2018

Guideline for Recognition of Prior Learning (RPL) by the use of Response Tools

Output 2 – Activity 2

Optimized Training, Innovative Methods and tools for Acceptance of prior Learning in qualifications and workplace training. Project number no 2016-1-NO01-KA202-022106

Guideline for innovative use of response tools

and

RPL in vocational education and training

Introduction

This guideline contains recommendations for how modern response tools can be applied in teaching of vocational training courses and in the preparations of the teaching activities. The goal is to provide the greatest possible impact for students and for you as a teacher to maximize the effect of your teaching.

How to make good questions for response tools?

The qualities of the questions you ask are very important when using response tools. If students are experiencing issues as thoughtful, relevant and stimulating, our experiences indicate that the students will be positive regarding the use of a response tool in vocational education and training. Otherwise, unprepared or little thoughtful questions that are experienced as irrelevant and not contribute to students learning, students will to often consider use of response tools as a waste of time.

General guidelines

The challenge with making up high quality multiple-choice questions is not related specifically to the use of a response tool. In this section, we'll provide general advice and guidelines for creating good multiple choices questions, and offer suggestions for further reading on the subject.

- Have a clear understanding of what type of questions you want to ask - factual questions, conceptual questions, and questions preparing for discussions in groups (peer learning) or in class
- Make sure to take ownership of the problem or case. If you "borrow" questions from other sources (textbooks or Internet etc.), be sure to transform it into "your" language. If students feel that the teacher has "stolen" questions from other sources without having any ownership of the issue and investing time in offering high quality

teaching to their class, there is a risk of that the class may interpret this as a lack of commitment from the teacher. Why should the students then invest time in providing feedback to the teacher?

- Avoid to ambiguous formulations in a question. A question may be challenging and difficult, but not because it is unclear.
- Prepare a detailed explanation after every question. The teacher must goes through the results, highlights the correct alternative and explains thoroughly why the various alternatives are correct or not.
- Whatever the learning activities that follows the usage of response tools (teacher lead explanation, peer learning, discussions etc.), it is important that the teacher concludes. It is the teacher's explanation that is the factor that affects and contributes most to the students' experience of learning. The teacher is according to the students, the expert.

How can I understand whether a task or problem has the appropriate level?

The question should be neither too easy, nor too difficult. Questions considered to be too trivial will not motivate students to take part in voting's whereby the process don't leads to learning, just time in the class will be spent. The same happens if the tasks or problems are perceived as to challenging or to difficult.

A very general rule for evaluating whether a task or problem is good or bad, can be based on the following:

- If more than 70% of the class answer correctly the question is too easy since it will be difficult to initiate discussions in the class or in groups
- If fewer than 30% answer correctly the question is too difficult and it will be challenging to set up a discussion in the class or in groups.

Thus, it is recommended to operate with a "30-70%" rule. It is recommended that he percentage of correct answers should be within this range in order to enhance discussions that support the learning. Just how good a question works will depend on the level of the students. It should be noticed that a question that works well in one class (e.g. a strong class) might not work well in another class, since the classes may be at a different level.

Can I introduce a problem or ask a question without showing the students the options?

Response tools may be used to stimulate interaction and discussion in the classroom. Multiple-choice questions of course have some limitations. For example, a question, when asked in multiple-choice form, could make a discussion less open and more focused on the alternatives itself, instead of addressing the problem itself. One-way to avoid the limitations of multiple-choice questions, is to present the task or problem without showing the options first.

Almost all multiple-choice questions can be presented to the class without showing any alternatives. Here is an example:

> *Your boss raises money for what he believes is a charitable purpose, in good faith. You suspect, however, that your boss has been deceived, and that it is all about fraud. What do you do?*

After presenting the question, the students must get a chance to think and discuss in small groups. The alternatives may be presented just before the voting takes place:

> *A. I ask my colleagues to not give money to this purpose*
>
> *B. I tell the boss about my suspicions*
>
> *C. I investigate*
>
> *D. I report my suspicions to my chief supervisor*
>
> *E. I do nothing*
>
> *F. None of the above*

To avoid displaying the options when the problem is presented may be used for knowledge-oriented questions too. The method may be particularly interesting and suitable for open and impartial discussion.

Suggestions for further reading on design of multiple-choice tests:

To make good multiple-choice tests requires experience, and many books have been written about the subject. We can recommend this book:

> **Thomas M. Haladyna**: *Developing and validating multiple-choice test items (2004), This English-language book provides a very thorough introduction in how to formulate multiple-choice questions.*
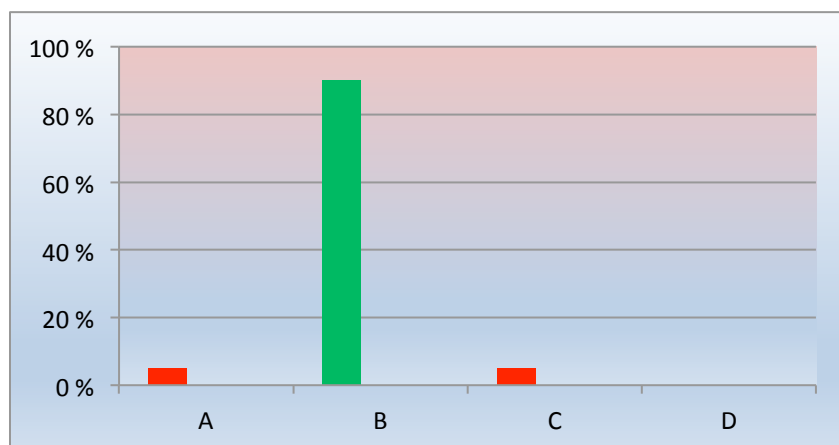
Methodology for giving feedback to the class after gathering data with a response system:

How to review the questions after voting is finished?

How teachers choose to review a question when a vote is completed, typically depend on the type of responses you get:

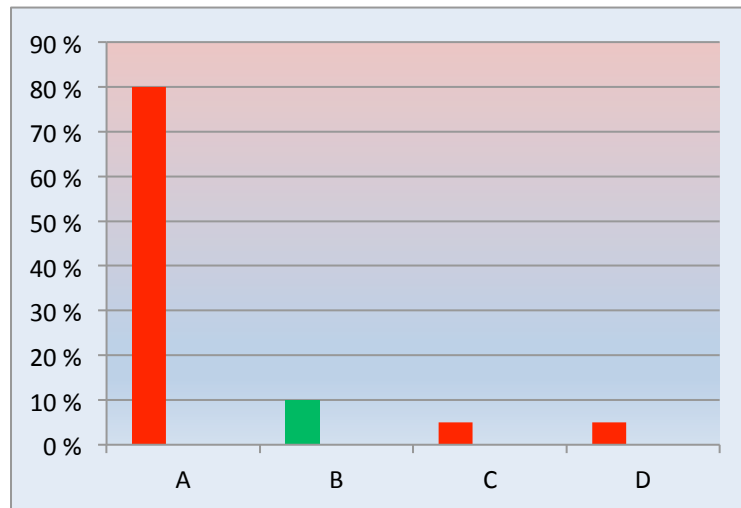- the percentage of correct and incorrect responses,
- how these are distributed

Case 1: The majority of the class answer correctly

When a large percentage have answered correctly (about 90% correct answers), you just need to give a brief verification that most students have answered correctly:

"Since most of you have answered correctly, green option B was right, and this is right because of ...., while the options are wrong because of …………….. ".

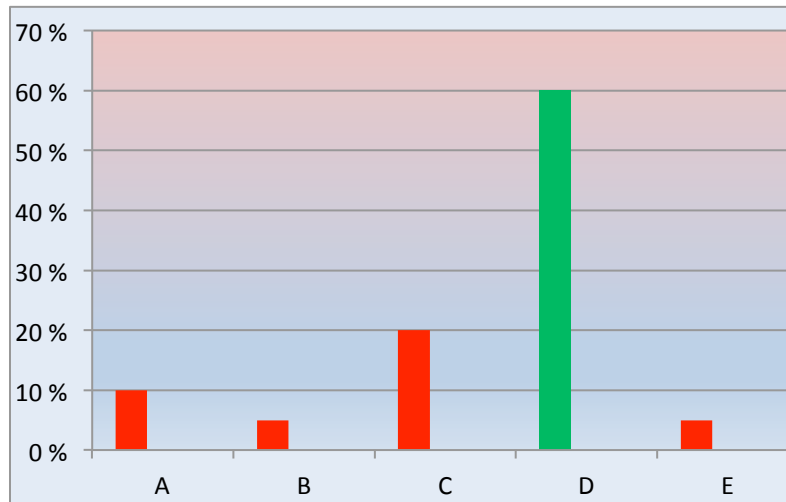## Case 2: The majority of the class fails to answer correctly

In such cases, where the vast majority of students answer incorrectly, it requires the intervention of the teacher in the form of a thorough review with in-dept explanations. Before such a review is given, you might try to encourage students to discuss

- why so many answered incorrectly,
- whether they experienced the task or problem as particularly difficult or formulated unclearly;
- whether the students felt that the presentation of the question in advance was sufficient;
- if it was an important concept or idea many had misunderstood,
- or whether there were other things that made so many were wrong.

Case 3: "30-70%" of the students answer correctly

If the number of correct answers is between 30-70%, it is an ideal starting point for establishing a group discussion between the students and then afterwards run a new second vote without the teacher at any time reveal the correct answer, which will be displayed at the very end. Such a distribution of responses indicates that a significant share of the students ahve understood the problem. The goal of the discussion should be that the students that have understood the problem should try to help

explaining what those who failed have misunderstood. This may help them to learn more too.

Such a session may extend approximately as follows:

1. Teacher presents question
2. Students will receive an individual pause of approximately One minute without any discussion
3. Students votes
4. The distribution of answers come up with a percentage of correct answers in the range of 30-70%
5. Without the teacher reveals what is the correct answer, request that the students discuss the problem at hand with their neighbors or in groups, where one tries to argue for his views.
6. A new vote
7. The teacher makes a summary and necessary review

The "peer instruction" method:

"Peer instruction" is a methodology for response systems originally developed by physics professor Eric Mazur at Harvard University. As the name indicates, this is a methodology that envisage that pupils / students will have the opportunity to instruct one another ("fellow student / peer" in this context).

When using this methodology, reconciliation occurs over two rounds - the first vote after a short break, and then a new vote after a group discussion.

To follow up a response tool question with "peer instruction" method goes roughly as follows:

1. The teacher presents the question.
2. Pupils / students receive an individual pause of up to 60 seconds.
3. The teacher runs a vote, and the students votes. *Be sure to turn off the automatic display of the result graphs before starting the vote, because the displaying of graphs will influence the discussion afterwards.*
4. The teacher then let the pupils / students start a group discussion, which can last 2-3 minutes.
5. The teacher runs a new vote, and the students vote again. *Here it is natural that the result graphs come up automatically - you can turn on this before voting begins. You can also view performance graphs before and after discussion, to demonstrate the efficacy of a discussion.*
6. Teacher sums up - exactly how the summary goes will depend on how students respond.

The purpose of the individual "thinking pause" at the very start, is that each student will make up an independent opinion on what is the correct answer, and why. This way they will be better prepared when the discussion starts and students will be less likely to be "overrun" by the dominant fellow students with divergent views on what is the correct answer.

Checklist before the first use of a response tool:

Before using a response tool for the first time in class, there are certain things that should be checked and tested:

1. There must be installed software on your computer in the classroom where the system is used. If you do not have administrator access to that computer (it can also be installed on a laptop, which is brought to the classroom).
2. The computer that's running the response tool software must be connected to a video projector - this is for pupils / students to see the result graphs for a vote.

3. The wireless network where the system is used must have sufficient capacity. Response tools normally generate little data traffic, but the critical factor is whether the wireless access points can handle a sufficient number of simultaneous connections. It must be noted that the same pupil / student can have multiple devices online simultaneously.
4. Pupils / students need to be informed in advance of first use of response tools - information about what is the purpose of use of the system, and how it will be done purely practical.

Examples for the use of response tools in teaching:

Response tools are designed to be a flexible educational tool, and here we provide some inspiration and concrete examples for how response tools can be used in teaching.

Before we get there, we want to make some methodological rules that makes the use of response tools most time efficient - a checklist for you as a teacher, if you will.

To do the actual voting most effective, it is a great advantage for both teacher and students to log on the system at the very start of every session - in this way the interface is ready for use, and students need only to recall the vote page to vote. The checklist for what happens in the start of a response tool-session can look like this:

1. You as a teacher logs on to the interface and create a session code
2. Students logs on an enters the session code (this should go quickly, if the students have saved log on page as a shortcut on their mobile device)

Many people use the response tool as an element in mainstream education - for example to ensure that students have understood the reasoning or to ask control questions along the way. This approach is illustrated below:

| The teacher ask a question | The students answers with their devices | The results being displayed and discussed |

What happens after the question is asked and the voting is finished, is up to you as a teacher. However, it is very important that the responses from the students are properly processed - the summary of the teacher is very important for the students' experience of learning.

Example from Aquaculture Vocational Education and Training:

Kåre Rømuld, the teacher in the picture on the left hand side, teaches aquaculture at Guri Kunna VET School in Norway. Kåre uses response tools in vocational courses, delivered to the aquaculture industry as well as in upper secondary education for younger students. Both student groups have the goal of qualifying for an Nationally Recognized Qualification (NRQ) certificate in Aquaculture.

It is particularly relevant to use response tools in the courses provided to industry because these students get considerable less time with theoretical lectures than the young students. It is therefore important to optimize and streamline lectures. Using the following methodology does this:

Before the course starts, students from the industry will receive a link to a pre-test that will be answered by the students upfront of the course. This is a quick evaluation where answers are given by using smart phones, tablets or computers, depending on what the students prefer to use.

The answers from the students will inform and help Kåre to decide which parts of the curriculum he has to highlight in the course and which parts that may be taught less thoroughly due to the experience that the students have obtained while working in a fish farming company. This he uses to finalize and detail the course plan for the whole course.

He then repeats this process in front of each new module in the course plan, in order to determine in more detail which parts of the curriculum in each module he must be taught most thoroughly during each on-site training session.

In addition to the pre-tests, Kåre also uses response tools to promote engagement, interaction and discussion between students during the lectures, by conducting small quizzes during each session that. Students reply by using a student response system. This helps him to check if the students have understood what he has taught during the lecture. This may be a prepared quiz, but one student who actualize and address a challenging task or a problem by asking a specific question may just as well offer it. Kåre then repeats this question to the class, giving them 3 alternative solutions to vote on. In this way the students question is smoothly included into the training session, without destroying the story that the teacher tells the students.

At the end of the module or towards the end of the course, Kåre repeats the upfront pre-tests to document the learning progression.

Example from mathematics

This is Knut Bjørkli, who teaches mathematics for engineering students at NTNU. Knut sometimes running so called "flipped classroom" where "flipped" means doing the opposite of a traditional lecture: here the students learn the theory on their own, outside the lectures, and so he use the time in class to review the subject matter that students found difficult, and to deal with calculation exercises.

To make some random samples of how much the students have managed to acquire on their own, Knut is running some multiple choice questions

from the subject matter by using response tools. The response tool makes it easy to locate any problem areas, and the lecture can be carried out in a far more convenient and time efficient way - teaching can be focused on the areas where students are struggling. When the students are given time to discuss each task before the vote takes place, it helps to reduce the threshold for the students to ask questions.

Response tools and digital blackboards

The teachers control interface of a response tool is normally designed to be very easy to operate from a digital board. All the buttons are large enough to be easily taped on, and all functions require just a few taps.

However, a digital board is absolutely not a requirement to use response tools, but goes hand in hand with the philosophy underlying the digital boards: this is a tool to help the teacher in telling a story and give best possible "flow" in the teaching.

If you in the tool have access to a digital whiteboard, this means that all communication from teacher to class can take place in front of the board - you do not need to move from the whiteboard and over to the computer each time you run a vote.