USING TECHNOLOGY IN CLASS, NOT JUST HAVING TECHNOLOGY IN CLASS

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Abstract

This article will outline some of the results and inventions from NTNU within the field of Educational Technology since 2007 until today. The article will also discuss how technology could be used to increase academic performance. The main focus will be on computer assisted language learning (CALL), and the article will aim at concluding that without methodology technology is just technology. In order to see any effects, you need to use Educational Technology with a purpose.

Even though NTNU has done thorough research, it is difficult to conclude in an unambiguous way, but there are real indications that correct usage of technology will have appositive impact on the academic performance, especially for the weaker performing students, at higher education institutions.

1 INTRODUCTION

Since the early 1980ties there has been many discussions about Educational Technology (EdTech). But what is EdTech and in what way has it improved the way teachers teach, and the way students obtain knowledge? This paper will try to define different EdTech and the way it is used, and also reflect upon practices being introduced by teachers at the largest university in Norway.

The background for NTNU and their concerns about this area can be illustrated through our own development of EdTech, especially through the project called HiSTMobile (2011-2015). In this internally funded project four different EdTech solutions were outlined, and in collaboration with partners in different EU-commission co-funded projects several tools and environments for learning were developed [1]. Especially the response tools (SRS, PeLe and finally iLike) have been maintained, refined and continuous updated according to needs at the University. We see great potential in the tools, and the way using the tools affects classes, and this paper will focus on these aspects of EdTech.

2 EDUCATIONAL TECHNOLOGY

Even though EdTech is a well-known terminology, and most educators understand what is being talked about when talking of EdTech it is fruitful to define what this article considers EdTech to be. Looking for common definitions is difficult, and they vary much. The main reason for this variation is the share amount of technologies available, the pace of emerging technologies and off course how the innovations, disruptive or not, are being used in everyday school education. A useful definition can be found with Robinson et.al: “Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources” [2]. This definition is in line with this papers view on EdTech, and includes several interesting aspects, all though in this article the latter part will be focused; how do we create, manage and use APPROPRIATE EdTech.

In this article we define EdTech as all technologies being introduced in learning processes, including response tools, learnings platforms, MOOCs, blended learning approaches (especially using AV-solutions), social media, makerspaces and digital exams. All of these technologies has pros and cons, but the most important aspect here is how they are being used and by whom.

This points back at the articles name; it is not about if we have technology, we need to use it in an appropriate manner. According to the Norwegian author June Breivik, there are three types of teachers when it comes to EdTech. You find 1) the digital enthusiast, always in front and eager to try out anything new, 2) the ordinary teacher, the ones that might try EdTech, but do not the necessary competence or insight to use these tools and 3) the digital negative, that are reluctant and active opponents against EdTech [3]. There is a reason why we are discussing EdTech, attending conferences and writing articles and books about the subject for several decades. Often articles,
presentations and workshops are focused on the second group, and how to get these on board and enabled to use EdTech. For the third group it is difficult to change their mode, but it is also interesting to address the first group. Is it so that technology enthusiasm is solemnly positive, or are their inherit problems also with being engaged, motivated and enthusiastic?

At NTNU we have been developing and implementing both software and hardware for the last twelve years, and have seen some differences when it comes to EdTech, different usage in different groups and approaches towards implementation. Simplified one can see the implementation of EdTech in three phases. Firstly it is the sense that one is presented with innovative Technology, and start using. In a while you will find ways of using the new EdTech in a way that fits your style and/or group. This is the easiest way of implementation, and is more or less accepted by all in the educational system and has been for decades. But this also means that you might have to adjust or change your approach to the curriculum and methods of learning.

This leads to the more advanced stage where most teachers are today; one “shops” between different tolls and technologies, assessing the available solutions and choosing the one best fitted for you. This is a good way of implementing EdTech and some teachers even take it further, suggesting improvements in usability or functionality. This makes the tools more appropriate, and also indicates that EdTech might improve academic performance. EdTech enthusiasts are often at this stage, and this is also the problem with this group, because being positive to all change and all innovations often leads to an overuse of new technologies, and a tendency to find new tools that fits every purpose. Considering the speed in which technologies change, there will almost always be something new that is better than the old, and that comes with new, improved functionality. Even though enthusiast certainly will suggest improvements themselves, and stop using technology that is not up to date, thus making an impact, often the focus will be solemnly on the technology itself, not on the possibilities or methodological approaches the EdTech provides. Technology is only technology if the methodology is not adequate and adopted by the tools.

The most advanced stage, and also the most fruitful would be to instead of shopping different technologies and replacing the ones that do not work, thus loosing reliability and continuity, teachers should more often participate in the actual development of the technology, not just reporting back suggesting improvements. A close collaboration between a teacher and a programmer will ensure that the EdTech is designed to fit the methodology, and that the methodology is refined through the usage of EdTech.

Looking back on experiences at NTNU throughout these last ten years this has proven to be the significant success criteria. It can be best illustrated through looking at two response tools developed in the period 2007 – 2014.

### 3 SRS VS. ILIKE

Commercial and proprietary Student Response Systems (SRS) solutions have been documented in literature for as early as 1972 [4]. The main motivation for starting the development of an online SRS for modern mobile devices back at NTNU back in 2007, was the prediction that the majority of students would have an appropriate device within a few years. Cost of commercial SRS can be a hindrance for smaller institutions investing in such a systems and cost of voting devices can be a concert for the students [5]. These two concerns are solved with an open SRS based on using students using a web-browser interface on their mobile devices. The teachers use software, developed using Flex framework and running on top of the Adobe AIR runtime, which is designed to be non-intrusive and independent of the teachers lecture format, available for both Mac and PC.

Designing SRS was done with massive cooperation between programmers, teachers and students, from the interfaces via the student users to the functionality for the teacher. SRS basically allows the teacher to ask multiple choice questions, and the students choose their option. After voting the collective results are projected for the whole student group to see. This allows an interaction between the whole student mass and the teacher, with all the benefits this brings.

Different response tools are nothing new or the solution to all challenges with EdTech. Looking at our results from the years of development, it can be summed up in six points:

- Good qualitative results.
- Many registered teachers.
- Great feedback from the EU-commission.
− Few positive quantitative results.
− Academic performance not significantly improved.
− Difficult to get teachers engaged over time

As we can see, the results is not overly impressive, even though both students and teachers enjoy using SRS (and other EdTech) it is difficult to say that it has improved the students learning and/or academic performance. This led us to think new about the methodological approaches applied, and how technology could provide new opportunities. To illustrate the point we can look at two examples.

Which sentence is correct?

A: I is a boy.
B: I am a boy.
C: I boy am.
D: None of the above.

Figure 1: A MP-question on grammar.

In fig.1 we can see what can be best called a question for repetition, with a possible answer rate. We can see that none of the students in this vote know the correct answer to the question. This gives valid information for the teacher; he will need to lecture about this again (even though we might in this case hope the question is asked before any lecture on grammar). Even if this is an example of using technology in an appropriate and good way, it do not necessarily provide better academic results throughout the year compared to “ordinary” lectures. Often these types of questions are a confirmation for the teacher and/or the student group that they know or do not know the curriculum, and to a large degree has a summative effect.

In order to improve the learning effect, we need to ask different types of questions, i.e. independent of the technology itself. In fig. 2 we have a conceptual question from mathematics.

2 + 3 × 4 = ?

A: 14
B: 20
C: 13
D: 11

Figure 2: A MP-question in mathematics, testing order of operations.
In this case the correct answer is A, and as we can see, only 25% of the group knew this. But in this case, the teacher does not have to repeat the previous lecture, because this is a conceptual question. Instead the teacher will comment on all four alternatives, and explain where the student was thinking wrong. In this way the students will learn from their mistakes and the lecturer uses Ed.Tech. in an appropriate and efficient way, thus involving and engaging all the students in the group, saving time in class and activating different ways thinking academically.

Research done at NTNU on response tools indicates that there is significant academic improvement when applying methodology to the usage of EdTech. In an article from 2013 Arnesen et.al found that the academically weaker students perform better when using SRS: “Indications that students with lower grades from vocational school have a lesser tendency to fail the course in groups using SRS than in control groups.” [6]. In an PhD study in physics from 2014, Kjetil L. Nilsen investigated how the usage of SRS changed the discussions and learning environment in groups at NTNU: “Change of methodology, from classic to peer instruction, increases the argumentation time with 91%. Most of this time is used to present explanations, related to curricula.” [7]. These indications are interesting, and they led us to think about how we could combine experience and expertise in the development group to design the response tools in a way that could make it easier to utilize methodology. Between 2012-2014 the response tool named iLike was developed.

When it comes to foreign language teaching (FLT), many will claim that innovations in technology have not yet been properly researched and taken into account, although the use of multimedia computing, the Internet, language laboratories and other technology has become common in classrooms all over the world [8]. It was widely accepted that traditional exercises and activities (albeit communicative, grammar-based, etc.) have just been copy/pasted to the digital form, with the advantage of distance learning, faster distributing of materials to the students and much lesser time for students to finish them. But could it be possible to help students understand the logic of how language works by utilizing modern technology and a new approach towards language training?

Mobile technology and learning (m-learning) provides a new active collaborative learning approach, which let students set the in-class terms for communication and interaction in order to get a clearer view of their instant knowledge and perception. Combined with the knowledge about methodological approaches iLike provides opportunities, also beyond language learning, to use EdTech in a good way.

The iLike methodology is illustrated in fig. 3.

![Figure 3: iLike methodology.](image-url)
To be able to do this, especially in languages, iLike is programmed with different functionalities that allows the group to work with text, both sentences, paragraphs and longer text types. The most commonly used function is a word cloud that immediately shows the selection of students answer on a projected screen. Using the results obtained from a big group, and immediately being able to comment on them, making new tasks/cases based on the previous results as well as pointing out why the students have answered incorrect or imprecise, disrupts the way we think about teaching. In this way Ed.Tech. improves both the academic performance, the students motivation and engagement in class and the teachers act more as facilitators of inherit knowledge in the student group.

Many researchers argue that the key constructs of m-learning pedagogy are authenticity, collaboration and personalization. The authenticity feature highlights opportunities for contextualized, participatory, situated learning; the collaboration feature captures the often-reported conversational, connected aspects of m-learning while the personalization feature has strong implications for ownership, agency and autonomous learning [9]. The results obtained through the iLike-project supports this research. Both students and involved teachers claim that iLike increases ownership, engagement, motivation and involvement in the students groups using iLike.

Additionally, iLike provides opportunities that more conservative response tools do not to actually make the students reflect, think about concepts in learning [10] and expand their understanding of the curricula taught.

Response tools provide an excellent way of using EdTech in classrooms learning, as long as it is being used connected to an adequate methodology. Students and teachers can easily integrate mobile technology and learning in the classroom today, due to portability of mobile devices and their ability to connect to Internet almost anywhere. Mobile devices are ideal as a store of reference materials, learning experiences, and general-use tools for fieldwork. Mobile learning is indeed dramatically shaping the nature of teaching, learning, and social interaction [11]. In order to utilize the full potential of mLearning, one needs a closer collaboration between the users, the programmers and the students in the development phase of the tools.

4 FORWARD, ONWARDS, JUST A SHORT BREAK

At NTNU we stopped and paused for a year, investigating what we had, what we needed and most importantly; what the students and teachers were requesting in order to improve their studies. As technology enthusiasts we need to look thoroughly at our own practices despite the obvious advantages EdTech provides. We should always consider also the other groups of teachers, both the positive ones that needs training, insight and time to implement EdTech, and the anti-technology group, that needs to see how using technology provides better academic performance or at least improved learning. New EdTech needs to be designed in a way that suits all groups, and it needs to involve students, programmers and teachers collaboratively from the initial planning stage. And we need to consider how the technology can be utilized in an appropriate way in the classroom. Technology is nothing if you do not have methodology as a fundament for your practice.

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REFERENCES


