GroupNotes: Encouraging Proactive Student Engagement in Lectures through Collaborative Note-taking on Smartphones

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Abstract: The lecture is still the primary teaching and learning form in university, but student disengagement caused by the traditional didactic style of lecture prevents students from taking full advantage of this learning paradigm. In this paper, we apply a student-centered collaborative learning pedagogy into the lecture environment through a novel Smartphone-based real-time collaborative note-taking application - GroupNotes - that encourages students to proactively engage themselves by means of student-student interaction in a lecture.

Introduction

A lecture is the primary teaching paradigm in most universities. During this time, the lecturer delivers information to students, who process the information passively, and in isolation, to build the relevant knowledge for themselves. The lack of feedback or interaction, at the time when it is most needed for a student to process relevant information during the lecture is a major factor toward student disengagement, which consequently causes negative impacts on their willingness to attend lectures and on their learning outcome. If a student cannot ask the lecturer (Hitchens and Lister 2009) or their peers critical questions at the right time to reconcile their own understanding, they may lose interest and find other ways to occupy themselves (Perry 2000).

In recent years, much attention has been paid to re-designing lectures in a bid to incorporate lecturer-and-student interaction by taking advantage of new teaching gadgets such as clickers, mobile phones, tablets, and laptops (Davis, Landay et al. 1999; Kam, Wang et al. 2005). Empirical evidence as to how student engagement can be improved by these tools as well as to their effectiveness in increasing student learning outcomes is yet to be proven (Patry 2009). In addition, many lecturers have yet to be convinced of making extra effort to re-design their lectures in order to harness these new technologies and students are generally unwilling or unable to own the specific devices, bring them to lectures or invest in learning how to use the devices or applications such as *Livenotes* (Kam, Wang et al. 2005) and *NoteBlogger* (Simon, Davis et al. 2008).

In this paper, we present a technical approach that allows a small group of students to participate in a real-time collaborative note-taking session using their own Smartphones, and motivate, assist, and monitor each other in order to actively learn and keep everyone in the group engaged during the lecture, in a way that does not disrupt the lecture, either for the lecturer, or for other students.

Applying a Student-centered Collaborative Learning Pedagogy into Lectures

We address the issue of student disengagement from a different perspective by introducing a student-centered collaborative learning pedagogy into lectures. Our primary objective is to encourage students to proactively engage themselves in a lecture by facilitating them to actively take notes - a proven effective learning technique that aids memory of the lecture by fostering encoding, articulation and rehearsal (Bligh 2000).

First, a student-centered collaborative learning pedagogy is proven effective in group-based learning tasks or activities in small classes (Kam, Wang et al. 2005); (Falkner and Munro 2009). However, application of this pedagogy to large-class lectures is still under exploration. We want to study its positive effect on improving student engagement and learning outcomes and also investigate any potential negative effects that may develop.

Second, the approach is also based on an active learning pedagogy, where students take a proactive role in engaging themselves rather than being passively kept engaged by the lecturer. Note-taking is an effective learning technique particularly in lectures, where students engage themselves to make sense of the lecture by documenting their understanding or misunderstanding of the information passed on by the lecturer in their initial knowledge building process. However, as note-taking is a personal choice rather than a curriculum requirement, students who do not take notes may not be actively engaged unless other means are used. We want to investigate how to motivate students to proactively take notes in a more engaging and stimulating way.

Third, we want to address the issues responsible for the slow uptake of hardware-based teaching innovations in lectures by investigating Smartphone-based student-student interaction. This approach does not require the lecturer to re-design the lecture and it adds no extra burden to students, either cost to own, time to learn, or effort to bring with them.

In a nutshell, Seven Principles for Good Practice in Undergraduate Education (Chickering and Gamson 1991) advocates, amongst others, developing reciprocity and cooperation among students, using active learning techniques, emphasizing time on task, and giving prompt feedback. While this idea is from the teaching staff to

the students, we aim to provide similar practices from each student to their peers in a collaborative learning group based on the hypothesis that the fun factor (e.g., Smartphone against paper-and-pen, collaborative learning against individual learning) and the peer motivation (e.g., the desire to help peers or not to let peers down) will be driving forces towards students proactively engaging themselves in lectures. We need to systematically develop this technical approach and then test this hypothesis.

A Real-time Collaborative Note-taking Application on Smartphones

The cornerstone of the approach is an application called *GroupNotes*, which operates on Smartphones, and provides for a small group of students to validate and explore the meaning of lecture content in real time through taking their own notes, while also reviewing, commentating, and questioning notes written by other group members as it is delivered, yet in a silent manner that does not disrupt either the lecturer or other students.

The user interface design of the *GroupNotes* application is concerned about issues such as utilization of screen space, simplicity and ease-to-use, efficient use of major functions, unobtrusiveness of minor functions, user control and freedom, and awareness of group work. The user interface design allows for adequate user control and freedom, ranging from individual to cooperative and collaborative uses of the application. Individual use does serve the purpose of engaging students while allowing students to be in control of their own preferred learning styles and to have a digital form of their own notes.

Cooperative use of *GroupNotes* is where a student, though being part of a group, independently take notes for the entire lecture slides because they cannot manage the cognitive load involved in keeping up with their peers' contributions while at the same time listening to the lecturer and taking their own notes, or only for a subset of the lecture slides to take on a fair share of the workload in the group. In this instance each member's notes form part of the community notes available to all group members.

Collaborative use of *GroupNotes* usually involves participants taking different roles, e.g., a note-taker, a reviewer, a commentator, or a questioner, in a real-time collaborative note-taking session in order to maximize each one's strength and cognitive power.

GroupNotes allows a group of students to take advantage of the power of social learning through small-scale "Wisdom of Crowds" (Surowiecki 2005), where cognitive diversity provides multiple views on the current subject matter to challenge or validate the current 'knowledge' of the student at the teaching moment.

Conclusions and Future Work

Low attendance rate and student disengagement in lectures are the common problems in most universities. Our approach encourages a student to proactively keep herself/himself engaged by allowing her/him to voluntarily participate in student-student interaction within a virtual group using her/his everyday pocket device. Preliminary student feedback has shown that the approach is pedagogically and technically feasible and students are quite open to this approach due to its fun factor and peer motivation.

The current *GroupNotes* application is being developed for Android-based Smartphones however to address platform agnosticism, we will also develop versions for other mainstream Smartphones such as the iPhone, Windows Phone etc. We will also study human factors and pedagogical issues in a near future.

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