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Integrating Microlearning Instructional Approach into an Introductory Data-management Course

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Abstract

In this full research paper, we aim to enhance the instructional delivery of the CIT 21400 (Introduction to Data Management) course at IUPUI to improve students' learning experience and to engage students better as they learn and apply the foundational database concepts. Introductory programming courses such as database programming and design represent crucial milestones in IT education, as they reflect students' ability to solve problems and design appropriate solutions. But, for novice programmers learning SQL (Structured Query Language) programming and logical database design concepts is a challenging task because while writing SQL programs, students not only have to apply theoretical concepts such as syntax and semantics but also practical concepts such as problem-solving at the same time, which results in cognitive overload. Furthermore, the current university students are mobile-savvy, and their learning needs are immediate and interactive. They prefer autonomy, learning in a short period, and immediate application of the knowledge they acquired. Thus, to engage and motivate these students, a new instructional strategy that is cognizant of their learning needs is needed.

This work entails the complete redesign of CIT 21400 through microlearning-based instruction based on student needs and course learning objectives. Microlearning is a successful form of learner-centered instructional approach with many features that should help undergraduate students master introductory programming concepts. In the microlearning approach, the learning content are broke up into small, targeted activities that are delivered digitally in an easily consumable form. Some of the benefits of microlearning include (1) increased learning performance, (2) better knowledge retention, (3) increased learner engagement, (4) improved learner attitudes, and (5) high learner satisfaction. Even though microlearning has gained increased popularity in Computer Science & IT education, it still has received little attention for teaching introductory core programming courses. In this work, based on principles outlined in the literature, we integrated microlearning intervention to teach database programming.

To validate the effectiveness of the microlearning instructional approach, in the fall of 2021, we conducted a pilot study for CIT 21400. In this study, the first half of the course content was delivered using microlearning instruction whereas the second half of the course content was delivered using pre-recorded video lectures. The following research questions guided this study:

1. What is the difference between students' performance while learning through microlearning instruction and recorded video lectures?
2. How do students perceive using microlearning instruction to learn introductory database concepts?

The present study provides insightful findings on the claim that microlearning as an instructional method -- can help students learn complex introductory programming concepts better. We found that students scored significantly higher in quizzes while using microlearning content compared to recorded class lectures; furthermore, we also found that participants preferred microlearning instruction compared to recorded video lectures to learn complex database programming concepts. This study also revealed various perceived benefits and associated challenges while using microlearning instruction. However, the results need further validation to provide guidelines to educators to use microlearning as a viable instructional approach for teaching introductory programming concepts.

Keywords: Active learning, cognitive load, microlearning

1 Introduction

Emerging fields such as Big Data and Data Science require new IT graduates to demonstrate their mastery in data acquisition, data management, and data inference skills when they enter the workforce (Mithun & Luo, 2020). Thus, introductory programming courses such as database programming and design represent crucial milestones in IT education, as they reflect students' ability to solve problems and design appropriate solutions (Skala & Drilk, 2018). But, for novice programmers learning SQL programming and logical database design concepts is a challenging task because while writing SQL programs, students not only have to apply theoretical concepts such as syntax and semantics but also practical concepts such as problem-solving at the same time, which results in cognitive overload (Malik et al. 2019). Furthermore, the current university students are mobile-savvy, and their learning needs are immediate and interactive (Aldosemani, 2019). They prefer autonomy, learning in a short period of time, and immediate application of the knowledge they acquired (Skala & Drilk, 2018).

While our literature review shows that innovative teaching methods such as flipped classrooms might improve student learning outcomes and teacher satisfaction, researchers have found that the success of flipped implementations depends on the content area, instructional design, and level of student expertise (e.g., Mithun & Luo, 2020). One common obstacle in using these approaches is the handling of students skipping video lectures due to a lack of motivation; this lack of engagement often leads to overwhelming feelings when they cannot follow the course content (Sobral, 2021). Most online instructors use pre-recorded video lectures as the instructional format. This is another motivation to investigate a more effective pedagogical approach for online classes and flipped classes that use pre-recorded video lectures to cover the course content.

Thus, to engage and motivate these students, a new instructional strategy that is cognizant of their learning preferences is required. Hence, in this curriculum enhancement, we targeted to mitigate the above challenges through a new learner-centered instructional strategy called the microlearning instructional approach. To implement the microlearning approach, we reviewed and adapted our existing instructional design for CIT 21400 (Introduction to Data Management course) to achieve our targeted learning outcomes. To evaluate the effectiveness of microlearning instruction, we compared microlearning instructions with a video lecture-based approach in the Fall of 2021. In this evaluation, we tried to answer the following research questions:

1. What is the difference between students' performance while learning through microlearning instruction and recorded video lectures?
2. How do students perceive using microlearning instruction to learn introductory database concepts?

2 Background

2.1 Description of CIT Curriculum

The Computer and Information Technology (CIT) program within Computer Information & Graphic Technology (CIGT) department at our institute has four concentrations: Networking Systems, Information Security, Web Development, and Data Management. These concentrations align with subdisciplines of Information Technology. By choosing a concentration, our students can dive deep into a subdiscipline. Due to the complex subject matter and technical nature, many of our current data-management concentration courses are taught using a traditional lecture-based format. But lecture-based instruction does not engage some students or keep them interested (Skala & Drilk, 2018; Mithun & Luo, 2020). Students often have difficulty retaining and applying their acquired knowledge (Malik & Coldwell-Neilson, 2018). Our current work directly impacts CIT 21400 course. In this study, we integrated the microlearning instructional approach into CIT 21400 to help engage students and retain the knowledge gained through the introduction to data management course. CIT 21400 is a required class for all CIT students and a prerequisite for all other courses in the data-management concentration. Figure 1 shows the current plan of study for the CIT data-management concentration; we draw particular attention to CIT 21400's position as a prerequisite course for all data-management courses. Approximately 140 students who enroll in CIT 21400 will directly benefit per academic year. We anticipate seeing learning and performance gains over time as students continue in their programs as an outcome of our research.

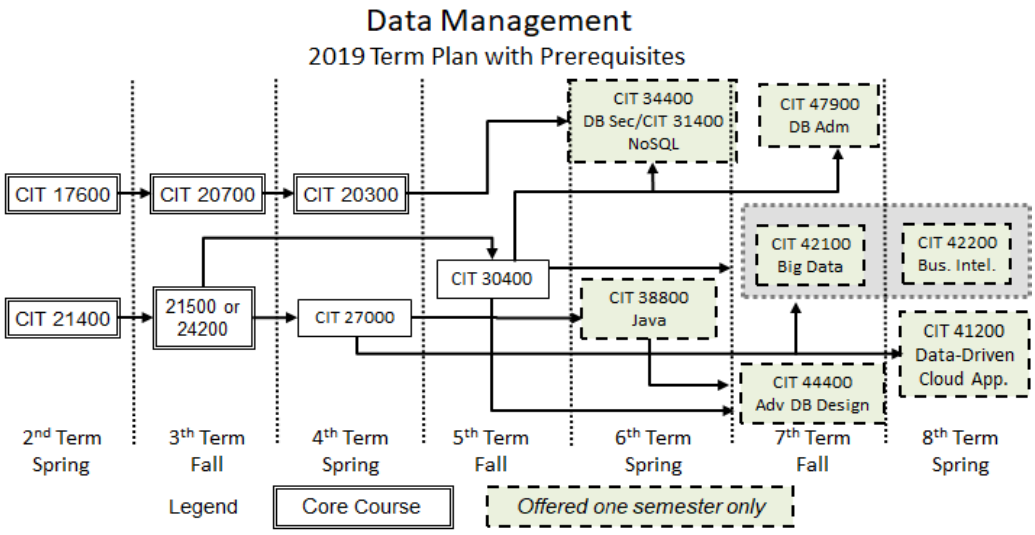

Figure 1: *Current Plan of Study for Data-Management Concentration*

2.2 Description of Microlearning

Microlearning (Micro learning, micro-learning) is a technology-enhanced learning format with many features that helps instructors and students to master introductory database programming concepts such as SQL. Some researchers define microlearning as the term that refers to any

instructional approach that encourages learning in small focused segments that are supported through technology and digital medium (e.g. Major & Calandrino, 2018). However, other researchers argue that microlearning is not about chunking long instructional content into small segments, but rather purposefully designing learning content that is focused on a single learning objective with targeted learning activities (e.g. Allela, 2021). In this study, we define microlearning as "an instructional strategy where the learning content is divided into small, focused activities and delivered digitally in an easily digestible form that is outcome-oriented" (Sankaranarayanan et al., 2023, p. 2).

Some of the educational benefits of the microlearning instructional approach include: (1) increased student motivation and satisfaction towards instruction (Allela, 2021; Nikou & Economides, 2018), (2) higher engagement with learning content (Arnab et al., 2021), (3) less cognitive load experienced by the students (Allela, 2021; Bruck et al., 2012), and (4) higher retention of knowledge (Dixit et al. 2022; Dolanski & Reynolds, 2020; Shail, 2019). Microlearning has been a successful and more prevalent instructional approach in many disciplines such as corporate training, medical sciences, language learning, and computer science engineering to name a few.

3 Rationale and Literature Review

The field of databases and data management is constantly evolving. The era of big data has motivated new paradigms in the development of data-management strategies and systems. Social, economic, and technological advancements are triggering new challenges and opportunities in our everyday lives. Education also needs to be transformed appropriately in the way we live, work, and learn (Giurgiu, 2017). Researching and exploring the best instructional strategies is one of the most important necessities of higher education (Aldosemani, 2019). As such, the CIT 21400 curriculum has changed over the years accordingly. The latest curriculum change was the flipped classroom and online class implementation with recorded video lectures. However, still, there is room for improving our pedagogical approach and instructional design of CIT 21400; data shows that approximately 18% of students did not complete the course successfully in Spring 2021. In addition, literature also shows that innovative teaching methods such as flipped classrooms might improve student learning outcomes and teacher satisfaction; it depends on the instructional design and implementation (Mithun & Luo, 2020). Some of the reasons for this could be when the students skip some of the video lectures due to a lack of motivation or when the students feel viewing long static videos is boring; thus, making the course content overwhelming for them (Sobral, 2021).

The microlearning approach might help with some of the problems faced by undergraduate students for the reasons below. First, some of the challenges such as students' feeling overwhelmed or bored after watching static boring video lectures could be averted as microlearning content delivers only must-know information about a single topic in a compact and focused manner, that takes less than 15 minutes to complete (Dolanski & Reynolds, 2020; Kovachev et al. 2011). Furthermore, this approach works because the proposed design is cognizant of human cognitive architecture; thus, helping to avoid cognitive overload, which aids in an effective learning process (Bruck et al. 2012). Finally, this approach works because it is a learner-centered approach to instruction and students have a sense of autonomy towards their learning processes. It also considers students' attention span while presenting the content to learners (e.g. Grevtseva et al. 2017).

Computer Science and the Information Technology field are one of the initial adopters of the microlearning approach. For example, Matthews and colleagues designed learning objects (LO) based on the number of pages, access time, and logical content for teaching introductory C programming concepts. They found that the students in the microlearning objects group scored better in the post-test and quizzes (Matthews et al. 2014). Similarly, Javorcik and Polasek (2019a) created a microlearning course from an existing e-learning course and compared the student learning outcomes. They found that the students in microlearning courses achieved course learning outcomes more easily and accessed the course twice the number of e-learning courses. As a follow-up study, the same authors presented two models - Model A and Model B to transform eLearning courses into microlearning courses in Moodle LMS (Learning Management System), and based on the pilot study results, they found model B with fewer thematic units is appropriate for first-year university students (Javorick & Polasek, 2019b). Likewise, Skala and Drilk focused on the didactical design of microlearning based on micro-content and micro-activities (Skala & Drilk, 2018). In one of their recent publications, based on longitudinal data from 2016 - 2019, they proposed a microlearning model to predict at-risk students and student outcomes in introductory programming courses (Skala & Drilk, 2020). They also found that students' perception was positive while using microlearning content in the introductory programming courses (Skala & Drilk, 2020).

Even though microlearning has gained increased popularity in CS & IT education, it still has received little attention for teaching introductory core programming courses. Only a handful of studies have explored the effectiveness of microlearning instruction for teaching introductory programming courses (e.g., Mathews et al. 2013; Skala & Drilk, 2020). Some of the reasons for this could be that microlearning is a relatively new but emerging trend in higher education (Leong et al. 2020). In this work, based on principles outlined in the literature, we integrated microlearning intervention to teach database programming and compared it with the recorded video lectures in terms of student perceptions and student learning outcomes.

4 Redesign of CIT 21400 using Microlearning

To investigate the effectiveness of the microlearning instructional approach, we integrated a microlearning instructional approach into the curriculum of the CIT 21400 course in the Fall of 2021 semester. To accomplish this goal, the CIT 21400 course was restructured and redesigned.

4.1 Design Learning Outcome for CIT 21400

Currently, the CIT 21400 course covers fundamentals of database development concepts and extensive exploration of data manipulation using a Relational Database Management System (DBMS) and SQL. Topics include database management concepts, database design methods, query by example, and SQL programming are taught in the course. The course combines lectures with hands-on activities through lab sessions and an application-oriented project using MySQL DBMS. To incorporate the microlearning framework, first, we finalized course learning outcomes for CIT 21400 course. We had a targeted set of learning outcomes for the CIT 21400:

- Understand basic data management concepts
- Understand the structure and methods of the relational data model
- Create and manipulate relational databases using QBE (Query By Example) and SQL
- Model logical data requirements using entity-oriented techniques
- Transform a logical data model into a relational database structure

- Apply normalization techniques to a database
- Understand the functions of a DBMS and database administration

4.2 Design Microlearning Module for CIT 21400

After finalizing course learning outcomes, we redesigned CIT 21400 to match the targeted learning outcomes. As part of the course redesign, content selection, and preparation were implemented using microlearning. A microlearning intervention in the form of microlearning modules and micro lessons was designed to deliver the course content for the course. From the literature (e.g., Jahnke et al., 2019), we have identified the following inherent principles (See Table 1) for designing the microlearning intervention. Even though some of these design principles are proposed for mobile microlearning; based on the literature most of these design principles apply to any form of microlearning. These microlearning modules were created from the pre-recorded video lectures (already used for the course) using the *Articulate Rise 360* tool, a web-based instructional design tool. The reasons for selecting Rise 360 include (1) a convenient website-like interface, (2) easy to-create modular course structure, (3) responsive to various screen sizes and devices (such as mobile, laptop, tablet, etc.), and (4) compatibility to integrate with Canvas LMS.

Table 1. *Microlearning design principles (adapted from Jahnke et al. 2019)*

Design Principles	**Implementation Details**
Micro-content and Micro-Activities Design ● Have a single objective ● Have short lessons ● Provide learner interaction	The Microlearning modules used in this course entailed 1. Single learning objective and are presented in small chunks. 2. Arranged in short segments, so they are easy to understand. 3. Learner could interact with microlearning content.
Instructional Flow ● Provide learning paths ● Provide Multi-modal instruction ● Provide instant feedback	The microlearning modules in this course are supported by 1. Multiple learning pathways, where learners can choose where they want to start the lesson with. 2. Micro lessons included diverse media like video, text, and images. 3. Instant feedback was provided during the practice assessment.
Systems Design ● Easily accessible content ● Learners can track progress ● Multiple device access	The microlearning modules are designed in such a way 1. They can be accessed through Canvas LMS. 2. Learners can track their progress using a progress bar 3. They can access the modules on any mobile device such as Laptop, Tablet, or smartphone.
Learner Motivation ● Support learner needs and Preferences ● Increase learner motivation ● Design for target learners	The microlearning modules were designed in a way 1. The learner's needs and preferences are supported through interactivity and short lessons. 2. The short lessons, interactive elements, and practice assessment help with learner motivation. 3. The learning content was specifically designed for the students of this course.

4.3 Research Design

To answer our research questions, we used a single exploratory case study approach (Yin, 2014). In the fall of 2021, we conducted a pilot study for CIT 21400. Participants were 30 undergraduate students (10 females; 20 males) in their sophomore year majoring in the CIT department. This online course was structured in a fifteen-week semester format and utilized the Canvas LMS to deliver the course content and assess students' performance. In this pilot study, the first half of the course content was delivered using microlearning instruction whereas the second half of the course content was delivered using pre-recorded video lectures.

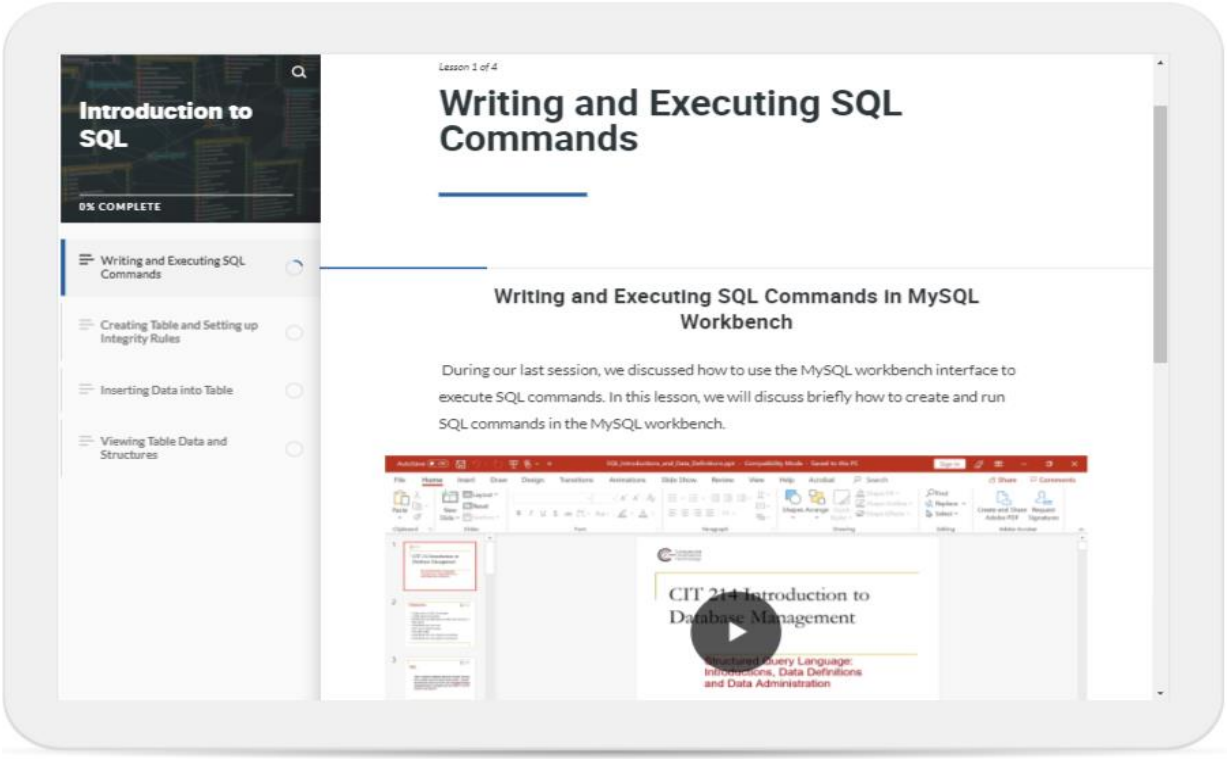

Figure 2. *Sample Microlearning Module for Week 3*

A microlearning instruction was created based on the design principles adapted from Jahnke et al. 2019. Each microlearning module was organized based on the weekly topics and built upon each other. The weekly microlearning lessons were made available via modules in the Canvas LMS at the start of the week. Students could go back to microlearning lessons and re-watch them as needed in any order they want. Figure 2 shows a sample microlearning module. The structure of the microlearning module was as follows:

- A user interface that allows the student to select the micro lesson they want to start with
- A progress bar that indicates the completion rate of that module
- A short, focused video on a single learning objective
- Review of contents in the micro lesson
- A practice knowledge check

Likewise, the recorded video lectures were based on the voice-over PowerPoint presentation on the weekly course content. They were recorded by the course instructor using the Kaltura

screencast tool and they were approximately 1 hour in duration. These recorded video lectures do not contain any interactive elements and mostly contain five to seven learning objectives clubbed together for the given week. The recorded video lectures are integrated directly into the Canvas modules page for the week and are directly accessed by the students in the Canvas LMS.

4.3.1. Study procedure

The study procedure is shown in Figure 3. There are three phases involved in this study. In phase 1, a total of ten topic quizzes (one quiz for each course topic) and two assessment exams (Exam 1 by the end of microlearning instruction during week 8 and Exam 2 by the end of video lecture during week 15) were completed by the students. In Phase 2, an electronic survey created using the Qualtrics application was administered during week 10. In the final phase, semi-structured interviews were administered with students. The interviews were recorded, transcribed, and member-checked for trustworthiness.

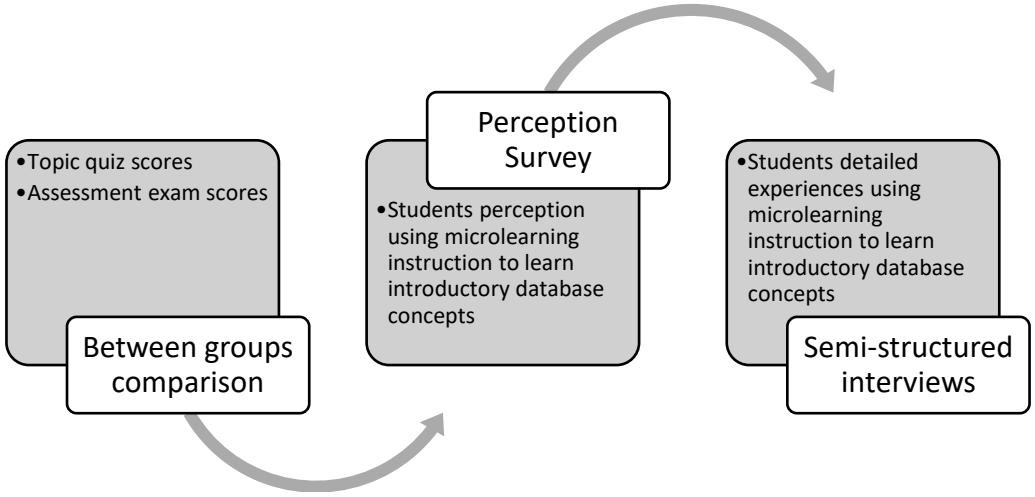

Figure 3. *Study Procedure*

4.3.2. Data collection

In our pilot study, we evaluated students' performance gains and perceptions. To identify the difference between students' performance while learning through microlearning instruction and recorded video lectures, the students' consolidated topic quiz scores from the first five quizzes were compared with the second five quizzes (i.e., microlearning versus video lecture). Likewise, the student's performance from Exam 1 was compared with Exam 2 to see if there were statistically significant differences in their scores based on the instructional method. Next, to explore the students' perceptions while using microlearning instruction, First, a 10-item survey instrument was created based on Leppink et al.'s (2013) cognitive load questionnaire and Inker et al. 2020's microlearning intervention feedback survey instruments (see appendix A for the survey instrument). The first part of the survey consisted of 10 statements based on a ten-point Likert scale using not at all the case (1) to completely the case (10). The second part consisted of questions about the desirable microlearning features. Second, a semi-structured interview protocol was created to gain an understanding of the students' detailed experiences while using the microlearning instruction (see Appendix B for the interview protocol). The interview questions mainly focused on students' experiences while using the microlearning instruction related to their learning, and the challenges they faced while using microlearning instruction.

4.3.3. Data analysis

To analyze the difference between students' performance while learning through microlearning instruction and recorded video lectures, two paired t-tests were conducted to compare the mean scores on the consolidated quiz scores and assessment exam scores. Similarly, descriptive statistics were used to present the students' perceptions while using the microlearning instruction to learn introductory database concepts. For analyzing the interview data, Braun & Clarke (2006)'s six-phase thematic analysis approach was used. After getting confirmation from the participants on the accuracy of the transcribed verbatim, they were loaded into the NVIVO software for the coding process. Using research questions, we intentionally coded the chunks of data that helped to answer our research questions. Each meaningful piece of data was compared with the existing codes and was grouped to create themes. Finally, a peer debriefing session was conducted with methodology experts, where the codes and themes were discussed and finalized.

5 Results and Discussion

The purpose of our pilot study was to examine the impact of microlearning in our introductory database programming online classroom based on student learning outcomes. This study also helped us study the students' perceptions while using the microlearning content. This study aimed to address the gaps in the microlearning literature by unpacking and exploring the experiences of undergraduate students using microlearning as an instructional approach to understanding introductory database programming concepts. The following research questions guided this study:

1. What is the difference between students' performance while learning through microlearning instruction and recorded video lectures?
2. How do students perceive using microlearning instruction to learn introductory database concepts?

Below we share the findings for the two research questions:

Differences between students' performance while learning through microlearning instruction and pre-recorded class lectures

Quantitative analysis began with examining the statistical differences between microlearning instruction and recorded class lectures in terms of quiz scores and assessment exam scores using repeated measures paired *t-tests.* The students' quiz performance in the microlearning instruction was significantly higher than that of the recorded lectures and the students' exam performance in the microlearning instruction was also significantly higher than that of the recorded lectures instruction. Table 2 shows the descriptive details.

Table 2. *Means and standard deviations of quiz scores and assessment scores*

	Recorded Video Lectures		**Microlearning Instruction**	
	Mean	***SD***	***Mean***	***SD***
Quiz Scores	75.80	14.38	81.25 *	14.93
Exam Scores	133.80	21.06	142.8**	10.19

note. *Denotes significant differences in the mean score of the paired items at the $p < .05$ level. For Quiz scores, $t=2.219$ and $p = 0.03$.
** Denotes significant differences in the mean score between exam 1 and exam 2, $t=2.848$ and $p < .01$.

Students' perceptions while using microlearning instruction to learn database concepts

The participants agreed that microlearning instruction is a better way to learn introductory database programming concepts compared to that recorded video lectures. The respondents also felt that microlearning instruction made them feel confident to perform in assessment exams. Table 3 and Table 4 present the students' perceptions and experiences.

Table 3. *Student perceptions regarding microlearning instruction*

Microlearning instruction increased my confidence to perform well in my exams	**7** /10
Microlearning instruction is better than recorded video lectures	**7** /10
Microlearning is a helpful way to learn introductory programming concepts	**8** /10

*(**1**: Not at all the case; **10**: Completely the case)

Table 4. *Student experiences while using microlearning instruction*

Perceived Benefits	**Perceived Challenges**
Easy to focus on learning content	Learning pathways not clearly defined
Interactive features such as flashcards	Unable to use full-screen functionality
Practice quizzes	More interactive features needed
Layout and modular structure	Chapter summaries

Here are some of the direct students' quotations from interviews:

Perceived Benefits:

"*I personally liked it a lot. It acts like one question after that video segment is over. As for me personally, I think it's easier to focus on something that's five minutes long as opposed to something say like 15 to 20 minutes.*"

"I feel the microlearning was helpful to learn the important concepts of the course. The examples are especially helpful to understand each concept. I actually prefer this more than the recorded lectures - video lectures, because I like how each [microlearning] video is about a certain topic and I found a short lesson, the video clips, the knowledge checks, and flashcards very helpful."

Challenges faced:

"I couldn't make it full screen. It was under the other stuff on the side, so I had to zoom in to see better. And another one, I think sometimes I couldn't skip around. Like if I try to go back, it made me start from the beginning. Keep clicking Next, I can just click on whichever video I want to view. It was not clear."

Suggestions for improvement:

"I think instruction wise, and it was pretty helpful. Maybe there should be something where you can enlarge it, or I look for another side option for that. But other than that, I think it was pretty easy to navigate and simple to understand."

There are many implications for both research and practice that could benefit from this study. First, the findings from this study provide empirical evidence for utilizing microlearning as a viable

instructional method for complex introductory database programming concepts. Second, the findings from this study help educators to understand the undergraduate students' perceptions of using microlearning content, which might help with their successful teaching of introductory programming courses. Finally, in terms of higher education, the findings of this study might help design microlearning content to be suitable for introductory programming courses, which can potentially help to address the high drop-out rates and turn-over issues in CS & IT education (e.g., Konecki, 2014; Luxton-Reilly et al., 2018).

6 Conclusion and Future Directions

The present study provides insightful findings on the claim that microlearning is an instructional method -- that can help students learn complex introductory programming concepts better. We found that students scored higher in quizzes and assessment exams while using microlearning content compared to recorded class lectures; furthermore, we also found that participants preferred microlearning instruction compared to recorded video lectures to learn complex database programming concepts. This study also revealed various perceived benefits and associated challenges while using microlearning instruction. However, the results need further validation to provide guidelines to educators to use microlearning as a viable instructional approach for teaching introductory programming concepts. Future research exploring the design and development of microlearning instruction in various settings such as blended learning is very much needed especially in this new normal era of the COVID-19 pandemic. As our pilot study shows that microlearning improves students' performance and learning experience. With the success of our pilot study, in the future, we would like to utilize microlearning instructions to teach the entirety of the CIT 21400 curriculum. In our future implementation, we also would like to address the challenges identified by our students and the instructor.

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Appendix A Microlearning perceptions Questionnaire

Part 1: Select an option between (1) *Not at all the case* to (10) *Completely the case*

1. The topics covered in the microlearning modules were very complex.
2. The database concepts and SQL commands covered in the microlearning modules that I perceived as very complex.
3. The instructions and/or explanations in the microlearning modules were very unclear.
4. The instructions and/or explanations in the microlearning modules were, in terms of learning, very ineffective.
5. The instructions and/or explanations in the microlearning modules were full of unclear language.
6. The microlearning modules really enhanced my understanding of the topic(s) covered.
7. The microlearning modules really enhanced my knowledge and understanding of database design and SQL commands.
8. Viewing the microlearning lectures made me feel confident in my ability to succeed on Exam 1.
9. I enjoyed viewing the microlearning lectures as opposed to the recorded video lecture.
10. I think microlearning is a helpful way to learn.

Part 2: Additional details

11. Please select all the desirable microlearning features you have used to learn
    a. Short Lessons
    b. Video Clips
    c. Interactive features (Flip cards, List items, practice knowledge checks, etc.)
    d. Is there anything else you would like to add (please specify)

12. Is there anything else you would like to share about how Microlearning has affected the way you understand database programming concepts?

13. Can we contact you to get a little more detail about your experience using microlearning? If yes, please share your email address.

Appendix B Interview Protocol

1. Could you please talk about your experiences using microlearning modules?

    - *Have you previously taken any microlearning courses?*
    - *How was your experience using microlearning courses for the first half of the course?*
    - *Do you want to share any specific week's content?*

2. Can you talk about some of the challenges you faced using microlearning modules?

    - *What are some of the areas that could be improved?*
    - *Were there any other challenges related to accessing the content?*
    - *Is this experience similar to your expectations?*
    - *What is your previous learning experience in this type of environment?*

3. Can you talk about some of the aspects you liked using microlearning modules?

    - *Is there a specific week's content you liked?*
    - *Do you think we need to add more types of interaction?*
    - *What do you think about the design of microlearning content?*

4. What factors most helped/hindered your learning using microlearning?

    - Why?
    - How?
    - How was your overall experience using microlearning?
    - What modules did you feel were complete or not complete? Why?