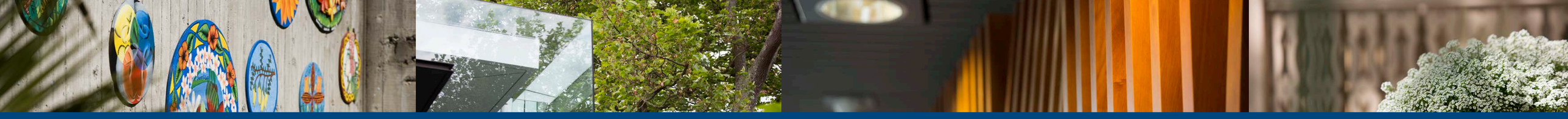

EXPANDING THE USE OF TEXT

ANALYSIS TOOL—QUANTEXT—ACROSS 4 FACULTIES

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Quantext designers were trying to build a tool that captures the dialogic nature of teaching and learning—and enables the teacher to make the dialogue visible through data. They wanted to enable teachers to engage with the language students are using, reflect on it in the context of the language teachers are using, and use those insights to adapt our teaching

Intention
Parallel, Cross-Faculty-informed experimentation to learn from each others' approaches and experiences to increase the range and speed of innovation

Covid Derailment
3 strands cancelled (Tsai, Whittaker, Withy) and
2 strands delayed
QUANTEXT developers unable to update/develop software to support specific projects

Adaptation
Funds used for vouchers for students for anonymous feedback, and research assistance for analysing data

LOKESH PADHYE: OVERCOMING TROUBLESOME KNOWLEDGE THROUGH THE USE OF STUDENT RESPONSE SYSTEM AND FEEDBACK VIDEOS IN AN ENVIRONMENTAL ENGINEERING COURSE

Adaptation: Carried out more weekly surveys. Conducted advanced analysis to try to draw meaningful conclusions.

Covid Derailment: COVID caused 60% drop in enrolment, meaning a much smaller sample size and less robustness in data and resulting analysis.

Intention: Use Quantext to analyse responses to open-ended questions in weekly surveys in a post-graduate course, to explore student-perceived troublesome knowledge.

My study was designed to address two research questions:

(a) What are the troublesome concepts/topics in 'advanced water treatment and reuse'? And, what differences, if any, exist between student-perceived and student-performance based troublesome knowledge, based on the analysis of SRSs?

(b) Do lecturer-created asynchronous feedback videos, targeting identified troublesome knowledge, enhance student learning and engagement in the course?

The conceptual design of the study is summarised below (Figure 1).

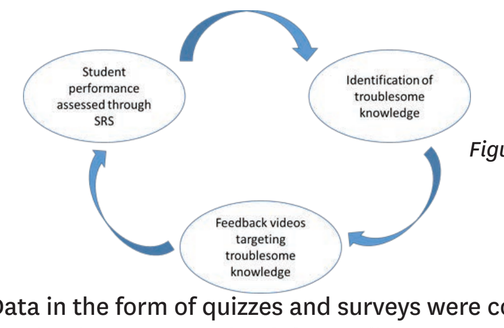

Figure 1: Conceptual Design of the Study

Data in the form of quizzes and surveys were collected through Canvas. The study results demonstrate that it is possible to use the students' perception to identify troublesome knowledge for environmental engineering topics covered in this course (Table 1).

There was a significant overlap in student-perceived troublesome topics/concepts and those identified through SRS analysis.

Table 1. Identification and Comparison of Troublesome Knowledge through SRS

Student Perceived Troublesome Concept/Topic (N = number of listed responses for the same concept/ topic)	**SRS-Identified Troublesome Concept/ Topic** (N = number of questions on the same concept/ topic with <50% score)
Quiz 1	
Direct and Indirect Potable Reuse (1) Contaminant Removal Efficiency (1)	Advanced Oxidation Process (1) Contaminant Removal Efficiency (1)
Quiz 2	
WSUD and LID (2)	WSUD and LID (3) Direct and Indirect Potable Reuse (1)
Quiz 3	
Wetland Design (4)	Wetland Design (3)
Quiz 4	
BOD and solids (3) Pathogens in wastewater (1) Temperature as a Pollutant (1)	BOD and solids (3) Pathogens in wastewater (1)
Quiz 5	
DBPs (1) Emerging Contaminants (1) Reclaim and Reuse (1) Surrogates (1)	DBPs (1) Emerging Contaminants (1) BOD and solids (1)
Quiz 6	
Surrogates (1) Calculations (1)	Surrogates (1) DBPs (1) LD50 and LC 50 (1)
Quiz 7	
	MF/UF/NF/RO (3) MBR (2) Surrogates (1)
Quiz 8	
Terminology (2) Calculations (1)	MF/UF/NF/RO (4)
Quiz 9	
	Advanced Oxidation Process (1) MF/UF/NF/RO (4)
Quiz 10	
Polarity and Electronegativity (1) EAdsorption isotherms (1) GAC (1) Second-Order Reaction Kinetics (1)	Polarity and Electronegativity (1) Second-Order Reaction Kinetics (1)
Quiz 11	
Advanced Oxidation Process (1)	MBR (1)

Results also showed that the feedback videos were effective in enhancing student learning and engagement in the course (Figures 2-4). Bigrams from Quantext output were most helpful in identification of student-perceived troublesome knowledge and effectiveness of videos in addressing troublesome knowledge (Figures 5-7).

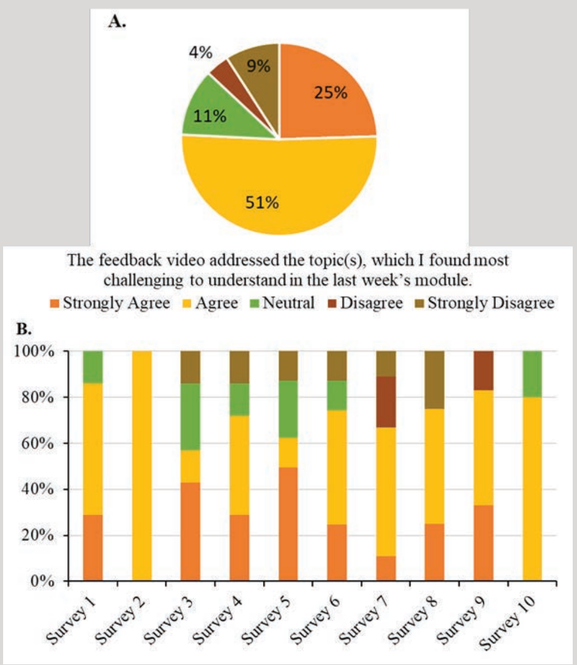

Figure 2. Feedback Video's Effectiveness to Address the Troublesome Knowledge (N = 65); A. Average % Distribution across Ten Surveys, and B. Weekly Trend

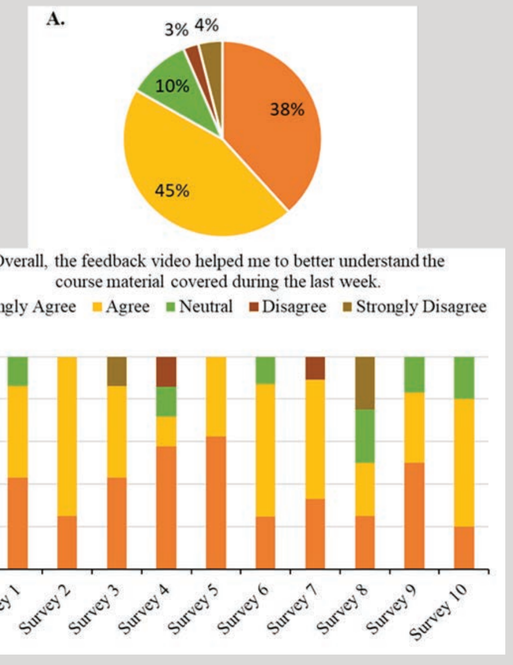

Figure 3. Feedback Video's Effectiveness to Better Understand the Course Content (N = 65); A. Average % Distribution across Ten Surveys, and B. Weekly Trend.

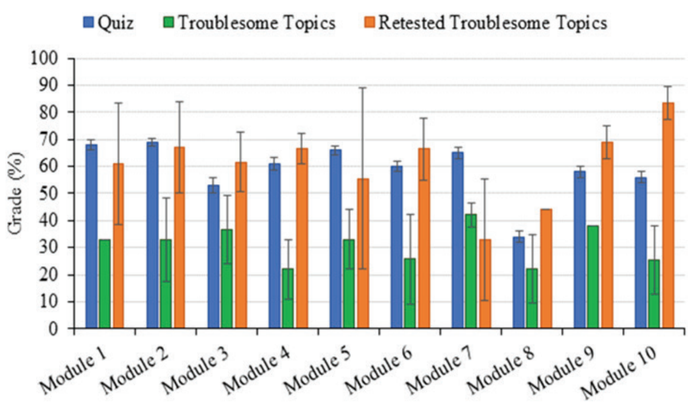

Figure 4. Comparison between Class Averages for Weekly Quizzes and Retested Questions

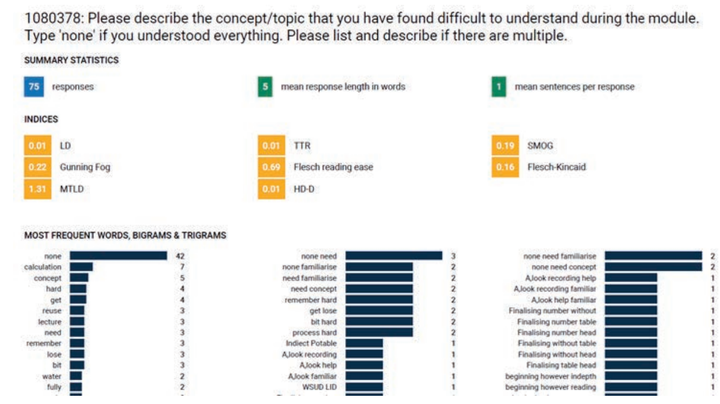

Figure 5. Quantext Snapshot 1

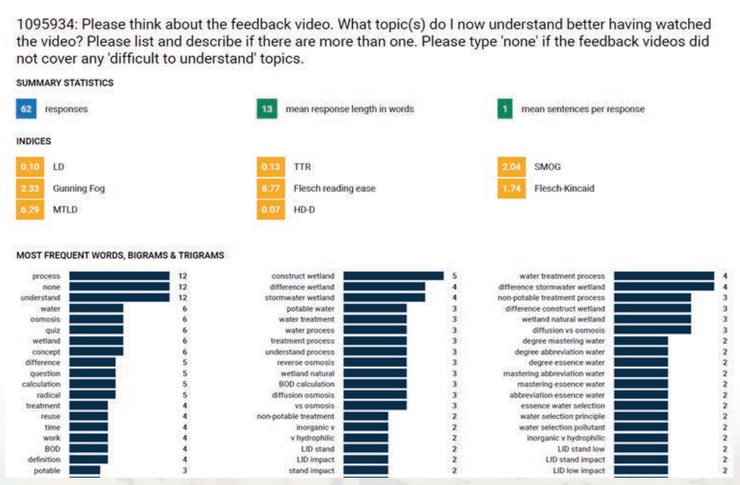

Figure 6. Quantext Snapshot 2

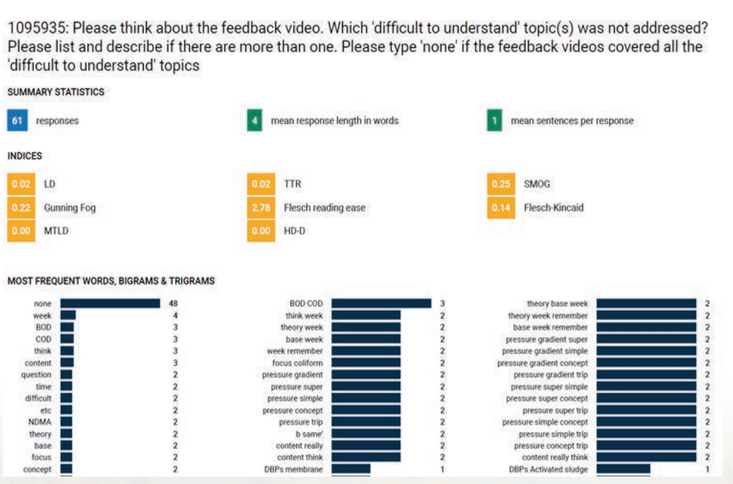

Figure 7. Quantext Snapshot 3

RESULTS

The study results demonstrate that it is possible to use the students' perception to identify troublesome knowledge for environmental engineering topics covered in this course.

The optimal length of feedback videos was determined to be 8-10 minutes based on student feedback.

Responses to open-ended questions and free-text comments received through the course and instructor evaluation further confirmed positive feedback of students on videos, based on student-perceived troublesome knowledge, as an effective intervention strategy.

CONCLUSIONS

The understanding of troublesome knowledge, identified in this study, can help teaching practices in environmental engineering, especially in the field of advanced water treatment.

The study contributes towards an understanding of differences in student-perceived and student performance-based troublesome concepts. Such an understanding will be useful for instructors to develop effective pedagogical practices for enhancing student learning.

The study also informs the community of practice about the effectiveness of instructor-created feedback videos, including the style and length of such videos.