Design of Assessments for Knowledge Levels related to Proficiency

Assessments are an important aspect of Competency Based Education (CBE) modules. Assessments in CBE should be specifically designed to diagnose deficiencies in student learning, so that remedial instruction can be administered. To design assessments for a CBE module, we recommend that you start with assessments for declarative knowledge using simple multiple choice questions.

**Step 1:** Identify the noun phrase, that reflects the declarative concept that you want to design the assessment for. Make sure the concept is specific enough for the CBE module.

Example: I want to develop an assessment question for the noun phrase “Administrative command, which adds a user account in Linux”

**Step 2:** Place the noun phrase in a question stem. Take care that your question does not accidentally introduce other concepts.

Example: 
*Which command is best used to administratively add a user account in Linux?*

**Step 3:** Determine the correct answer and make it one of the answer choice

Example: Correct answer: *adduser*

**Step 4:** Now use the following language templates to think about what could go wrong with student learning of this concept. State the top level learning claim as follows:

**Claim:** *Student has learned X*

Where X is the concept to be learned.

Now we attack this claim by introducing doubts, which challenge our belief that this claim is actually true. We call these rebuttals:

**Rebuttals:** *Unless the student believes Y*

Where Y is the incorrectly understood concept learned and applied.

*Y becomes an answer choice for the question.*

We start such descriptions using the phrase UNLESS.

Example:
Claim: Student has learned the adduser command to administratively add users in Linux
Rebuttal 1: Unless the student believes the useradd command to do this which only sets the username and does not offer any other options.
Rebuttal 2: Unless the student believes the usermod command which actually modifies the account instead of adding it
Rebuttal 3: Unless the student believes the net user command, which is valid only in Windows command line to add a user.

Step 5: Continue developing rebuttals and include all resulting distractors in the final question form. Add E as an option for lack of knowledge on the concept. Add the correct answer as option A. The survey engine will randomize these later.

Example:
Which command will you use to administratively add a user account in Linux?

A. adduser
B. useradd
C. usermod
D. NET USER
E. Do not know

Step 6: For each question, ask the student for their confidence in the selected answer. The confidence measure will be used to further classify the response as:

- Insufficient understanding (Low confidence, correct answer)
- Misunderstanding (Low confidence, wrong answer)
- Misconception (High confidence, wrong answer)
- Complete understanding (High confidence, correct answer)
- Lack of knowledge (Option E chosen)