Freeform Video Analysis: A Coding Scheme for Observing Active, Blended, and Collaborative Classroom Instruction

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Overview

This coding scheme was developed to categorize and record the actions of instructors in undergraduate engineering courses. It combines elements from popular classroom observation protocols (such as the Classroom Observation Protocol for Undergraduate STEM*) with literature on active learning, blended learning, and collaborative learning (together referred to as ABC learning) in order to create an instrument capable of quantifying ABC instruction for professional development and research purposes. There are three parts to this coding structure: a list of nine Events which define the actions of the instructor at a given moment, four Characterizations which note whether the coded Event reflects any aspects of ABC instruction, and three mutually-exclusive Degrees of Requisite Engagement expressing what proportion of students in the class are engaged in active learning by a given Event. In the breakdown below, we present and define each of the nine Events, as well as note which Characterizations and Degrees of Requisite Engagement we associated with these events for the purpose of our research.

Coding Scheme Breakdown

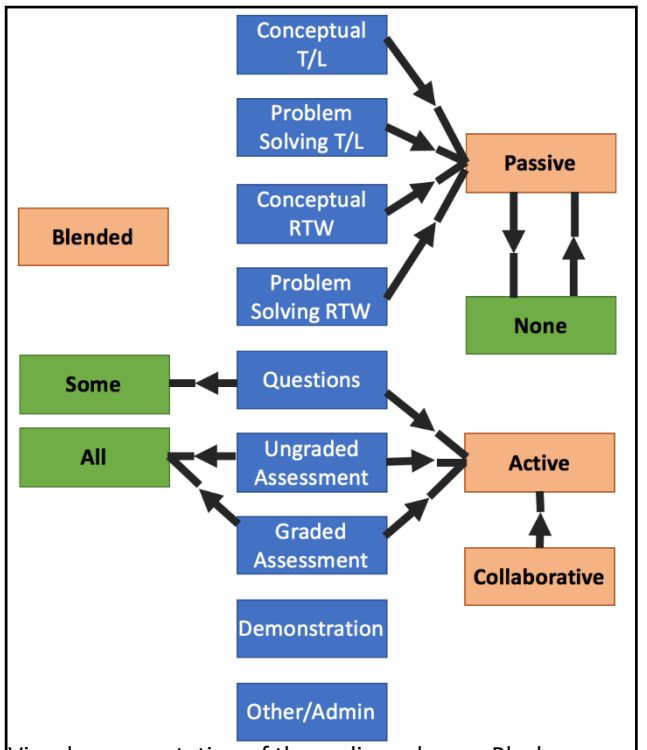
Event	Description	Characterization	Degree of Requisite Engagement
Conceptual Talking / Lecturing (T/L)	The instructor is talking directly to the students; a monologue or purely didactic form of instruction. The content is purely conceptual; theoretical knowledge is delivered to the students.	Forced: Passive Optional: Blended Excluded: Active, Collaborative	Forced: None Excluded: Some, All
Problem Solving Talking / Lecturing	The instructor is talking directly to the students; a monologue or purely didactic form of instruction. The content is generally a verbal discussion of a problem-solving activity, the reading out of a problem statement, etc.	Forced: Passive Optional: Blended Excluded: Active, Collaborative	Forced: None Excluded: Some, All
Conceptual Real Time Writing (RTW)	The instructor is explaining some concept (e.g. Free body diagrams, equation derivations, etc.) by writing on the board.	Forced: Passive Optional: Blended Excluded: Active, Collaborative	Forced: None Excluded: Some, All
Problem Solving Real Time Writing	The instructor is solving some example problem on the board, demonstrating the application of equations, or enumerating a problem-solving process.	Forced: Passive Optional: Blended Excluded: Active, Collaborative	Forced: None Excluded: Some, All
Questions	This categorization includes both when the students ask a question of the instructor, and when the instructor asks a question of the students. In the second case, this specifically refers to instances where the instructor is not expecting, nor requiring, every student to respond.	Forced: Active Optional: Blended, Collaborative Excluded: Passive	Forced: Some Excluded: None, All
Graded Assessment	This categorization includes instances where the instructor asks a question or series of questions of the students that all the students are expected to answer for a grade. For example, quizzes, exams, extra credit in-class problems, etc.	Forced: Active Optional: Blended, Collaborative Excluded: Passive	Forced: All Excluded: None, Some

Ungraded Assessment	This categorization includes where the instructor asks a question or series of questions of the students that all the students are expected to answer but their responses are not graded. For example, feedback forms, problems or examples given to solve in class.	Forced: Active Optional: Blended, Collaborative Excluded: Passive	Forced: All Excluded: None, Some
Demonstration	This categorization includes any kind of demonstration that uses some accessory, digital resource, or real-world object, and is intended to ease the understanding or visualization of a phenomenon or a concept. This includes the use of videos and simulations.	Optional: Active, Blended, Collaborative, Passive	Optional: None, Some, All
Other	This categorization includes any other events which may transpire that do not fit the above categories. For example, administrative work, logistics, waiting when the instructor is late to class, etc.	Excluded: Active, Blended, Collaborative, Passive	Optional: None, Some, All

Application

To use this protocol, an observer would directly code instructor actions (in blue). Characteristics of these actions (beige and green) follow from the codes and may be modified based on the context (see below).

This coding scheme was specifically designed for observing the actions of an instructor, not the actions of the students in a course. This is why Events which do not directly force students to be active, such as Real Time Writing codes, are not characterized as Active. In research on *Freeform*, each of the forced and excluded relationships between codes detailed above were programmed directly into the video-analysis software used for coding (in this case, StudioCode). The image to the right shows an example of this, with black arrows indicating forced activation relationships between codes. However, these relationships may be shifted or redefined to better align with other learning environments and research projects. This instrument represents a variation on existing observation protocols which was adapted to fit the needs of *Freeform* through iterative design and thorough grounding in literature. We encourage others to take a similar approach to their own work and in adapting this protocol for use in their own classrooms.



Visual representation of the coding scheme. Black arrows represent forcing relationships between codes.

Further Reading:

For more on the development and use of this protocol, please refer to our publications listed below.

What does an in-class meeting entail? A characterization and assessment of instructor actions in an active, blended, and collaborative classroom. *124th ASEE Annual Conference and Exposition*.

Development of a video coding structure to record active, blended, and collaborative pedagogical practice. *2017 Research in Engineering Education Symposium*.

Longitudinal analysis of instructor actions in an active, blended, and collaborative classroom environment. *47th Annual Frontiers in Education Conference*.

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*Smith, M. K., Jones, F. H. M., Gilbert, S. L., & Wieman, C. E. (2013). The classroom observation protocol for undergraduate stem (COPUS): A new instrument to characterize university STEM classroom practices. *CBE Life Sciences Education*, *12*(4), 618–627.