Whitepaper

The positive impact of educational technology on student engagement

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NUITEQ SNOWFLAKE

Introduction

Lack of student engagement is one of the teachers' most prominent issues in the classroom. NUITEQ's educational software, NUITEQ Snowflake, leverages the benefits of technology in order to activate students for greater engagement. To measure the degree to which Snowflake helps teachers address students' lack of engagement, we conducted a pilot project where we let teachers try out Snowflake in their classroom for 3 months. The results showed that Snowflake is indeed very effective in increasing student engagement.

Background

In research NUITEQ conducted with teachers in Sweden and in the USA, one of the main issues they reported was lack of student motivation and engagement. When asked what the challenges they were confronted with each day in the classroom were, teachers responded among other things:

- To reach the goals that my superiors set without making instruction boring
- Students that find it difficult to learn and concentrate.
- A big problem is children's attitude and engagement.
- Students who are not interested in investing any energy in their studies.
- Lack of motivation in students.
- Apathetic students.
- To stimulate, and motivate to the best of my ability my student body
- Motivating the class to get their work done.
- How to keep students engaged

How is student engagement defined? According to "The Glossary of Education Reform", student engagement

> [...] refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education. Generally speaking, the concept of "student engagement" is predicated on the belief that learning improves when students are inquisitive, interested, or inspired, and that learning tends to suffer when students are bored, dispassionate, disaffected, or otherwise "disengaged." (Great Schools Partnership, 2016)

There are a lot of things vying for the students' attention, both in the classroom and outside it. Motivation to learn diminishes if the subject doesn't interest the students or if the way it is presented is disinteresting. The traditional, passive way of teaching that relies on strict discipline and mechanical repetition has been abandoned in many Western countries in favour of active, collaborative learning and flipped classrooms. The goal is to engage students more and to promote actual, meaningful learning instead of mindless memorisation.

To assist teachers in their efforts, NUITEQ developed its educational software Snowflake and its online counterpart, Snowflake.live (the two will collectively be called Snowflake going forward in this case study). Snowflake engages and activates students for several reasons: first of all, it is designed to contain game elements, such as esthetically pleasing graphics which offer immediate feedback to students' input. This increases students' situational interest (the temporary interest created by one's environment). Moreover, Snowflake gives teachers the possibility to create their own content, to cater to their students' personal interests and needs, by using one of 16 different activity templates and adding text, images, video and audio, turning each activity into an interactive, multimodal experience and providing scaffolding to students or challenging them where appropriate.

By stimulating students' situational and personal interests, their motivation to learn increases and knowledge is absorbed more readily (Seifert & Sutton, 2009).

The pilot project

We wanted to find out how well Snowflake works as a tool to help teachers address the engagement and motivation issue in their students. In order to do so, we designed a

pilot project with teachers in Skellefteå, the town where NUITEQ has its headquarters. We hand-picked the 6 teachers that were going to participate in the pilot project among several candidates who had expressed an interest, across preschool and mandatory education. The participants were given product licenses. Some of our main participants' colleagues also got licenses to try out Snowflake. We then delivered a series of educational sessions individually to each teacher (and their colleagues where applicable) and we asked them to also watch the tutorial videos we have on our website.

Touch screens where we had pre-installed Snowflake were lent to the teachers. For the project, teachers were asked to create lesson activities and try out different functions in Snowflake in the classroom, either alone or together with their students. Some teachers sent activities as homework to their students. We then touched base with the teachers regularly during the duration of the project to support them in their questions and to receive feedback. This was done by email and/or video calls, and -in some cases- in person.

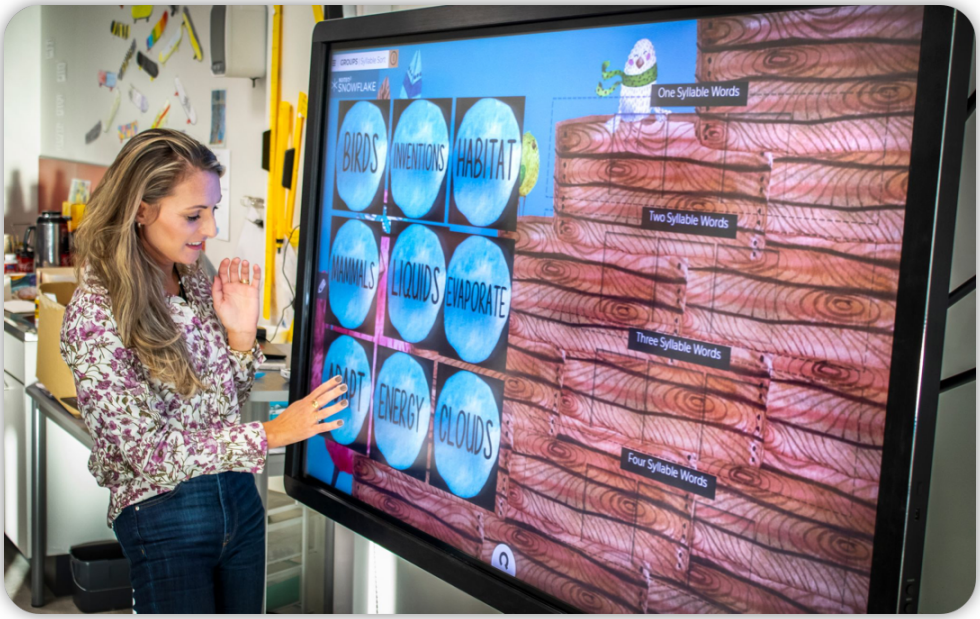
We measured the teachers' impressions of Snowflake through questionnaires, interviews and informal conversations through video calls and emails.

The project was originally due to last from February 2020 until June 2020 but because of the outbreak of Covid-19 during that spring the project was put on hold until autumn 2020. It was relaunched in August and it finished at the end of November 2020. A refresher session was offered to the teachers in the beginning of the autumn. Unfortunately Covid-19 was still proving to have an impact on the school system and our participants had to deal with obstacles such as sick colleagues, reorganization of classes and more. One of the initial participants changed jobs and could therefore not continue with the project, leaving us with a final number of participants of 5. Other pilot project activities (such as classroom observations) that had been planned were cancelled due to Covid-19 restrictions and considerations. Despite these difficulties we maintained momentum and were able to complete the project according to schedule.

The results

Teachers were requested to rate their students' engagement in a questionnaire administered to them before the project and then again in a similar one after the project. After the project's end they were also asked to rate how much they felt Snowflake contributed to increased student engagement. The questionnaire contained several questions, both open-ended and closed. The latter could be answered by clicking on a scale from 1 to 5, where 1 means they do not agree with the statement at all and 5 means that they agree with it fully. Some of the teachers were also interviewed to get a more detailed and nuanced account of their experience. We also kept up communication regularly through video calls and email to receive feedback.

Teachers responded to Snowflake with enthusiasm and curiosity. They also reported that their students showed the same.



The responses we received during the interviews spoke highly of Snowflake as a means to engage students:

"Snowflake awakens the curiosity of students and engages them. It also lets me see students' progress in a simple way."

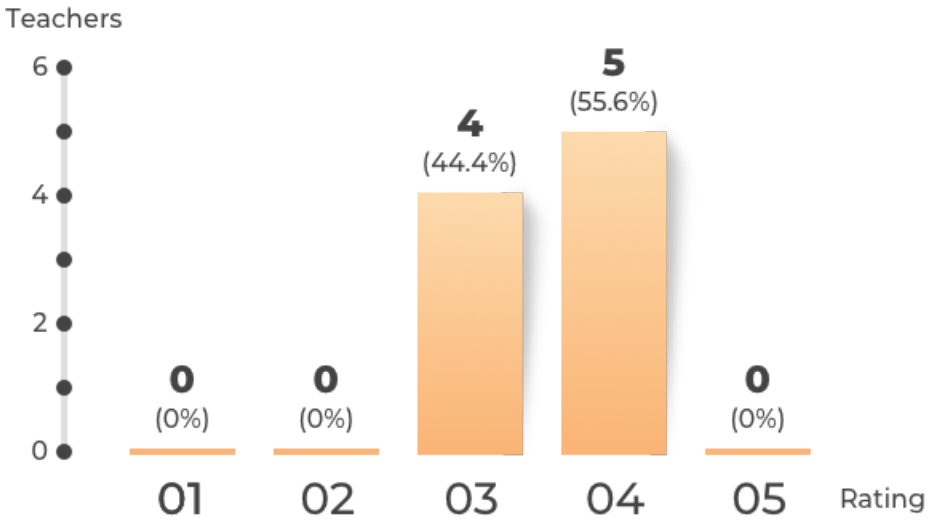
"Variation makes the students think it's more fun and also makes the knowledge "stick" more. I can change [the content] in Snowflake based on what I prioritise".

"It is fascinating to see a student who never gets things done in the classroom suddenly work through activity after activity - it is a fantastic experience!"

"Snowflake gets my students to participate and collaborate actively."

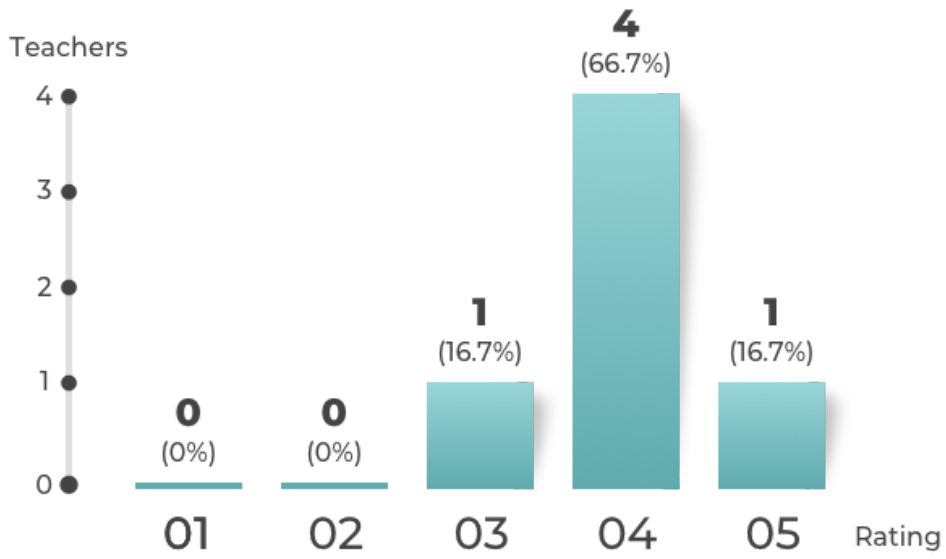
So teachers explain this higher degree of engagement and curiosity in their students as a result of using Snowflake, leading to greater student activation and better knowledge retention. Students find it fun to work through lesson activities in Snowflake so much that they want to go on to the next one once they are finished with one. Some teachers attribute this to the user interface, namely that it reminds students of games that they play at home. Today's students are digital natives, fluent in the use of digital technology and at home in a digital environment. The game aspect provides them with situational motivation to keep playing, while the element of individualised activities created by teachers can cater to their intrinsic, personal interests. Using Snowflake as a way to vary instruction also helps pique students' interest and curiosity.

Our questionnaire backed up these findings. We asked the question before the commencement of the pilot project: *"How would you rate your students' engagement in the classroom today?"*



The answers were almost equally distributed between the neutral middle of the scale and 4 ("almost fully engaged"). There was some engagement among students but there was definitely room for improvement.

After the completion of the project, we asked the same question.



This time, there was a clear shift towards 4 and 5. Moreover, when asked about Snowflake, 83,4% of participants reported that Snowflake contributes to increased student engagement in the classroom.

Some other results that are worth mentioning are that 4 out of 6 teachers reported that Snowflake contributes to increased collaboration among students and improved communication. Collaboration and communication are two of the four Cs of 21st century learning, skills that are crucial in order to prepare students for future jobs. In addition to that, 84% of the teachers thought that it was easy or very easy to get started with Snowflake, which is important considering how limited teachers' time is.

The results show clearly that Snowflake has a positive impact on student engagement and can therefore lead to more efficient knowledge acquisition and retention in students.

Conclusion

NUITEQ wanted to find out if our educational software, Snowflake, contributes to increased student engagement in the classroom. The results of the pilot project showed that Snowflake can indeed help engage and activate students. Greater engagement and interest lead to better, more meaningful learning. Snowflake's user interface (with its game elements) and its vast range of options when it comes to instruction differentiation are effective in capturing and holding students' attention. By using Snowflake, teachers can address one of the main issues they face in the classroom.

The knowledge we acquired through this pilot project will help us at NUITEQ develop our products further, placing focus on the steps we can take to address the issue of student engagement. Digital tools carry the potential to greatly improve the quality of education and it is through pilot projects like this one we find out exactly how we can do that.

References

Great Schools Partnership (2016, February 18). Student engagement definition. *The glossary of education reform*. Retrieved from https://www.edglossary.org/student-engagement/

Seifert, K. and Sutton, R. (2009). *Educational Psychology*. Retrieved from https://resources.saylor.org/wwwresources/archived/site/wp-content/uploads/2012/06/Educational-Psychology.pdf