8. Are Your Students 'Slack'ers?

Using Cloud-Based Communication to Elicit Peer and Instructor Feedback

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Abstract: Slack is a popular cloud-based communication tool that is increasingly being used for collaborative learning in higher education. This study found that Slack was a viable tool for eliciting peer and instructor feedback as part of a face-to-face interdisciplinary project-based course. Students elicited feedback by directly requesting it from either their peers or instructors. Feedback was also provided via unsolicited advice or recommendations. Positive affirmations from both peers and instructors were the most common form of feedback. Slack provided a space outside of the learning-management system (LMS) where students could post photo and video updates about their project while engaging in (a)synchronous communication. Members of the Slack learning community were able to participate at their own pace and could choose whether they wanted to reply outside of traditional working hours.

Introduction

The use of learning-management systems (LMS), such as Blackboard and Canvas, have become the norm in facilitating face-to-face, blended, and online learning in higher education. These platforms provide a digital space for online collaboration where instructors can deliver course content, communicate with students, track their progress, and manage grades. However, "LMS are owned by companies that tightly control their platforms, making it difficult to expand the feature sets and integrate external resources in ways that best align with evolving institutional needs and pedagogies" (Adams Becker et al., 2017, p. 44). As a result, many faculty and students are accessing tools and apps that are not integrated within the LMS. This is especially true for project-based courses, in which students are often left to manage their own communication, file management, project roles, and schedules. Since these external tools and apps are not incorporated into the existing LMS, it makes it difficult for both instructors and peers to provide timely and constructive feedback.

The Role of Feedback in Collaborative Learning

Feedback is an essential part of collaboration since social interactions help to facilitate the co-construction of knowledge (Lipponen, 2002). As such, participants in learning communities mutually depend on each other in order to build shared understandings. This process of knowledge building can be supported by software platforms that serve as knowledge-building environments (KBE), where participants can create new meanings through social collaboration in order to resolve personal understandings (Stahl, 2000). LMS have the capability to serve as KBE, since their social tools provide a platform where knowledge can be co-constructed through dialogue and feedback while also maintaining a record of student learning.

Resta and Lee (2010) believe that both individual and group accountability are essential for successful online collaboration. Their research shows that while peer assessment can lead to a satisfying experience that ultimately deepens student learning, it can also hamper student learning if peers lack the expertise needed to give proper feedback.

Peer feedback is also impacted by the amount of group or team building that takes place in the community (Resta & Lee, 2010). As such, the social pressures of the community directly affect how comfortable students are with providing suggestions when work does not meet both individual and shared expectations.

Current LMS provide opportunities for both students and instructors to offer feedback. For example, the Canvas LMS has the option for instructors to create electronic assignments that students submit online and which are then graded by the instructor or through peer review. This can be done through comments and rubrics, and students in turn can respond to comments to create an electronic dialogue with the instructor. Similarly, the discussion feature in Canvas provides a forum where both students and instructors can pose questions, reply to each other's posts, and provide feedback. However, these affordances are lost once students begin to engage in online collaboration with tools and apps that are not built into the LMS. With the increased use of external tools and apps in mind, we turn our attention to Slack—a cloud-based communication tool that has been popular in the workplace, which "also holds compelling implications for collaborative learning" (Adams Becker et al., 2017, p. 44).

What Is Slack?

Slack, which was released in 2014, was originally developed as an internal collaboration tool for a gaming company (Anderson, 2016). Unlike most real-time messaging platforms that have interfaces designed only for mobile devices, Slack is designed to be fully functional on computers, tablets, and smartphones. The platform has adopted several social media conventions such as the use of hashtags (#) for topics and channels, the *at* sign (@) for direct messaging another user, and emojis to "like" a post (Anderson, 2016). The design of Slack centers around the use of teams in a virtual shared workspace. Team members can join a workspace through an invitation sent to their email address. Upon the creation of a new Slack workspace, channels called #general and #random are automatically generated. Team members may add new channels that are public to all members or limited to specific team members via private invitation. The use of multiple channels provides a "right place" for conversations to happen (McCracken, 2015). The tool also integrates external apps for file management and allows for the embedding of multimedia.

Slack as a Collaborative Learning Tool in Higher Education

The emerging research involving Slack has involved both blended and online learning environments. Altebarmakian and Alterman (2017) used Slack to communicate as part of a blended course on computer-supported learning. They found that students enrolled in the course used Slack to create channels and manage to-do lists; however, communication between peers was often superficial with comments that did not warrant a response. Sabin and Olive (2018) used Slack with an online course as a platform to improve communication between instructors and peers while also delivering diverse and dynamic course content. They found that about one third of the students were enthusiastic about using Slack and that the instructors perceived Slack as enriching their online teaching and interactions with students. However, the authors recommend that instructors adopt active and social learning frameworks in order to improve communication and collaboration, as well as building more meaningful social relationships among students.

As part of a case study, Tuhkala and Karkkainen (2018) investigated how Slack could support peer interactions in a master's thesis seminar course. All out-of-class communication took place via Slack, with students completing questionnaires at the end of the course. Results showed that students perceived Slack as easy to use, provided a relaxed environment when asking for assistance, and that participants had high intentions to use Slack in the future. However, students expressed frustration at being asked to use different communication tools in different courses. Zhang, Meng, Ordóñez de Pablos, and Sun (2019) used surveys and structural equation modeling to measure students' mutual trust,

social influence, and reward valence in connection to teamwork engagement as part of an eight-week postgraduate business course in China. Results showed that group members engaged more in Slack when they perceived mutual trust among their group members, and that the social influence of both fellow group members and the instructor had a positive effect on engagement. Furthermore, teamwork engagement had a positive effect on personal success.

Research Question

Although these studies are useful in developing a better understanding of how both students and instructors perceive the use of Slack as a communication and collaboration tool, there is a lack of research that examines the dialogue that takes place when providing both peer and instructor feedback via Slack. As such, this paper seeks to answer the research question: How is peer and instructor feedback elicited using a cloud-based communication tool, such as Slack?

Theoretical Framework

The connected learning framework is a theoretical framework that recognizes that learning is "socially embedded, interest-driven, and oriented toward educational, economic, or political opportunity" (Ito et al., 2013, p. 4). Connected learning is framed around three learning principles, which include: (a) Everyday exchanges of sharing and giving feedback are *peer-supported*; (b) learning becomes *interest-powered* when the subject is of both personal interest and relevant; and (c) that learning is *academically oriented* when learners can engage in social, civic, or career engagement. Furthermore, this framework espouses that the learning experience should follow three design principles, which include: (a) The use of digital tools should be *production-centered* in that learners actively create and experiment with content; (b) the design should be around a *shared purpose* made up of common goals and interests; and (c) the design should be *openly networked* where "online platforms and digital tools can make learning resources abundant, accessible, and visible across all learner settings" (Ito et al., 2013, p. 12).

The collaborative nature of Slack has allowed it to become an online platform that exemplifies both the design and learning principles of the connected learning framework. With its roots in workplace collaboration, Slack thrives as a production-centered space where animated GIFs, photos, and videos are easily uploaded and shared with peers. The ability to add channels makes it possible to customize the workspace, where members can still engage in the #random water cooler conversations while also remaining academically oriented and interest-powered while communicating in their team channel. In addition, the openly networked abilities of the platform allow for peer support to thrive, providing a space where students can elicit feedback from both their peers and instructors.

Methods

In the section below we outline the participants, how they were recruited, and how Slack data were both collected and analyzed in this study.

Participants

Participants included 23 undergraduate students and two instructors who used Slack as their primary communication tool for a face-to-face interdisciplinary project-based course focused on creating practical movie special effects (i.e., physical effects without the use of computer-generated images). This 14-week course took place at a large research institution in the United States during the fall of 2018. The instructors actively recruited students from multiple colleges to create a diverse interdisciplinary cohort. Participants' majors included Engineering (7), Theatre and Dance (7), Arts, Entertainment, and Technology (4), Radio, Television, and Film (3), Studio Art (1), and a double major in French and Design Arts and Media (1). Of the student participants, 12 were female and 11 were male. One male instructor had 15 years' experience in technical theater design and one female instructor had 25 years in scenic design.

Recruitment for the Study

Recruitment for the study was done during the first physical meeting of the course. The instructors were asked to leave the room during student recruitment. All 23 undergraduate students consented to participate in the study. Undergraduate participants were offered $50 cash compensation as part of a larger study for the first author's dissertation. The two instructors were approached outside of class hours for their consent to participate in the study. The instructors were not offered any cash compensation for participation and were not informed of which students consented to the study.

Data Collection

Slack data collection began during the second week of the course. The instructors renamed the default #general channel to #announcements, left #random unaltered, and added #questions about four weeks into the course. Students created three additional channels for sharing resources, arranging a visit to a haunted house, and organizing an end-of-semester holiday party. In total, there were 11,428 messages consisting of 6,323 public channels messages and 5,105 private direct messages. Over 5.9GB of files were posted, comprising primarily photos and video. This course used the free version of Slack, which limits users to seeing the 10,000 most recent messages and limits storage to 5.0GB. All messages were backed up once a week using Slack's export tool and multimedia were manually downloaded to ensure no data were lost once the message and storage threshold were crossed.

Data Analysis

Slack export files for each channel were parsed into a spreadsheet that the authors could access remotely via Google Sheets. Following the guidelines for open-thematic coding (Miles, Huberman, & Saldaña, 2013), the first and second author coded the first 200 messages from the channel #team1 to create a codebook including the name of the code, definition, inclusion criteria, exclusion criteria, and an example. To ensure interrater reliability (IRR), the authors engaged in constant comparison (Creswell, 2014), in which codes were compared and negotiated until there was agreement based on the criteria of the codebook. If new codes were added to the codebook all previous messages were reviewed and modified if needed. Over two months, the researchers compared a total of 2,141 messages at a rate of about 300 per week. Because of the size of the corpus, coding was limited to public channels, student-generated channels, and two of the seven team channels. Team channels ranged from 153 to 1,291 messages with a mean of 773. #team1 and

#team2 were selected since they represented moderate-use cases with 578 and 649 messages each. In total, 2,141 of the 6,323 messages were coded for this study, representing over one third of the entire Slack data corpus (33.86%).

Results

In the section below we describe the results about eliciting peer and instructor feedback via cloud-based communication. Our results found that feedback came in five different categories: (a) student requesting feedback from peers, (b) student requesting feedback from instructor, (c) unsolicited peer feedback, (d) unsolicited instructor feedback, and (e) peer and instructor affirmations.

Time	Person	Message
15:25:22	Student 1	<@Student 2> can you give the design brief a once over. I believe everything is finished but I want to make sure you have a chance to look it over before we ask for <Instructor 2> and <Instructor 1> for feedback
16:18:16	Student 2	Sorry just saw you message I can look at it right now *Student 1 reacted with* 👍 1
16:18:34 16:37:56	Student 2 Student 2	Also I will see what I can do <@Student 1> <@Student 1> <@Student 3> I made some edits and withheld from approval so you guys can review and approve if you agree. I mostly made edits to try to get our brief down to one page. I think it's important that our design brief is concise. If you could look at my suggested edits that would be great. Whether approved or not I think it will be good to send to <Instructor 1> and <Instructor 2> once you have reviewed the edits 👍 *[:Thumbs-up: in message]* *Instructor 1 reacted with* 👍 1
16:39:54	Instructor 1	Concise is good. Love one pagers. *Student 2 reacted with* 👍 1 *Instructor 2 reacted with* ❤️ 1

Table 1. Example of student requesting feedback from peers.

The first form of eliciting feedback came through direct requests from students to their peers (see Table 1). One example is requesting peers to review or edit documents stored remotely. As seen in the example in Table 1, students could perform peer review asynchronously and provide each other with updates when tasks were complete. Peers responded in both text and reaction emojis, and using the *at* sign (@) allowed students to directly message their peers and instructors. Of note in this example, dialogue shifted from asynchronous to synchronous feedback as the exchange progressed.

The second form of eliciting feedback came through direct requests from students to their instructors (see Table 2). In the example in Table 2, a student is requesting feedback about the movie demo reel two days before its final presentation. Of note in this example are both the time at which the dialogue took place and the length of the instructor's response. This exchange happened around 11 p.m. on a Saturday night, which represents an outlier in the data corpus. In addition, this example demonstrates that feedback via Slack can be as detailed as an email response.

Time	Person	Message
22:38:43	Student 3	I just uploaded a draft of our demo reel to our box folder. <@Instructor 1> I know its late but do you think you'll have time to give us feedback by tomorrow? I was trying to finish it this afternoon but we had a hard drive crisis *[:grimacing:]*
23:11:27	Instructor 1	This is so good your guys. I like ho you used your story boards. And the music is great! All my comments are little tweaks. Mostly I think could cut between 20 and 30 seconds out of this to pick up the pace. For example at 0:36 you say your were the pitcher and then go on to describe what a pitch is. I would cut that. 1:13 there are some mumbles about fabrication that could be cut. [...]

Note. [...] is used to represent 14 lines of text that were omitted due to space.

Table 2. Example of student requesting feedback from instructor.

Time	Person	Message
16:05:52	Student 1	Look how mesmerizing this is [Video clip of animated OLED eyeball] *Student 2 and 3 reacted with* ❤️ 2 *Student 2 also reacted with* 1
23:49:37	Instructor 1	Oh! That is crazy cool!
8:36:38	Instructor 2	This is AMAZING!!!! Such fine work team <#team2> 👏👏👏👏👏 *[:clap:]*
10:25:25	Instructor 1	I just realized shouldn't the iris get smaller when exposed to more light?
10:26:24	Student 1	I noticed that too. I should be able to fix that by just reversing the min and max value. Haven't tried it yet though

Table 3. Example of unsolicited instructor feedback.

The third form of eliciting feedback came through unsolicited responses from the instructors (see Table 3). In the example in Table 3, Student 1 posts a video update of the group project, which features an animated eye on an OLED display–powered single-board microprocessor. This dialogue begins with reaction emojis from peers, followed by an affirmation from Instructor 1 (note again the time of the instructor's response). This dialogue continues the next day with Instructor 2 also providing an affirmation. This example is unique because the exchange does not terminate with the affirmation, but leads to a critical piece of feedback from Instructor 1.

Person	Message
Student 4 Student 4	First print failed trying again with rafts Second print failed
Student 5	Are you printing supports?
Student 4 Student 4	It won't even get to the supports The clippy part of each finger is so thin it peels up and clumps
Student 5 Student 5	Hmmmm You're printing pla?
Student 4	Yup
Student 5 Student 5	Is the bed heated? Other than that I'd ask if you can use hairspray or something to make it stick

Table 4. Example of unsolicited peer feedback.

The fourth form of eliciting feedback came through unsolicited responses from peers (see Table 4). In the example in Table 4, Student 4 is providing real-time updates about multiple 3D print jobs that are failing. Student 5 interjects with questions in an attempt to help troubleshoot the issues. The dialogue terminates with unsolicited feedback with a suggestion about using hairspray to adhere filament to the print bed. From an interdisciplinary stance, this exchange is of interest since it involves a theater and dance major with experience in 3D printing remotely assisting a mechanical engineer in the troubleshooting process.

Time	Person	Message
11:29:40	Student 5	This is a test with some silver spray paint I have- thoughts? [Photo of the paint sample on a piece of foam]
11:29:59	Student 4	I think it looks good
11:37:16 12:23:06	Student 5 Student 5	About to paint! [Photo of unpainted project] Painting! [Photo of painted project]
12:29:45	Instructor 1	Cuuuuuuute!
13:14:58	Student 5	[Photo of painted project]
13:15:32	Student 4	Wow that looks great

Table 5. Example of peer and instructor affirmation in response to project updates.

The fifth form of eliciting feedback came through peer and instructor affirmations (see Table 5). In the example in Table 5, Student 4 post photos of paint samples on a piece of foam before applying the paint to the project. After Student 4 receives positive feedback from Student 5, she begins to post updates about the painting progress. After these updates, both Instructor 1 and Student 5 respond with affirmations that are positive in nature but do not constitute as substantial

feedback. This replicates the findings from our literature review, which found communication was often superficial via Slack.

Discussion

Based on our findings, using Slack provided an additional space outside of the LMS where students and instructors could engage in casual conversation while still providing both peer and instructor feedback. The (a)synchronous affordances of Slack allowed for communication to flow at a causal pace, proved more timely than scheduling in-person meetings, and replaced the need for lengthy email exchanges. While face-to-face communications terminates at the end of the meeting, Slack conversation can span several hours or even days, which allows members of the community to participate at their own pace.

Since the platform is available 24/7, it is up to both students and instructors to decide when they choose to interact via Slack. Instructors teaching with Slack may choose to set boundaries in terms of times when students can directly contact them. By default, Slack is set to snooze from 10 p.m. until 8 a.m., but as noted in our examples, conversations did take place during snooze hours. This may indicate that Slack could become yet another digital distraction, running the risk of transitioning from being a novel and informal way of communicating to becoming the next email inbox.

Unsolicited instructor feedback was quite common and happened at all hours of the day. Unsolicited peer feedback, however, was very uncommon via Slack. As supported by Resta and Lee (2010), the online community, viewable to all peers and instructors, may influence their activity when providing feedback. In addition, text-based affirmations were a common form of feedback from both peers and instructors. These affirmations were always positive and functioned as the equivalent of hitting the "like" button on other social platforms such as Facebook or Twitter.

Limitations

This study was limited to peer and instructor feedback in Slack and did not investigate how feedback was provided in person or via the LMS. The data analyzed for this study examined only two out of seven team channels, so other types of feedback may have been present in the low- and high-message channels. This use of Slack was limited to a unique case study at a research university, so findings may not be generalizable to other settings. Research about Slack as a collaborative learning tool in higher education is still emerging, thus further research needs to be done to learn about how the platform can be used to elicit peer and instructor feedback.

Conclusion

This study found that Slack was a viable tool for eliciting peer and instructor feedback as part of an interdisciplinary project-based course that had weekly face-to-face meetings. Students elicited feedback by directly requesting it from either their peers or instructors. Unsolicited feedback came in the form of advice or recommendations made by instructors, but rarely by peers. Instead, positive affirmations from both peers and instructors were the most common form of feedback. The platform provided a space outside of the LMS where students could post photo and video updates about their project while engaging in (a)synchronous communication. Members of the Slack learning community were

able to participate at their own pace and could choose whether they wanted to reply outside of traditional working hours.

References

Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C., & Ananthanarayanan, V. (2017). *NMC Horizon Report: 2017 Higher Education Edition*. Austin, TX: The New Media Consortium. Retrieved from http://cdn.nmc.org/media/2017-nmc-horizon-report-he-EN.pdf

Altebarmakian, M., & Alterman, R. (2017). *Engagement and social cohesion in an online collaborative learning environment* (Report No. CS-17-290). https://doi.org/10.13140/RG.2.2.17630.13122

Anderson, K. E. (2016). Getting acquainted with social networks and apps: Picking up the Slack in communication and collaboration. *Library Hi Tech News*, *3*(9), 6–9. https://doi.org/10.1108/LHTN-10-2016-0049

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage.

Ito, M., Gutiérrez, K., Livingstone, S., Penuel, B., Rhodes, J., Salen, K., … Watkins, S. C. (2013). *Connected learning: An agenda for research and design*. Irvine, CA: Digital Media and Learning Research Hub.

Lipponen, L. (2002). *Exploring foundations for computer-supported collaborative learning*. In *CSCL '02 Proceedings of the Computer Supported Collaborative Learning* (pp. 72–81). New York, NY: ACM. https://doi.org/10.3115/1658616.1658627

McCracken, H. (2015, February 19). How Slack uses Slack. *Fastcompany.com*. Retrieved from https://www.fastcompany.com/3040638/how-slack-uses-slack

Miles, M. B., Huberman, A. M., & Saldaña, J. (2013). *Qualitative data analysis: A methods sourcebook*. Thousand Oaks, CA: Sage.

Resta, P., & Lee, H. (2010). Peer and self-assessment. In R. Ubell (Ed.), *Virtual teamwork: Mastering the art and practice of online learning and corporate collaboration* (pp. 45–64). Hoboken, NJ: John WIley & Sons.

Sabin, J., & Olive, A. (2018). Slack: Adopting social-networking platforms for active learning. *PS: Political Science & Politics*, *51*(1), 183–189. https://doi.org/10.1017/S1049096517001913

Stahl, G. (2000). A model of collaborative knowledge-building. In B. Fishman & S. O'Connor-Divelbiss (Eds.), *Fourth International Conference of the Learning Sciences* (pp. 70–77). Mahwah, NJ: Erlbaum.

Tuhkala, A., & Karkkainen, T. (2018). Using Slack for computer-mediated communication to support higher education students' peer interactions during master's thesis seminar. *Education and Information Technologies*, *23*(6), 2379–2397. https://doi.org/10.1007/s10639-018-9722-6

Zhang, X., Meng, Y., Ordóñez de Pablos, P., & Sun, Y. (2019). Learning analytics in collaborative learning supported by Slack: From the perspective of engagement. *Computers in Human Behavior*, *92*, 625–633. https://doi.org/10.1016/j.chb.2017.08.012