

# Understanding Student Behaviors in Online Classroom

- Data Scientific Approach -

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**Abstract**— Students drop classes for many reasons. Some are personal such as medical conditions, family issues, or financial difficulties. Others are course specific such as course contents, instructor, or classmates. In either way, class drop is a serious problem to institutions because without students there will be no students learning. As a first step to understand students drops, this study will address the issue of students' behaviors in online classrooms.

**Keywords**—Online Education, Presence, Student's Behavior, Big Data, Data Science (key words)

## I. INTRODUCTION

Students behave mysteriously in their online classrooms. Although course developers, instructional designers, and instructors spend lots of time to develop educational artifacts in the online classroom, students don't use these contents as the developers designed. In our previous research, we found some patterns in student's activities in online classroom [1]. We defined them as habits of online students and tried to find its relationships to the student's classroom performances. Students in online education start to develop their study habits in their early classes. They access the classroom at a certain time on a certain day of the week. Some students access the classroom as early as possible, while others delay it as long as they can. Although both of them do the same classroom activities, some are doing well while others are not. The differences in their study habits make their differences in academic performances.

Academic institutions have been trying to understand why some students are successful and others are not. Researches focus on the different profiles of the students. One of the recent research projects assumes the demographics of students are important factors for determining the successes or failures of students. Based on these assumptions, schools are trying to recruit certain demographic groups of students and develop programs to support these demographic groups [2].

We argue that there is a missing piece of information in this profiling model. The profiling approaches focused on the factors that cannot be changed. The so called 'profiling factors' are not changeable in many cases by the institutions. For example, students' gender or ethnicity cannot be altered at any time. Although these factors might have some impacts

on the students' performances, academic institutions have limited capabilities to use the impacts of these factors.

We want to investigate the problems with a different viewpoint: a behavioral perspective. Students develop their own behaviors in their online classrooms and these behaviors can be formed and altered with proper interventions by the institutions. From this point of view, the factors which affect students' performance and satisfaction are not static anymore. There are dynamic factors which can be supported or discouraged by the institutions.

## II. LITERATURE REVIEW

Many current studies and approaches to improve students' retention have focused on static factors [3]. For example, finding the risk factors of a student based on their profile, redesigning and redeveloping course contents to address better participation and student understanding, and requiring certain intervention and/or interaction of the instructors and the students are a part of these various efforts to improve students' engagement in the classroom and improve the retention in the institution. Unfortunately, these static factors are not changeable in short periods of time.

We are interested in a different approach to understanding this issue. From a behavioral standpoint, we would like to investigate how students are interacting in their online classroom discussions. There could be quantitative and qualitative differences between successful students (who have higher retention) and unsuccessful students (who might have dropped out). The results of this research will provide a complementary perspective to the important issue of student retention.

The Community of Inquiry (COI) model was proposed more than 13 years ago to provide a basic framework for understanding online educational platforms [4]. According to the model, there are three main constructs in the online classroom. Social presence represents the participating students' feeling about their connectedness to other students in the classroom. If they feel they are more connected, it is easier to share their personal information and promote inquiry for knowledge of the content. With this social presence, students may develop a cognitive presence, which represents their capability to reflect and create meanings from within the online classroom. To support this, the course

content, structure, and direct intervention from the instructor provide teaching presence.

The COI framework provides the fundamental structures of the online classroom's building blocks. This framework provides the tools to measure the different levels of presence and ways to think about how to improve online classrooms. We argue that this framework should be extended more according to time. Students are developing their presence patterns over time while they are in online classrooms. When students start their first online course, many of them have never been exposed to the online educational environment. Therefore, they are confused and misbehave in the classrooms. They need more attention and support from the institution until they develop their own learning habits. The feedback and intervention from the instructors change their ways to communicate and interact within the classroom over time. Since the students repeat this online classroom experience, they gradually develop their online classroom habits.

Habits are developed by the repetitive actions with cue and rewards [5]. Based on certain cues, such as course requirements, due dates, and time of the week, students will follow certain routines. These routines will deliver positive or negative rewards. This loop of behaviors will create the habitual behavioral patterns in students. Once the habits have been developed, students will do the same things in their next class and will get the same results. It is difficult to change habits; therefore, we need to help students develop good habits in their engagement levels and classroom behaviors early in their academic life.

We need to look at the problems from a different angle: the behavioral perspective. Students' behaviors in online classrooms can be changed and should be addressed properly by the institution and the instructors. Probably the teaching presence in the COI model should be interpreted differently.

### III. DESIGN

This study has two research questions. First, we would like to examine the existence of behavioral patterns in online discussion board activities. Some students post their discussions early enough to make them visible at the top of the discussion boards. Since the discussion board displays posts chronologically, they receive more attention and feedback from their peers and the instructor. Some other students post late or right before the due date. Consequently, their contributions do not get enough exposure or feedback. We argue students show some behavioral patterns in their participation within the discussion forums. These patterns are habitual and difficult to change.

Second, we would like to observe the existence of relationships between the students' behavioral patterns and their learning performance. We argue that different behavioral patterns or habits lead to different results in students' learning. Certain habits could bring more interactions with other participants. These increased interactions could lead to more creative thinking, constructive feedback, and opportunities to improve. Each behavioral pattern or habit could result in different impacts on students' learning outcomes such as course grade, student

retention, and course satisfaction. We assume that the different habits of online students will lead to different levels of learning performance in students.

Given today's advanced information technologies, more schools are offering online courses. Online classrooms are accessible 24/7 and are more affordable than traditional models [6]. Course standardization and mass reproduction enable these benefits to the students [7]. However, at the same time, there are growing criticisms about the quality of online education [8].

### IV. RESEARCH METHOD

We will observe students' behavioral patterns by measuring their discussion forum participation. We will create a measuring matrix of the frequency, time stamps, and sequencing of discussion posts. The data will be extracted from the archived repository of the eCollege learning management system for the entire course (5 weeks). Using big data analysis with clustering methods, we will identify patterns in students' behaviors.

Once we identify the patterns, we will trace the relationships between these behavioral patterns and the academic performance of the students. Grades, retention rates after the course, and other factors can be analyzed as indicators of students' performance. We also will do some qualitative analysis about the contents of the discussion posts. This contextual analysis will be supported via a separate project which we are doing at the same time.

The neural network research method will be used to develop a predictive model to identify successful habits in the early stages of building up. Once the neural network has been trained, it can identify and classify the similarity of the input data [9]. The result of this study will be to identify the successful behavior patterns of online students. Also, we will develop a working prototype of a neural network to predict the successful behavioral patterns of online students.

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