

Answering your questions: Technology Enhanced Items (TEIs) on National Registry Examinations

Gregory M. Applegate, PhD, MBA
August 20, 2020

The National Registry sent an email to EMS Program Directors on Monday, August 17, 2020 about including Technology Enhanced Items (TEIs) on the National Registry certification examinations. Since that time, the National Registry has received several questions from a variety of people mainly asking for more detail about TEIs and how the Registry plans to use them. Thank you to everyone who took the time to share their questions and concerns. Clear communication is essential to our success. Now, on to the questions!

Will each multiple response question always include the direction “Select the (x) answer options which are correct” or will some multiple response questions say, “Select all the correct answer options”?

The National Registry had decided to always use “Select the (x) answer options which are correct”. There is not a lot of research on this topic but a research project by Scott Thayn in [2011](#) found that “when examinees are told how many options they are to select, MA (multiple answer) items perform at least as well as SA (single answer) items, and in some cases may even perform better” (page 53). Other research looking at multiple response items where the directions did not specify the number of correct options found the multiple response format did not perform as well as traditional multiple-choice items. Including specific instructions on how many options to choose in a multiple response question results in better measurement of ability and are a best practice for testing.

How will multiple response items be scored?

They will be scored as right or wrong. Using a partial credit scoring model was considered but two factors influenced the decision to score the items as right or wrong. First, the Thayn study found that using a partial credit model for scoring did not improve item reliability or increase the test information provided by the item. Second, other certification examinations, for example the American Registry of Radiologic Technologists ([ARRT](#)), the National Center for Competency Testing ([NCCT](#)), or the National Council of State Boards of Nursing ([NCSBN](#)), have been using multiple response items with good results. The National Registry feels that scoring the items as right or wrong is the best option for a summative examination and for EMS candidates.

How will TEIs affect the Computerized Adaptive Testing (CAT) format?

Introducing multiple response items will not change the examination presentation, scoring, or adaptive algorithm. Like multiple-choice questions, multiple response questions will be assigned to a test domain and administered like any other question. The only difference will be in the way the answers are recorded in the system.

Will the percentage of test items for each domain remain the same?

Yes. The introduction of TEIs does not affect the test specifications. In the future, if TEIs are added which span multiple test domains, the issue will be revisited but, for now, there is no need for a change.

Will candidates have more time to complete the examination?

No, because data on response times shows that candidates typically take about the same amount of time to answer multiple response questions as they do multiple choice questions and most candidates complete their examinations well within the current time limit. Response times for items and overall test time are monitored for each National Registry examination. We do not anticipate any issues, but adjustments will be made if needed.

When will other types of TEIs, such as images and videos, be added to the examinations?

That depends on the experience with multiple-response items. The intent is to phase in different types of TEIs over time. There is no set item format or date for phase two.

How many TEIs will be included on the examinations?

The number for each candidate will vary and a candidate may not receive any TEIs on a given examination. The focus is on the item content, not the item type.

We need more time to prepare for these types of items, why is this happening so quickly?

The National Registry has been discussing the introduction of TEIs with the EMS educator community for about two years. Multiple-response items have been included in the National Registry item writing presentations and TEIs are already standard item formats on many examinations. Developing and responding to multiple response items is straightforward and works with most automatic scoring systems used by educational institutions.

Overall, this is a minor change. The amount of work needed to transition to multiple response items and to teach candidates to respond to them is minimal. Candidates typically have no difficulty understanding how to respond to a multiple response item. Even if they are unsure, the response instruction is included with each item and the examination will not let the candidate proceed if they choose too few or too many options.

What if these TEIs cause a student to fail?

This is a good opportunity to remind ourselves of how item development works for professional credentialing examinations in general and at the National Registry specifically. Item development is a process that is designed to ensure only good items, which provide useful measurement, are used to evaluate candidates. The process, which applies to multiple-choice and TEIs, is as follows.

1. A representative panel of EMS professionals is convened, and they write items for the examination.
2. National Registry staff edits the items for clarity and finds a reference in the medical literature that demonstrates the item is correct as written.
3. A National Registry editor proofreads each item and ensures it follows the style guide.

4. A representative panel of EMS professionals, different members from the first panel, reviews each item to ensure it is well-written, correct, and within scope. Items which do not meet the criteria are sent back to be corrected and must go through another review panel before they can proceed. Items which fail multiple panels are archived and not used on examinations.
5. Items approved by the review panel are included on a live examination, but they do not count towards a candidate's score. The item responses are recorded for analysis.
6. A psychometrician analyzes and reviews the item responses. If an item does not meet the criteria for inclusion on the test, it is sent back to the beginning of the process to be fixed or the item is archived and is never used on a live examination.
7. Items that pass all the steps are used on future examinations to evaluate candidates.

If multiple response items are confusing to candidates, this process will identify the issue before it can affect a candidate's score.

Concluding Thoughts

TEIs are being used successfully on many professional certification examinations and in academic settings. Multiple response items are an easy transition from traditional multiple-choice items for programs and candidates. More advanced TEIs will be introduced over time but there is no set timeframe.

While transition should be relatively easy for programs and candidates, we acknowledge the concerns that have been raised and are taking steps to address them. The National Registry is taking the following steps to address the concerns we have heard so far.

- Preparing a webinar to demonstrate how to construct good multiple response questions
- Providing example items for candidates to review
- Continuing to spread the word about TEIs through social media, conferences, and emails
- Continuing to work with the EMS community to develop and approve TEIs

As we work through this together, it will help to remember why TEIs are being used. They can provide a better measurement of ability which will translate into more accurate evaluations of candidates. TEIs can also provide more authentic assessment of a candidate's knowledge, skills, and abilities, often making questions less artificial and closer to field practice. Anything we can do to better assess candidates and to make questions more closely related to field conditions is good for the candidates, EMS, and for public protection.