Chapter 21
Improving the Effectiveness of Research Supervision in STEM Education:
Cloud–Based Multimedia Solutions

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ABSTRACT

Higher degree STEM research students working at a distance often report that they feel more isolated than students who have face-to-face contact with their supervisors (Macauley, 2002). Though face-to-face often implies "on campus" contact, face-to-face can now also be via videoconference software and cloud based solutions. It is the purpose of this chapter to provide an auto ethnographic example of some ways to enhance student supervision at a distance using these education technologies. The author has utilised technology to enhance teacher-student interpersonal behaviour (Fisher & Rickards, 1998), social presence (Stacey & Fountain, 2001) and learning outcomes in STEM Education since 1999. Reductions in the time research students take to complete research proposals and a greater sense of personalised supervision have been positive outcomes from using these learning environment enhancements. This chapter presents a journal like case study perspective to show academics and teachers everywhere how utilizing freely available online software might improve the effectiveness of the supervisory experience for all.

INTRODUCTION

The activity reported in this chapter began in 1999 and in the last 12 years since 2003 has evolved and defined a new way of supervising doctoral students for the author. Other studies report similar outcomes (Macauley, 2002) but what is unique here is that students involved in the supervisions described in this chapter are globally distributed.

In 1999 the author began travelling regularly from Australia to the United States and Southeast Asia to supervise doctoral research students face-to-face in local learning environments. This travel for face-to-face supervision of individuals

and small groups of doctoral students began to become costly, ineffective and time-consuming for both the students and the author. Students were typically full time academics wanting to upgrade their qualifications, and so they typically worked full time. Some were school teachers and / or administrators and did not have flexibility in their working day to attend study sessions outside school break times. These constraints began to limit the scheduling options for conducting face-to-face "nodes of study". Another key factor that over time eroded the effectiveness of "Nodes" was larger student groups where local classes were held. This meant long days for supervisors trying to meet with each student to construct research proposals and methodology for a doctoral study. Following supervisor visits, only asynchronous email contact was available to students, and this extended the time taken to complete research proposals where students had questions or wanted expert guidance to complete the proposal.

Another factor that was observed and commented on by students at the time was the inability for students at a distance to gain one on one supervisor support for skill training in areas such as survey design, data collection, and data analysis. The operation of statistical analysis programs such as SPSS and SAS benefit a great deal if there is supervisor input during the early stages of survey design, prior to data collection. Some academics solve this problem by employing "tutors" to carry out data analysis on behalf of students as a research assistant might, but not this supervisor. It is the view of the author that all students should conduct their own data analysis, as a part of the learning process.

As skill training was becoming increasingly difficult to do on the regular supervisory visits due to the time involved, an additional "Research Methods visit" became necessary. This increased the cost and with around 30 hours of travel time in each direction, there was a growing loss of time in the air for the supervisor. A comment from students at the time was that it was always great

to see supervisors and to discuss their studies with other students, but when the supervisor left it was back to "normal" isolated work on individual research. A simple problem or lack of knowledge about a procedure might cripple student progress and enthusiasm for a number of days as the emails went back and forth, in an effort to identify and then solve the issue. A more time, cost and academically effective way to personally supervise and upskill doctoral students had to be found.

The first step was to examine ways in which students might collaborate locally using available technology solutions that were platform independent and accessible to all. This it was hoped would establish a community of practice that encouraged resource sharing and discussion. A Geocities / Yahoo group was established on July 3, 2003 and this was supplemented with direct email sharing. It is interesting to note that though the original Geocities Group is still live, it remained active until 2008. After this time most students in the first cohort either graduated or moved to more widely available social media platforms such as Facebook which launched in February of 2004.

Another major catalyst for a change in the way students were supervised by the author was the introduction of desktop video conferencing software. When combined with email and the Yahoo groups, this presented a triumvirate solution for teacher-student interaction and encouraged a sense of collegiality and social presence. Students were now able to contribute shared online resources and have a discussion board to communicate amongst themselves, and have one-on-one face-to-face contact with their supervisor and their peers.

Despite the early versions of video conferencing (pre-Skype such as iVisit) having very slow frame rates and sometimes being limited to voice only due to bandwidth limitations, the beginnings of a new supervision model had emerged. Social presence and the nature of the teacher-student interactions was now enhanced as participants could see each other, even in different time zones and on opposite sides of the world.

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