Using Response Technology to Make Lectures More Engaging, Fun and Interactive

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ABSTRACT: The aim of the workshop is to familiarize the participants with response technology and its applications in teaching of mathematics and science.

HiST has over the past years developed tools which utilize existing infrastructure (e.g. wi-fi) to gather feedback from students, both in-class and outside of classes. Considerable research has gone into developing methods which allow the teacher to harness student feedback to achieve effective teaching.

Feedback facilitates ownership of the learning process, in the sense that it enables students to become active actors in their own learning process, with the teacher as a guide and facilitator. Students get to see that they can influence the learning process, which in turn has the effect of increasing their engagement with the activities.

When used for in-class quizzes or tests, response technology can be used to quickly uncover misunderstandings and misconceptions, and then let the teacher provide feedback and corrective actions at a time when the students’ window of learning opportunity is wide open. Students can be engaged in peer learning processes which let share and reflect on concepts and learning strategies.

Response technology can also be used in between classes, for example to let students answer a short test or a survey before a class. The feedback provided by the students can then be used by the teacher to shape the upcoming class, in order to best address problem areas.

This workshop will give participants insight into the response tools and methods developed at HiST by interactive demonstrations and group discussions.

1 INTRODUCTION

The response technology has as its core goal to facilitate gathering the input from a large number of people (audience) in almost real time and making that input available in a form that can be further used in the dialog with that audience. Obviously, there are many ways to achieve this and even more methods for using the obtained instant feedback.

In the last 25 years the response technology has been gradually adopted in educational settings at various levels and in several fields. There are many terms used to describe the response technology systems (Keough 2012; Johnson 2014) but they normally fall into one of the following broad categories: voting systems and clickers – based on proprietary hardware and communication, online and mobile based response systems – based on standard data networks and leveraging existing hardware and software and finally mixed systems that combine both approaches.

1.1 Voting systems and clickers

Typical examples include a number of wireless terminals that must be distributed to the students while the teacher makes use of a receiver hardware that gathers the answers and makes them available to the teachers’ computer via a wired or wireless interface.

Older systems used hardwired terminals embedded for example into the desks but newer systems use battery operated wireless handheld terminals about the size of a remote control that transmit the answers via IR or RF.
1.2 Online and mobile based response systems

The increased penetration rate of smartphones and internet made feasible creating response systems that leverage this new potential. Instead of more hardware and more logistic burden the typical system in this category has an online (cloud) service that allows managing the questions and a browser / app based interface for gathering the answers from the students. Some systems allow students to answer questions via SMS.

1.3 ONE2ACT Response technology

The ONE2ACT instruments are designed to leverage existing infrastructure in order to allow eliciting necessary instant feedback from the students without a big logistic burden. The tools developed are geared towards specific scenarios and methods. The ONE2ACT SRS tool is geared towards simple response from the students catering also to dynamic and spontaneous lectures via student response through ad-hoc questions. ONE2ACT PeLe focuses on assessments, allowing students to answer a set of questions. ONE2ACT Eval allows creation of evaluations and surveys. All the tools provide the teacher with user interfaces that are facilitating discussions. Moreover, selected screens in the teacher client tools are optimized for usage on smart-boards. The students do not need to care much about which tool the teacher works with as they need to handle a single client that works with all of them.

2 ONE2ACT EVAL

With Eval teachers can be supported for several scenarios in order to increase the interactivity, the sense of ownership and the engagement levels. Eval supports several question types: multiple choice, rating (Likert) and open text. Eval can be used for activities before, during and after the lecture.

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**Fig. 1.** ONE2ACT Eval clients – Teacher client (left), student client (right)

ONE2ACT response technology system is based on a web service that deals with several types of clients that match different user roles and scenarios.

2.1 Adaptive training (mini-survey)

Teacher can create a short survey related to an upcoming lecture in order to check knowledge and or attitudes towards the planned materials to be taught. Upon receiving the answers the teacher can modify the lecture so that the focus is on the problem areas, misunderstandings or misconceptions.

The mini-survey could be sent in advance and the lecture would start with a discussion of the results or it could be even run at the very beginning of the lecture.
2.2 Lecture / Activity Evaluation

After a lecture the teacher could run an evaluation aiming to elicit opinions, attitudes, satisfaction levels, comments etc. towards the past activity. The results should be discussed with the students and they may be used to improve future similar activities and or adapt the next activities.

2.3 Knowledge checking

During the lecture Eval can be used to check the students’ level of understanding for the taught material by making use of the multiple choice questions. The answers received from the students allow the teacher to clarify misunderstandings and focus on the problem areas. The immediate feedback provided allows students to understand why something is correct or wrong while having all the information and the problem data fresh in mind thus improving learning.

2.4 Create meta-learning reflection

The teacher can pose several questions related to the students’ experiences while learning in order to shed light on aspects related to things like learning strategies, perceived mastery opposed to real mastery of notions. Using Eval allows the teacher to bring into discussion potential sensitive questions by using aggregated non-identifiable representations of the students feedback. In medium to large size audiences it is rather easy to anonymize the gathered issues.

3 BENEFITS AND CHALLENGES

The introduction and usage of response technology has undeniable benefits but also a number of challenges. In (Kay & LeSage 2009) the authors synthesized challenges and benefits from 67 relevant papers and classify the benefits in: classroom benefits, learning benefits and assessment benefits, and the challenges in: technological, teacher centred and students centred.

The response technology creates an interactive environment where answers to individual questions, assessments, surveys, evaluations can be instantly aggregated from hundreds of students. The results can be discussed with immediate effects creating a sense of ownership. The response technology can increase the students’ engagement level (Heaslip et al. 2014) by making everyone’s opinion count in the class. The whole environment in the classroom gets transformed into a more dynamic realm where students are more attentive and cannot get bored and where they can even have a bit of fun while learning.

The experiences with the ONE2ACT response technology indicate quite positive effects. For example in (Arnesen et al. 2013) it is reported that the use response technology (an early version of the ONE2ACT SRS) has either positive or neutral observed effects. Moreover, over 70% of the participating students claimed that the system increased their engagement and over 90% of the students claimed that the system contributes “to increase their learning”.

The attitude of the students is in concordance with many studies as indicated in (Kay & LeSage 2009), where the authors point out that 36 out of 38 studies dealing with attitudes towards response technology found that students and/or teachers had a positive attitude towards response technology.

Response technology is a tool that facilitates new things, makes new things possible. It empowers the teacher to handle the hundreds of answers in mere seconds. However, response technology cannot work by itself, the questions and the teaching methods are probably more important than the technology. (Premkumar & Coupal 2008) have compiled a set of tips related to the use of response technology and not surprisingly the first tip states that the focus is pedagogy and not the technology.

The pinpointing of the exact effects of the response technology it is rather challenging exactly because there are so many factors at play (Anthis 2011; Fies & Marshall 2006). The system and the technology used (“clicker type”) affects the impact as found in (Wolter et al. 2011). The attitudes and expectations from the lectures based on previous experiences significantly influences the willingness of the students to adopt new ways for conducting and participating into the lectures (Trees & Jackson 2007). The effects of using response technology are a mix of the technology used, teaching, learner and course characteristics (Fortner-Wood et al. 2013).
While technological challenges will eventually get solved and fade away the teacher centred challenges and student centred challenges require more attention. It is rather difficult and potentially time consuming to come up with good questions that will obtain the desired pedagogical effect. Moreover, the teacher needs to be able to use the instant feedback in a beneficial way. The potential for unexpected and spontaneous developments might generate anxiety in some teachers.

Inevitably introducing a new type of activity in the lecture will require an amount of time to be allocated to it. This means that the lectures must be adapted accordingly.

To get the best out of the response technology based lectures, students need to participate and to embrace the new way.

One main challenge for the students is related to their reluctance of being monitored or the potential for such systems to monitor their activity in a non-anonymous way.

In our system design we have been trying to tackle several issues uncovered by research studies in literature and our own experiences. Our system does not require any specific hardware so users can make use of their own smartphones, tablets or laptops, so there is no additional device to carry around and charge. Forgetting the device in hardware based proprietary systems is a serious issue.

We offer both anonymous and registered operation. The student participation will increase if anonymous participation is allowed. The system can deal with several levels of anonymity. The presentation and discussion elements meant to be shared with the audience do not contain any identifiable elements. However the teacher can identify which student gave specific answers if the participation was with registered user accounts. If for some reason, the students desire full anonymity that is achievable as well.

4 CONCLUSION

The ONE2ACT Eval and ONE2ACT response technology provide enabling tools for creating engaging and fun lectures that focus on the important aspects for that specific group of students. However advanced a technology is, it is just technology – it is up to the teacher to ask the right questions, guide the discussions, stir relevant reflections through, apply the appropriate pedagogical methods and ultimately inspire the students to engage and learn more. In other words the magic is in the teacher and not in the technology.

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REFERENCES


