Foundations of Online Assessments: The Importance of Feedback During Formative Assessment

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Online instruction must address mastery of content and be able to measure mastery. But, before we can get to the measurement of mastery, we have to arrive at readiness for assessment. The journey to summative testing in an online environment needs to look a little different than traditional classroom instruction. The online tasks demand a different level of self-regulation, motivation, and, most importantly, communication. In a traditional classroom setting, a learner can raise a hand and ask for clarity or for further explanation when the lesson is not clear. The instruction is stopped at the moment the learner is confused. Online instruction needs to be structured in a similar way to provide clarity at a point of confusion. Instruction must provide further explanation at the learner's fingertips. It takes forethought, planning, and a solid grasp of scaffolding to create an online lesson with built-in feedback to support steps toward mastery. This paper will explore the importance of feedback on formative assessments in an online environment, delve into common types of question/answer relationships, and explore how to develop appropriate feedback for the learner according to chosen instructional models.

Assessment Terms

There are several different types of tests. Here are a few of the commonly applied terms when discussing assessments:

Norm-referenced. A norm referenced test compares similar learners to generate data. These assessments contend there is a "norm" to a descriptive population and that learners can be statistically classified by comparison methods. Normative tests include item writing. Item writing is precise in order to create a valid and reliable evaluation (Ledford and Sleeman, 2000).

Criterion-referenced. Criterion-referenced evaluation measures needed skills and knowledge. These assessments contend that all learners will eventually succeed at mastery, but at different learning paces, "Criterion-referenced evaluation is based on direct, positive criteria-guided observation of a tangible product" (Ledford et al., 2000, p.154).

Summative Assessment. Assessment can be summative or formative. A summative assessment delivers an end-of-unit, end of year, end of school (exit exam or capstone project) score to measure overall competencies. A good summative assessment melds knowledge and skill with transference of learning to real world application. These are referred to as authentic assessments (Ledford et al., 2000).

Formative Assessment. A formative assessment is given during the sequence of instruction to check if the learner is reaching the objectives or if the learner is confused. Formative assessments mirror tasks and looks like instruction (Honig, Diamond, and Gutlohn, 2000). Performance on formative assessments drives daily instruction. Formative assessment can catch a learner who needs intervention or enrichment. A formative assessment is criterion focused seeking to measure how the learner is gaining skills towards learning objectives. A formative assessment within online instruction will require branching and feedback for the learner. Formative assessment can be referred to as objective tests, which are very useful for testing basic understanding and skills (Suskie, 2009).

Feedback. Feedback provides the learner with specific information about the accuracy of a response. Feedback is provided to guide the learner to improve knowledge and skills. Direct, specific feedback sets the learner up for direct improvement. Direct feedback is more potent than general feedback (Shute, 2008). Formative assessment feedback comes in several forms: tips, examples of work, prompts, and explanations of the correct answer. Feedback should be positive

and corrective in nature (Alessi and Trollip, 2008). This paper will focus on online, formative assessment utilizing feedback to drive instruction.

Online Learners Need Feedback to Self-regulate

Instructional success starts with a strong foundation of learning theories, or how students gain competencies and master objectives. An instructional designer needs to be well-versed in analyzing tasks needed to gain targeted objectives. From this vision, a sequence of lesson steps and layered skills is sketched out. The designer needs to place areas in the lessons for formative assessment to assure the learner is progressing towards mastery. This is very important for online instruction as the learner is in the driver's seat and is self-regulating their own learning and goals. The learner needs the feedback so that they can manage their learning. Using technology to design tests opens up a few new tools for learner interaction:

> …e-learning practice interactions may use formats similar to those used in the classroom, such as selecting the correct answer in a multiple-choice list, checking a box to indicate whether a statement is true of false, or even typing in short answers. Other interactions use formats that are unique to computers such as drag and drop and simulations. (Clark and Mayer, 2011, p. 253)

Response feedback with these interactions can be given immediately within the module. The instruction may branch to needed information or launch a corrective example on the screen. The learner can remediate their thinking with the given feedback. Online instruction allows the learner to mange their own progress through self-pacing and self-direction. The feedback needs to lead the learner to improvement.

Shute (2008) explains that corrective feedback is like a "good murder" in that it requires the motive, the opportunity, and the means. The learner needs the feedback (motive), the learner receives the feedback in time to use it (opportunity), and the learner is willing and able to use the feedback (means).

Questioning Techniques for Formative Assessment

Creating good questioning techniques for these formative assessments starts with the designer understanding the quality and complexity of questioning. Through this understanding, the designer can guide learners in their quest for competencies with explanatory feedback. Corrective feedback is not as powerful as explanatory feedback (Clark et al, 2011). Start with understanding the metacognitive processes needed to answer certain question types. Once the designer can identify the type of question and the thinking skills needed to produce the correct response, explanatory feedback can be crafted to guide the learner through the correct process of answering the question. There are different suggestions for analyzing questions for cognitive processes. This paper will explore two, Raphael's QAR and Bloom's Taxonomy.

Question-answer relationships

QAR. Honig, Diamond, and Gutlohn (2000) suggest that teachers need to pose effective questions and answering questions requires an understanding of the question-answer relationship – that is the relationship between a question and where in the text or the reader's background knowledge the answer can be found.

Taffy Raphael (1982) posited that there is a three-way connection in the question-answer relationship (QAR): the question, the text, and the learner's prior experience. Instructional designers, while devising formative assessments during the instructional sequence, should be

aware of this relationship in order to gauge not only the learner's abilities, but the type of feedback needed for improved performance.

Raphael's (1982) four types of Question-Answer Relationships are: Right There (literal - same wording), Think and Search (literal - the questions and answers have different wording), On my Own (inferential and evaluative - the answer comes entirely from the learner's prior knowledge without even reading the text), Author and Me (inferential - prior knowledge with text clues). For example, while constructing questions to assess a literal, "Right There" question, the instructional designer would create feedback that would direct the learner to the text. A "Right There" question has the same wording in the text and the question. If the designer is constructing an inferential question, the feedback would include metacognitive modeling of combining the text with what the learner knows about the subject to derive the correct answer. Inferential questions need more in-depth modeling for explanatory feedback. Or an instructional designer could use Bloom's categories of questions in order to craft instructive feedback.

Bloom's Taxonomy. Questions are varied in difficulty and complexity. Bloom's taxonomy (1956) ranks questions into six categories according to the complexity of questions and the abilities, or critical thinking skills, needed to provide an answer. These six categories are: knowledge, comprehension, application, analysis, synthesis, and evaluation. Lower level question types are knowledge, comprehension, and application. The more complex question/answer categories are analysis, synthesis, and evaluation.

When developing formative questions, a designer should be aware of ways to support varied learner abilities to guide the instruction to targeted objectives. Being conscious of the level of difficulty the questions pose will help frame the feedback to reinforce continuing towards success. The lower level question types will have straight-forward feedback. The more complex

questions may require a branching to a worked example or more development of background knowledge through the use of multi-media or other technological interactions.

Alessi et al. (2001) suggest using a test blueprint called a *table of specifications* which organizes and cross-references the learning objectives of the course against the level of intellectual engagement of the learner according to Bloom's taxonomy. This blueprint helps the designer stay focused on what is important, but also helps to scaffold skills appropriately throughout the course. The beginning of an online module will have Bloom's lower level questions building the learner's knowledge base. As the learner grows in experience through the course, the questioning becomes more complex and intellectually challenging. The material will scaffold alongside the questions.

Matching the Online Module with Proper Feedback

Online learning can be constructed into a variety of modules. These instructional modules differ in learner performance activities and the level of critical thinking skills. Not only should an instructional designer be informed of the question/answer relationship in order to provide corrective feedback, the designer should also be cognizant of the type of online module utilized for instruction. Constructing learner feedback for online instruction varies according to the type of instructional model: Tutorials, drills, simulations, or games.

Tutorial. An online tutorial models skills and has the learner use those skills. Comprehension and skills are assessed through learner responses. Feedback is given to guide the learner towards success. Alessi et al. (2001) suggest there are two types of questions in tutorials, recognition (chosen from a list) or learner produced, constructed–response questions. Multiple choice, true/false, matching, and fill-in-the-blank sentences are considered recognition questions as the learner recognizes the answer. Writing a short answer is a constructed-response question.

Alessi et al. (2001) recommend that feedback for a tutorial should be positive and corrective. The learner should be given the correct answer after a set amount of attempts and should be provided with hints and prompts in steps towards the correct response. Recognition questions in tutorials tend to be "Right There" or "Think and Search" questions.

Drills. Drills are similar to tutorials, except they are designed to give the learner skill practice. The feedback should be corrective and positive. Items should be grouped by difficulty so that the learner may be sent back to an easier level if needed. Following an error, the learner should be given the correct answer so when the question comes back in the queue for practice, the learner will be ready to give the correct response (Alessi et al., 2001). Drills have "Right There" questions.

Simulations. Educational simulations teach through interaction with a replicated activity (Alessi et al., 2001). In real world simulations feedback is either natural or artificial. Real world feedback is higher in fidelity and is easier to transfer to real life; whereas artificial feedback (such as a warning or a discontinuation of the simulation because the learner is off-track) helps new learners interpret situations quickly. The feedback can be either delayed or immediate. Beginners need more immediate feedback. A learner should always be allowed to restart or exit as feedback choices (Alessi et al., 2001). Simulations may start out with "Right There" or "Think and Search" questions while building learner knowledge, but will need to move to inferential questions, "On my Own," or "Author and Me." Or in this case, the Simulation and Me!

Games. Games support learning in many ways (Reiser and Dempsey, 2012). Providing feedback within a game structured learning activity needs to be delivered in the manner that supports mastering a sequence of tasks for game advancement. This progressing through a series of tasks signals learner proficiencies. Prompts and hints are the feedback in games rather than a straight reaction to learner performance. The feedback is contextually sensitive and evidence-

based. Games reflect competencies based on a series of decisions and actions. In games, avoid making incorrect answers attractive through interesting explanations. Use interesting explanations as feedback for correct responses only (Alessi et al., 2001). Games build user skills through all levels of questioning.

General tips to consider

Clark et al. (2011) outlines several tips to consider while creating formative assessments and explanatory feedback. First, be sure to position the feedback, response, and question together on the screen so the learner can review all three at the same time. Be sure to focus on explaining the task and the process. It is helpful to highlight learner improvement to keep feedback positive. Provide step-by-step feedback when there are inter-reliant steps.

In designing instruction and crafting assessments, an instructional designer should correlate the evaluation with the method of instruction. If the lesson is developed to enhance critical thinking skills through higher order questioning, the formative assessment should mirror the language and the activities:

> …optimally guided learning students (discovery learning, inquiry-based learning, and student-centered learning) would not perform as well as students receiving direct instruction with regard to externally defined formal knowledge and intellectual skills: conversely, students receiving direct fully guided instruction would not preform as well as optimally guided learning students on assessments of thinking like a scientist or reasoning mathematically. (Clark & Hannafin., 2012, p. 373)

Discussion

Crafting excellent formative assessments takes an ability to predict challenges to

understanding the material. Start with the learning objective. Devise questions that will provide evidence that the learner is heading towards mastery. Program the module with feedback that will guide and further instruct the learner. Analyze the level of questioning to understand how to correlate feedback with appropriate responses. Feedback should explain the why it is the right choice or model thinking skills needed to reason out the answer. Design formative assessment to move the self-motivated learner down the continuum towards readiness for summative assessment.

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