

# A Lecture-Based Instructional System to Promote Student Agency

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### **ARTICLE INFO**

# **Keywords:**

Agentic engagement
Digital backchannel
Instruction
Lecture-based learning
Technology

#### **ABSTRACT**

This research study was conducted in 2018 and resulted in an instructional system designed to support university instructors that seek to promote student agency in lecture-based learning environments. The objective of the study was to design and test an instructional system that supplements the traditional lecture and provides opportunities for the development of agentic engagement. In support of the instructional system design, the study examined ways in which university undergraduates used a digital backchannel, determined if using a digital backchannel affected agentic engagement, and identified the features of a digital backchannel that influenced student agency. The study employed a mixed methodology design using a questionnaire to collect quantitative student profile data and phenomenography to conduct a qualitative inquiry into participants' experience. The population for this study consisted of undergraduates at a private, international university located outside of Bangkok, Thailand. A total of 171 participants took part in this study, with ten students selected for a focus group through a non-probability, purposive sampling. Overall, the study found that a lecturing system that employs the strategic use of a digital backchannel can promote student agentic engagement. Student agency and instructor effectiveness were both positively influenced through the employment of an instructional system.

# 1. Introduction

An issue facing today's university lecture halls, worldwide, is the universal lack of student engagement, specifically student agency. Agentic engagement is a student-initiated pathway, representing the "students' constructive contribution to the flow of instruction" as they express interests and offer input to their instructor (Reeve & Shin, 2020). For the agentically-engaged learner, their role in lecture-based learning environments is unclear. They seek to take an active role in the classroom, but in an environment where questioning, commenting, and contributing are not coveted, this leaves them isolated and unsure of expectations. The lecture hall does not promote what Reeve and Shin (2020) describe as the "purposive, proactive, and reciprocal type of engagement" (p. 150) that is integral to promoting student agency.

Lecture-based instruction has a long and revered history in tertiary education. It is an appealing format for instructors and curriculum writers for several reasons. The lecture provides an

#### Cite this article as:

Merritt, M. R., Cleesuntorn, A., & Brahmakasikara, L. (2021). A Lecture-Based Instructional System to Promote Student Agency. *European Journal of Teaching and Education*, 3(2):11-20. https://doi.org/10.33422/ejte.v3i2.644

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instructional format that is universal, orderly, predictable, and repeatable. The instructor is central to the learning environment and assumes the influential position of source and presenter of pre-selected information. In the lecture hall, the student's role is often a passive one, with a simple set of expected behaviors, including listening, note-taking, keeping quiet, and staying still, with the end goal of retaining presented materials for a standardized exam. The instructor unilaterally makes decisions, and the scope and timing of content are predetermined. In response to the one-size-fits-all approach inherent with lecture-based instruction, educational technology has historically provided substantial tools to meet the needs of individual learners. The digital backchannel is built on interactivity and provides a tool for learners to ask, exchange, process, and engage with each other, the instructor, and course content on a personal level.

A common misconception of digital backchannel use in lecture-formatted instruction consists of an increase in student distraction. A study conducted by Baron, et al., 2016 found that there was little evidence of the backchannel promoting distraction in class. Instead, student distractions are the product of a mismanaged backchannel instead of the backchannel itself. Used well, the overall learning environment is enhanced by the based on the feedback that a digital backchannel can potentially provide. Student questions, comments, and backchannel contributions were continuously monitored throughout this study as the researcher sought to use the backchannel to increase student engagement and agency.

Thai universities are not immune to the lack of student agency where most teachers still have a dominant transmission and controlling role in classroom learning activities (Tapinta, 2016). Politeness, honor, social conformity, and passivity are all integral parts of Thai culture and are found in the school systems. These cultural norms are embodied by the country's standard practice of undergraduates being required to wear a uniform; a practice followed by very few other countries. Whereas agentic engagement involves questioning, self-empowerment, and active involvement in the flow of instruction, the requiring of uniforms creates passive characteristics and obedience to authority and reinforces the superiority of teachers and inferiority of students (Bunyawanich, Järvelä, & Ghaffar,2018). Use of a digital backchannel allows for student voice and choice, without asking Thai students to directly confront their cultural norms.

Three learning theories provided the theoretical foundation for this study. A digital backchannel offers opportunities for student to student, student to instructor, and student to content interaction. Interactions of this nature are markers of learning that fall within the learning theory of Social Constructivism. Central to this theory is the notion that knowledge is constructed as a result of collaborative interaction and stimuli. Louvigné, et al., 2018, further explained that contemporary learning theories and their implementations associated with information and communication technologies increasingly integrate social constructivist approaches in order to assist and facilitate the construction of knowledge.

When considering student engagement, the Social Cognitive Theory of learning is a common reference. Schunk and Usher, 2019 hold the Social Cognitive Theory which emphasizes much of human learning and behavior occur in social contexts. By its nature, a digital backchannel is a social context. Schunk and Usher's modern take on Social Cognitive Theory maintains that through observation and interaction with others, learners acquire knowledge, skills, strategies, beliefs and attitudes. The increase in socialization through the digital backchannel provided a venue for social learning for participants.

Finally, Connectivism is a learning framework for understanding how information is processed in a technological society. With the Connectivism framework, learning occurs when knowledge is actuated through the process of a learner connecting and feeding information into a learning community. Siemens (2017) stated that the starting point of connectivism is the individual. Personal knowledge is comprised of a network, which feeds into organizations and

institutions, which in turn feed back into the network, and then continue to provide learning to individual. This cycle of knowledge development (personal to network to organization) allows learners to remain current in their field through the connections they have formed. The digital backchannel provided the network that lies at the center of Connectivism's learning theory.

# 1.1. Study Framework

Central to the conceptual framework (Figure 1) of this study was the digital backchannel. The digital backchannel employed several features to provide a venue for students to learn and practice aspects of student agency. These features included updating in real-time, providing for a large number of synchronous users, requiring registration information to provide for secure chatrooms, providing the option for users to select their username, allowing for the digital backchannel to project onto a screen in the lecture hall, and the provision for transcription saving and export. These are standard features found in most free online digital backchannel applications.

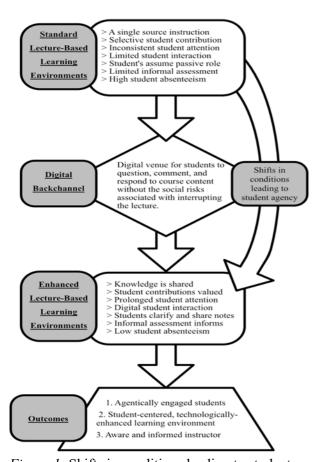


Figure 1: Shifts in conditions leading to student agency through the use of a digital backchannel.

The specific digital backchannel used for this study was the web-based application called *Padlet* (Wallwisher Inc., 2017). Within the application, a *Padlet* is essentially a digital chat room that allowed each of the course's four sections to have its own dedicated space. *Padlets* can be saved and exported as portable document formats or pdfs. The program offers many design features that, when utilized, increase interactivity between instructor and student, between students, and between course content and students. For this study, students used their student number as their profile name. This allowed students to operate within the backchannel with a sense of anonymity with the expectation that it would lead to more honest contributions. Each participant had access to the full range of *Padlet* options. These included posting

questions, answers, and comments; commenting and rating other participants' posts; and adding a full range of media, as in sound, photos, video, color, text enhancements, and external links to contributions.

## 1.2. Research Questions

This study was concerned with identifying the ways a digital backchannel can transform the relatively passive experience of a lecture into one where student voice, investment in learning, and active engagement are part of the learning environment.

Questions that led to these targets include:

- 1. How will students use a digital backchannel in lecture-based courses?
- 2. How does the use of a digital backchannel influence student agency?
- 3. What features of a digital backchannel influence student agency?
- 4. What are the components of an instructional system that supplements a lecture, utilizes a digital backchannel, and increases student agency?

## 1.3. Research Objectives

Through an explorative and comprehensive phenomenographic method, answers to the questions mentioned above lead to the development of four objectives for this study:

- 1. To find the ways in which undergraduate students use a digital backchannel.
- 2. To establish a relationship between the use of digital backchannel and student agency.
- 3. To classify the features of a digital backchannel that influence student agency.
- 4. To create a digital backchannel-based lecturing system that supplements the traditional lecture and increases student agency.

## 2. Methodology

This study was conducted from January to May 2018, at a private, international university outside of Bangkok, Thailand. The population for this study was undergraduates enrolled in a lecture-based course, Environmental Science, GE1301. Participants consisted of four sections of the course meeting three hours per week for 15 weeks and ranged in age from 18 to 23 years old. Of the 171 participants, 97 were female and 74 were male. 140 considered Thailand as their home country, 27 identified as Chinese, and four were from other countries. The course was taught in a standard lecture-based learning environment, with a large number of students in a single classroom, set up in one-directional, theatre-style seating arrangement.

A mixed method research design was utilized in this study. The quantitative component of this study included a pre-treatment questionnaire adapted from Jang and Reeve's 2016 Agentic Engagement Scale. The purpose of the questionnaire was to establish an agency profile for each participant that would inform a heterogeneous, representative group to participate in the focus group. The focus group was a representative group designed to provide a wide range of students who had historically engaged in their lecture-based classes at varying degrees. Agentic engagement from a wide range was desirable as a way to determine if the lecture system influenced participants differently based on their predisposition to agentic engagement.

The qualitative component of the study provided the majority of data collected over the course of the 15-week study. The phenomenographic method employed in this study was used to describe the ways in which participants experienced the common phenomenon of using a digital backchannel in a lecture-based learning environment. The analysis involved a holistic examination of the participants' actions and feelings regarding the use of a digital backchannel. Phenomenographic analysis was completed on the digital backchannel entries, field notes, and focus group transcription. Each data source provided a different perspective on the experience and all contributed to structural descriptions of each participant's experience. The web-based program, HyperREASEARCH, was used to record and organize codes and themes.

The phenomenography yielded the systematic reduction of text-based data or bracketing into themes and codes that led to each participant's structural descriptions. Bracketing helps the researcher develop a keen awareness of participant's assumptions and expectations (Sohn, et al., 2017). Analysis consisted of multiple readings of the text, the identification of patterns and repetitions within the text, and the construction of meaningful units. The researcher was able to consider the digital backchannel experience from the perspective of the participant and gain a deeper understanding of how technology influenced learning. Features of the technology were isolated and discussed in detail, providing insights into how and why specific features were used and preferred over others.

The development of the Digital Backchannel-Enhanced Instructional System (DBEIS) was based on the Seven-Step Model for Prototype Development designed by Brahmawong in 1999 (Raso, et al., 2018) The procedure was designed to develop and test the digital backchannel-enhanced instructional system comprehensively. The conceptual model was sent to five experts in the field to help establish the validity of the methodology and provide feedback that was incorporated into the design of the instructional system.

Both quantitative instruments and qualitative procedures associated with each data source were sent to five field experts to establish data validity and trustworthiness. First, the questionnaire was presented to the five field experts for any suggestions for improvement. Next, items in the questionnaire were corrected and adjusted in accordance with comments and recommendations made by the experts. Next, after receiving feedback and recommendations, the researcher used the Index of Item-Objective Congruence (IOC) to find the content validity. The experts evaluated the ten items of the questionnaire based on the score range from -1 to +1, where items that were congruent scored a +1, items that were questionable were scored with a 0, and incongruent items were scored -1. Items that received total scores lower than 0.5 were revised. Conversely, the items that had scores higher than or equal to 0.5 were reserved. Six items were related to agentic engagement behaviors and scored an index average of 0.82. All items were reserved. The remaining four items related to agentic disengagement behaviors and averaged a score index of 0.7. All of these items were also reserved. The same experts also provided feedback on the focus group questions and phenomenographic procedures for collection and analysis of qualitative data.

# 3. Research results

Table 1 shows a selection portion of the results of the quantitative data analyzed as the measure for the purposive selection sampling for focus group participation.

RQ1: How will students use a digital backchannel in lecture-based courses? Phenomenographic analysis showed an increase in student participation through the backchannel, and this participation increased when the students knew the backchannel was being monitored and the instructor was providing feedback. The initial analysis of the entries resulted in several generalizations. First, the sheer number of entries was worth noting. At over 2,000 entries throughout the study, on average, this constituted 26 backchannel entries per hour, per section. When compared to the average face-to-face participation rate of eight contributions per hour, the backchannel, as a learning tool, was well-utilized and provided participants with an avenue not typically provided for in a standard lecture hall.

**RQ2:** How does the use of a digital backchannel influence student agency? The use of personal technology has been shown to increase participation in lecture-based learning environments, and findings as a result of this research study support these conclusions. This study concluded that specific aspects of student agency (intentionality and self-awareness) were utilized in the backchannel more than others (forethought) and to find an increase in the development of these specific aspects of agentic engagement would require further study.

**RQ3:** What features of a digital backchannel influenced student agency? The study concluded that microblogging was the backchannel feature that led to the instances of agentic engagement. This was due to the participant's ability to express their thoughts, needs, and wants, in the short text-based entries. Analysis also led to the conclusion that participants who showed a tendency towards agentic engagement before the study were more likely to use the digital backchannel in agentic ways during the study. Contributions to the backchannel from focus group participants did not relate directly to the amount participants contributed to the focus group discussion. This discrepancy is an indication of the backchannel's appeal to those students who are less comfortable verbally conversing in English.

Table 1. Focus Group Participants Agentic Engagement Ouestionnaire Results

#	Name	Tech. Use*	Spoken English*	Written English*	Agentic Engage*	Agentic Disengage*	Profile
1	Alan	7	7	7	6.3	3.3	Confident in both technology and English use. Highly engaged, low disengagement.
2	Bill	7	6	4	6.2	3.0	Confident technology user. Highly engaged, low disengagement.
3	Andy	7	4	4	5.0	3.25	Confident technology user. Average engagement, low disengagement.
4	Prim	4	5	5	3.0	3.0	Not confident user of technology or English. Low engagement and
5	Charlie	7	3	3	4.8	4.5	disengagement. Confident technology user. Limited English use. Low engagement, high disengagement.
6	Polly	6	7	7	6.7	2.3	Confident technology and English user. Highly engaged, low disengagement.
7	Molly	4	5	6	6.3	4.5	Not confident technology user. Highly engaged and disengaged.
8	Carly	3	3	6	4.5	2.0	Not confident technology user. Low disengagement.
9	Philip	7	4	3	6.2	2.5	Confident technology user. Highly engaged, low disengagement.
10	Frank	6	5	5	6.2	5.3	Confident technology user. Highly engaged and disengaged.
Stu	dy AVG	5.9	4.6	4.8	5.0	3.8	

Note. Study average is based on 171 participants.

**RQ4:** What are the components of an instructional system that supplements a lecture, utilizes a digital backchannel, and increases student agency? During focus group meetings, six stages of The Digital Backchannel Enhanced Instructional System (Figure 2) were discussed: grounding, instruction, question & comment, monitoring, reflection, and preparation. Equally important as the components was the lecturer's philosophy regarding student agency. The system allowed for opportunities to practice agentic engagement, but the system required a lecturer who believed in the value of student agency and promoted students to engage with each other and the course material. Both structure and user were needed for the system to be effective.

<sup>\*</sup> The research instrument was a seven-point, Likert scale questionnaire asking each participant to self-assess themselves on pre-treatment levels.

	DBEIS Stage	Instructional Event (Gagne, 1965)	Mental Process (Gagne, 1965)	E-Learning (Pappas, 2015)	Lecture	Padlet
1	Grounding	Gain attention	Stimuli activate receptors	Create an attention- grabbing introduction	Read the Group	Independent Opening
		Inform learners of objectives	Create levels of expectation for learning	Inform learner about objectives of eLearning course	Big Ideas, Key Terms	
2	Instruction	Stimulate recall of prior learning	Retrieval and activation of short-term memory	Stimulate recall of prior knowledge	Look Back	
		Present the content	Selective perception of content	Create goal- centered eLearning content	30+30 Present	
3	Question & Comments	Provide "learning guidance"	Semantic encoding for storage of long-term memory	Provide online guidance	Respond	Questions & Comments
4	Monitoring	Elicit performance (practice)	Respond to questions to enhance encoding and verification	Practice makes perfect	Set Task	Backchannel Loop
		Provide feedback	Reinforce and assess correct performance	Offer timely feedback	Monitor	Post, Respond, Evaluate
5	Reflection	Assess performance	Retrieve and reinforce content as final evaluation	Assess early and often	For Next Time	Reflect
6	Preparation	Enhance retention and transfer to the job	Retrieve and generalize learned skill to new situation	Enhance transfer of knowledge by tying it into real- world situations and applications	Conceptual Understanding Checks	Formative Feedback

Figure 2. Digital Backchannel Enhanced Instructional System (DBEIS)

Table 2 provides examples for each of the focus group participants of phenomenographic analysis and the formation of structural descriptions. These descriptions, along with the process of bracketing led to the answers to the research questions.

Table 2. Structural Description Formation

#	Name	Observations, Quotes, Notes	Structural Description Excerpt		
	Alan	"Padlet was really easy to use and	Alan's sense of efficacy is strong and when he used		
1		find some information from	Padlet, he was one of the few students who provided		
	Tiun	others. I could add my ideas to the	feedback to the instructor regarding the pace of speaking		
		lecture."	or content presented.		
2	Bill	Most of participant's backchannel	Bill uses <i>Padlet</i> when prompted and of his own accord, as		
		contributions added in between	it "provides him time to think about the right words" and		
		classes.	produce reflective responses.		
3	Andy	Participant is quiet and rarely	It was difficult to tell from Andy's demeanor how much		
		contributes to verbal discussions.	or little he was understanding during lectures.		
4	Prim	"Padlet helps me to know how	Prim is a quiet student in her second year at university.		
		others answered the question. It	She is observant, but passive in class. She rarely used		
		gives me time to work out the	technology to help her learn and relies upon her friends		
		vocabulary."	when asked to timely contribute to discussions.		
5	Charlie	Participant often uses phone to	Charlie described his lecture experience as a "challenge.		
		translate English into Thai during	My challenge is to understand the words which might be		
		lectures.	quite difficult, so I was better to learn the reading before I		
		"Teachers asks us to do more	get into class."		
	Polly		Polly was a prolific contributor during class discussions		
6		group work, so most of our work	and although she is confident in her use of technology in		
		we could do together on the backchannel."	an educational setting, she preferred discussing		
		"I think most students are	environmental issues face to face.  Molly prefers to work with her peers and instructor rather		
7	Molly	distracted by their phone."	than use technology when learning a new concept.		
		distracted by their phone.	Carly felt much more comfortable reading and writing		
	Carly	Participant is often engaged, but	English than speaking it and appreciated how the <i>Padlet</i>		
		not agentically, allowing concepts	was available to her after class. She was an attentive		
8		to pass her by without seeking	student, but did not regularly contribute to the		
		understanding.	backchannel, choosing to read and reflect on what others		
		anderstanding.	had to say on a topic.		
	Philip	Participant commonly reacts to			
		other's backchannel contributions	Philip enjoys using technology in and out of class. He is not shy about the fact that it can distract him from his		
9		with his own stories and			
		experiences.	studies.		
	Frank	Participant is able to comprehend	Franks admits to being easily distracted during long		
10		English at a higher level than his	lectures and would often open a second window on his		
10		ability to produce it. He uses	device and check his other social media sites to fill the		
		phone to translate.	time.		
		•			

Note. Observations, field notes, and transcriptions led to the formation of themes and the construction of the structural descriptions for each participant.

## 4. Discussion

The backchannel entries and focus group discussion transcriptions provided the researcher with an abundance of direct source data. The initial analysis of the entries resulted in several generalizations. First, the backchannel was well-used and provided participants with a voice. The backchannel feature of microblogging or "fast open real-time communication using short messages between users" (Hronmic & Hayes, 2020), was the most utilized backchannel feature and provided a venue for participants to agentically engage in course content. Considering Thai students are raised to respect their teachers and minimize interaction and questioning in class, higher rates of participation in discussions is a meaningful result. Backchannel entries were almost entirely used for course-related contributions, and there were very few entries of off-topic dialogue and socialization as anticipated by the researcher.

When the backchannel was monitored, students used it more often. Previous research in this area supports the concept that if feedback is timely, specific, and relevant, there are positive

effects on student learning (Brooks et al., 2019). Feedback, as described by Brooks et al., was consistent with the findings of this study where students participated with more frequency and with more course-related comments and questions if they knew the entry was going to be monitored and potentially elicit a response.

Agency in the backchannel translated to agentic engagement in person. Students that showed a high level of engagement, including agency, undertook similar behaviors when in learning situations, both online and in person. These habits included providing personal opinions, engaging in respectful discourse, engaging the learning community, using a variety of resources, and interacting with a mentor (Preus et al. 2016). The digital backchannel gave Thai students an opportunity to agentically engage in ways that do not directly oppose cultural norms. Similar to their non-Thai counterparts, participants that displayed agentic engagement before the study were more likely to use the digital backchannel to agentically engage during the study.

#### 5. Conclusions

The backchannel was popular with the participants as a way to participate in the course. With over 2,000 backchannel entries by the 171 participants over 15 weeks results showed that the use of personal technology in lecture-based learning environments can increase participation. To further elicit this point, participants that did not contribute readily to the focus group discussion were more productive within the digital backchannel. Despite the focus group engaged in an unbalanced discussion, the backchannel, itself, was composed of a wide range of contributors. A discrepancy in participation in the digital world versus the real world can be an indication of the backchannel's appeal to those students who are less comfortable conversing in English in real-time.

The instructional system helped the lecturer stay focused on learner-centered instruction. By employing the DBCIS framework, the instructor was able to engage in systematic formative assessment, provide real-time feedback, and build natural breaks in the flow of the lecture. Within the cultural context of Thailand, student agency is not recognized as a valued aspect of engagement. However, Reeve and Shin (2020) have identified agentic engagement as an independent predictor of student achievement, worthy of development in all learning environments. Considering the prevalence of lecture-based learning environments in Thailand, technology can provide a means to allow students to benefit from agentic engagement without confronting established cultural norms.

It is recommended that further study consider the application of a digital backchannel-enhanced instructional system with upper secondary students. Giving these students the opportunity to increase their agentic engagement before university-level studies may have a positive effect on how these students learn in lecture-based learning environments. Agentic engagement may be a learned skill that could benefit learners from an earlier age and adjust how these learners perceive their role in their own education.

There are a number of limitations that should be factored into the analysis of this study, namely, the study took place at a private, international university in Thailand. The conclusions reached as a result of the data collected in this study will consider the cultural and social context but may not represent a typical Thai population or undergraduates in other contexts and countries. Another limitation of this research is that it took place amongst students enrolled in a single subject area. Environmental Science is a lecture-based course and is part of the general education requirements for a bachelor's degree in the Faculty of Arts. For conclusions to be drawn across a larger population of undergraduates, other courses in additional faculties should be considered.

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