. These tables are presented here only for the purpose of providing a clearer sense of the range of participation by individual students



and to give a basic sense of patterns of participation in each section. From these tables we can see that both sections are similar in terms of having a relatively wide distribution of outcomes. It is clear that some students put considerably more effort into the process than others in each section. Table 5.2 presents these data for the tagging section.<sup>13</sup>

**Table 5.2 Means for Dialogue Score, Depth of Reply, and Word Count for all Posts in the Tagging Section by Student**

Participant	Number of Posts	Dialogue Score	Depth of Reply	Word Count
Anna	34	2.06	1.32	54.71
Arlo	18	1.61	1.28	53.06
Cindy	13	1.69	1.08	49.15
Jim	34	2.76	1.32	83.71
Julia	18	1.50	1.11	44.89
Kiara	11	1.55	1.00	55.45
Laura	31	1.81	1.26	43.97
Narges	33	1.33	1.36	43.73
Petra	15	2.13	1.20	72.53
Pippa	31	2.48	1.35	71.77
Sarah	14	1.57	1.21	54.86
Terrance	27	1.74	1.26	44.33
Tiffany	29	1.66	1.14	58.97
Wendy	34	1.74	1.35	38.24
Yvonne	14	1.71	1.36	58.43
<b>Total</b>	<b>356</b>	<b>1.88</b>	<b>1.27</b>	<b>55.14</b>

The mean word count, depth of post, and dialogue score per student across all posts considered for the study are presented in Table 5.3 for the non-tagging section.

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<sup>13</sup> All names presented are pseudonyms to protect the identify of the research participants.

**Table 5.3 Means for Dialogue Score, Depth of Reply, and Word Count for all Posts in the Non-Tagging Section by Student**

Participant	Number of Posts	Dialogue Score	Depth of Reply	Word Count
Alexis	34	2.09	1.29	56.68
Edward	19	2.89	1.16	55.89
Jack	24	1.88	1.00	40.75
Lulu	21	2.05	1.19	55.52
Maria	38	2.26	1.05	87.42
Mark	15	1.53	1.00	48.87
Melody	18	1.56	1.06	54.94
Mike	28	1.04	1.11	45.32
Tony	25	2.04	1.12	50.80
Total	222	1.94	1.12	57.28

### **5.3. Comparing by section and phase of semester**

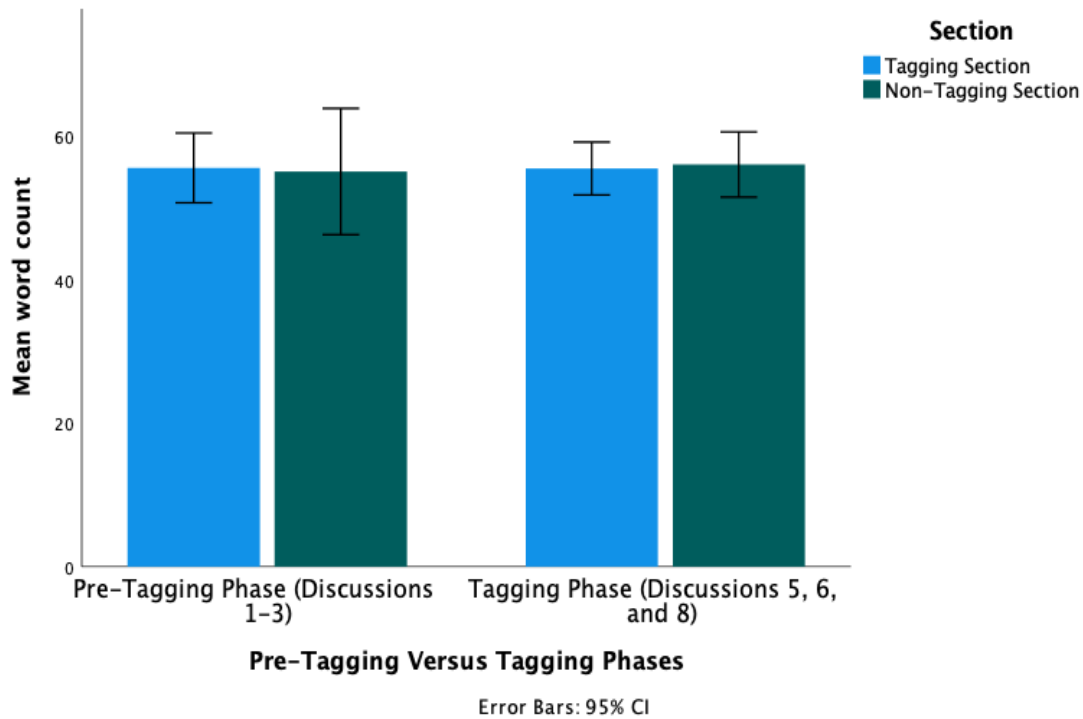
In the previous section a comparison of the posts generated by students in the two separate sections involved in the study over the entire semester was presented. Seen from this perspective the sections were quite similar with regard to the mean word counts and dialogue scores across the entire semester. It is through the comparison of each section over time, however, that some interesting patterns emerge.

#### **5.3.1. Word count**

As seen in Figure 5.1, the mean word count per post remained quite consistent across both sections, as well as across both the pre-tagging and tagging phases of the semester. In the pre-tagging phase (Discussions 1-3) there were 77 posts spread across 56 threads in the tagging section. The mean words per post was 55.61 with a standard deviation (SD) of 21.44. For the non-tagging section there were 50 posts spread across 45 threads with a mean of 55.10 words per post and a SD of 31. In the tagging phase (Discussions 5, 6, and 8) there were 244 posts spread across 67 threads in the tagging section. The mean was 55.52 words per post with a SD of 29.18. For the non-tagging

section there were 149 posts spread across 55 threads with a mean of 56.08 words per post and a SD of 28.10.

**Figure 5.1 Mean Word Count by Section and Phase in Semester**

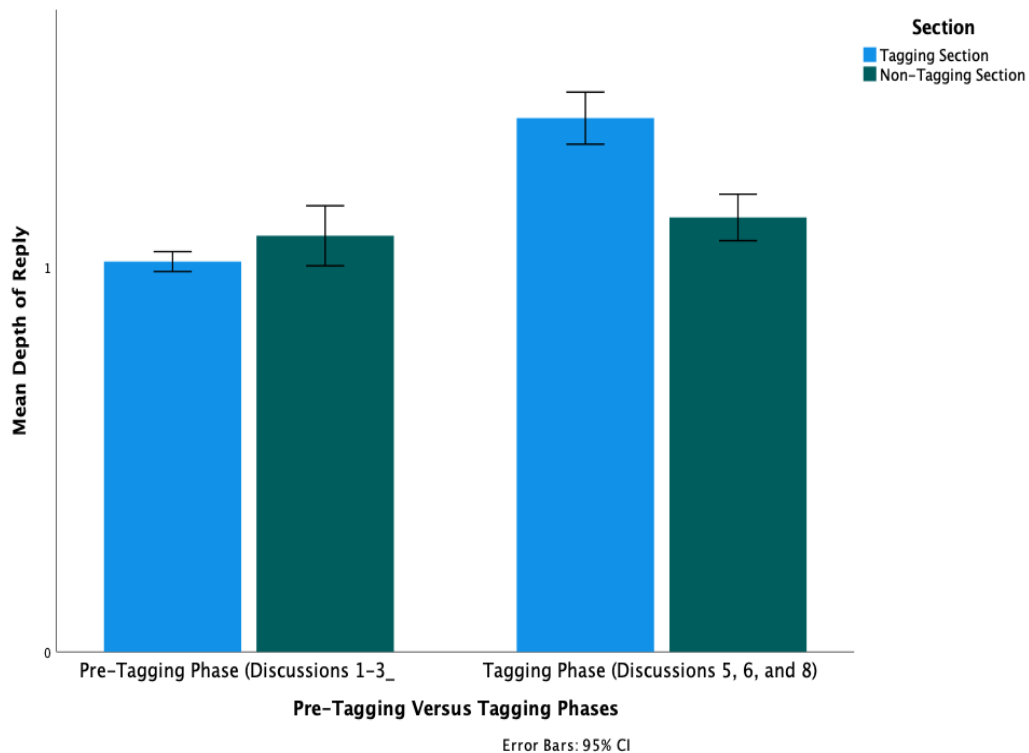


There were 14 participants in the tagging section and 9 participants in the non-tagging section. An independent-samples t-test was run to determine if there were differences in word counts between the sections in the pre-tagging phase versus the tagging phase. There were no outliers in the data, as assessed by inspection of a boxplot. Word count scores for each level of section were normally distributed, as assessed by Shapiro-Wilk's test ( $p > .05$ ), and there was homogeneity of variances, as assessed by Levene's test for equality of variances ( $p = .520$ ). There was not a significant difference in word count difference scores between the tagging ( $M = .49$ ,  $SD = 17.58$ ) and non-tagging ( $M = -.72$ ,  $SD = 14.46$ ) sections, with a difference of  $M = 1.21$ , 95% CI [-13.23, 15.65],  $t(22) = .174$ ,  $p = .863$ ,  $d = .073$ .

### 5.3.2. Depth of reply

Figure 5.2 compares the mean depth of reply across the two sections and phases of the semester. The mean depth of reply remained relatively consistent over time for the non-tagging section; however for the tagging section there was a pronounced increase in depth of reply scores during the tagging phase. The mean for the tagging section was 1.01 per post with a standard deviation (SD) of 0.11 in the non-tagging phase. For the non-tagging section the mean was 1.08 with a SD of 0.27. In the tagging phase the mean depth of reply for the tagging section rose to 1.39 with a SD of 0.536. For the non-tagging section the mean depth of reply was 1.13 with a SD of 0.37 in this phase.

**Figure 5.2 Comparison of Mean Depth of Reply Score by Section and Phase in Semester**



A consideration of the assumptions of this test in terms of normality as assessed by Shapiro-Wilk's test revealed, however, that the data for the variable depth of reply were not normally distributed ( $p < .05$ ). For this reason, a Mann-Whitney U Test was employed for this variable instead. Distributions of the depth of reply difference scores for the tagging and non-tagging sections were similar, as assessed by visual inspection.

The depth of reply difference score was statistically significantly higher in the tagging section ( $Mdn = .38$ ) than for the non-tagging section ( $Mdn = .00$ ),  $U = 10$ ,  $z = -3.44$ ,  $p < .001$ . SPSS does not provide an effect size statistic for the Mann-Whitney U Test but an approximation was calculated using the formula  $r = Z\sqrt{N}$ . The calculated effect of tagging on depth of reply was found to be .73.

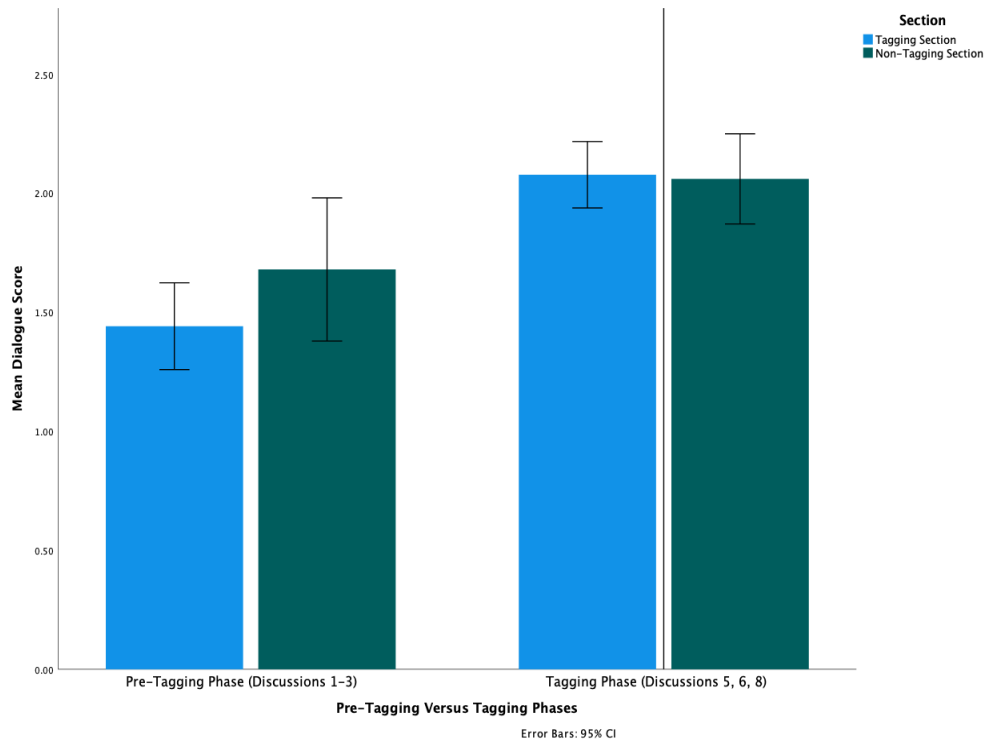
### 5.3.3. Dialogue score

As the reader will recall, the entire motivation for the exploration of social tagging using hashtags in this study was to enhance students' experience of dialogue in AODs. A comparison of the mean dialogue scores across the two sections and phases of the semester revealed that scores for the tagging section started out lower in the pre-tagging phase than those for the non-tagging section. The mean score for dialogue for the tagging sections was 1.44 per post with a standard deviation (SD) of 0.80 in the non-tagging phase. For the non-tagging section the mean was 1.68 with a SD of 1.06. In the tagging phase the mean score for dialogue for the tagging section was 2.08 with a SD of 1.11. For the non-tagging section the mean score for dialogue was 2.06 with a SD of 1.17 in this phase. Differences in mean dialogue score by section and phase are shown in Figure 5.3.

We may only speculate about potential reasons for the overall difference in dialogue scores between the two sections. It could be a consequence of the relatively small number of research participants in the study, and random variation of student abilities and tendency to follow directions. However, as an experienced instructor I will note that there is a general tendency for different sections of a course to fill up at different rates based on the desirability of the time slot offered for the tutorial. (For example, a course section with a tutorial scheduled early in the morning will fill up more slowly than one with a tutorial section scheduled mid-morning or mid-afternoon.) Due to the registration priority system, students with higher CGPAs are able to enrol earlier than students with lower CGPAs; for this reason different tutorial sections can wind up having very different characteristics. In this study the section that used hashtags in their online discussions happened to have started in a timeslot scheduled before the lecture. In this study it is possible that there was a difference in the mean CGPA of each section based on the perceived desirability of the timeslot offered after the lecture and the fact that students with higher CGPAs were able to pick their section earlier than students with

lower CGPAs. This is, however, only speculative as this kind of information about students is not available to instructors for obvious ethical reasons.

**Figure 5.3 Comparison of Mean Dialogue Score by Section and Phase in Semester**



An independent-samples t-test was run to determine if there were differences in dialogue scores between the sections in the pre-tagging phase versus the tagging phase. There was one outlier in the data. A decision was made to keep the outlier, however, based on the fact that it was 2.16 SD away from the mean. The difference scores for dialogue for each section were normally distributed, as assessed by Shapiro-Wilk's test ( $p > .05$ ), and there was homogeneity of variances, as assessed by Levene's test for equality of variances ( $p = .520$ ). The mean difference score for dialogue was higher in the tagging section ( $M = .62$ ,  $SD = .49$ ) than in the non-tagging section ( $M = .23$ ,  $SD = .57$ ) section, but this difference was not significant,  $M = .39$ , 95% CI [-.07, .84],  $t(22) = 1.75$ ,  $p = .093$ ,  $d = .74$ .

## 5.4. Mean dialogue scores by depth of reply

In teaching with AODs, instructors often pay particular attention to thread depth. Having deeper threads (with more replies) would seem to be an indicator of dialogicality; though this is not necessarily the case, since replies can be non-substantive in their content. In this study, great effort was invested to code the content of posts for their dialogicality. This enables us to assess the relationship between dialogicality and thread depth.

When we compare mean dialogue scores by depth of reply levels across all of the posts in the study (ie. both sections over the entire semester), an interesting pattern emerges. Looking at Table 5.4 we see that the mean dialogue score is 1.78 for all posts, with a thread depth of 1; but this rises to 2.33 for posts with a depth of reply of 2. Posts with a depth of reply greater than 2 were rare in the study, but for the 5 posts with a depth of reply level of 3 we see another rise in mean dialogue score, to 3.00. There was only one thread that reached a depth of reply of 4 in this study. This unique thread will be considered in detail in the next section.

**Table 5.4 Mean Dialogue Score by Thread Depth for all Posts**

Depth of Reply	N	Mean Dialogue Score	Standard Deviation
1	464	1.78	1.03
2	108	2.33	1.14
3	5	3.00	1.00
4	1	6.00	
Total	578	1.90	1.09

A Kendall's tau-b correlation was run to determine the relationship between depth of reply and dialogue scores amongst 24 participants. There was a moderate, positive association between depth of reply and dialogue score, which was statistically significant,  $\tau_b = .202$ ,  $p < .001$ .

## 5.5. Sustaining dialogue through hashtags that support increased depth of reply

Of all posts generated by the tagging section in the tagging phase of the semester, 86.5% were assigned at least one tag. The mean number of tags per post for the tagging section in discussions where tagging was requested was 3.12, with a standard deviation of 1.65. The median was 3 tags and the mode was 4. The largest number of tags in a single post was 9. A total of 762 tags were generated by the tagging section in the tagging phase for all posts considered as part of the study. Table 5.5 shows the distribution of posts by number of tags per post for the tagging section in the tagging phase.

**Table 5.5** Frequency Distribution of Posts Over Number of Tags for the Tagging Section in the Tagging Phase

Number of Tags	Frequency	Percent	Valid Percent	Cumulative Percent
0	33	13.5	13.5	13.5
1	9	3.7	3.7	17.2
2	23	9.4	9.4	26.6
3	58	23.8	23.8	50.4
4	85	34.8	34.8	85.2
5	28	11.5	11.5	96.7
6	5	2.0	2.0	98.8
7	2	0.8	0.8	99.6
9	1	0.4	0.4	100.0
Total	244	100.0	100.0	

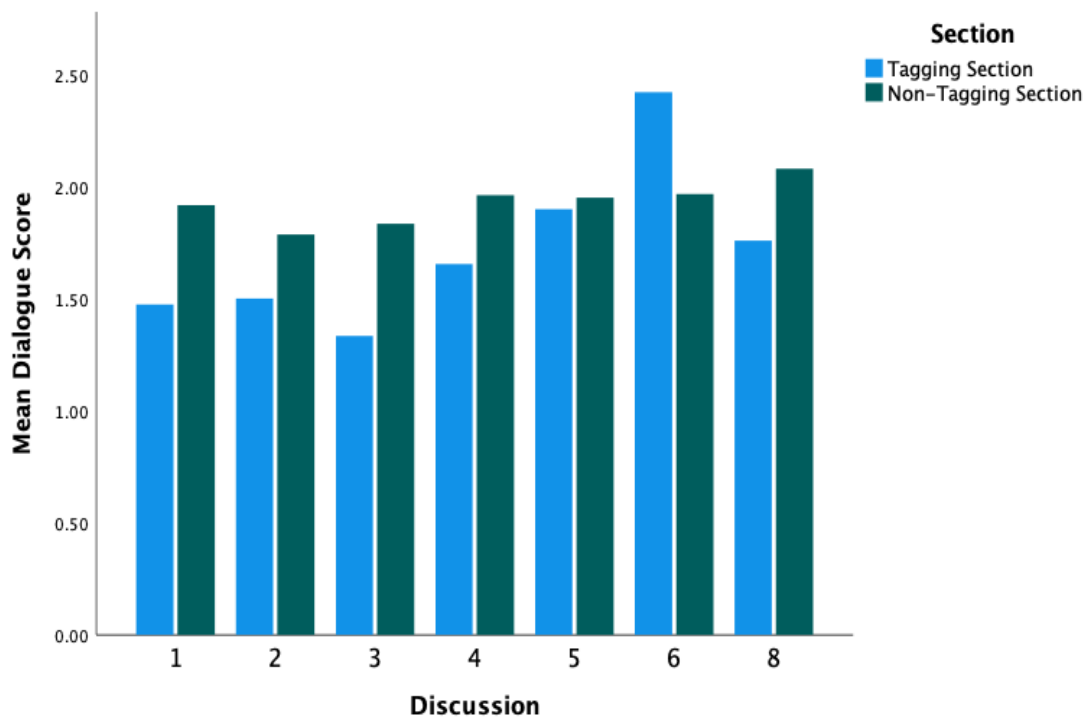
### 5.5.1. Instructor-generated hashtags

In discussion number 6, students in the tagging section incorporated a position-taking structure into their tags. As discussed previously, students were instructed to label their initial synopsis-style post with either #SN\_agency or #SN\_determinism, as well as provide a list of keywords to summarize their reading. In the following week, students in both sections were encouraged to go back to discussion number 6, read the synopses of



other students, and develop a dialogue on the orientation of the original reading in order to generate ideas for the final written assignment in the course. In this week we see a dramatic increase in mean dialogue scores for the tagging section. In fact, this is the only discussion in which the mean dialogue score in the tagging section exceeded the score in the non-tagging section, which the reader will recall was higher from the beginning of the semester. Scores for the non-tagging section remained relatively consistent across all discussions, as shown in Figure 5.4.

**Figure 5.4 Comparison of Mean Dialogue Score by Discussion by Section**

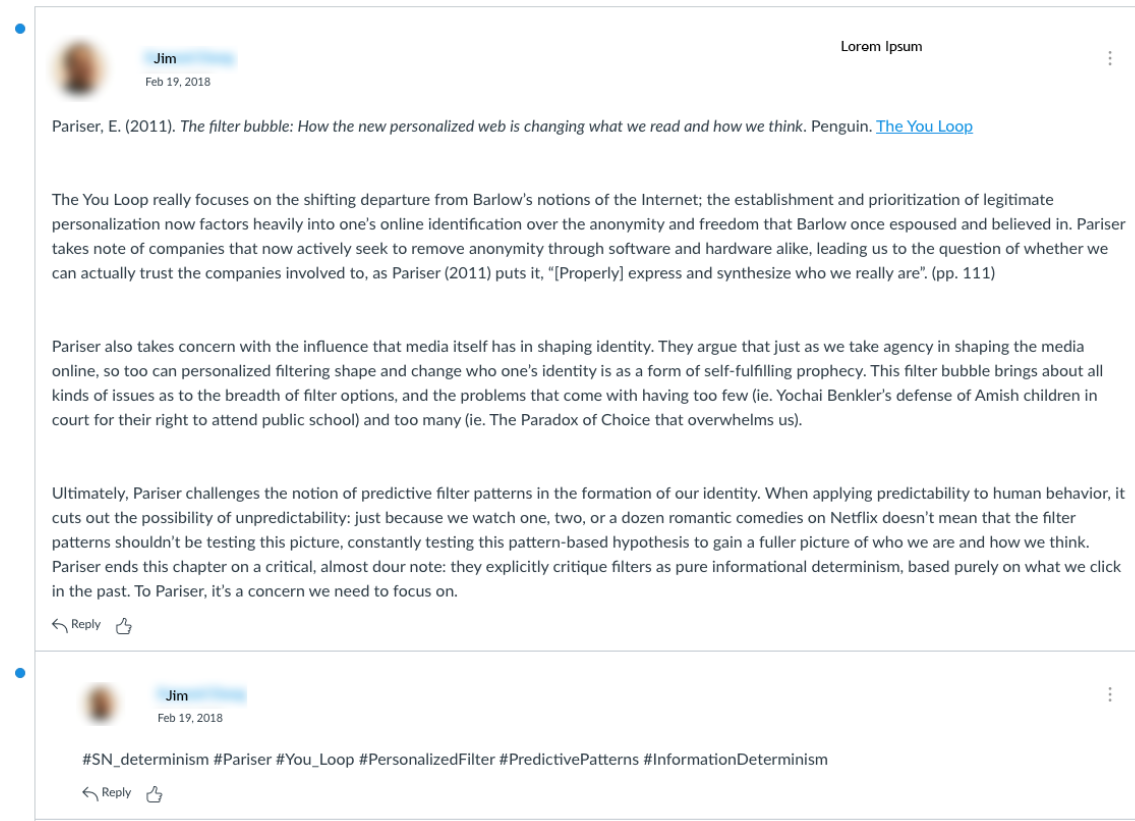


### 5.5.2. Example of dialogic exchange supported by hashtags

The following figures are used to present an example of an exchange between two students that occurred in the tagging section during discussion 6. It has been included because it consists of an exchange of posts that led to the highest depth of reply score (4) recorded in the entire dataset. It provides a demonstration of how hashtagged keywords can be used in an online discussion to sustain dialogic exchange over extended periods of time, in this case a total of six weeks. The first screenshot contained in Figure 5.5 shows the original post, by one of the students (Jim) who has

provided a synopsis and commentary on one of the readings for the class. The student then replied to their own initial post with a list of keywords, including the instructor-generated hashtag choice of "#SN\_determinism".

**Figure 5.5 Initiating the Thread**

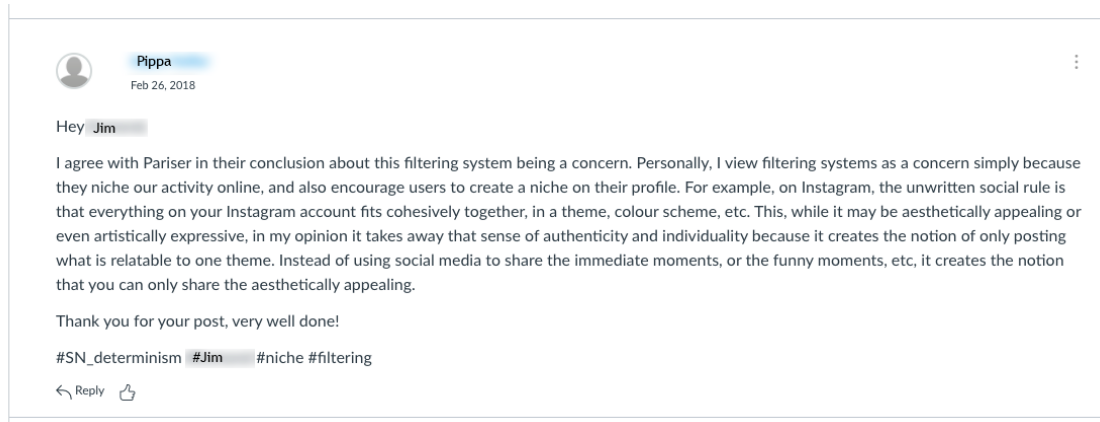


Students in this discussion in the tagging section were asked to pick one of the tags "#SN\_determinism" or "#SN\_agency" to describe the general orientation of the reading that they had picked for the week. The tag was to indicate whether the student felt that the reading was leading in the direction of making the case for determinism or agency with regard to the communicative value of social networking sites. In this example, the student (Pippa) also included a hashtag for the author of the reading (#Pariser), as well as four other descriptive hashtags (#You\_Loop, #PersonalizedFilter, #PredictivePatterns, and #InformationDeterminism).

In Figure 5.6 we see the first reply, scored with a depth of reply of 1, posted the following week. Pippa included "#SN\_determinism" to indicate their assessment of the general orientation of the reading that they had chosen as well as "#niche" and

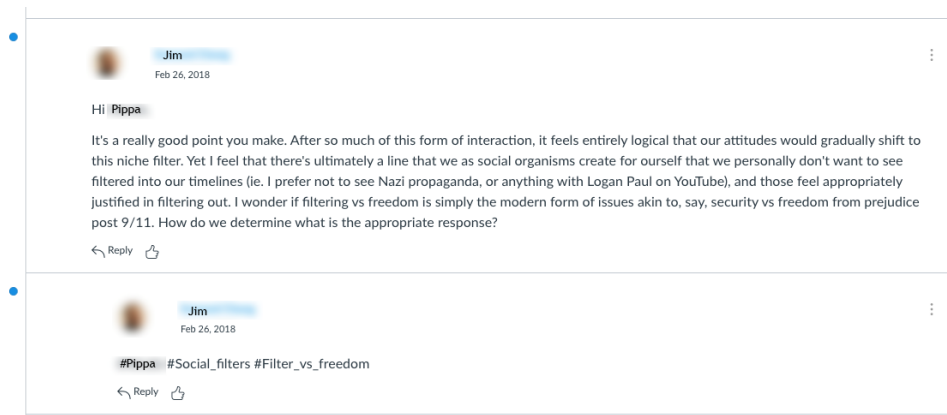
"#filtering" to describe the content in their reply. In this reply we can see a clear connection between the dialogic orientation of the post and the hashtags provided. Pippa is making an argument for the determining aspects of a social media platform (Instagram) based on how users create a niche on their profile and how this is then presented to other users.

**Figure 5.6 Depth of Reply Level 1 with Accompanying Hashtags**



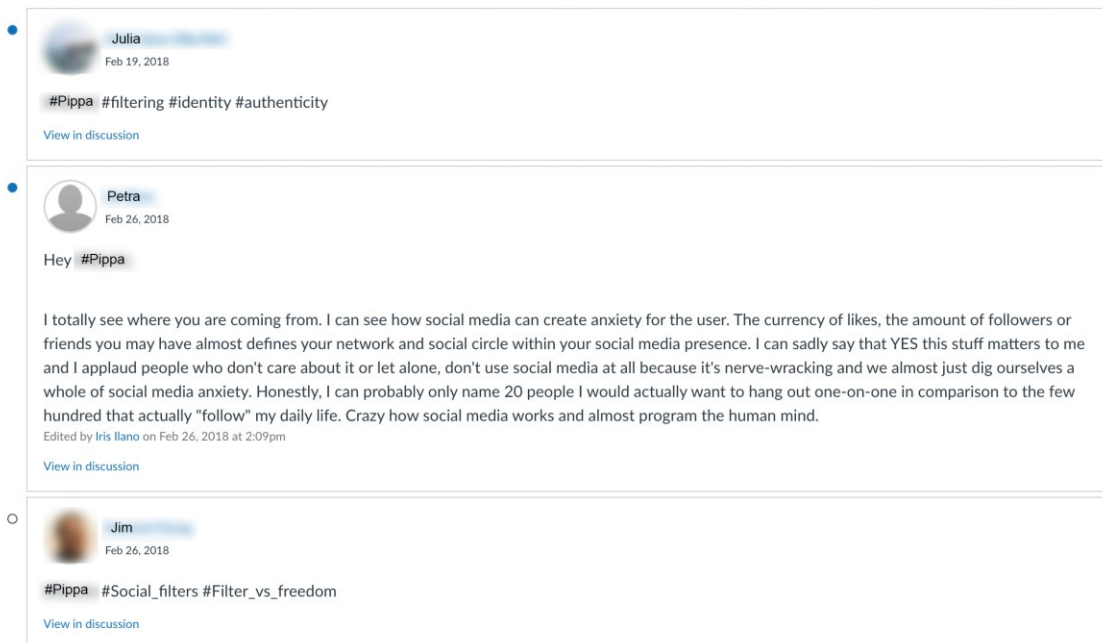
In Figure 5.7 we see Jim's response to Pippa on the same day. He has attached his keywords (#Pippa, #Social\_filters and #Filter\_vs\_freedom) in a direct reply to his post, as instructed. Taken together, these three hashtags provide an 'address' for the student's reply by clearly indicating a response to a chosen speech partner, but also by providing an overview of the content and an indicator of a very specific point that they are making with regard to a balancing act between providing access to appropriate content online and other issues related to security and ethics.

**Figure 5.7 Depth of Reply Level 2 Post with Accompanying Hashtags**



This post could be found very quickly by Pippa, simply by typing "#Pippa" into the search bar in the discussion. She could then decide whether to reply or not based on the accompanying hashtags in any of the posts returned by that search. In Figure 5.8 we can see a portion of the search result<sup>14</sup> that is returned when "#Pippa" is entered. The middle post is an example of a student who included "#Pippa" directly in the body of the reply. It is worthwhile to consider the difference in search outcome that this yields. From the perspective of a student making a decision about which post to reply to, it is much less time-consuming to scan through a short list of hashtags than to read entire posts. Potentially, this allows students to make meaningful choices in terms of picking a speech partner when presented with a relatively large number of choices of posts, with a much smaller time investment per post.

**Figure 5.8 Sample of Posts Generated by Search for "#Pippa"**

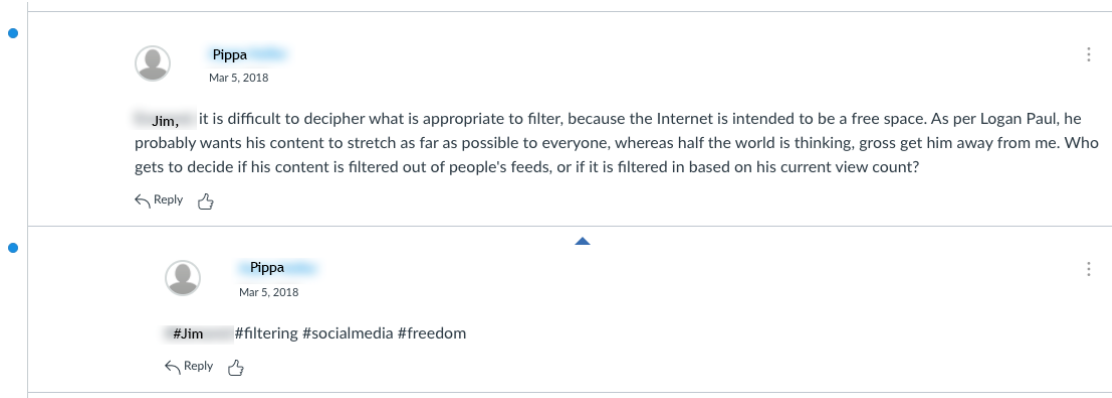


Next, in Figure 5.9, we see Pippa's second reply (depth of reply score of 3) one week later. In this post, Pippa follows Jim's example and includes her hashtags in a reply to her own post as instructed. The inclusion of the hashtag "#freedom" in the tag set

<sup>14</sup> Only the posts of students participating in the study are shown in this figure; the names of students who did participate have been altered to protect their identity.

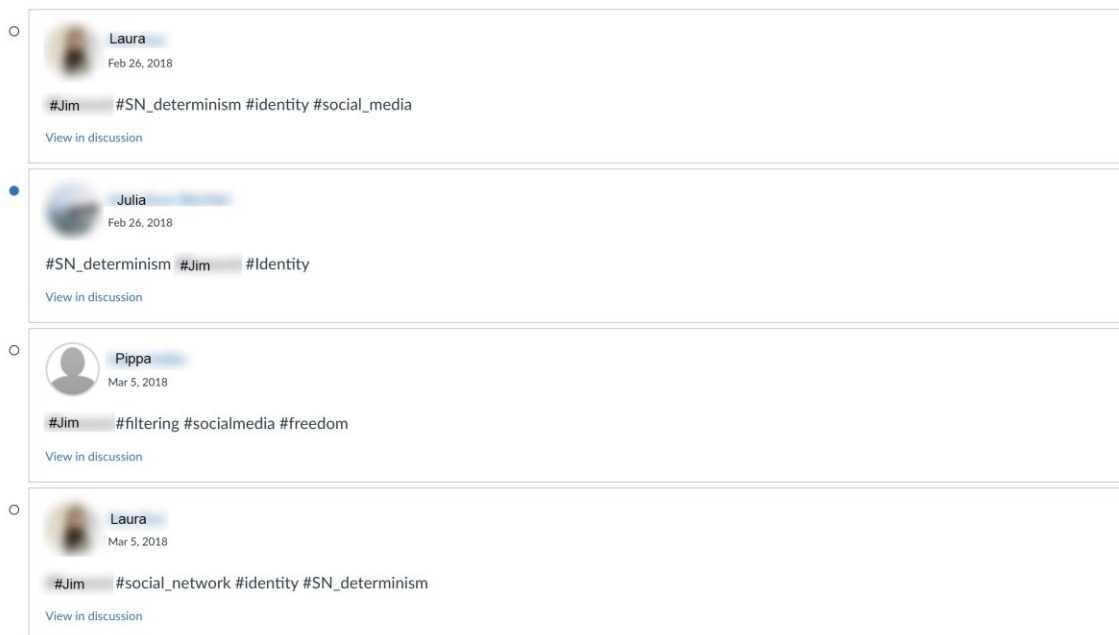
suggests that a dialogic positioning is occurring in this post in relation to the instructor-generated hashtags of agency vs. determinism.

**Figure 5.9 Depth of Reply Level 3 with Accompanying Hashtags**



Below in Figure 5.10 is a sample of posts that would be returned when Jim typed #Jim into the search bar:

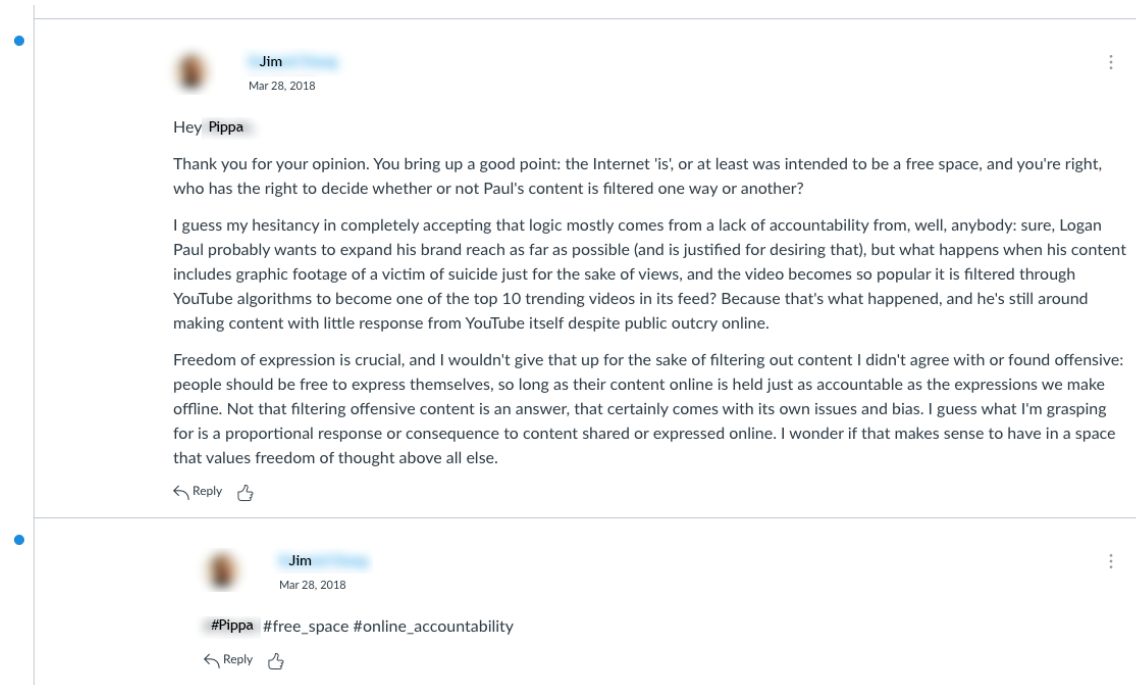
**Figure 5.10 Sample of Posts Generated by Search for "#Jim"**



From this list, Jim would be able to monitor for any responses to his posts and then make a choice about which posts to respond to. Jim chose to respond to Pippa on March 28th, roughly five weeks after he had initiated this thread. Shown below in Figure 5.11 is the final post from Jim in this exchange, with a depth of reply score of 4. He

continues in the established vein of dialogue with the hashtags "#free\_space" and "#online\_accountability". These tags have been picked carefully to frame the response within the ongoing exchange as related to the broader course theme related to agency and determinism. The depth of reply level of this exchange between Jim and Pippa was unique in this study, as no other post was scored with a level of 4. (As shown in Table 5.4, 80.3% of replies occurred at a thread depth level of 1.) This is a result that is generally consistent with prior research in this area. For example, Guzdial (1997) in a study of 18 classes at Georgia Tech, found that the majority of discussion threads contained essentially a single message and a response to that message. Other studies, such as Hewitt and Teplovs' (1999) study of seven graduate classes at the University of Toronto, have had similar findings.

**Figure 5.11 Depth of Reply Level 4 with Accompanying Hashtags**



This exchange between two students in the tagging section demonstrates how dialogue between students can be sustained over roughly a five-week period, in a semester using a system of hashtags applied to posts in an online discussion. Through this process students were able to enhance their engagement with course readings and other learning resources. This exchange stands out as an example of the kind of dialogic exchange that can be supported through the use of hashtagged keywords to provide a

structure of addressivity in online discussions. As Hewitt (2005) noted, the importance of sustained interaction in online discussions has been a recurring theme in the literature. He also observed that while extended online dialogue in online discussions should be the norm, this is often not the case. It is possible that exchanges such as the one examined in this section will remain a rarity. On the other hand, it is also possible to envision future course designs that employ hashtagged keywords in ways that provide the potential for many more exchanges such as this one.

## **Chapter 6.**

### **Discussion**

#### **6.1. Introduction**

In order to react to Castell's call for action to provide a pedagogical response to the challenges posed by the networked society, we as post-secondary instructors need to proactively adapt to the Internet and how it is being used by our students. An important aspect of this strategy consists of finding new ways to promote dialogue and corresponding states of empathy within the medium. This will require specific teaching and learning designs that strive to enhance data information literacy among our students. Goldman and Scardamalia (2013) make the case that traditional pedagogical approaches have not provided sufficient contexts for supporting students as they develop the core requirements of becoming data information literate. In particular, there is an urgent need for citizens to develop the capacity to create coherence from large amounts of data available online. This will require students, as citizens in training, to develop strategies and competencies that will help them navigate through multiple sources containing conflicting as well as complementary information. Hashtags, as a form of searchable text, have developed as an emergent response by users to facilitate the navigation of vast amounts of information contained within various social media applications. In this study, the use of hashtagged keywords in online discussions has been explored as a potential intervention to increase levels of dialogue amongst post-secondary students. Correspondingly, a method of assessment has been employed based on content analysis to provide evidence regarding the efficacy of the intervention. In the following sections this evidence will be discussed in light of the particular challenges, limitations and implications involved. I will also discuss directions in which this line of research can be taken in the future.



## **6.2. Overview of Findings**

### **6.2.1. Viability of employing social annotation in online discussions**

One of the most basic aspects of introducing any kind of innovative pedagogical practice is the assumption that there will be a willingness on the part of students to participate. Before undertaking this study, it was not clear how students would react to social tagging in an academic environment. There is always a risk that students will simply not be willing to adopt a new type of learning activity, even if they have engaged in something similar outside the classroom. This possibility was a very real concern at the onset of the study, given that the issue of cognitive burden associated with using social annotation in online environments has been clearly identified in the literature. Kawase et al. (2009) for example, found this to be the case in their study of how Ph.D. students and postdoctoral researchers shared annotations using a web-based tool that allowed users to attach keywords and comments to various web resources. Jeong and Joung (2007) raised similar concerns in their work with undergraduate students and found that students using constraints in the form of message categories for posts actually inhibited challenges and responses to other students.

A key finding of this study was that there was a general willingness on the part of students to employ social annotation in online discussions. In the tagging section, students employed at least one tag in 86.5% of the posts where they were asked to do so, despite discussions not being graded. The mean number of tags per post in the tagging section was 3.12, demonstrating that for the most part students followed the instructions given around applying tags to their posts. Although tagging is potentially a cognitive burden that can add to the load asked of students, it was shown to be a viable learning activity. It is likely that most students have already undergone an extensive 'training' period in the use of social annotation by way of their accumulated practices of using social media for many hours per day over many years. The results of this study demonstrate that students may be both willing and able to adapt an existing base of practices built on the use of social annotation to the reading and comprehension of academic texts.

### **6.2.2. Training requirements**

Despite an overall high rate of participation in the tagging phase, it is important to note that the participation rates in the training session were quite low. Tagging was introduced to the tagging group in the fourth online discussion of the semester. This was deemed necessary in order to give the students time to adjust to the development of a new practice within their usual repertoire of behaviours concerning the use of online discussions. As was expected, many students did not apply hashtags in the way that was described in the instructions for the training session. The percentage of posts that employed any kind of hashtag was 48.2%. A mean of 1.64 tags were generated per post, even though students had been instructed to generate a minimum of 3 tags per post. This demonstrates the importance of a training phase when introducing a new kind of learning activity. In this instance, with a relatively small group of students, one discussion or week seemed sufficient for training, as the participation rate shot to 97.4% of students employing at least one hashtag (mean number of 3.53 tags generated per post) in discussion number five. For larger classes, the duration of the training period should be considered very carefully. It is possible that a minimum of two discussions or weeks would be required with larger groups. For this reason, it is recommended that learning activities involving tagging in online discussions that are critical to the functioning of a course should be preceded by at least two weeks of training.

### **6.2.3. Tagging fatigue**

Despite relatively high participation rates it was also observed that something like tagging fatigue occurred in the tagging section over subsequent discussions, as the rate of posts accompanied by at least one hashtag steadily dropped from a high of 97.4% in the fifth discussion to 85.5% in the eighth discussion. In future efforts, this fatigue factor should be taken into account through a combination of continual training efforts throughout the semester as well as a strengthening of the motivational factors involved. In this study, no form of assessment was directly tied to the output of the students in the online discussions. It is possible that adding a grading component for the online discussions could provide an additional motivational element. It is likely, however, that a better motivating strategy in this specific course would be to demonstrate more clearly to students how tagging their posts could be of benefit in terms of improving their written assignment that was based on the course readings that students were posting about.

This could take the form of further exercises that fully integrate the hashtags into an outline structure useful for writing assignments.

#### **6.2.4. Word count versus dialogue scores**

In this study it was observed that the mean word count per post<sup>15</sup> was quite similar across the tagging and non-tagging sections, as well as over the semester when comparing the pre-tagging and tagging phases. The stability of the word count stands in contrast to the differences in mean dialogue scores observed. Overall, there was a tendency towards an increase in dialogue scores for both sections over the semester, and a much more pronounced and significant difference for the tagging section. The relationship between the quantity and quality of text generated in online discussions is a complicated, yet crucial consideration in terms of assessing the pedagogical value of online discussions. If it is found that the text generated in posts is not connected to course content in meaningful ways, then we would naturally have to question the usefulness of the exercise.

In this study, the difference of mean dialogue scores across the sections and over the semester demonstrates a qualitative improvement in the discourse employed in the online discussions, as assessed by the application of the content analysis protocol. On the other hand, a simple word count did not reflect any substantial quantitative differences either between sections or over the course of the semester. This demonstrates the inadequacy of relying on simple word counts to assess the teaching and learning value of the content generated in online discussions. It is clear that some form of semantic assessment of post content is necessary. Combining both quantitative and qualitative approaches (i.e., counting the instances of the qualitative codes applied to posts), the content analysis method proved useful for constructing evidence that will inform the development of best practices for teaching and learning designs for online discussions.

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<sup>15</sup> Word counts for the initial synopsis style post that initiate each thread are not included in these figures.

### 6.2.5. Depth of reply and dialogue scores

In a typical online discussion using Canvas, it is not uncommon to find a pattern of response where replies are focussed near the top of a discussion. This problem has been referred to by Marbouti and Wise (2016) as “new post bias.” From a dialogic perspective this is an important problem to consider in the design of learning activities involving online discussion. It is clear that dialogue is limited when students reply disproportionately to posts that are simply more convenient to read by virtue of their position in a scrolling interface, rather than considering the meaning of the content<sup>16</sup>. Another common type of bias that operates to limit dialogue in online discussions is related to the mean depth of reply. If a group of 30 students are expected to write two replies in a week, it is likely that not only will most of the 60 replies be found near the top of a scrolling interface, but that they will also demonstrate a bias towards shallow depth of reply. Typically it is rare to see replies to replies, a kind of 'back and forth' pattern that is indicative of dialogic processes spread throughout the entire body of an online discussion.

In this study the mean depth of reply was 1.21 and the mean dialogue score was 1.90 across all posts considered as part of the study. Of the 578 posts considered, 464 had a depth of reply score of 1, 108 had a score of 2, and only 5 posts were scored as 3<sup>17</sup>. It was through the application of the content analysis method, however, that an important pattern could be observed in this study. There was an increase in the mean dialogue score with increased depth of reply across all posts in both sections. Posts with a thread depth of 1 were associated with a mean dialogue score of 1.78; but this score increased to 2.33 for posts with a thread depth of 2, and a mean dialogue score of 3.00 for posts with a thread depth of 3. As it turned out, there was only one post in the study scored with a thread depth of 4 and the dialogue score for this post was 6 – the highest dialogue score of all the posts. This is a pattern that was observed based on the posts from both sections across all the discussions considered as part of the study. If we accept dialogue as an important, if not essential, component of constructivist teaching

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<sup>16</sup> In the Canvas online discussion interface this means that newer posts are presented at the bottom of a scrolling interface.

<sup>17</sup> A score of 1 indicates that the post took the form of a reply to an initial post that began a thread. A score of 2 indicates a reply to reply and so on.

and learning designs, then depth of reply emerges as a core concern of the engagement potential for online discussions.

One of the potential benefits of using social annotation in online discussions is that they can provide an information structure for students that will help them to address their posts in a way that will support higher levels of depth of reply. In this study, a difference in the mean depth of reply score per post was observed between the sections during the tagging phase. The mean depth of reply scores were 1.01 for the tagging and 1.08 for the non-tagging section for the first three discussions (the non-tagging phase). In the last three discussions (the tagging phase), the mean depth of reply had risen to 1.13 for the non-tagging group, for a difference of 0.05. The difference for the tagging section was much more pronounced. In the tagging phase of the study, the mean depth of reply for the tagging section had risen to 1.39, a difference of 0.38. This indicates that there were many more replies to replies in the tagging section during the tagging phase of the course. If we imagine a conversation between a group of people in a physical setting like a table at a dinner party, a mean thread-depth of 1 is the equivalent of a situation where one person makes a statement, everyone at the table takes a turn to reply *exactly once*, and then the conversation ends. This would be regarded as a very strange situation, and nothing like the innumerable back-and-forth snippets of speech that are characteristic of what we would think of as typical conversation at a physically attended social gathering. Face to face conversations normally involve all conversation participants actively listening to the discourse as it unfolds as opposed to participants in AODs who may or may not be reading previous posts in a thread. This study provides evidence that social annotation in the form of hashtags can play a role in increasing the mean depth of reply in AODs, and that this can potentially support higher levels of dialogue in online discussions in post-secondary learning environments.

#### **6.2.6. #Addressivity**

It is possible that the difference of depth of reply observed between the sections in the tagging phase can be attributed to the use of a variety of different types of hashtagged keywords. Most took the form of freetags, open-ended descriptive words that students were asked to apply to their posts. They were encouraged to find words that identified aspects of the content that they thought were important by, for example, pinpointing specific theories or stances, or just general points about the content.

Students in the tagging section were encouraged to use the search function to find posts labelled with student-generated freetags when making decisions about which posts to reply to.

Students in the tagging section were also instructed to 'address' their posts by hashtagging the name of the person that they were responding to. As discussed previously, a decision was made to not use the '@' character for this function in order to keep things as simple as possible for students. This use of a hashtag is a simple way to improve the ability of students to find instances in a discussion where they had been replied to. For example, if a student was replying to a post written by a student named Suzanne, they were expected to include the hashtag #Suzanne in their reply. This was another workaround necessitated by the limitations of the online discussion function in Canvas. It allowed students to quickly find instances where other students had replied to their posts. By typing their own hashtagged name into the search bar, a filtered list of replies could easily be generated. Without hashtags, a student could still use the search function to search for their own name in a discussion; but this would bring up a relatively large list of posts including all the posts that the student had written themselves and any instances of overlap between their names and common words with the same set of characters. Using the hashtag naming system improved the specificity of the search by reducing the number of posts retrieved from a general search for their own name.

### **6.2.7. Instructor-generated hashtags**

Another type of hashtag that was employed in the study was used by the instructor to signify that a synopsis-style post initiating a thread had not been replied to. These tags were applied by myself as the instructor, and were contained as a separate reply to any unread thread-initiating post. An important aspect of this type of post was that the original hashtagged keywords were included along with the hashtag #unread. This was an attempt to make sure that replies in any given discussion were more evenly distributed, and to reduce the typical pattern of new post bias. This simple tactic drastically reduced the number of "orphaned" posts in the tagging section. In the first three discussions when this system was not yet employed, there were 12 thread-initiating posts that were not replied to by any other students. In discussions 5, 6, and 8, #unread tags were applied to any thread-initiating posts that had not received any replies. Across all three discussions there was only one instance of a post that had been

tagged with #unread that did not later receive a reply. The non-tagging group had a much lower rate of orphaned posts across the semester, even without the use of any tags. Of all thread initiating posts in the first three discussions, there were only 2 that had not been replied to. In discussions 5, 6, and 8, there were also only 3 initial synopsis style posts that had not been replied to. In some ways this should have been expected, as the non-tagging section appeared to be composed of a stronger group of students overall. This also speaks to the problem of small sample size employed in this study.

Given the success of reducing orphaned posts in the tagging section, it seems that the #unread tag is a potentially useful way to reduce new post bias. In terms of developing sustainable practices for instruction related to the use of hashtags in online discussions, it is recommended that wherever possible, students take on the responsibility of generating social annotations. In this case the application of #unread to unread posts by the instructor was quite an onerous task. It would be much more practical for students (from the perspective of an instructor) to take on this task. Students would be expected to apply #unread to their thread-initiating posts only if they had not received a reply within a specified time. They would also have to take the extra step of removing #unread from their thread-initiating post after they had received a reply. To clarify, the use of the #unread tag is functionally different than the use of the filtering mechanism in discussions in Canvas that allows students to identify posts that they haven't read by clicking 'Unread'. In the sense used in this study #unread meant that the post had also not been replied to; and this is an important distinction. Another difference is that when students in the tagging section typed #unread into the search bar they would be presented with a short list (usually 4-6 thread-initiating posts per week that had not been replied to by the following week) of options that also contained hashtagged keywords that allowed students to get a better sense of what the post was about and whether it was of interest to them.

When examining the mean dialogue scores by section and discussion, discussion number 6 stood out as the only discussion where the mean dialogue scores for the tagging section were higher than those for the non-tagging section (see Figure 5.4 for an overview). The mean dialogue score for the tagging section in this discussion jumped to 2.42. Considering that the scores for the non-tagging section ranged from 1.79 to 2.08, and that the scores for the tagging section (excluding discussion 6) ranged from 1.33 to 1.90, this was a noteworthy increase in scores for the tagging section.

Some of the potential explanations for the spike in dialogue scores have already been covered in this section. It is possible that the scores peaked in the 6th discussion due to the students in the tagging section having developed enough fluency with the practice of adding hashtags. The dialogue scores, however, dropped in the following discussion for the tagging group, down from 2.42 to 1.76. It is possible that at that point some form of fatigue had set in, and interest had dropped in the tagging section after having peaked in the 6th discussion. Another potential reason for the rise in activity in the tagging section in discussion 6 was that students were asked to label their original post in the form of a synopsis of a course reading on the topic of social networking as either taking the stance of '#SN\_agency' or '#SN\_determinism'. These tags are referred to as instructor-generated tags as opposed to the freetags that students were also asked to add to their posts. The theme of agency and determinism in relation to social networking services was one of the main themes of the course. Students in both sections were encouraged to consider whether the authors of the assigned readings in this week were taking a stance in their writing. Students in the tagging section took this extra step of actually applying this label to their synopsis style post.

In general, the use of instructor-generated tags or labelling constraints should be considered very carefully. In their study Jeong and Joung (2007) found that the requirement of using message constraints actually hindered argumentation among students. In this study, the instructor-generated tag took a simple dichotomous form that was covered in lecture material in this course, as well as other Communication courses. It is possible that in this case, an instructor-generated label in the form of a message constraint actually increased levels of dialogue in the discussion. It is important to be very careful about making this claim, however, based on the evidence provided in this study. For example, the relatively low number of participants could be seen as a limiting factor. It is also entirely possible that the peak in dialogue scores in the tagging section in this discussion was driven by factors other than the use of instructor-generated hashtags. In the following section, this and other limitations of the study will be discussed.

If we are concerned with raising the overall levels of dialogue attained within online discussions as a component of post-secondary instruction, then it makes sense to develop a learning design that works towards maximizing thread depth. In many undergraduate courses, students are expected to fulfill a minimum requirement of a



certain number of posts per week. In many cases this will involve an expectation of writing a mix of thread-initiating posts as well as replies to established threads. If most or even all of those replies occupy a thread depth level of zero or one<sup>18</sup>, then it is possible that an increase in the qualitative levels of dialogue as assessed through a content analysis coding scheme could take place when the mean depth of reply levels are increased. In this study, the pattern observed in the first three (pre-tagging) discussions in both sections was that there was a very high number of posts with a thread depth of one. The mean thread depth in the tagging phase for the tagging section increased significantly, accompanied by a higher mean dialogue score in that section as well.

### **6.3. Challenges and limitations**

#### **6.3.1. Managing the risk for conflict of interest**

As discussed previously, an abundance of caution was exercised in the research design and process of this work. This level of caution was necessary to protect the rights of students taking a course in a post-secondary institution. This caution did, however, affect the research process in fundamental ways. For example, it is possible that more data could have been available for analysis if the researcher (myself) had been able to directly manage the process of obtaining consent from students. Of the 36 potential research participants, permission forms were only obtained from 24. At this point it is impossible to ascertain whether this relatively low rate of participation was due to genuine concerns about the process on the part of the students, or was a by-product of the organizational complexity of having a third party manage the research permission process on a purely volunteer basis. Of course, not having a disinterested third party distribute, collect and manage the forms would have been a direct violation of the principles at play with the concept of conflict of interest. In future research in this area, it would be best to avoid the issue altogether by ensuring that the roles of researcher and instructor are separate. This would allow for a more precise management of research related resources like consent forms.

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<sup>18</sup> In this study thread initiating posts were scored with a value of '0' and direct replies to those posts were scored with '1'.

### 6.3.2. Lack of platform support for tagging infrastructure

As discussed previously, many attempts were made to find a platform for online discussions that directly supported the tagging of posts. The desired functional requirements included an extensive and ambitious list of features to support:

- instructor generated tags that students could associate to their posts
- setting requirements for the number of posts students should tag
- setting upper and lower limits for the number of tags generated by students per post
- allow searches of collections of tags through a visual interface
- search and replace functions for tags at a global level
- delete function for tags at a global level
- allow students to apply tags at multiple levels including text within a post, entire posts and multiple posts
- relinking of tags to different levels (for example, reapplying a tag from a single post to multiple posts)
- the ability for students to attach tags to their posts
- the ability to generate tag clouds
- lumping and splitting (ability to combine tags multiple tags and conversely separate them)

After extensive consultations with technical staff at SFU extending over a period of many months, it became clear that a technical solution offering the desired feature set outlined above was not attainable. In fact, it was made clear that there were no readily available platforms that could provide any of the desired features. The only solution that came remotely close to fulfilling the requirements would have been to use a blog-style platform that supported some rudimentary features of tagging. In the end a decision was made to not go in that direction, due to lack of support options at SFU, coupled with the reality of a steep learning curve for the vast majority of students.

In order to proceed with the study, a decision was made to attempt to use a simple system of hashtags within the existing online discussion structure of Canvas. Although many of the desired features of the initial requirements were not attainable using this method, the core concept of using hashtags to reduce long lists of posts to meaningful subsets was preserved. As rudimentary as this system was, it still allowed

the basic functionality for students to use hashtags to “address” their posts. A key consideration behind this decision was that the training required for students to learn how to properly use tags within a blogging system would have placed an undue burden on the students within the context of the class. This, coupled with the lack of support options, including the actual hosting of the blog on SFU servers (which was not possible at the time) made the option of blogging infeasible.

In many ways the use of hashtags worked quite well. There is something to be said for a simple system that is robust and easy to learn, versus a complex solution with a steep learning curve and many more possibilities for technical problems. On the other hand, it was necessary to go of many features that would have been beneficial for this study. The ability to easily aggregate tags into tag clouds or other forms of visualized representation, for example, would have been tremendously useful and interesting to work with in the context of the course. In any case, the workarounds developed to replace that kind of functionality did in the end provide the ability for students to access the foundational aspects of tagging through the use of searchable hashtags.

There are many important aspects of the students' use of hashtagged keywords that were unfortunately beyond the scope of this study. As valuable as it would have been to consider a wider range of the students' use of tags, these remained beyond reach for many reasons. In particular, it would have been informative to have been able to collect and analyze data related to the searches that students used when navigating through the AOD interface in Canvas. It would have been of interest to obtain specific data on the types of searches that students in both sections were using, whether there were differences in the quantity of searches employed, as well as data specific to the posts in terms of click analytics (number of views, duration of time to read, etc.). Many of the limitations of the current study are related to the fact that the originally desired feature set described earlier was simply not available to the researcher for technical and privacy reasons.

### **6.3.3. Methodological constraints**

There are, of course, certain constraints involved when conducting exploratory and descriptive research that can limit the scope of interpretation of the results. In this case, an association was observed between the dialogue scores in posts and the depth

of reply. It is possible that this association can be attributed to causes other than those considered in this work so far. For example, it is possible that students who were more diligent in their approach to responding to posts also happened to be more likely to invest care and attention in writing posts with more dialogic content. Another possibility is that students in the tagging section may have simply been responding to the presence of hashtags in the discussions as something novel. This would be another potential explanation, along the lines of a Hawthorne effect.

While these possibilities cannot be ruled out with the research design employed in this study, it is important to note that the results of this work are valuable in the sense that they could inform the design of future studies. Taking into account one of the other major limitations of this study related to potential conflict of interest, it is possible to conceive of other research designs more suitable for establishing confidence with regard to establishing causality. A controlled experimental design involving random assignment of research participants to condition and appropriate controls could be used for such a purpose. In order to move toward explanatory forms of research, however, we first need to establish an understanding of the conditions and variables at play. It is reasonable and perhaps even necessary to consider that exploratory and descriptive forms of research are essential steps in this development. This is particularly important when considering the potential pedagogical value of an intervention as novel as social tagging in online discussion environments.

#### **6.4. Potential considerations for future research**

The inertia that propels post-secondary teaching and learning design is an extremely powerful force that can in many cases override the need for change. As Brown and Duguid pointed out in the year 2000, universities are among the few institutions that have persisted throughout much of the previous thousand years. At the onset of a new millennium, they questioned where this mass of historical momentum might lead in the future. They referenced the opinion of Peter Drucker, a contemporary management theorist, who predicted the demise of the University within 30 years. As we approach the year 2030, we should now be in a better position to evaluate Drucker's pessimistic forecast. On the one hand, it seems to be a case of "business as usual": post-secondary institutions continue to attract students, and a precipitous decline is nowhere in sight. On the other hand, business as usual might be the phrase that best

describes the problem with higher education that Drucker was pointing out. According to Beghetto (2018):

Doing things differently is at the heart of creativity. But doing things differently is also risky. These risks are particularly pronounced in educational settings because schools and classrooms tend not to be places where thinking and acting differently is always encouraged or rewarded. Oftentimes existing ways of doing things make the most sense. (p. ix)

The practice of applying hashtags to various forms of digital media is a relatively new phenomenon. It is only since 2007 that the use of hashtags started to emerge on a large scale among Twitter users. It is worth assessing whether this is a practice worthy of incorporating into the design of teaching and learning activities in post-secondary environments, or just a passing fad. At this point I would argue that the use of social annotation in the form of hashtags is well enough established in mainstream usage to be considered as a potentially valuable component of pedagogical interventions that can be described as constructivist or dialogic. If we make the decision that there is potential value for forms of social annotation in the form of hashtags, the next consideration will be formed around the question of how we might go about implementing them in pedagogical practices and actual course designs.

Despite the challenges and limitations involved with the research presented in this dissertation, a number of potentially useful considerations have been identified as being important considerations for the use of hashtags in online discussions. Evidence has been presented that students will successfully engage with the activity of employing hashtags in online discussion posts, that hashtags are a viable form of intervention that can be employed to increase mean depth of reply, and that increased depth of reply can be associated with an increase in dialogue related to course content and themes. It was also demonstrated that students in the tagging section were able to successfully employ instructor-generated hashtags. On the other hand, a pattern of fatigue or diminished participation in tagging was observed in the tagging section over successive weekly discussions. The results of this study could be used to inform future research designs that explore the relationship between hashtagged keywords and dialogue in online discussions at the post-secondary level of education.

When considering all of the different discussions evaluated in this study, it is clear that one in particular stood out in terms of the quality of dialogue generated.

Discussion number six was the only instance in which the mean dialogue scores for the tagging section exceeded that of the non-tagging section. In fact, the mean dialogue scores for the tagging section in this discussion were the highest in the entire study. There are a number of considerations that should be taken into account when looking at this result. For example, in week six it is possible that the tagging section had reached a type of 'Goldilocks zone' balanced between the benefit of having established familiarity with the practice of tagging but not yet experiencing what could be described as tagging fatigue. Another explanation, however, can be traced back to the work of Clark and Brennan (1991) and the principle of least collaborative effort. In particular, this explanation focuses on how the process that they described as 'grounding' changes with established collective purposes:

If addressees are to understand what the speaker meant “to a criterion sufficient for current purposes,” then the criterion should change as their collective purposes change. So, too, should the techniques they exploit. Techniques should change, for example, with the content of the conversation-with what needs to be understood. (p. 136)

In discussion six, students in the tagging section were asked to employ either #SN\_agency or #SN\_determinism to label their posts. In both sections of the course the case was made that the weekly readings and subsequent discussions would provide the basis for students' final written assignment in the course. The agency vs. determinism was a major theme of the course, and explored at length in lectures and related course resources. It is possible that discussion number six demonstrated how a confluence of different factors or considerations can work together to support the process of grounding as put forward by Clark and Brennan. In this explanation, tagging was a grounding technique very well-suited to the medium of online discussions and more specifically, the collective purpose of supporting written assignments in post-secondary learning environments.

In the following sections, a number of potential areas of future research are outlined that follow up on the theoretical implications of the use of social tags in online discussions.

### **6.4.1. Collaborative learning environments**

Future research initiatives on the use of social annotation in online discussions would most likely flourish in constructivist teaching environments with a focus on generating dialogue that provides a discursive framework for supporting collaborative group projects. Looking back on some of the key attributes of collaborative learning environments there is a strong emphasis on: learners being able to share and reflect on each others' ideas (Hay & Barab, 2001), the role of negotiation and interpretation (Karagiorgi & Symeou, 2005), the facilitation of a variety of group sizes and types of interaction (Richey et al., 2011), and support for the interaction of multiple perspectives (Karagiorgi & Symeou, 2005). All of these key characteristics of collaboration require dialogue to function. As such, there is tremendous potential to support and enhance collaborative learning with the use of social annotation in online discussions.

In particular, teaching and learning situations that can be described as student-centered learning environments (SCLEs) offer a rich vein of possible areas of study. Access to multiple perspectives, resources, and representations form one of the core sets of values and assumptions of this perspective (Land et al., 2012). Looking at the results of this study, it is possible to envision future work focussed on how the use of different types of hashtagged keywords could enhance and support the interaction of different perspectives in authentic learning environments. In this sense it would be possible to bring together the voices of not only teachers and students but perspectives from outside the classroom as well, in the form of related field area experts, other types of public stakeholders such as non-profit entities, or even members of the general public.

### **6.4.2. Exploring motivational factors**

Another potential area of study that emerges from careful analysis of the current study can be formed around considerations of the motivational structure for the practice of tagging in online discussions. In the current study the use of hashtags was presented to the students as a way of effectively exploring course readings by having students pool their collective reading and writing resources. Students were expected to read only one of a short list of related readings each week. It was hoped that the use of hashtags would increase the likelihood of finding related posts from other students containing references to other course readings that would be useful in terms of completing the final

written assignment for the course. The motivation for employing hashtags from the student perspective was that it provided a mechanism for students to save time and effort by providing an organizational structure that could potentially enhance their individual work on the final written assignment in the class.

Future research in this area would be most appropriate in situations where the motivational structure for using hashtags in online discussions is made as clear as possible. The rationale for using hashtags needs to be made explicit to the students, and wherever possible be linked directly to formally assessed outcomes. Providing students with a way to potentially increase their grade on an assignment through the use of enhanced addressivity in the form of hashtags is an important motivational structure that could reduce tagging fatigue, and possibly encourage an increase in participation in the activity over time.

#### **6.4.3. Exploring growth in the value of hashtags with larger discussion sizes**

As highlighted in the previous section, a primary consideration for the implementation of a social annotation system in online discussions is that students need to perceive the activity as being a valid use of their time. Any investment expected on their behalf should be motivated by a sense of the utility of the practice. In this sense it is likely that the perceived value of a system of addressivity in the form of hashtags grows with the amount of text that has been generated in any given online discussion. Simply put, this means that using hashtags is more likely to be perceived as useful in larger online discussions. There is a point where scrolling through large amounts of text becomes so onerous that the practice and extra effort of having students address their posts becomes worthwhile. In the current study, each week was accompanied by a separate discussion. It might be that higher levels of dialogue could have been attained simply by combining multiple discussions into one very large discussion, or alternatively to have discussions last for two weeks rather than one week each.

A relatively obvious next step in developing an iterative research strategy on this topic would be to scale up the design by working with a mid-to-large-sized class. In the current study there were 36 students enrolled in the class, and of those 25 agreed to



take part in the study. In order to corroborate and expand on the results obtained in this study, moving to a class in excess of 100 students would be a good next step.

#### **6.4.4. Reducing the risk for conflict of interest**

One of the necessary challenges involved with the current study was that there was a potential for conflict of interest given that the instructor and the researcher were one and the same person. Given the exploratory nature of the work, this was difficult to avoid. For example, it would be quite an onerous 'ask' to expect another instructor to participate in a study involving a novel design intervention built around the use of social annotation in online discussions. There are many considerations that need to be weighed carefully in terms of the extra time and effort involved. If something were to go wrong in a class where research is being conducted, damage to professional relationships would be a real possibility. After having undertaken the current study and providing evidence for the viability of using hashtagged keywords in online discussions, it would make sense to move towards a separation of the roles of instructor and researcher. This would provide an opportunity to design a study with a reduced risk of conflict of interest.

To this end, it would be best to identify potential research scenarios involving a team teaching approach: in other words, situations where regularly taught courses are shared between a core group of instructors over time. Team teaching necessarily involves high levels of trust between cooperating instructors. It also requires the establishment of consistency of practice and course design across semesters, which could be useful for establishing baselines for comparison and supporting a wider variety of research designs and methods. For example, data could be collected over successive semesters to compare thread depth and levels of dialogue from an instance of a course run the way that it has been in the past without the use of hashtags, to a different semester where the use of hashtags has been incorporated. Given that instructors in these situations are already cooperating in many different ways, it would be far more reasonable to expect that an instructor would be willing to allow someone on their team to conduct research in this fashion. Knowing that students in this study were willing to participate in the learning activity, reduces the perceived risk involved with trying something 'experimental' in another instructor's class.

## 6.5. Conclusion

Specific modes or genres of discourse engender particular epistemic roles for the conversants, and these roles, in turn, engender, constrain, and empower their thinking. The bottom line for instruction is that the quality of student learning is closely linked to the quality of classroom talk. (Nystrand et al., 1997, p. 29)

It has been well over fifty years since the “birth” of the Internet in southern California. Considering the impact and historical trajectory of other forms of electric communication like the telegraph or telephone, it should not come as a shock that we are still struggling to come to terms with the full magnitude of the event. In the early years of the development of the Internet, and subsequently the World Wide Web, many claims were made about how networked computing would radically alter the field of Education. This is understandable given the immense power to exchange words and ideas that the Internet affords. If, as Nystrand argues above, there is a link between the quality of student learning and the quality of classroom talk, it may have been taken for granted that the potential of Internet-based solutions for communication like online discussions would necessarily lead to an improvement in educational processes and outcomes.

Writing from the University of San Diego in 2001, Andrew Feenberg reminded us that “the social impact of technology depends on how it is designed and used.” (2001, p. 83). The advent of radio broadcasting in the 1920s, along with advances in sound recording technology, launched what has become known as the audiovisual instruction movement (Reiser, 2001a). In 1913, Thomas Edison predicted the demise of the use of books in schools and the rise of motion pictures as the dominant form of instructional media. By the 1960s, it was widely recognized that motion pictures, even when accompanied by an audio signal in the form of television, had failed to replace the printed word in terms of delivering educational content (Reiser, 2001a).

A closer examination of the historical trajectories of instructional media and instructional design, as well as general perspectives on learning such as behaviorism, cognitivism and constructivism, shows that these are all intertwined in complex and subtle relationships that co-evolved over time. If we want to understand why any particular technology implementation in the field of Education has not lived up to expectations, we need to take into account many different factors. As Feenberg (2010)

argues, technologies often seem disconnected from their past, and the conditions within which they were developed are obscured:

No device emerged full blown from the logic of its functioning. Every process of development is fraught with contingencies, choices, alternative possibilities. The perfecting of the technical object obliterates the traces of the labor of its construction and the social forces that were in play as its design was fixed. (p. 7)

Every choice and alternative possibility that is part of the development process of any specific technological implementation for teaching and learning activities necessarily involves risk, and as a consequence a price to pay for failure.

As with any kind of pedagogical intervention involving technology, the attempt to use social annotation in the form of hashtagged keywords to enhance dialogue involves unknown unknowns. This study has identified several useful considerations for future practice and research. In future research, different methodological strategies than those used in the present may be applicable depending on the state of existing knowledge. In this exploratory phase, it made sense to initiate an iterative research approach in an attempt to identify potential considerations that could be used to inform future research and teaching initiatives. Over time this process will lead to the identification of relevant variables to be studied in future research, possibly using an experimental methodology.

Based on the evidence presented in this study a case can be made that employing searchable text through the use of hashtags in online discussions is a viable solution to the problems of new post bias and low thread depth. Both of these issues are important challenges to overcome if we want to improve the quality of dialogue in online discussions. The use of hashtags in posts allows students to employ a form of addressivity that increases the chances of the meaningful reception and decoding of their message. While it is still not possible to replace all of the signals that face-to-face speakers continuously encode and decode to allow them to 'tune into' the apperceptive masses of other students (in Yakubinsky's words) it is still possible to improve the dialogic processes involved through the use of specific hashtags accessed through the search function. Teaching and learning are emergent processes filled with complexity and surprises at every turn. Taking the next steps will involve a careful consideration of the results of previous studies in order to proceed towards a goal of the successful

implementation of new techniques and practices and the enhancement of dialogic pedagogy.

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## Appendix.

# Content Coding Scheme for Educational Dialogue Analysis in Online Discussions

<b>(C)ONNECT</b>		
<b>OVERVIEW:</b> Make explicit links to ideas/positions/arguments/artefacts/examples/prior contributions or knowledge from both within the immediate dialogue or context, and beyond.		
<b>Communicative Act</b>	<b>Description</b>	<b>Examples</b>
<b>C1</b> Connecting to existing content in thread	Making a specific reference to material contained in existing posts within the thread. To count for a C1 learner needs to make a clear reference to the material in a thread through direct repetition or paraphrasing.	<b>Accepted:</b> With a clear emphasis on the protagonist, this reading helps steer our direction in how we can form and tell a story about a protagonist effectively.
<b>Boundary Markers</b>	It is not enough for a learner to make qualitative judgments about the value of the material without making a specific reference.	<b>Not Accepted:</b> I read this article as well. Your analysis is very clear and concise, <i>it gets right to the point of</i> the Fuchs's essay. <b>Not Accepted:</b> <i>I really liked your way of describing the main points</i> , I honestly got really weighed down by all of the history explained and all of the dates and names used, but <i>the way you broke down the article and simplified it</i> to the core concepts helped me understand even better!
<b>C2</b> Connecting to any other material beyond the immediate thread but limited to the online discussions within the class and associated readings	Making a specific reference to material from any other post from any discussion in the course beyond the immediate thread. If it is the synopsis from an initial post in a different thread the title or author does not need to be included.	<b>Accepted:</b> This is an interesting thing to look at and it actually <i>plays along with the Humphreys article</i> on Network analysis, talking about degrees of connection between people in a network. <b>Accepted:</b> <i>The article that I read</i> focused more on regulating streaming services and paying more for faster speed,
<b>Boundary Markers</b>	It is not enough to make references to articles in general or themes from different sessions (weeks).	<b>Not Accepted:</b> We do have a sense of priority to some extent, and <i>sometimes these articles</i> tend to smooth over that idea. <b>Not Accepted:</b> The idea of surveillance keeps coming up in discussions, <i>last week</i> and in other courses.

<b>C3</b> Connecting to any other resource in class	Making a specific reference to any knowledge or learning resource used in this particular class, including lecture materials and in-person learning exercises.	<b>Accepted:</b> This got me to think <b>about the podcast we just recently heard in lecture.</b> After hearing the news about the man being dragged off the airplane... <b>Accepted:</b> I would disagree with the writers of this piece, because I do see the potential problems of networking and technology-based communication. I see networked individualism as a problem as it is becoming so dominant that interpersonal skills are reducing. For example, if you look around a classroom before tutorial or lecture, you see a majority of people on their mobile devices - no one is talking. Then, when we do activities such as the one performed in lab today where we had to shake hands and introduce ourselves, people are shy, avoiding eye contact, giggling, etc.
<b>Boundary Markers</b>	The reference must made be to something specific, not just the topic or theme of a different week in the semester.	<b>Not Accepted:</b> I think this article actually relates to <b>what we are looking at this week</b> , Social Networking...
<b>C4</b> Connecting to any other class in Post-Secondary experience	Making a specific reference to any knowledge or learning resource used in any class from the students' experiences in the University, including lecture materials and multi-media sources.	<b>Accepted: <i>I am taking another course</i></b> , which challenges us to take a look at our "needs" in life. According to William Glasser, we have 5 basic needs in life: Survival, Acceptance, Pleasure, Freedom, and of course, Power!
<b>Boundary Markers</b>	The reference must made be to specific class, not just the topic or theme of a different week in the semester.	<b>Not Accepted:</b> The idea of surveillance keeps coming up in discussions, last week and <b>in other courses.</b> <b>Not Accepted:</b> I also did this read and found that it breached topics that are <b>widely discussed in interactive arts classes</b> as well.
<b>C5</b> Connecting to wider contexts	Bringing knowledge from outside of the classroom or school (i.e. beyond, before or after the current lesson) into the discussion of what is being learned, relating previous experiences outside of the post-secondary experience, linking given and new information. This may include personal experience/memory, or anecdote. The text must provide a specific example, it is not enough to state something abstract about technology, without	<b>Accepted:</b> there is a <b>very good short on youtube</b> that tackles this issue of putting your best self online and how that affects your perception of the actual world around you. (link provided in original post) <b>Accepted:</b> I agree with the previous comments as I have this weird connection with people online, <b>one of my closest friends for 10 years</b> lives on the other side of the country and we have never met yet the online world brought us together one day randomly in Halo 3 and the rest was history. <b>Accepted:</b> it is difficult to decipher what is appropriate to filter, because the Internet is intended to be a free space. As <b>per Logan Paul</b> , he probably wants his content to stretch as far as possible to everyone,

	<p>mentioning something concrete or specific.</p> <p><b>C5</b> given when material provided by the learner is not captured by any of the other C categories and when it specifically and clearly goes beyond the material covered in the readings and lecture materials of the course, as well as other courses in the learners post-secondary experience by providing specific examples.</p>	<p>whereas half the world is thinking, gross get him away from me.</p> <p><b>Accepted:</b> How have we become used to the idea that one person (<i>i.e. Mark Zuckerberg</i>) can make so much money off our personal information?</p>
<b>Boundary Markers</b>	<p>It is important that the learner go beyond paraphrasing ideas, concepts and examples given in previous posts. They must make reference to a concrete example.</p>	<p><b>Not Accepted:</b> We can find <i>various examples</i> from world events today.</p> <p><b>Not Accepted:</b> your summary of the emergence and importance of networks was very interesting and found them to be very applicable to real life examples. It helped put into perspective how <i>I currently use social networks</i> and how I can further use them.</p> <p><b>Not Accepted:</b> it is indeed problematic when technology becomes controlling over our identities and representation, as they are rarely fully accurate and has <i>limitations in terms of race, gender and sexual representations</i>.</p>
<p><b>Make (R)EASONING Explicit</b>  <b>OVERVIEW:</b> Provide or elaborate justification/evidence or explanation of reasoning or the process of arriving at a solution.</p>		
<b>Communicative Act</b>	<b>Description</b>	<b>Examples</b>
<b>R</b> Explain or justify	<p>Posts coded <b>R1</b> should indicate a <b>clear attempt</b> at reasoning, typically (but not necessarily or sufficiently) through key words such as 'because', 'so', 'therefore', 'thus,' 'in order to', 'if...then', 'not...unless', 'it's like...', 'imagine if...'. The attempt need not be 'successful' - that is, reasoning need not be judged good in order to be coded. For <b>R</b> code, the coder does not need to assess the validity or correctness of the attempt; simply trying to use reasoning counts.</p>	<p><b>Accepted for USE OF EVIDENCE:</b> I like the point when you brought up the difference between regulation of phone provider vs. internet provider. I had never really thought about this before, <b>but it does seem like</b> phone service providers are more strictly regulated compared to the internet (<i>ex. data usage, text message limits, phone call limits, voicemail limits</i>).</p> <p><b>Accepted JUSTIFICATION:</b> Read the same article and <b>totally agree</b> on labelling it as deterministic. <b>Mainly because</b> of the filter bubble you conveniently said. Social media these days limits our perspective, due to its algorithms based on preferences.</p> <p><b>Accepted for ARGUMENTATION:</b> I am also <b>not sure if I agree</b> that we should normalize algorithms, <b>as we have</b> all learned the ways in which they hinder</p>

	<p>Text coded with R can take the form of: an <b>explanation, justification, argumentation</b> (providing an argument or a counter-argument), <b>analogy, categorisation, use of evidence</b> (providing examples), <b>prediction, hypothesis, or extrapolation.</b></p> <p>To qualify for an <b>R</b> two components need be present in the post: 1. the statement of a clear position/opinion <b>as well as</b> 2. some form of justification/evidence/explanation as described above that is clearly linked to a position/opinion taken by the learner. The position stated can be taken from a previous post in the thread (as is the case with agreements and disagreements) or a new position/stance formed but it needs to be clearly stated and connected to the existing material in the thread.</p>	<p>human expression, <b>as seen through</b> Facebook News Feed algorithms.  <b>Accepted for PROVIDE EVIDENCE</b> (provides specific example): I think you make a good point towards the end of your synopsis where you state that we write differently on different social media platforms <b>because</b> they are used in different ways. <b>For example, writing a Tweet</b> as opposed to an Instagram caption or comment.  <b>Accepted for EXPLANATION:</b> All of us like some kind of stories, whether it be fictional or real life experiences. Chances are, we don't always get the opportunity to perform a story or create a story for a wide audience, and that's <b>why</b> movies and theatres are so attracting; we like to watch other people's stories  <b>Accepted ANALOGY: I definitely agree that</b> social networks are a form of human interaction. I especially like the metaphor "web" when it is used to define the internet, <b>since it reveals</b> a 'natural' approach of networks. Just as a spider web, we become connected through our social networks. Our webs may all look different and that is because we all have different journeys, connections, and experiences online.  <b>Accepted for SPECULATION:</b> I find it interesting to come across this line, regarding network publics as a "space for people to gather, connect, and help construct society", after discussing the concerns over net neutrality. <b>Will these publics really be able to construct society if not everyone has equal access to them? I can't imagine so</b>, and I can't imagine Boyd taking the stance against net neutrality either.</p>
<p><b>Boundary Markers</b></p>	<p>Not given when learner establishes a position but doesn't connect the position given in the second sentence with any form of: explanation, justification, argumentation (providing an argument or a counter-argument), analogy, categorisation, making distinctions, use of evidence</p> <p>Learner establishes a position but doesn't connect the position</p>	<p><b>Not Accepted:</b> I wonder that sometimes as well. However, I personally still feel that social media does have positive contributions in terms of the effectiveness of our communication. <b>It probably also isn't possible to revert to the days before social media or remove social media from our society at this point even if we wanted to...</b></p> <p><b>Not Accepted:</b> I find it interesting that an explanation of why we like to use social media is because we like to talk about ourselves. The article that I read also</p>

	<p>established in the first part of the post with the last sentence. The last sentence establishes another position that is not directly connected to the first position.</p> <p>In this post there is not a clearly established position in the first place that moves beyond material presented in original post.</p> <p>The learner establishes a position but instead of providing evidence/argumentation/justification for that position asks a question back.</p>	<p>touched on this critique of social media. <b>I think that this is very true, although we as humans, might not want to admit that this is the reason why we like to use social media.</b></p> <p><b>Not Accepted: I found this article interesting as well.</b> It's interesting to see how much it has advanced from the past - from a small publicly owned computer network to now a global phenomenon - and how predominant it is in every single aspects of our lives nowadays.</p> <p><b>Not Accepted:</b> I think user generated content leads to more social action and engagement, which is really crucial in today's age. In your opinion, is user generated content a good way for social media to go, or no?</p>
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**(I)NVITE Elaboration or Reasoning OVERVIEW:**

1. Respond critically to ideas, perspectives, problems, situations or artefacts through: explanation, justification, argumentation, analogy, categorisation, making distinctions, use of evidence; as well as exploration of possibilities, prediction or hypothesising, speculation. The invitation has to be explicit through typical key words or phrases such as: 'why?', 'how?', 'what caused...?' for reasoning; or conditional phrases such as 'what would/could/might happen if...?', when asking for speculation/prediction.

2. Elaborate, reformulate, provide examples, extend/add to or build on contributions/ideas/theories; evaluate or (dis)agree with another's contribution/idea/theory.

<b>Communicative Act</b>	<b>Description</b>	<b>Examples</b>
<p><b>I</b> Invite elaboration or reasoning</p>	<p>Ask other(s) for justification/evidence or explanation of reasoning or the process of arriving at a solution.</p> <p>Use previous contribution to elicit further responses, inviting addition to or elaboration/clarification/(dis)agreement/positioning/comparison/evaluation of another's contribution or idea. Invite speculation/imagining, hypothesis, conjecture, or question posing.</p>	<p><b>Accepted:</b> 'I'm curious about how you think this came about historically, for example, why was the Soviet Internet doomed to fail in the first place?' Totally, networking may be done entirely through social media in the future, who knows?</p> <p><b>Accepted:</b> the authors approach of 'genres' looks like an interesting narrative to delve into more and I wonder if calling it that would shape how they are used.</p> <p><b>Accepted:</b> 'That is a really great example! I completely agree. I found the although the ASL Ice bucket challenge turned ASL into a common house hold word, but how many people actually dove into learning more about the condition?'</p>

	<p>A question mark suffices to count for an I code, even if the question intention or meaning is debatable. On the other hand, an I code can be given when there is no question mark when it is clearly marked with the intention of Inviting elaboration or reasoning marked by words like 'wonder', or 'would have liked to know more about...'</p>	<p><b>Accepted:</b> I am not sure how we could overcome this issue though, because social media is now so deeply engrained in our practices. Does anyone else have an opinion on the best approach to discuss the exploitative nature of social media with someone?</p> <p><b>Accepted:</b> <i>I actually wonder about</i> the entire idea of objectivity and impartial news, I don't actually believe that objectivity in journalism can exist</p> <p><b>Accepted:</b> <i>I would have liked to know more about</i> why Google was accused of being a "a major threat to freedom of expression and participation in cultural diversity".</p>
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**(P)OSITIONING and Coordination OVERVIEW:**

1. Taking a position/stance in the dialogue by: Evaluating different ideas/perspectives/arguments by comparing/contrasting/critiquing them; offering an opinion on the value or lack of value of an idea/position/argument/artefact in relation to the task at hand; explicitly acknowledging a shift of position; challenging other's arguments, beliefs or assumptions; stating agreement/disagreement/partial (dis)agreement with others.

2. Coordinating ideas by:  
Proposing to resolve differences/agree a solution; synthesising or bringing together ideas, or generalizing.

<b>Communicative Act</b>	<b>Description</b>	<b>Examples</b>
<b>P1</b> Synthesise ideas	<p>Bringing multiple perspectives or ideas into inter-relation and drawing out or distilling a key idea(s) / conclusion / implication. May include ideas from immediately preceding discussion or earlier in lesson / lesson sequence.</p> <p><b>Must include ideas from more than one person/source (two in total is sufficient).</b> May include own ideas in the collective synthesis. May include integrating or summarising or recapping.e.g. after class</p>	<p><b>Accepted:</b> I think if we <b>consider the example that you used</b> on how algorithms discriminate unfairly for travellers <b>and the point that I was making</b> about how Facebook has used algorithms to control what people see on their feeds <b>we can see that there is</b> a greater issue of online privacy at play.</p>



	brainstorm or during/at the end of a group discussion.	
<b>Boundary Markers</b>		<b>Not Accepted:</b> I don't think social media is completely good or bad. There's always a positive and negative things about it that we should be aware of, but it definitely does not fall completely to one side.
<b>P2</b> Compare/ Evaluate alternative views	Compare/evaluate at least two arguments / positions (may include own or other's), with explanation or justification.	<b>Accepted:</b> Personally I can see the positives of algorithms as a way of sorting information. But can see the harm in it as things start to lose their identity as they are constantly sorted into categories or given labels. <b>Accepted:</b> It's interesting to see that <b>Herring says that</b> there is no single definition for social media, <b>yet others like Meikle (2016)</b> takes great effort to quantify the elements that make social media unique. <b>Herring seems pretty explicit</b> in acknowledging the narcissistic quality behind social media. <b>Meikle's assertion</b> of social media being merely a redistribution platform of content would certainly seem to support that belief.
<b>Boundary Markers</b>	Must have some kind of explanation or justification, it's not enough to state that there are positive and negative aspects of a particular issue.	<b>Not Accepted:</b> It's an interesting debate between the two because, personally, <b>I think it goes both ways. I'm not heavily in favour of one or the other</b> because I can see why both men believe their view is correct. <b>Not Accepted:</b> I don't think social media is completely good or bad. There's always a positive and negative things about it that we should be aware of, but it <b>definitely does not fall completely to one side.</b>
<b>P3</b> Propose resolution	This act includes the result of seeking consensus/ agreement, either by suggesting a solution that could be shared by all, or by suggesting that participant should partially agree, or disagree entirely, after discussing a task, issue or problem. Other participants need not agree or share the viewpoint.	<b>Accepted:</b> I think there are definitely different ways without tampering with the 'privacy' or 'freedom' of the people. <b>One solution I can think of is</b> try to work on policies and the law in way that can target torrent sites. Perhaps working out a negotiation with different countries and implement regulations and laws regarding piracy. Or even if there is a global agreement as well. <b>Accepted: I think we're in agreement that</b> strong net neutrality would be the best option for protecting user privacy online.
<b>P4</b> Acknowledge shift in position	Participants acknowledge that they have shifted their position in response to the preceding dialogue. It includes clarifying a misconception or changing opinions/ideas/beliefs. There has to be evidence	<b>Accepted: I see what you mean, I agree with you now</b> that C is probably right, not B. <b>Accepted:</b> do you still feel less concerned about this issue? I think the opposite has happened to me, that <b>this course has</b>

	of the shift/adjustment in position or change of mind in the dialogue. E.g. <b>change in the argument or idea that the participant was exposing earlier.</b> It requires an explicit statement.	<b>opened up the possibilities of</b> our technology being overly controlling and deterministic...
<b>Boundary Markers</b>	Statements like 'I never really thought about that before' do not count.	<b>Not Accepted:</b> One thing I found really interesting is how it mentioned that Joseph Cambell's Hero's Journey concept always excluded women, which is <b><i>something I never really considered.</i></b>
<b>P5</b> Challenge or Disagree with position taken	Challenge/confront others' view/assumption/argument. The challenge must be evident through verbal (or nonverbal) means. Can apply to a challenge or disagreement that a learner has with either the position of another learner or a source reading used in the discussion.  A P5 should be given if a learner agrees initially and then also partially disagrees with the position of another learner or the content of a course reading.	<b>Accepted:</b> I like how you have organized your points <b><i>but do you really think that</i></b> the use of algorithms is only negative, aren't there some positive aspects as well?  <b>Accepted: <i>Your view on the restrictions to be placed on net neutrality are probably right,</i></b> given the example you provided and where this whole debate seems to be going. History shows that its probably going to happen. <b><i>But, I have an optimistic view.</i></b> Given the size of the internet, and how it has a global reach, I believe that there are enough people that can fight against and repeal any net neutrality changes.  <b>Accepted: I agree that</b> most stories need some form or structure based off these steps, <b><i>but I also find that</i></b> sometimes these steps do not always appear in this order within a story, which can be interesting.
<b>Boundary Markers</b>		<b>Not Accepted: I agree with that this article represents</b> agency within social networks, allowing individuals to more freedom with the technology to interact with many other individuals in a matter of a few seconds. We now have the freedom to contact anyone with the reach of a handheld device and that allows us and opens up many opportunities. <b><i>But, also I agree that with this,</i></b> there is also a negative side attached to this having all of this technology. <b>Not Accepted:</b> After reading this post I am not sure if I agree with the use of algorithms for things as important as politics and ethics.
<b>P6</b> Agree with position taken	One or more participants state that they agree with one other or a point made	<b>Accepted: I agree with you,</b> this reading indeed was connected to the video in class. <b>Accepted: I do somewhat agree</b> with the

	<p>in one of the readings. This act includes the result of seeking agreement, either by arriving at a solution or acknowledging participants' differences after discussing a task, issue or problem. Can apply to a challenge or disagreement that a learner has with either the position of another learner or a source reading used in the discussion.</p> <p>Weaker expressions of agreement can be accepted as long as the learner is clearly making an agreement within the context of the thread.</p>	<p>idea that social media allows us connect like we couldn't ever before.  <b>Accepted: I also thought the same!</b> We should be aware of the flaws of algorithms themselves, and equip ourselves with knowledge in order to better understand algorithms and their performance in different situations.  <b>Accepted: That is true,</b> Instagram has a really challenging algorithm that a majority of users are aware of, and disliking for the most part.  <b>Accepted: This is indeed an article that</b> talks about a deterministic approach towards algorithms.  <b>Accepted: Definitely.</b> Self-revelation is something that we can all relate to and is an important part of our own lives as well.</p>
<b>Boundary Markers</b>	<p>P6 is not given if the learner does not clearly identify a position taken by another learner or author of a reading used in the course and a clear agreement.</p>	<p><b>Not Accepted:</b> Arpanet <i>surely played</i> a significant role as a stepping stone towards the invention of the internet.  <b>Not Accepted: I like your point</b> that net neutrality is an important consideration in the discussion of online privacy.</p>
<p><b><u>(B)UILD on Ideas</u></b>  <b>OVERVIEW:</b> Make a relevant contribution to the dialogue by building on, giving examples, adding to, reformulating or clarifying one's own contribution or directly answering a question posed by another learner. Contributions should add something either in terms of content or in the way ideas are expressed; excludes repetition of one's own or other's ideas.</p>		
<p><b>Communicative Act</b></p>		
<b>B1</b> Answer a question	<p>Answering any direct question previously coded as an I</p>	<p><b>Accepted:</b> Thank you for your reply. <b>That was exactly the point I was trying to make.</b> If you are against internet censorship and think that 'fake news' is rampant you should -- in theory -- be one of the biggest supporters of net neutrality, as it directly impacts free speech/expression.</p>
<b>B2</b> Build on own contribution from a previous post	<p>Clarify, elaborate, exemplify or extend own opinion/idea/belief or question.  <b>B2</b> only given for a separate post referring back specifically to one's own previous post</p>	<p><b>Accepted: Yes this is actually what I was trying to get at in my above response to Joey.</b> It really doesn't feel like that we are being exploited when we participate in these social networks so even after doing all of these readings I do still find it difficult to fully grasp.</p>
<p><b><u>(R)EFLECT on (D)ialogue or Activity</u></b></p>		
<p><b>Communicative Act</b></p>		

<p><b>RD</b> Reflect on learning process/purpose/value</p>	<p>Comment/talk about the process of carrying out the collective activity or evaluate own performance. Or reflect on the importance, usefulness, purpose or outcomes of learning or of the task, as part of a collective activity.</p> <p><b>RD</b> can be given for expression of inability to understand something as long as there is a specific reason given</p>	<p><b>Accepted:</b> After reading the first two sentences of your post, <i>I instantly thought of the method we are using to approach the readings in this class. Instead of us each individually taking notes on the readings, we are all sharing the different perspectives and questions we encounter with everyone in our class.</i> This is similar to how the WWW and the idea of the internet was established, since it took a complex method and needed a combination of ideas and information to occur, as opposed to linear systems.</p> <p><b>Accepted:</b> Good summary! I also read this article, and I found it very interesting but a little bit <i>hard to understand because they included a lot of math equations.</i></p>
<p><b>Boundary Markers</b></p>		<p><b>Not Accepted:</b> I liked how you numbered the key sections of the article, which made it easier to understand. It's interesting what that the article mentioned about each individual being 6 steps from another because <i>I hadn't thought about it like that.</i></p> <p><b>Not Accepted:</b> <i>I had never really thought about this before,</i> but it does seem like phone service providers are more strictly regulated compared to the internet (ex. data usage, text message limits, phone call limits, voicemail limits).</p> <p><b>Not Accepted:</b> I find it very interesting that the human mind actually served as a model for designing the internet. <i>I did not know this fact,</i> but it makes sense</p>