

Impact of Weekly Reflection Prompts on First-Year Engineering Students' Metacognitive Strategies

Emily Stratman & Dr. Heidi A. Diefes-Dux

Department of Biological Systems Engineering, University of Nebraska-Lincoln



Background

- Metacognitive practices are a key part of developing effective learning strategies⁶
- Different dimensions of metacognition exist²
- Reflection prompts are one way to engage students in different metacognitive practices^{3,6}
- Lack of focus on learning strategies and reflective practices in engineering⁵
- Reflection prompts that direct students to specific concepts and feedback on their work help them identify strengths/weaknesses, self-regulate their learning, and engage in higher levels of metacognitive strategies^{1,4}

Purpose

Determine if the word choice used in weekly reflection prompts influences students' level of thinking when reflecting on feedback on their performance in a course.

Methods

- Participants: first-year engineering students in one section of a large required course; N(2017) = 1600, n(2017) = 117 & N(2018) = 1521, n(2018) = 114
- Data collection: students' responses to open-ended weekly reflection prompts concerning their development of abilities to create user-defined functions
 - Reflections prompts from weeks 5, 6, & 7 (2017) and weeks 7 & 8 (2018)
- Qualitative coding analysis:
 - Developed and applied coding scheme for metacognitive strategies students used with low, medium, and high levels for each dimension³

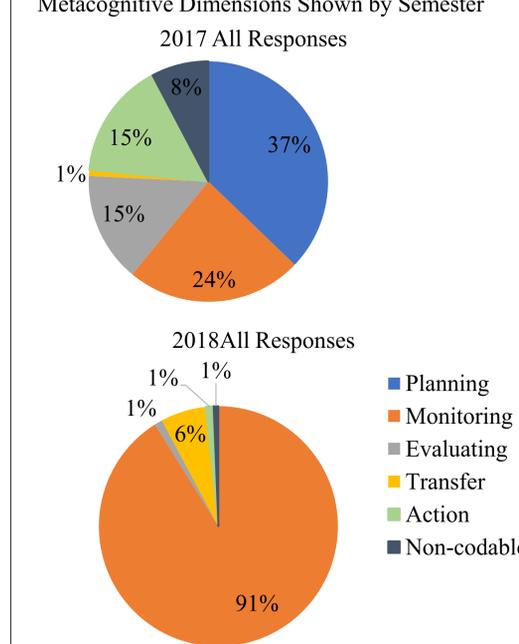
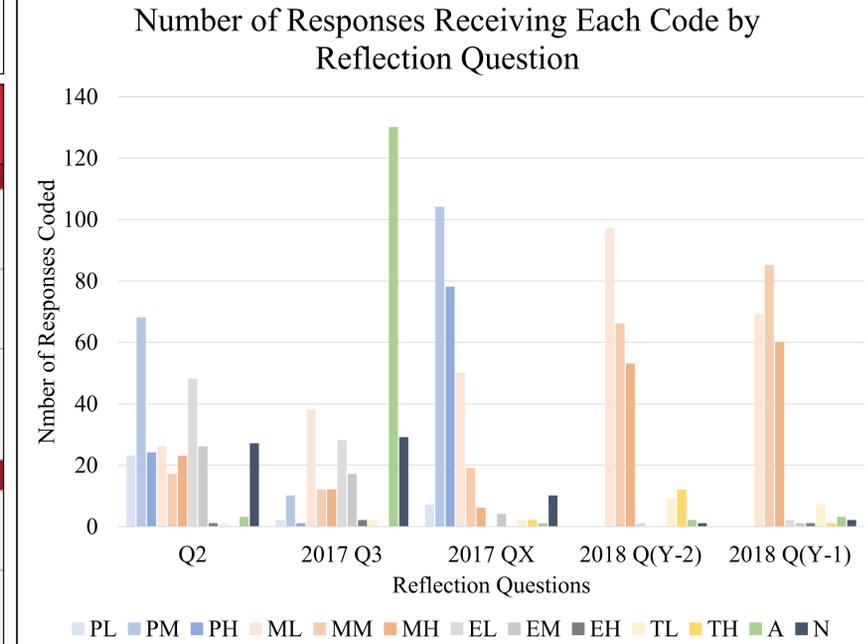
Reflection Prompts

- 2017**
- Q2. Based on your feedback, what actions have you already taken to improve your abilities? Refer to specific learning objectives and be specific about your actions.
- Q3. Based on your feedback, what actions do you still plan to take to improve your abilities? Refer to specific learning objectives and be specific about your planned actions.
- Q(X). For those learning objectives that you are not able to do on your own, what do you plan to do to improve your abilities over the next week? Refer to specific learning objectives and be specific about your planned actions.
- 2018**
- Q(Y-2). Considering the evidence of proficiency for the LOs, what is going particularly well for you? Be specific.
- Q(Y-1). Considering the evidence of proficiency for the LOs, what is particularly difficult for you? Be specific.

Coding Scheme

Planning (P)	Comments on preparation for task execution, identifies procedures and requirements for a task ³ • Low (PL), Medium (PM), High (PH): Indicating an awareness of a need for planning ³ ; levels differentiated based on presence of actions and a goal
Monitoring (M)	Comments related to task comprehension as a form of self-assessment. Response indicates an understanding/lack of understanding, not influenced by outside factors (e.g., instructor feedback) ³ • Low (ML), Medium (MM), High (MH): Awareness of level of understanding. Levels based on reference to specifics on topic, specific learning objective (LO) or the proficiency list for an LO
Evaluating (E)	An assessment of one's thoughts or performance influenced by outside factors. Student identifies a problem/solution related to a task or goal ³ • Low (EL), Medium (EM), Evaluating High (EH): Identifying a problem; Levels based on presence of a solution and how the solution changed their thinking or something it helped them achieve; understanding of why the correct solution is right/their solution was wrong. ³
Action (A)	Declaration of actions they have/have not taken
Transfer (T)	Comments connecting past, concurrent, and/or future experiences, or connecting to other courses • Low (TL) Connecting to learning from different courses/past experiences; High (TH): Connecting current course concepts with other courses or past knowledge/experiences & how it enhanced their understanding
Non-codable (N)	Comments that do not fit definitions above, reflection questions that were not answered

Results



Discussion

- Specifically asking students what they planned to do (Q1) yielded a high number of planning responses
- Specifically asking how feedback influenced students' past/future actions (Q2) yielded high levels of evaluating
- Asking students what was going well for them or needed improvement based on their proficiency(Q3) yielded high monitoring levels, but low amounts of planning and evaluating
- Students unlikely to reflect on how outside factors influenced their understanding if reflection prompts do not call attention to those factors (i.e., feedback) (2017)
- Prompts that emphasize monitoring (2018) are more likely to encourage the use of transfer strategies
- Low numbers of evaluating at the high level suggest students fail to use feedback to develop learning strategies or improve their understanding (both years)
- Wording used in reflection prompts influences students' metacognitive strategies

References

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