



Exploring the Use of #Hashtags as an Easy Entry Solution to Enhance Online Discussions

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Abstract: Growing interest in online learning has instructors looking for new ways to engage learners in asynchronous discussions. Building on experiences with hashtag use to connect on social media platforms, the purpose of this study is to investigate the contexts of hashtag use and its associated impact on learner engagement in asynchronous online discussions. In more detail, this mixed-methods case study will answer the following questions: 1) How and in what context do students use hashtags in online discussions? and 2) In what ways, if any, does the use of hashtags promote engagement in an online community? Findings suggest that while classifying and organizing course information was a strong motivator for tagging posts, hashtags were also used to connect to others in the learning community, express opinions, and encourage knowledge building. The results from our study contribute to a better understanding of engagement with and through hashtag use.

Keywords: engagement, social media, online learning, tagging

Résumé: L'intérêt croissant pour l'apprentissage en ligne incite les instructeurs à rechercher de nouvelles façons d'engager les apprenants dans des discussions asynchrones. S'appuyant sur les expériences d'utilisation du hashtag pour se connecter sur les plateformes de médias sociaux, le but de cette étude est d'étudier les contextes d'utilisation du hashtag et son impact sur l'engagement



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des apprenants dans les discussions en ligne asynchrones. Plus en détail, cette étude de cas à méthodes mixtes répondra aux questions suivantes: (1) Comment et dans quel contexte les élèves utilisent-ils les hashtags dans les discussions en ligne? (2) De quelle manière, le cas échéant, l'utilisation de hashtags favorise-t-elle l'engagement dans une communauté en ligne? Les résultats suggèrent que si la classification et l'organisation des informations sur les cours ont été un puissant facteur de motivation pour marquer les publications, les hashtags ont également été utilisés pour se connecter à d'autres membres de la communauté d'apprentissage, exprimer des opinions et encourager le renforcement des connaissances. Les résultats de notre étude contribuent à une meilleure compréhension de l'engagement avec et via l'utilisation du hashtag.

Mots-clés: engagement, médias sociaux, apprentissage en ligne, marquage

Introduction

Right now, so many conversations are online. Learning online has taken on new significance in light of the COVID-19 pandemic. Accommodations for distancing have made everyone, not just those in the online learning community, think about how to best allow students to find ways not only to access information online but, ideally, to become part of a learning community as active, involved members. Learner interaction has long been considered one of the key components of effective distance education (Jung et al., 2002). With online education offerings growing exponentially, instructors are continuously looking for ways to communicate with diverse students and to help their students exchange ideas and information with each other. At the same time, we are at a pivotal moment, globally. Increased financial pressures and technological advances, combined with the almost urgent need to provide new ways to educate and allow various degrees of social distancing, make it imperative that we think deeply as educators about ways to optimize learning environments in simple ways.

Discussion boards provide a way for students and teachers to communicate online, across space, and usually asynchronously or not in an immediate time or space. Threaded discourse allows posts and replies to be branched and even broadened and, ideally, to “tease out the best ideas, and rally the community around promising new avenues of investigation” (Hewitt, 2001, p. 217). However, practically, this same freedom to enter a discussion at different points, to comment on other student posts, and then to reply multiple times to one’s own post and other posts can become confusing or even frustrating. Imagine, as a student, what happens when you enter a forum or conversation late, or participate early, then have conflicting time pressures and log back in and find more posts than you can read without a considerable time commitment: What do you choose to read? What if you miss something important?

While an active community of engaged students focusing on sharing and collaborating has its advantages, those very advantages are lost when the conversation grows across multiple threads around various topics, and participants feel overwhelmed with the problem of information overload in online learning communities (Dwivedi & Bharadwaj, 2012). Indeed, the same rich, productive conversation, with great ideas and examples from an engaged group of students, can sometimes also mean that the community members may not be able to find the relevant information of interest from the large pool present (Dwivedi & Bharadwaj, 2012; Gil, 2014).

Recently, researchers have studied the use of social media tools such as the like button in threaded discussions to facilitate community interactions and prevent information overload (Makos et al., 2013). As researchers and graduate students involved with the learning management system (LMS), PeppereR (<https://pepperproject.ca/>), we decided to look more closely at a new feature of our own LMS, hashtags (#hashtag), to see in what ways this relatively easy-to-access tool could help students enter the conversation, find and organize information, and belong to a learning community. PeppereR is an LMS designed to facilitate online academic conversations and to allow student interaction and participation in creating knowledge together online and in class using threaded discussions. Threaded online discussions have been suggested as an effective pedagogical tool which requires both cooperative interaction among students and individual active reflection of knowledge. The purpose of our current work is to investigate how hashtags were being used in two graduate teacher education courses at a public university, and suggest similar social media-based affordances that can help other students and instructors be productive, active learners in a virtual space.

Background and Literature Review

Online learning communities can contribute positively to enhancing student learning and satisfaction (Abel et al., 2010; Curtis & Lawson, 2019; Ellis & Cohen, 2009; Gil, 2014; Marks, 2011; Oliver & Shaw, 2003; Patel & Aghayere, 2006; Picciano, 2002; Sani et al., 2013). Online discussion forums are especially useful in discussion-based classes which focus on collaborative learning (Hamer et al., 2011; Hiltz et al., 1999). Students and teachers can be meaningfully involved in constructing and co-constructing knowledge (Gil, 2014, p. 17; Hiltz et al., 1999; Marks, 2011; Picciano, 2002). An online learning community is also active outside the classroom, with virtual discussions continuing when students think further about questions and answers while they complete other assignments or interact with their readings (Gil, 2014; Meyer, 2003; Patel & Aghayere, 2006). Students like to hear from their teachers online, but they also enjoy the increased dialogue and perspective when they participate in a wider dialogue with other students (Gil, 2014; Patel & Aghayere, 2006).

However, a rich and productive discussion can become incoherent and nonconverging when there are so many ideas developing (Ioannou, 2011; Thomas, 2002). A post may not necessarily build upon the one before, or the one it links to, despite being posted as a reply or response (Thomas, 2002). This diverging nature of online threaded discussions can be a limitation; students can struggle to enter the conversation or to get the central idea or core of the discussion, especially when the discussion has different thought trails that branch out simultaneously (Gil, 2014; Picciano, 2002; Thomas, 2002).

Threaded Discussion Helps Online Learning

One way to promote online discussions is to provide a forum specifically for threaded discussion. An online discussion forum provides a “platform for anywhere/anytime interaction and information-sharing among forum users” (Gil, 2014, p. 7). When the discussion allows for a threading or reply-based architecture, it attempts to provide a practical way for one user to comment or reply to another thread. Then, other users can add onto these threads. So, threaded discourse is a type of non-reply-based protocol that allows not only branching and broadening for new ideas, but also bringing together of promising new ideas and collating the thoughts and ideas of the community (Hewitt, 2001).

Asynchronous threaded discussion is thought to increase dialogic reasoning, critical thinking, and mutual understanding by explicitly positioning one utterance next to another in a way that connects, articulates, and reflects the meaning of the social interaction (Hewitt, 2005; Jeong, 2003; Makos, 2017). An online forum or discussion board is not successful unless it is adopted by students who contributed productively (Gil, 2014).

Gao et al. (2013) noted that threaded forums, while popular, “do not often foster productive online discussion naturally” (p. 469). There are constraints to being constructive online, including the challenge of maintaining focus. Also, many notes often remain unread (Gao et al., 2013, p. 473). Ideally, these forums serve as communication environments when ideas are reciprocated and responded to, and influence other ideas (Curtis & Lawson, 2019; Gil, 2014; Thomas, 2002).

But while online discussions hold the promise of collaboration and richness, the actual comments do not necessarily need to continue the conversation or build on each other (Marbouti & Wise, 2016). Students often feel frustrated when they enter a conversation. They often have no easy way to purposefully select threads or posts about what to read, which is an important precursor to engage students to make contributions that build on and progress the existing discussions (Marbouti & Wise, 2016). Students report few useful indicators to help them navigate the discussion when they are overwhelmed by the number of messages. Students will open messages at the top or bottom of the screen (Dringus & Ellis, 2005; Hewitt, 2005; Johnston & Badley, 1996; Teplovs, 2008).

Students Need a Space to Think

Research suggests that even though online discussions are popular, students are often challenged by the time required to read and participate (Gil, 2014). Students have a hard time finding the most relevant information (Gil, 2014). The organization of topics based on their time of origin and not according to conceptual information or ideas can inhibit the process of deep learning by students because they are not able to find relationships between a number of concepts (Ioannou, 2011). Students are challenged to determine a central or linking theme, and they become frustrated (Gil, 2014; Ioannou, 2011).

Students often report they are overloaded and find it difficult to keep up with the discussions when so much is posted online (Kear & Heap, 2007; Peters & Hewitt, 2010). Information overload happens when students can no longer process the posts or feel they cannot reply adequately (Peters & Hewitt, 2010; Vonderwell et al., 2007). Feeling overwhelmed or overloaded is directly related to the number of messages that are yet to be read when they log into the system (Kear & Heap, 2007). Also, even when a student

is investing in reading a long discussion, they sometimes struggle to find a relevant post for their own query (Robinson, 2011; Gil, 2014).

Practically, when a student is overwhelmed, they miss out on potential learning. Students cope: they skim notes, and they ignore others (Qiu et al., 2012; Peters & Hewitt, 2010; Avery et al., 2019). If the information they need is at the end of a long post, they may get frustrated and quit before reaching it (Gil, 2014; Robinson, 2011; Thomas, 2002). They may even stop contributing if they really feel overloaded (Jones et al., 2004). Thomas (2002) found that as the number of forum posts in a discussion thread increases, there is a related decline in the hit or read rate for each post. If a student is overwhelmed, and reads less before they post, their responses will be less a building on knowledge and more likely a duplication or repetition: “They end up posting their queries as new posts instead, thus starting a new divergent path and leading to duplication in forum posts” (Gil, 2014, p. 21).

Making online discussions less overwhelming for students is important. Educators still want to allow time for reflection, since we cannot assume that simply adding a new mode of communication will increase interaction. Interaction needs to be fostered and nourished in the community (Sarker & Nicholson, 2005).

A core goal of online discussion is meaningful discourse and development of personal and lasting understandings of course topics (Rourke & Kanuka, 2009; Oztok et al., 2014). Educators who want to give students a space to think have to consider how students will filter and manage incoming information (Hiltz & Turoff, 1985). One way is to use tools or systems that make the discussion more intuitive to enter (Kear & Heap, 2007; Wise et al., 2012).

What Is a #Hashtag?

A hashtag begins with the # or pound sign, followed by a group of words, or one word with no spaces, that makes a searchable link. Whenever a hashtag is added to a note in the threaded discussion, it is indexed and becomes searchable/discoverable. So, in practice, once someone clicks on that hashtag, they will be brought to a page that aggregates all of the posts with the same hashtag. These tags can then be used to bring together posts about specific topics, or to organize or group similar posts or inquiries together. In this way, hashtags can help online learners find topics that interest them, and connect individuals interested in similar topics in an online learning community. This type of association of ideas can motivate learners to take an active role in knowledge construction and meaning making (Avery et al., 2019). A hashtag tool can also allow a participant in an online conversation or community to see all posts that are centred around a particular topic together—consequently facilitating active, meaningful learning. Hashtags can be a way to bring together relevant information in an online forum or discussion. They can facilitate information diffusion, including user information sharing, dissemination, and acquisition of information (Zhao et al., 2016). Hashtags are a kind of recommendation tool which can help users, in large and sometimes information-dense conversations, navigate large amounts of information (Avery et al., 2019; Kalloubi & Nfaoui, 2019; Zhao et al., 2016).

Hashtags can be used to help in organizing information. In Twitter, a social network system that really popularized hashtags into widespread use, there is a great deal of discussion around how to recommend hashtags to users. There are three main ways to use hashtags in filtering. First, early systems used a topical-based recommendation system. Ding et al. (2012) linked hashtags to key phrase extractions. Later, Zhao and Chan (2014) used a collaborative filter to look at the local user and the global community to determine relevant hashtags. We can learn from this study that when

choosing hashtags, it is important to look beyond what one single user may choose as relevant hashtags. Hashtags will be more effectively used in online learning when they also take into account a wider community like a class or even a program. The second main way to use hashtags to filter involves temporal personal factors. Zhang and Cranshaw (2018) used the translation model of analytics, but also added a layer of personal and temporal factors. The rationale for including these factors takes different user perspectives into account. They also included space for looking at trends that were temporal, but that persisted for a time. For example, during COVID-19, hashtags that included that naming were popular as a means to further differentiate so many topics for consideration. Third, adding to global, temporal, and personal filtering, is a user-defined preference system. More recent recommendation systems look more closely at topics deemed important by the users alone using a hierarchical attention mechanism to combine information within the text of tweets with corresponding user history (Li et al., 2016).

Hashtags provide ways for participants to organize course materials and additional information for follow-up later by participants (Avery et al., 2019). Hashtags have become a ubiquitous and seminal feature of communication within social media (Erz et al., 2018), and are utilized in an array of social media platforms in students' personal lives. Hashtags are not just a temporary trend, but appear to be a permanent and crucial currency for users in digital environments extending beyond social media platforms. They also serve as a broadcasting function to increase visibility of content. Online, computer-mediated learning environments, such as an LMS, provide an ideal opportunity for students as active learners to apply familiar, intuitive hashtag communication actions within similar online community spaces.

Why Use #Hashtags?

Tagging is used in digital communication and information organization to add labels, called “tags,” to digital artifacts: blog posts, social media posts, photos, and video.

Tagging is a way to make ideas or pieces of information easier to find, sort, and share.

On the Web, tagging is more specifically used to encourage sharing, and is becoming more widely used in shared resources such as Creative Commons and open educational resource sites. Tags are user-defined when an author creates and uses key tags in their own published or promoted work, or pre-defined at a higher level by a group or class. Tags can also be added to webpages to make information searchable (Rennie & Smyth, 2019). Tags in digital media serve multiple functions: allowing search engines to locate and index content, allowing readers to select and view specific content, and alerting users when they are featured (tagged). In Twitter, tagging topics or events uses hashtags, and including an author is done with an “at” symbol and the Twitter handle in the post: e.g., @author. Tagging as a way to create an identification tag allows users of a forum or a discussion to become part of a conversation and to track their own posts and contribution.

Some real-time chat forums like Slack, Microsoft Teams, and Google Hangouts are predominantly synchronous and have a heightened expectation for quick responses. These chats are different from the longer threaded discussions in education and often have little distinction in the intertwined threads about what is important and what is not. Chat participants, however, often have similar issues, if they are not present in the real-time conversation, with struggling to make sense of the posts afterward. This challenge to sift through conversations is similar, in some ways, to those who log in after a few days to an online threaded discussion. Zhang & Cranshaw (2018) look at ways to use “sensemaking affordances” designed for other textual domains and information management. They suggest adding tags to important messages to

“contextualize them or differentiate them from unimportant messages . . . adding *structure* to the conversation . . . [to] allow related messages to be grouped” (Zhang & Cranshaw, 2018, p. 2). This idea of sensemaking includes other tools, such as highlighting and tagging, to help with “foraging loops” and to provide “contextual signposts to readers while navigating through and diving in to the discussion space” (Zhang & Cranshaw, 2018, p. 3). Their work is more about shorter chats, but the notions about contextualizing and organizing ideas to let the user enter the conversation in smarter and more strategic ways are good.

Another benefit of using a relatively easy or low-cost tool, such as tagging, in a discussion forum is that users are already familiar with tagging in social media. For example, Dennen et al. (2018) found that when introducing a tagging activity and tool to a group of students in an online discussion, most students could tag with a high rate of accuracy after a single, brief lesson. This study suggests students adopt the idea of using tags for online learning readily, and that they can successfully apply useful classes for their online tags to identify types of content pre-determined by the instructor. Also, students experimented with freestyle tags, which provided an opportunity for them to reflect relevant issues in their tagging organization.

Tagging, hashtagging, pinging, and linking are ways that different user groups can use forums and indicate their own roles, and even establish a hierarchy of contribution (Rohden et al., 2019). When participants are active in curating texts and information, Rohden et al. (2019) found that it was important for them to use their own tag and identify their own work in context. When the participants interacted in a more active way with the text, it gave them a much deeper interest in the text that they transcribed (Rohden et al., 2019). This project did not emphasize discussion about ideas, but the study is valuable because it shows how researchers and contributors interact online,

creating a knowledge typology since the users have multiple ways to interact with the forum.

Tagging with an author handle is simple and familiar like using a hashtag. It can be easily integrated into existing activities and assignments. Activities that involve categorizing information and attaching tags or labels—to organize information both for the student and for others who will also add to the student’s work—facilitate student-student and student-teacher interaction. Students are empowered when they integrate tagging to organize and share instructional resources (Tu, 2013). Ideally, students are guided to create unique and effective tags that help community formation and identity and provide a way for them to continue to contribute ideas and resources (Tu, 2013).

Tagging also contributes to critical thinking. This easy entry tool (most web 2.0 forum tools feature social tagging fields) can develop “tagging thinking” or a way to help students mentally organize or categories their own main points, and access key ideas from others, to significantly enhance the critical thinking process (Schellens et al., 2009; Tu, 2013). Another suggested use is to assign tags to discussion posts as a way to involve students in effective distributed cognition; this is a way to begin to coordinate internal and external tagging. Instructors can then access, monitor, and convert posting tags to tag clouds (see Figure 3) to help students get a bigger picture of discussion topics.

Theoretical Framework

The Community of Inquiry (CoI) model was recently validated by Garrison (2018). These validation studies are an invaluable foundation and “provide increased confidence [for] using this framework to study collaborative approaches to deep and meaningful inquiry” (Garrison, 2018; Dempsey & Jang, 2019). This model frames dynamic interaction online and is one of the most comprehensive in the field of online

learning, providing a dynamic way to explain learning within a computer-mediated environment. A CoI model highlights the importance of discussion as a form of “meaningful discourse and [to] develop personal and lasting understandings of course topics” (Garrison et al., 1999; Oztok et al., 2014; Rourke & Kanuka, 2009). CoI is a balance of three elements: social presence, cognitive presence, and teaching presence (Oztok et al., 2014). The three presences encompass the constructivist idea of learners and teachers interacting together in a community or a learning space: these presences are inter-related, but each gives a deeper understanding of what is happening in the community. Knowledge as it is constructed is not only individual, but part of the community of collaboration; co-created knowledge takes on an “organic fusion of the public and our private worlds” (Swan et al., 2009, p. 44). Effective teaching and learning, from this framework, incorporates many iterating levels of student-teacher and student-student interactions. Tools and technologies can play an important role in aiding such interactions, especially when they foster human-computer interactions (HCI), where usability is treated as a programmatic objective that should continue to develop as our ability to use the tool improves (Morris & Dillon, 1997). Guided by principles of HCI, we use a minimalist framework in our thinking and design. “Technological minimalism” is a methodological stance that can guide the choice of tools that are already proven to be available and relatively inexpensive, without a steep learning curve. Collins defined technological minimalism as “the unapologetic use of minimum levels of technology, carefully chosen with precise attention to their advantages and limitations, in support of well-defined instructional objectives” (Collins, 1999, p. 9; Collins & Berge, 1994). Hashtags could thus be a minimalist solution to positive online learning experiences.

The research questions guiding our current work are:

1. How and in what context do students use hashtags in online discussions?

2. In what ways, if any, does the use of hashtags promote engagement in an online community?

Methods and Data Sources

For this research, we conducted a multiple case study (Creswell, 2013) using data collected from two different courses: one blended and one fully online. In this method, multiple cases are examined to better understand the phenomenon or event. When multiple cases are studied, findings may be used either collectively to draw a more persuasive argument (Barone, 2011), or individually to investigate the differences between cases. Such unique differences could lead to a better understanding of the phenomenon. We used both of these techniques to better understand how hashtags are used in online discussions.

The first case (course) we studied is bounded by being limited to 28 graduate students who participated in a blended learning education course in a large, public, Canadian university. Students met face-to-face and were prompted to use online discussions to continue conversations on themes that were negotiated in class. The second course was offered fully online to graduate students at the same university. Twenty-seven students participated in the course. Participation in the discussions in both courses was graded. Data were collected from anonymized interactions of students within the learning environment. Content analysis on this data was systematic and objective, involving both human-coded and computer-aided analysis which accounts for context and takes account of information from qualitative interviews.

Both courses were offered on PeppereR, a collaborative learning platform used across many courses at the university. The platform's features include threaded discussions, public and private notes and replies, notifications, links, and other social media-

inspired features. PeppeR facilitates knowledge building primarily through asynchronous threaded online discussion, and is continually updated in response to feedback and research.

Students participate in asynchronous class discussions on PeppeR by reading the “notes” (or posts) of other participants and replying to those notes to form a threaded discussion. Participants can also link to other notes and “like” notes. Reads, replies, likes, links, and private messages are used as measures of engagement within the community. In this study, hashtags were typed by the students in the notes as per directions provided by the instructor.

Quantitative measures for student interactions within PeppeR were collected and analyzed. PeppeR maintains detailed logs of each student’s activity within the system. These logs were analyzed to understand and contextualize hashtag use and determine the effect of such use on student interactions. Individual notes (posts) were used as the unit measure for analysis. User data was protected through anonymization by the system as well as by visual inspection of the log data to ensure there were no machine errors or omissions. However, a further level of anonymization was implemented for content analyses of note content. The extra layer of anonymization removes any participant-identifying information from note authorship.

Student reflections were collected by email and in person to understand student perceptions of, and expectations from, hashtag use. The intent of this mixed-methods approach was to guide the conversation around hashtag use while allowing for a broader discussion around online learning.

Results and Analyses

Hashtags used in each note were extracted, sorted, and aggregated. None of the notes used a single hashtag more than once.

Table 1

Overview of Hashtags Used in Both Courses

	Total notes	Notes with hashtags	Total replies	Total likes	Hashtags used	Repeated hashtags
Blended course	254	159	163	173	115	82
Online course	1,873	1,393	1,145	1,308	421	158

As shown in Table 1, 254 notes were posted in the threaded discussions of the blended course where PeppereR served solely as a platform to converse about course readings. One hundred and eleven unique hashtags were used in 159 notes in the blended course, while a total of 421 distinct hashtags were created and used in the online course. In regard to students, 42% tried introducing, for the first time, a hashtag that was new to this community. Of all the hashtags created, 73.8% were reused in the blended course, while 37.3% were reused in the online course over a period of 12 weeks. In our interviews, we explored differences in the reuse or repetition of hashtags between the two courses. Students expressed familiarity with hashtags (mostly from use on Twitter) in both courses and were comfortable using them.

Coding and Content Analysis

Coding is a repeated act. Rarely is the first cycle of coding data perfectly attempted. Our coding scheme was developed using a comprehensive inductive and deductive

approach through multiple iterations of the hashtags used. After the first rough attempt to categorize the hashtags, 50 notes with hashtags were coded independently by two researchers and intercoder reliability (ICR) was calculated. ICR indicates the degree of agreement between coders, taking into account the chance rate of agreement or disagreement (Lavrakas, 2008). A resulting kappa value of 0.71 can be regarded as satisfactory to good. We worked to reduce the amount of overlap among the categories by providing clear operational definitions of the different categories that created the final typology presented in Table 2.

Table 2
Categories of Hashtags – Descriptions and Examples

Category	Description	Example
Activism	Invitation to take action, reused from other platforms	#withgreatpowercomesgreatresponsibility #bellletstalk #blacklivesmatter #ferguson
Classify	Place a note into a certain course theme	#gamesforlearning #socialmedia #assessment #edchat
Community	Mention another student, instructor, group, or class	#jessica #mary #sandhya
Emphasize	Highlight a certain word in the note to draw attention to it	#collaborative #wordlimit #happiness
Expand	Invite other students to say more	#accessibility #whynow #criticalthinking
Other	Unclassified, verbs, out-of-context tags	#t #yun #to
Summarize	Provide gist or main point of the note	#digitalcitizenship #safeschools #learnercentered

Students both created hashtags and reused those created by others. Unlike social media platforms, discussion posts online cannot be retweeted. Thus, each hashtag use was

unique. Hashtags were distinctly grouped into the categories identified based on the context. For example, Student 2 wrote:

Thanks to Kapp's article, now I know that Game and #Gamification is not the same idea. While Game is more related to winning and losing in a game system/world while #Gamification does not rely too much on the whole procedures of the game but more on important connections with the knowledge.

In this context, the hashtag #Gamification is used to classify the post under the course theme, "Games for Learning." Students were also encouraged by the instructor in the online course to tag each other in their posts. Each student was asked to pick a name tag, most often just their first name. Such use was classified under "community." Students quoted each other by using the #author tag in their posts: "#John mentioned 54% of youth get their news from social media . . ." Hashtags were also used to raise awareness for a cause mirroring their use on social media: "This makes me question if online [*sic*] political activism has bearing on the verdict as all of these victims die without justice. #BlackLivesMatter." Some hashtags were either used in error or for a purpose not defined by our classification, such as for numbering (#1, #2, etc.) or for prepositions (#to, etc.).

Table 3 summarizes the different hashtags used in both courses. In the blended course, hashtags were used mostly to classify a post into a particular course theme. These hashtags were community negotiated organically and continued being reused, as can be seen by the 35% (57% overall) shaded area shown in Figure 1. Students did not use any author tags since this was not negotiated in the class. In the online course, however, students created and used hashtags in different categories, but the community tags were the most reused (69.7%), as seen in Figure 1. Neither the activism hashtags nor the emphasis hashtags had high reuse in both courses. When students used hashtags to

expand on a previously mentioned idea, or to promote further knowledge building, the hashtag continued to live within a thread but was not reused as often outside that particular thread.

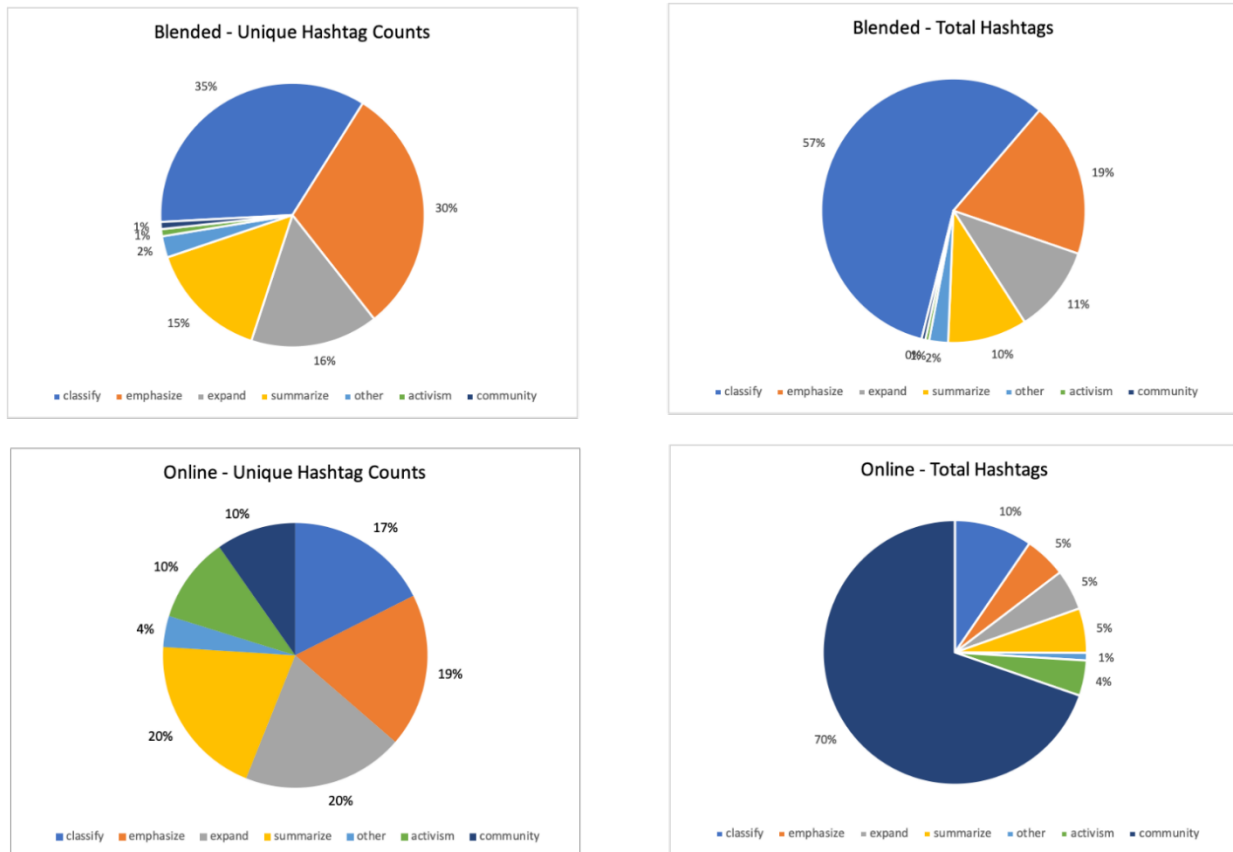
Table 3

Hashtags by Category – Blended and Online Courses

Category	Blended		Online	
	Unique	Total	Unique	Total
Classify	40	124	74	259
Emphasize	35	41	79	138
Expand	18	23	83	134
Summarize	17	21	84	148
Other	3	5	16	25
Activism	1	1	44	117
Community	1	1	41	1889
Total hashtags	115	216	421	2710

Figure 1

Hashtag Use Classification for Both Courses



Analysis of Log Data

While content analysis provided us a means to explore the use of hashtags in different contexts, log data from PeppeR was extracted, cleaned, and analyzed for engagement. In threaded discussions, replies and likes to a note have been shown to indicate increased engagement (Makos, 2017). Table 4 provides a comparison of the number of replies and likes a note received for various categories for the online course. Certain notes had more than one hashtag while certain others had none. The average number of likes a note received in the course was 0.68, while notes with hashtags received, on average, 0.87 likes. Community hashtags that tagged an author received 1.62 likes, on

average. Any note that had a hashtag had a higher number of replies than those without. Notes that included hashtags to classify (based on course themes) received the most replies; on average, they were replied to 4.2 times more than a note with no hashtags.

Table 4

Hashtags by Category – Comparison of Replies and Likes

Category	Total notes	Total likes	Total replies	Average likes	Average replies
Activism	81	90	41	1.11	0.51
Classify	112	152	160	1.36	1.43
Community	1014	1644	715	1.62	0.71
Emphasize	102	140	68	1.37	0.67
Expand	103	116	51	1.13	0.50
Other	23	15	10	0.65	0.43
Summarize	115	144	61	1.25	0.53
Notes with hashtags	1083	937	473	0.87	0.44
Notes without hashtags	838	371	281	0.44	0.34
Total notes	1921	1308	754	0.68	0.39

Qualitative Interviews

To understand the uniqueness and diversity of hashtag use in threaded discussions, we studied and coded results from student reflections and open-ended survey questions to find common themes. Six students shared their reflections in the blended course to a specific question—“Can you talk a little about the hashtags used in this course? How

did these help or hinder you?” — while 10 students reflected on the use of hashtags in the online course. One out of three of these students had used hashtags before. Two students in the second course had taken the blended course previously and had used hashtags in it. The common theme that emerged from students is one of novelty and wonder with hashtag use. As Student 4 mentioned, “I am still learning and am still skeptical about the idea, but as I continue to reflect, I hope that I will become more open minded.” Two categories of hashtag use were mentioned in the reflections: classification and connection. Students particularly enjoyed the use of author hashtags.

Four students were pleasantly surprised with how hashtags were used by their peers and expressed appreciation. Student 8 shared an example of a hashtag created by a peer that was helpful to their learning: “. . . both sides of the personal device ban question through including the #devilsadvocate hashtag. That particular hashtag is great for encouraging our critical thinking!” Student 2 reflected, “I read two different perspectives on the same issue because . . . continued to use my hashtag . . . ” Particular hashtags were mentioned as beneficial, others as confusing. New ideas on hashtag use emerged as well: Student 1 shared, “I feel my note could have been further improved by using hashtags #academic #informal #nonformal to identify the types of learning that could help foster the goals under the definition.” Overall, students reflected on the ease of hashtag use, appreciated others using their author tags, and liked when their hashtags were reused.

Discussion

To answer our first research question—“How and in what context do students use hashtags in online discussions?”—see Figure 1 on hashtag use classification for both courses. Seven categories emerged from the content analysis of individual notes. The blended course did not use author hashtags while the online course did. This could be a

consequence of the instructor instructions regarding hashtag use at the beginning of the course alongside modelling of such use by the instructor. Additionally, one of the students in this course also shared a short video made by the student on hashtag use. This video was well received by their peers and also mentioned by a few in the reflections.

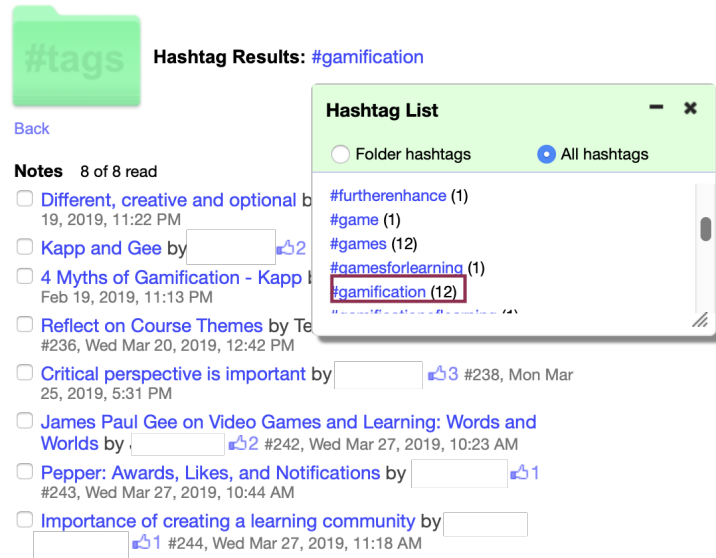
The reasons given by students for hashtag use were to: share an idea and encourage a response; relate to a broader idea and give examples; expand an idea and relate to course themes; link to a peer's idea; and categorize. Some hashtags were only used once. When asked in class about the hashtags used one time, students explained that hashtags can be "a powerful tool to say what you want in a few words . . . this might be useful for those who don't want to share too much verbally or for those who are people of few words" (Student 2). Hashtag use was unconventional for these students across both courses, and as one student reflected, they served as a "creative metatag." In fact, a hashtag can help the user go beyond the words:

. . . retrospectively, this tag [hashtag] seems more like a one-line summary of the entire note. Actually as I think about it, this tag seems to add something to the meaning of the note itself since the words in the hashtag do more than summarize the note as it states something more than what was said in the note itself. (Student 5)

Hashtags facilitated not only the emergence of new themes in the discussions but also the critique and growth of ideas in the discussions. One student who created and used many new hashtags found this tool helpful for organizing personal notes and tracking their own learning. Classifying and organizing course information was a strong motivator for the use of hashtags. Given that the original purpose of hashtags is to structure and organize social content, it is not surprising that students used hashtags to filter out content that was of interest to them using hashtags, as shown in Figure 2.

Figure 2

Using Classified Hashtags for Personal Organization



Student 3 explained, so clearly, the need for such organization and classification in threaded discussions: “I am finding my colleagues’ posts confusing for me that I feel it is hard to follow many ideas they have made in one post.” With regard to our second research question—“In what ways, if any, does the use of hashtags promote engagement in an online community?”—Table 4 provides insights into interactions with notes which contained hashtags. While the novelty of the hashtag itself was appreciated, students were more engaged when they were tagged, a note they started had been referenced, or their hashtag was adopted by the class. Notes with hashtags also had the possibility of being found with ease, thereby engaging more readers.

One student, however, mentioned the need for more clear guiding principles and perhaps a bucket list of community-negotiated hashtags to choose from. Some suggestions to improve included an autofill for hashtags, notifications and personalized

recommendations for similar hashtags, and visual representations of knowledge connections.

Limitations and Next Steps

There are a few limitations to this research that restrict the generalization of its findings. Case studies are neither ubiquitous nor universal. There are aspects of community, epistemics, pedagogies, engagement, and hashtag use that cannot be answered in this way. Compared with social media engagement research on hashtags, such as those with Twitter data, the sample size is significantly small in our study. Second, the class size is small. Both courses had graduate teacher candidates with less than 30 students. However, this is an intentional choice since we are interested in learning the effect of hashtags in university graduate courses. Third, the qualitative data in this study were not sufficient to capture the experience of the learners. Deeper insights through focus groups, continuous reflection journals, and informative surveys during the course may have provided more insights into student perceptions of hashtag use. More student voices and experiences may help explain how and why hashtags contribute or hinder their learning. Future research could include other types of qualitative data such as instructor interviews to provide a fuller picture.

Figure 3

Hashtag Community Cloud



Further iterations of this study could include autofill and suggested hashtags to avoid typing errors. We are currently working on hashtag clouds that could be available to both the students and instructors to visualize community knowledge building.

Instructors can also monitor tag clouds to help students get a bigger picture of discussion topics and find connections between the same. These types of activities facilitate “community-community interaction” and can be used for reflection and growth.

Conclusions

This study yielded a few interesting insights into the contexts in which hashtags are used in online discussions. One important finding was that student familiarity with hashtag use, and the simplicity of its use, enabled students to adopt and use them with ease. They also served as a community-building engine with limited scripting from the instructor, thereby decreasing the instructional load on the teacher. Increased engagement with notes that were tagged suggests they may play a role in knowledge

building in online discussions. Moreover, drawing connections to social media using activism hashtags promotes broader discussions.

One surprising result was that students felt invested in their learning by being able to use the appropriate hashtags to classify notes based on criteria defined by the community. While further research is needed to study their role in amplifying student voice online, hashtags are a steppingstone to building agency in online communities.

References

- Abel, F., Bittencourt, I. I., Costa, E., Henze, N., Krause, D., & Vassileva, J. (2010). Recommendations in online discussion forums for e-learning systems. *IEEE Transactions on Learning Technologies*, 3(2), 165–176. <https://doi.org/10.1109/TLT.2009.40>
- Avery, T., Sarguroh, W., & Sheehy, A. (2019). #Hashtags: Towards understanding the student experience in online discussion-based learning environments. INTED2019 Proceedings. <http://hdl.handle.net/1807/94673>
- Barone, D. (2011). Case study research. In N. K. Duke & M. H. Mallette (Eds.), *Literacy research methods* (2nd ed., pp. 7–27). Guilford Press.
- Collins, M. P. (1999). I know my instructional technologies: It's these learners that perplex me! *American Journal of Distance Education*, 13(1), 8–23. <https://doi.org/10.1080/08923649909527011>
- Collins, M. P., & Berge, Z. L. (1994, September-October). *Guiding design principles for interactive teleconferencing* [Paper presentation]. Pathways to Change: New Directions for Distance Education and Training Conference, Augusta, ME, United States.
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. SAGE Publications.
- Curtis, D. D., & Lawson, M. J. (2019). Exploring collaborative online learning. *Journal of Asynchronous Learning Networks*, 5(1), 21–34. <https://doi.org/10.24059/olj.v5i1.1885>
- Dennen, V. P., Bagdy, L. M., & Cates, M. L. (2018). Effective tagging practices for online learning environments: An exploratory study of approach and accuracy. *Online Learning*, 22(3), 103–120. <http://dx.doi.org/10.24059/olj.v22i3.1471>

- Ding, Z., Zhang, Q., & Huang, X. J. (2012). Automatic hashtag recommendation for microblogs using topic-specific translation model. In M. Kay & C. Boitet (Eds.), *Proceedings of COLING 2012: Posters* (pp. 265–274). The COLING 2012 Organizing Committee. <https://www.aclweb.org/anthology/C12-2027.pdf>
- Dringus, L. P., & Ellis, T. (2005). Using data mining as a strategy for assessing asynchronous discussion forums. *Computers & Education*, 45(1), 141–160. <http://doi.org/10.1016/j.compedu.2004.05.003>
- Dwivedi, P., & Bharadwaj, K. K. (2012). e-Learning recommender system for learners in online social networks through association retrieval. In *CUBE '12: Proceedings of the CUBE International Information Technology Conference* (pp. 676–681). Association for Computing Machinery. <https://doi.org/10.1145/2381716.2381846>
- Ellis, T. J., & Cohen, M. S. (2009). Forums and wikis and blogs, oh my: Building a foundation for social computing in education. In *2009 39th IEEE Frontiers in Education Conference* (pp. 1–2). IEEE. <https://doi.org/10.1109/FIE.2009.5350845>
- Erz, A., Marder, B., & Osadchaya, E. (2018). Hashtags: Motivational drivers, their use, and differences between influencers and followers. *Computers in Human Behavior*, 89, 48–60. <https://doi.org/10.1016/j.chb.2018.07.030>
- Gao, F., Ulyshen, T., & Franklin, T. (2013). Designing asynchronous online discussion environments: Recent progress and possible future directions. *British Journal of Educational Technology*, 44(3), 469–483. <https://doi.org/10.1111/j.1467-8535.2012.01330.x>
- Garrison, D. R. (2018, September 29). *Validity of CoI*. The Community of Inquiry. <http://www.thecommunityofinquiry.org/editorial15>
- Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2–3), 87–105. [http://doi.org/10.1016/S1096-7516\(00\)00016-6](http://doi.org/10.1016/S1096-7516(00)00016-6)
- Gil, S. (2014). *Exploring the benefits of tagging forum posts based on a hierarchical domain model of the course content in online forums* [Thesis, University of Guelph]. Semantic Scholar. <https://pdfs.semanticscholar.org/a9de/7f5470205705c8b69b5d79d0bbefd3230c64.pdf>
- Hamer, J., Purchase, H. C., Luxton-Reilly, A., & Sheard, J. (2011). Tools for “contributing student learning.” *ACM Inroads*, 2(2), 78–91. <https://doi.org/10.1145/1963533.1963553>
- Hewitt, J. (2001). Beyond threaded discourse. *International Journal of Educational Telecommunications*, 7(3), 207–221. <http://hdl.handle.net/1807/26522>

- Hewitt, J. (2005). Toward an understanding of how threads die in asynchronous computer conferences. *The Journal of the Learning Sciences*, 14(4) (2005), 567–589.
http://doi.org/10.1207/s15327809jls1404_4
- Hiltz, S. R., Coppola, N., Rotter, N., Turoff, M., & Benbunan-Fich, R. (1999). Measuring the importance of collaborative learning for the effectiveness of ALN: A multi-measure, multi-method approach. *Online Learning*, 4(2), 103–125.
<https://doi.org/10.24059/olj.v4i2.1904>
- Hiltz, S. R., & Turoff, M. (1985). Structuring computer-mediated communication systems to avoid information overload. *Communications of the ACM*, 28(7), 680–689.
<https://doi.org/10.1145/3894.3895>
- Ioannou, A. (2011). Online collaborative learning: The promise of wikis. *International Journal of Instructional Media*, 38(3), 213–223.
- Jeong, A. C. (2003) The sequential analysis of group interaction and critical thinking in online threaded discussions. *American Journal of Distance Education*, 17(1), 25–43.
http://doi.org/10.1207/S15389286AJDE1701_3
- Johnston, R., & Badley, G. (1996). The competent reflective practitioner. *Innovation and Learning in Education*, 2(1), 4–10.
- Jones, Q., Ravid, G., & Rafaeli, S. (2004). Information overload and the message dynamics of online interaction spaces: A theoretical model and empirical exploration. *Information Systems Research*, 15(2), 194–210. <http://doi.org/10.1287/isre.1040.0023>
- Jung, I., Choi, S., Lim, C., & Leem, J. (2002). Effects of different types of interaction on learning achievement, satisfaction and participation in web-based instruction. *Innovations in Education and Teaching International*, 39(2), 153–162.
<https://doi.org/10.1080/14703290252934603>
- Kalloubi, F., & Nfaoui, E. (2019). Learning to suggest hashtags: Leveraging semantic features for time-sensitive hashtag recommendation on the Twitter network. In M. D. Lytras, N. Aljohani, E. Damiani, & K. T. Chui (Eds.), *Semantic web science and real-world applications* (pp. 302–325). IGI Global.
- Kear, K., & Heap, N. (2007). ‘Sorting the wheat from the chaff’: Investigating overload in educational discussion systems. *Journal of Computer Assisted Learning*, 23(3), 235–247.
<https://doi.org/10.1111/j.1365-2729.2006.00212.x>
- Lavrakas, P. J. (2008). *Encyclopedia of survey research methods*. Sage Publications, Inc.
<https://doi.org/10.4135/9781412963947>

- Li, Y., Liu, T., Jiang, J., & Zhang, L. (2016). Hashtag recommendation with topical attention-based LSTM. In *Proceedings of the 26th International Conference on Computational Linguistics* (pp. 943–952). ACL Anthology. <https://www.aclweb.org/anthology/C16-1284>
- Makos, A. (2017). *The like button: A way to explore social interaction in threaded discourse* [Unpublished doctoral thesis]. Ontario Institute for Studies in Education, University of Toronto.
- Makos, A., Oztok, M., Zingaro, D., & Hewitt, J. (2013). Use of a “like” button in a collaborative online learning environment. American Educational Research Association (AERA). <http://hdl.handle.net/1807/74934>
- Marbouti, F., & Wise, A. (2016). Starburst: A new graphical interface to support purposeful attention to others’ posts in online discussions. *Educational Technology Research and Development*, 64, 87–113. <http://doi.org/10.1007/s11423-015-9400-y>
- Marks, A. (2011). Electronic group collaboration in higher education. In *Proceedings of the 2011 15th International Conference on Computer Supported Cooperative Work in Design (CSCWD)* (pp. 742–747). IEEE. <https://doi.org/10.1109/CSCWD.2011.5960201>
- Meyer, K. A. (2003). Face-to-face versus threaded discussions: The role of time and higher-order thinking. *Journal of Asynchronous Learning Networks*, 7(3), 55–65. <http://dx.doi.org/10.24059/olj.v7i3.1845>
- Morris, M. G., & Dillon, A. (1997). How user perceptions influence software use. *IEEE Software*, 14(4), 58–65. <https://doi.org/10.1109/52.595956>
- Oliver, M., & Shaw, G. P (2003). Asynchronous discussion in support of medical education. *Journal of Asynchronous Learning Networks*, 7(1), 56–67. <http://dx.doi.org/10.24059/olj.v7i1.1863>
- Oztok, M., Wilton, L., Lee, K., Zingaro, D., Mackinnon, K., Makos, A., Phirangee, K., Brett, C., & Hewitt, J. (2014). Polysynchronous: Dialogic construction of time in online learning. *E-Learning and Digital Media*, 11(2), 154–161. <https://doi.org/10.2304/elea.2014.11.2.154>
- Patel, J., & Aghayere, A. (2006). Students’ perspective on the impact of a web-based discussion forum on student learning. In *Proceedings. Frontiers in Education. 36th annual conference* (pp. 26–31). IEEE. <https://doi.org/10.1109/FIE.2006.322600>
- Peters, V. L., & Hewitt, J. (2010). An investigation of student practices in asynchronous computer conferencing courses. *Computers & Education*, 54(4), 951–961. <https://doi.org/10.1016/j.compedu.2009.09.030>

- Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. *Journal of Asynchronous Learning Networks*, 6(1), 21–40. <https://doi.org/10.24059/olj.v6i1.1870>.
- Qiu, M., Hewitt, J., & Brett, C. (2012). Online class size, note reading, note writing and collaborative discourse. *International Journal of Computer-Supported Collaborative Learning*, 7(3), 423–442. <https://doi.org/10.1007/s11412-012-9151-2>
- Raman, P., Avery, T., & Brett, C. (2020). #Learningtogether: exploring the use of hashtags in building a knowledge community online. In L. G. Chova, A. L. Martínez, & C. Torres (Eds.), *INTED2020 proceedings* (pp. 7611–7617). IATED. <https://doi.org/10.21125/inted.2020>
- Rennie, F., & Smyth, K. (2019). *Digital learning: The key concepts* (2nd ed.). Routledge.
- Robinson, J. (2011). Assessing the value of using an online discussion board for engaging students. *Journal of Hospitality, Leisure, Sport & Tourism Education*, 10(1), 13–22.
- Rohden, F., Kullenberg, C., Hagen, N., & Kasperowski, D. (2019). Tagging, pinging and linking – User roles in virtual citizen science forums. *Citizen Science: Theory and Practice*, 4(1), 19. <http://doi.org/10.5334/cstp.181>
- Rourke, L., & Kanuka, H. (2009). Learning in communities of inquiry: A review of the literature. *Journal of Distance Education*, 23(1), 19–48. <http://www.jofde.ca/index.php/jde/article/view/474>
- Sani, M. R. F., Kardan, A. A., & Cohan, A. (2013). A supporting tool in online learning forums based on multi-documents summarization. In *4th International Conference on e-Learning and e-Teaching (ICELET 2013)* (pp. 30–35). IEEE. <http://doi.org/10.1109/ICELET.2013.6681641>
- Sarker, S., & Nicholson, J. A. (2005). Exploring the myths about online education in information systems. *Informing Science: International Journal of an Emerging Transdiscipline*, 8, 55–73. <https://doi.org/10.28945/486>
- Schellens, T., Keer, H., De Wever, B., & Valcke, M. (2009). Tagging thinking types in asynchronous discussion groups: Effects on critical thinking. *Interactive Learning Environments*, 17(1), 77–94. <https://doi.org/10.1080/10494820701651757>
- Swan, K., Garrison, D. R., & Richardson, J. C. (2009). A constructivist approach to online learning: The community of inquiry framework. In C. R. Payne (Ed.), *Information technology and constructivism in higher education: Progressive learning frameworks* (pp. 43–57). IGI Global.

- Teplovs, C. (2008). *The knowledge space visualizer: A tool for visualizing online discourse* [Paper presentation]. CSCL Interaction Analysis Workshop at the International Conference of the Learning Sciences, Utrecht, The Netherlands.
- Thomas, M. (2002). Learning within incoherent structures: The space of online discussion forums. *Journal of Computer Assisted Learning*, 18(3), 351–366.
<https://doi.org/10.1046/j.0266-4909.2002.03800.x>
- Tu, C.-H. (2013). Strategies for building a Web 2.0 learning environment. Libraries Unlimited.
- Vonderwell, S., Liang, X., & Alderman, K. (2007). Asynchronous discussions and assessment in online learning. *Journal of Research on Technology in Education*, 39(3), 309–328.
<https://doi.org/10.1080/15391523.2007.10782485>
- Wise, A. F., Speer, J., Marbouti, F., & Hsiao, Y.-T. (2012). Broadening the notion of participation in online discussions: Examining patterns in learners' online listening behaviors. *Instructional Science*, 41(2), 323–343. <https://doi.org/10.1007/s11251-012-9230-9>
- Zhang, A. X., & Cranshaw, J. (2018). Making sense of group chat through collaborative tagging and summarization. *Proceedings of the ACM on Human-Computer Interaction*, 2(CSCW), 1–27. <https://doi.org/10.1145/3274465>
- Zhao, F., Zhu, Y., Jin, H., & Yang, L. (2016). A personalized hashtag recommendation approach using LDA-based topic model in microblog environment. *Future Generation Computer Systems*, 65, 196–206. <https://doi.org/10.1016/j.future.2015.10.012>
- Zhao, K., & Chan, C. (2014). Fostering collective and individual learning through knowledge building. *International Journal of Computer-Supported Collaborative Learning*, 9(1), 63–95.
<https://doi.org/10.1007/s11412-013-9188-x>
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