

# INSIGHTS FROM PRELIMINARY ANALYSIS OF CLASSROOM CHAT LOGS DURING THE COVID-19 PANDEMIC

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## Abstract:

This work-in-progress practice paper reports on the experiences of using Microsoft Teams to teach a large postgraduate class on database systems during the 2020/'21 academic year, under conditions when students and lecturers were in an enforced societal lock-down because of the COVID-19 pandemic. The class was made up of 167 students of 12 different nationalities from diverse backgrounds. Determined efforts were made to create an interactive online classroom experience through the use of quizzes, practical demonstrations, worked examples, and live discussion. The chat feature of Microsoft Teams was extensively used by students to pose and answer questions, as well as to communicate with each other outside of class time. An analysis of the chat log files is presented, looking at how factors such as gender and national culture influenced behaviour, and also looking at how participation in the chat impacted upon the sense of belonging and overall performance.

**Keywords:** online classroom behaviour, diversity, individualism, national culture, Microsoft Teams, COVID-19

## I. INTRODUCTION

The global COVID-19 pandemic forced information systems educators to entirely pivot their time-honoured teaching practices at short notice. At the University of Capetown in 1966, US Senator Robert Kennedy famously remarked that “we live in interesting times ... they are times of danger and uncertainty, but they are also more open to the creative energy of men [and women]”. For IS educators, the disruptive COVID-19 crisis has indeed been an interesting and creative time, bringing about the radical transformation of traditional methods of course delivery and assessment.

The author has over twenty years experience of teaching database technologies at undergraduate and postgraduate levels but, prior to September 2020, had never done so in an online synchronous environment. This work-in-progress practice paper reports on insights gained from this new departure, specifically relating to the use of the chat feature in Microsoft Teams to build a sense of community in an online classroom.

Microsoft Teams is a cloud-based digital hub integrated with Office 365 that can be used for meetings, breakout rooms, chat, calls, file sharing, remote screen sharing, classroom group conversations, channels, assignments, and time management. It has been found to be very useful in supporting active student-driven learning [Martin and Tapp, 2019, Sobaih et al, 2021, Henderson et al., 2020, Ismail 2020]. However, Teams and other such tools require considerable effort and expertise to be effective [Ouyang and Scharber, 2017]. If not managed appropriately, they can create barriers and make interaction between students and lecturers more difficult [Rojabi, 2020, Sobaih et al, 2021, Ismail 2020]. The use of Teams within a group of diverse students of various ages, gender, (dis)ability, nationality, language fluency, academic background and professional experience raises very complex challenges for IS educators.

In relation to the chat feature, there is a substantial body of prior literature pertaining to the behaviour of passive “lurkers” and active “posters” on social media sites and within online communities. Generally, lurkers make up the silent majority on such fora; they are that body of individuals whose primary objective is to selectively consume information of interest but who rarely if ever contribute anything. On the other hand, posters are those individuals who habitually share information with the community. The greater their commitment to the community, the higher their level of active participation [Yang et al., 2017, Gazit et al., 2018, Sharma et al., 2021]. Factors such as gender and age may impact a user’s tendency to be a lurker or a poster [Yang et al., 2017]. Nationality may also come into the equation, with those from collectivist cultures more willing to contribute than those from individualistic cultures [Hofstede, 2011].

This work-in-progress practice paper presents preliminary analysis of data gathered from Microsoft Teams chat logs for a postgraduate module on database systems. The following research questions were explored:

- How did the user profiles of lurkers compare to those of posters?
- Did gender, age, or national culture impact behaviour on the chat feature?
- How did chat behaviour influence overall performance?
- How did chat behaviour influence students’ sense of connectedness during the COVID-19 pandemic?

## II. OVERVIEW OF TEACHING APPROACH

“Database Systems Development” was taken by 167 students across three separate postgraduate programmes at a large AACSB-accredited Irish university in the 2020/21 academic year. The gender mix within the class was 36% female and 64% male. Students were of 12 different nationalities, of which Irish, Indian and Chinese were the largest cohorts, with the remainder from Nigeria, Cameroon, USA, Mexico, Brazil, France, Ukraine, Pakistan and Indonesia. The median age was 25.2 years. The majority of international students arrived in Ireland prior to commencement of teaching semester but a few remained in their home countries.

Under normal circumstances, this module would have been taught in a lecture hall with additional laboratory practicals, as had been done for many years previously. However, because of the COVID-19 pandemic, it was taught fully online. The class ran over the period of one semester with a live two-hour session each week via a recurring Microsoft Teams meeting. The weekly sessions were recorded so students were advised to deactivate their cameras and microphones in the interests of privacy because they were mostly joining in from their own personal spaces.

During the session, aspects of relational database design and development were explained and demonstrated by means of Microsoft Powerpoint, Adobe Acrobat, Lucid Chart, Neo Smartpen with Grida Whiteboard, Sublime Text and MAMP PHPMyAdmin. Supplementary e-learning materials were provided in a customised learning path created on the Udemy for Business platform. For teaching data modelling and normalisation, a mini-case study [Parker, 2003] was used and students were prompted to engage in dialogue about various design decisions, considering the merits of different ways of solving problems. When the course moved on to database development using MySQL, a “learning from errors” approach was adopted [Taipalus et al., 2018, Metcalfe, 2017]. Examples of both correct and incorrect code were presented and discussed. Microsoft Forms “test your knowledge” 15-minute multiple-choice quizzes were also periodically used in class to provide students with formative feedback on their level of comprehension. Quiz responses were analysed in real-time and material that caused difficulty for a substantial number of students was gone over again, with explanations of answers.

Students were encouraged to pose questions at any time during the class. Some did so by turning on their microphones but the majority of questions were received via the Teams chat dialogue. However, because the lecturer was operating in maximised shared-screen mode while demonstrating examples and had muted alert notifications, he did not know immediately when

something was posted in the chat. Instead, he paused every few minutes to check for questions in the chat. On doing so, it was frequently found that other students had already responded. The lecturer thanked the students for doing this and affirmed their response if it was correct or otherwise explained why their response wasn't correct (or fully correct).

This teaching approach was well received by students, with positive feedback comments such as:

- *"Professor solves examples in live lectures, it definitely helps"*
- *"I really like the practical demonstration of concepts provided by the professor in online class"*
- *"He is very knowledgeable about this subject so I listen to him to learn as much as I can about SQL and other material"*
- *"I thoroughly enjoyed the module and enjoyed the lecture every week and I credit that to your teaching style and your persistent engagement with the class"*

### III. PRELIMINARY RESULTS AND DISCUSSION

#### Lurkers and Posters

A total of 894 online messages were posted in chat over the duration of the course. These were manually extracted from Microsoft Teams history and matched against student profile data. In the interests of protecting privacy, personally identifiable information was stripped from the data before analysis and replaced with anonymised identifiers.

Out of the class of 167 students, 61 (37%) did not post anything at all in the chat. On the other extreme, the top 10% most active chat participants accounted for 557 (62%) of all posts. This is not surprising as it is quite common for the bulk of user-generated content within online channels to be created by a small number of core members [Yang et al., 2017]. It became apparent as the weeks progressed that this small core group were highly capable, confident, ambitious and dedicated students whose posts not alone made an immensely valuable contribution to the learning experience of the class as a whole (as indicated by 'Like' reactions), but also contributed to the enjoyment of the teaching experience for the lecturer. Their interactions influenced the flow of conversation and enabled them to take some degree of control over their live in-class experience [Gazit et al., 2018].

Amongst those who were frequent posters, a small few appeared to do so for ostentatious reasons. Because the students in the course came from diverse backgrounds, some of who were experienced in database systems and some not, material was taught from the ground up and the first few weeks covered the fundamentals. The worked examples in the early stages were therefore relatively easy for some students and occasionally there were show-off remarks in the chat such as *"mind blowing stuff"* or *"was hoping for something more challenging, not going to lie"*. This latter comment received a lot of negative feedback from others, including from lurkers, consistent with Gazit et al. [2018] who found that lurkers often only react when an emotion is triggered.

On occasion, the sideline chat while class was in progress became a distraction. During a session when there was quite a lot of dialogue going on, an irritated student commented *"pls stop interrupting the class, call the teacher after the class pls"* (liked by about 10% of students in attendance) and another commented that *"[it's OK to] ask questions but make sure it doesn't adversely impact the whole class"* (liked by 7% of students). Such comments and their endorsement or rejection by peers, in the form of Like/Love or Sad/Angry reactions, were instrumental in shaping the acceptable social norms within the class regarding chat behaviour.

### **Gender, Age and National Culture**

Looking at gender, a two-tailed Mann-Whitney test found no significant differences between male and females as regards the frequency of chat posts. 60% of the posts were made by males and 40% by females, which was very close to the gender mix of the class as a whole. The very same proportion was noted at the outlying upper end, with four of the top ten most frequent posters being females and six males.

Statistical tests were not run to explore possible age-related issues because, on closer inspection of the profile of the class, it was considered pointless to do (e.g. the oldest quartile included a varied mix of those who were either very confident working with databases or alternatively were complete beginners pursuing a career change). However, a visual inspection of the data and some basic descriptive analysis suggested that age was not a factor that came into play as regards posting behaviour, but age cannot be separated from prior experience and unfortunately there was no reliable measure in the available data set to determine this.

Notably, national culture had a very clear impact on behaviour. Of the 39 students who were in the top quartile for frequency of chat posts, only two were from countries with high individualism scores on the Hofstede indices [Hofstede Insights, 2021]. All the others were from countries with high collectivism scores, such as India, Pakistan, China, Brazil, Mexico, Nigeria and Ukraine.

Comparing the two countries that had the highest proportion of students – Ireland (38% of the class) and India (44% of the class) – the difference in posting behaviour was quite remarkable. The Irish students contributed just 10% of all the chat posts, as against the Indian contribution of 62% of the posts. Otherwise put, each Indian student contributed an average of 7.5 chat posts across the semester, compared to an average of just 1.4 posts by the Irish. A possible explanation is that Ireland has a national culture tending towards individualism, whereas India tends towards collectivism (Hofstede individualism indices of 71 and 48 respectively). Another possible explanation is the vivacious and outgoing temperament of most international students from India.

### **Engagement and Overall Performance**

To explore the possibility of an association between the number of chat posts (as a proxy measure for level of engagement) and overall performance score, a Spearman's correlation test was executed. A statistically significant but quite weak positive correlation was found ( $r_s = .236$ ,  $p = .002$ ). Again, looking specifically at Irish versus Indian students, the Indians substantially outperformed the Irish (median overall scores of 82 and 65 respectively, roughly equivalent to GPA 3.6 and GPA 4.0 on the US grade system). An explanation is that the Indian students, in addition to responding to each others questions on the chat forum, also formed study groups to help each other to learn. The Irish students, in contrast, were more much individualist in both their online and offline study behaviour. A caveat here that must be noted is that many of the Indian students already had database development knowledge prior to enrollment on the course so were at an advantage over the Irish students.

Of course, the mere act of posting in the chat does not directly impact the likelihood of achieving a higher score in the course. However, it can contribute, through positive affirmation and repeated interaction, to a stronger sense of connection with one's peers. It can also contribute to enjoyment (as discussed in the next subsection). Both these factors have been shown to impact academic performance [Lee et al., 2019, Lin et al., 2020]. Man [2012] found that there is a self-reinforcing effect between sense of connection and the willingness to post, so enticing lurkers into becoming more active may, indirectly, lead to improvements in their performance.

### **Social Isolation and Online Socialisation**

A survey conducted two weeks into semester revealed that one third of the students still knew nobody else in the class at that point in time. In retrospect, this turned out to be a significant indicator because 63% of that cohort did not actively participate in the online chat at all during the ensuing semester. This may have been because they were introverted by nature or lacking in

confidence, or just uncomfortable in an online environment [Gazit et al., 2018]. More importantly, 75% of the students who were in the “I don’t know any others” category a fortnight into semester ended up with overall performance scores that were below the 50<sup>th</sup> percentile for the whole class.

Interestingly, nearly all of those who knew nobody else were Irish students. This unusual observation that it was mainly indigenous and not international students who were “out in the cold” can partly be explained by the extraordinary circumstances that pertained at the time. As a measure to curb the spread of COVID-19, the Irish government introduced public health guidelines which severely restricted social interaction. This meant that many Irish students either through choice or compulsion became remote learners, distanced from their classmates, whereas many of the international students were based in on-campus residences or other shared accommodation so they got to know each other more easily. Prior research has found that international students also tend to be more active in seeking out new friendships and building social ties [Rienties et al, 2013].

Quite a few of the chat posts were of a sociable nature, not related to the technical course material but rather just regular community-building conversation. It became the norm for students to join the Teams meeting 15 minutes before the scheduled start, during which time (in the absence of the lecturer) they appear to have engaged in friendly good-humoured banter, going by some of the comments in the chat e.g. “*Good morning everyone !!! [big smileys]*”, “*Sing it louder brother!*”, “*Any thoughts on the football game at the weekend?*”, “*No singing today? [smiley]*”, “*this is fun!*”. When class commenced, the subject of the chat posts reverted back to serious course-related questions, but smileys and other emoticons were often used to lighten the mood. These pre-lecture “huddles” were of tremendous importance for student wellbeing during the COVID-19 pandemic, as was also the experience in other universities [Kotera et al., 2020]. Comments gathered via formal and informal feedback processes showed that many students felt quite lonely, isolated and overwhelmed by the situation:

- “*I would strongly suggest that the university should plan things to allow students in small groups to visit the university on a rotation basis so we get to experience socialising too.*” (female international student, based in Ireland)
- “*I feel good about some modules and a bit lost with others, overall just slightly overwhelmed but that is to be expected.*” (female Irish student)
- “*With this format and large class size, it’s easy to feel disconnected and disengaged. Many of us work out of our bedrooms and may not have a lot of space. It can be tempting or likely to even fall asleep during a lecture in that environment, which has already happened to me more than once.*” (female international student, based abroad).
- “*Too much information, I am anxious about the examination. Still lost; but it is a continuous learning process*”. (male international student, based abroad).

Notably, these last two comments were made by students who were very active participants in the online chat, suggesting that their motivation for doing so was partly driven by a sense of isolation or a need for gratification [Gazit et al., 2018].

#### IV. CONCLUSION AND FURTHER WORK

On several occasions throughout its history, the discipline of information systems has reflected on its need to “eat our own dog food” in relation to such issues as knowledge management, computer-supported collaborative work, open innovation and academic standards [Avital et al., 2008, Truex et al., 2011]. To this list we can now add learning analytics. Many of the tools that were hurriedly appropriated for online teaching during the COVID-19 pandemic – such as Microsoft Teams, Zoom, Webex and Discord – do not produce timely, easy-to-use and meaningful analytics reports. The process that was used to analyse the data in this paper, similar to that of others in the past, involved a quite tedious and time-consuming manual procedure. Teams chat data was copied and pasted into a text editor, parsed and cleansed, imported into Microsoft Excel where it was combined with other data sources, and then exported to SPSS for

further analysis. This is not a tenable approach; it works for “in hindsight” research purposes, but not for teaching purposes. Valuable insights are being missed. On the other end, VLE platforms such as Blackboard produce comprehensive reports but offer very limited capabilities to customise the data or merge it with supplementary sources. Sophisticated tools such as Microsoft Power BI, IBM Cognos Analytics and the ‘sna’ package within R provide the capability to do so, but require specialist knowledge beyond the comfort zone of many information systems educators. There is substantial room for improvement in the ways that we, as IS educators, educate our graduates to analyse software requirements for business analytics and also how we, as academic administrators, manage information about our students, programmes and modules.

The findings herein reported are based on a simplistic preliminary analysis of the chat logs. To further the analysis, the next step will be to code the posts into categories (e.g. response to lecturer, response to other student, off-topic social post, etc.) and to explore patterns of interactions between students such as reciprocity and recognition for contribution [Yang et al., 2017]. The theory of strong and weak ties [Sundararajan, 2020] and techniques such as social network analysis and content analysis [Knoke and Yang, 2019, Adanir, 2019, Cela et al., 2015, Rienties and Rivers, 2014] offer potentially interesting ways to explore and interpret this data. Looking at the chat logs in isolation is to take them out of context, so another possible avenue might be to transcribe the recorded lectures and synchronise them with the chat timestamps, something that is made considerably easier by the emergence of tools such as Otter.ai.

As a brief aside, the behaviour of students in the academic year that followed those reported on herein was quite different. Classes returned to face-to-face on-campus mode, but with restrictions on venue capacity and lecture duration because of COVID-19 guidelines. Material was covered much more quickly so there was much less time for in-class discussion. Additionally, students were compelled to wear face masks and maintain distance away from the lecturer, which also dissuaded questions. This meant that students were very passive in class. When a cyberattack in Week 4 took the campus network out of operation for the remainder of the semester, students and lectures returned to their off-campus places of study/work, reverting to Microsoft Teams. However, the chat function remained very passive with nothing like the level of interaction of the previous year. Undoubtedly, this is related to the very different circumstances that pertained between the 2020/21 and 2021/22 academic years. This shall also be the subject of further research.

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