Experiences of flipping an online classroom

An appraisal using Community of Inquiry Framework

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Abstract— Technological developments in the recent times have changed the face and attributes of higher education. Online education, with an emphasis on technology augmented learning strategies, exerts unprecedented pressure on educators to adapt these changes. The increasing focus on cost effectiveness in the sector adds to this challenge. Hence, there is demand on educators to devise innovative instructional methods which are flexible, user-friendly, empowering and student-centred. A rational process in response to such demands and challenges would involve collaboration and sharing of learning-teaching practices among educators.

This paper shares and explores the experiences of flipping an online classroom with a large cohort of externally enrolled, Undergraduate Nursing and Midwifery students in a regional Australian university. The design, implementation, and outcome of this active learning strategy are examined using the theoretical framework, Community of Inquiry by Garrison, Anderson, and Archer [1]. The students' readiness engage in the task, in a student-centred pedagogy which reinforced higher order thinking was the key to this successfully flipped task.

Keywords- flipped classroom, Community of Inquiry, online, active learning, student engagement, student centred learning

I. INTRODUCTION

The attributes of higher education have changed with the call for proactive practitioners, varying cohorts of students, economic pressures and the demand for flexible modes of delivery. There is pressure on universities for cost effectiveness, to cater for large class sizes, to reach out to wider and heterogeneous student cohorts and offer courses in both on-campus and external mode. Diverse pedagogical practices are adapted to engage the growing number of adult learners that are seeking flexible learning modes due to work, family and other commitments in life. In this context, the educators may not be fully prepared to face such challenges and are compelled to introduce new pedagogical methods which they are unsure about. Collaboration and sharing learning-teaching practices would be the most sensible response to these demands.

The context of the flipped activity involved a core unit in the Undergraduate Nursing and Midwifery Degrees. The health research and evidence- based practice unit presents unique

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challenges centered on offering quality learning experiences to students who are off campus and enrolled externally. The paper describes the journey undertaken by the teaching team to engage students, elicit student participation in the learning activities and to sustain student motivation throughout the semester. The theoretical framework, Community of Inquiry by Garrison, Anderson, and Archer [1] was used to plan, design, implement and evaluate this online learning experience.

II. BACKGROUND

Over the past couple of decades, there have been rapid advancements in technology which has transformed the pedagogical strategies in higher education. Online education, emphasis on technology dependent learning strategies and increasing stress on cost effectiveness have mounted pressure on educators to develop innovative instructional methods which are flexible, user-friendly, empowering, and studentcentred [2][3]. Student centred learning demands delivery of active learning strategies which encourage higher order thinking and engagement in learning activities [4][5]. Consequently, this creates an impetus for teachers to design creative learning experiences such as blended learning strategies which could be challenging to both students and teachers [6][10].

Blended learning experiences are allied with pedagogical richness, student autonomy, and life-long learning strategies. Blended learning can enhance student experiences to address the needs of diverse cohorts and distinct learning styles [4][11]. However, meticulous planning is needed to design technology-augmented, blended learning sessions especially in heterogeneous groups of students. Blended learning requires creative planning, constant reflection and adaptation of pedagogical strategies to engage the new age learners of the 21st century [10][12]. Flipped classrooms are one of such interactive, blended learning technique designed to engage these learners.

III. THE CONCEPT OF FLIPPED CLASSROOM

Flipped classrooms, being the 'buzz word' around higher education since the early 2000's has continued to achieve momentum over the last five years. The pioneer of the flipped classroom concept was Professor Erik Mazur of Harvard

University, who shared the content of instruction as a pre-class reference material to elicit more interactive learning time with the face-to-face teaching [2]. The concept further evolved with use of technology and video sharing facilities which was successfully used by Khan Academy [2]. The flipped classroom approach was further popularised by Bergmann and Sam [13] who used instructional videos as preparatory lessons before their face-to-face lectures in secondary school classrooms. Since then, the traditional definition of flipped classroom has evolved and undergone more advanced pedagogical experimentations. Bishop and Verleger [14] conceptualised the flipped classroom as an educational technique with two parts: an individual external instructional activity in the pre-class mode followed by an interactive group learning activity in the classroom. In a flipped classroom, the order of the instructional method is inverted to present the static information transmission as a pre-class activity, followed by an active teacher-student interaction to discuss and explore the content, and a post- class activity to assimilate and preserve the learning.

Flipped classroom as a pedagogical strategy has been examined by many scholars to appreciate its theoretical and conceptual soundness in relation to major learning theories [2][5][10][12][17]. Bishop and Verleger's exploration to identify a theoretical framework and explain the studentcentred learning in the flipped classroom reached to the major learning theories of Piaget (1967) and Vygotsky (1978). Moreover, the flipped tasks were explained as student centred learning activities in the light of other significant theories and models such as Kolb's experiential learning (YR), Jung's psychological types (YR), collaborative learning, active learning, and constructivism [14]. In another significant observation, Waldrop et al., [18] explained flipped classrooms using Kolb's (YR) experiential learning theory outlining that; the most valid learning experience is learning by doing (Kolb) and in the flipped methodology, students are encouraged to be in charge of their learning by actively engaging in learning activities. The importance of student centred learning theories in flipped classroom method and the conceptualisation and clarity of the pedagogical theory that shapes the classroom activity are the deciding factors of the success of flipped classroom [14].

The student-centred learning and autonomy of the students in the learning process increase the desirability of a flipped classroom approach in the current higher education schema. The Taxonomy of Learning Activities Model by Roberts, Strippling, and Estepp as cited in Connor et al. [15] proposes the autonomy of the learners by moving in the continuum from a teacher centred learning to more social interaction and to a student centred learning activity. In this model, the first segment for the teacher-centred activities involves more lectures and instructions. The second segment of social activities concentrates on questioning, discussion, and cooperative learning. The final segment, student centred learning caters for synthesis and application of knowledge by students. Furthermore, this continuum can be linked to the theoretical framework of Bloom's (YR) Taxonomy of Educational Objectives [15]. With this theory, the lower cognitive level activities involving knowledge and comprehension can be flipped as a pre-class activity and the higher-level objectives such as application, analysis, and synthesis can be achieved as in class activities with the support of the teacher. The flipped classroom model puts the responsibility on students to be accountable for their learning with the "active learning" concept emphasised in every flipped activity and thus equipping them to be independent lifelong learners.

Flipped classroom models lead to active classrooms with the use of advanced technology to support learner-centred pedagogy [2][6][10][12][14][19][22]. Students are encouraged to take charge of their learning by becoming actively involved in learning activities and learn more static contents by themselves [18]. Recent research evidence demonstrates that the flipped classroom increases student motivation and results with improved student outcomes when compared to that of traditional didactic classes [6][17][21][26]. However, further research is needed to identify what aspects of the flipped classroom actually encourages student learning [16]. There are cautionary voices about the research evidence of flipped classrooms, as this pedagogical strategy is "under-evaluated, under-theorized and under-researched" [16][27]. Exploration and review of some flip experiences showed no significant improvement in academic performance besides visible distress among students to become familiar with the new pedagogical strategy and increased time commitments to pre-and post-class activities [7][9]. Therefore, it is vital for educators to comprehend the practical implications of this pedagogical strategy before incorporating this into the curriculum.

IV. FLIPPED CLASSROOM DESIGN

The students involved in this flipped classroom consisted of a third-year undergraduate nursing and midwifery cohort, enrolled in one of the core units for their degree. This unit introduces health research and evidence based practice. Research and evidence-based practice has proven to be a challenging subject for undergraduate nursing and midwifery students [4][5][17] and often students find it difficult to understand the practical application to their professional life [9][11][17][21][28]. The flipped activity and the innovative mode of delivery was an effort to elicit engagement and ownership of learning for the students.

The unit attracts 600 students per year with higher enrolments in the first semester. This flipped activity was trialed in the second semester of the academic year with comparatively smaller student enrolments. The unit was offered as an online reliant unit with 202 students enrolled externally (off-campus). There was a need to create communication strategies both synchronous and asynchronous to offer a flexible learning mode to this external cohort and initiate higher order thinking such as analysis, synthesis and critical introspection. The content and activities in the unit were carefully planned to prompt active learning and to avoid one-way delivery of information.

A major assessment activity of the unit, and the preparatory online workshop for this assessment activity was flipped to elicit active participation and ownership of learning. This assessment carried 60% weighting toward the final grade and the learning activity covered three of the six unit learning outcomes. The assessment task was to critically analyse an original research article using the critique guideline detailed in the prescribed research text. In the previous semesters, the preparatory workshop attracted only 10% of students via an online platform. This resulted in underperformance in the summative assessments and significant distress and anxiety among students during the assessment submission time. This assessment activity required students to critically analyse and comment on the research components of a chosen original research article. Therefore, it required students to apply higher order thinking such as analysis, synthesis, application, and evaluation.

A. Justification to flip

- Evidence-based practice and critical analysis of research are mandatory competencies to become a Registered Nurse/Midwife in Australia
- The assessment was identified by students as challenging and they requested additional support
- Prior evidence of reduced engagement in the assessment activity despite the large weight of the mark towards the final grade.
- The university's strategic plan and the Australian Council of Deans of Science encourage flipped classroom model [29] as a pedagogical strategy.

V. FOUR COMPONENTS OF FLIPPING IN THIS CASE

This flipping activity had four components: a reading task, reacting to the reading task on the discussion board, discussing the critical analysis process in the online classroom and reflecting about the process on the discussion board.

First, in the '*Reading*' section, students were directed to read an original research article with critical introspection, using the critical review guideline from their prescribed research text. The article was shared in the online Learning Management System (LMS) and the web link was emailed to students a week before the online workshop to remind them.

Second, for the '*Reacting*' section, students were directed to post their thoughts about any one research element of the article on the discussion board before the online workshop.

Third, the '*Discussing*' occurred in the online classroom. The lecturer collated the thoughts of students from the 'reacting' segment and discussed the points in the workshop guiding them through the critical analysis of the article.

In the final component, 'Reflecting', the students were encouraged to post their evaluation about the experience of critical analysis on the discussion board. The lengths of the discussion board posts were allocated a minimum of 50 words. Students were offered the incentive of a total of 3% marks towards the final grade for being engaged in the discussion board activities.

VI. RESULTS/FINDINGS

Students' perceptions towards the flipped classroom were collected through the reflective discussion posts and an end of semester student evaluation survey. The quantitative data were collected using the unit analytics tool from the LMS and the summative assessment results. Ethical approval was sought from the Chair of the Faculty Learning and Teaching Committee to analyse these scholarly experiences of flipping the classroom and be published. Students were asked to opt out from this activity if they did not want their qualitative responses to be used in the research. However, the majority of students welcomed sharing the experience with the wider higher education community.

The majority of the qualitative responses clearly showed the success of the flipped classroom strategy. The following responses from the reflective discussion board confirm and demonstrate that the students approached the task skeptically. They expected the assessment activity to be challenging and were not quite sure about how they were going to benefit from the flipped task. However, towards the end of the process, most of their perceptions changed positively.

"As I was reading the assignment information, I was expecting to have trouble with and really dislike writing this assignment but to my surprise I actually enjoyed it! Yes, it was difficult as it was my first time ever doing something like this workshop, but it was worth it. I know the importance of critiquing articles and not taking everything, you read as the right thing so it was good to put everything I have learnt into practice".

Some of the responses shared their concerns towards the topic; however, they were convinced by the end of the process about a deeper understanding of the critical analysis process and developed the confidence to use the skill in their professional practice.

"I found the critical analysis to be challenging. However, I understand that it is important to evaluate the overall quality of reports, especially the key elements.

"In this way, I can become more discerning in the research I read, using this evidence to improve my practice."





Interactions Average vs School Average



Figure 1. Student engagement accessed from unit analytics

The majority of the participants expressed that the flipped activity and the continued engagement improved their confidence to face the final assessment task.

"The workshop presented inspired me to go that little bit deeper into the research studies. Stepping past the aim and objective and exploring aspects of sample size and data analysis has opened me up to a new world of research. This unit and indeed the online workshops have instilled confidence in being able to be the journey of a critical review of journal articles".

The academic results are summarised in the following table for the previous and the current semester.

TABLE 1. C	COMPARISON O	F STATISTICAL	SUMMARY (OF GRADES
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Grade	Without flip		With flip	
	Students (numerical)	Students (percentage)	Students (numerical)	Students (percentage)
HD	12	7%	25	10%
D	29	16%	81	33%
С	33	19%	54	22%
Р	45	25%	28	12%
F	17	9%	14	6%
W	41	24%	43	17%
Total	177	100%	245	100%

Summary of student performance data showed significant improvement in student performance in terms of high academic achievement and reduced withdrawal rate in the semester. This improved academic performance can be attributed to the flipped task in terms of enhanced ability to complete the assessment and to achieve learning outcomes of the unit. However, to assess the long-term progress in higher order thinking and the ability to practice evidence-based in their professional life is difficult to measure due to the abstract nature of the critical thinking skill.

VII. DISCUSSION

This section will explore this flipped activity and the pedagogical experiment using the Community of Inquiry framework (YR) by Garrison, Anderson, and Archer [1]. The Community of Inquiry as a theoretical framework originated from the fundamental thought of 'community' and 'inquiry' of John Dewey, which later influenced Lipmann (1991) to apply as a "Community of Inquiry' to the educational setting [2]. Garry Anderson, Terry Anderson and Walter Archer from the University of Alberta further conceptualised the framework in the context of online education in early 2000. The Community of Inquiry model is a constructivist theoretical framework exploring the online teaching-learning with three core aspects: social presence, cognitive presence, and teaching presence [1][30].

Community of Inquiry



Figure 2. Elements of Educational experience by Garrison, Anderson and Archer [1] reproduced with permission

The model provides a unique platform to examine current online blended learning activities and presents as one of the most widely referenced theoretical models used to examine teaching and learning practices in an online environment.

A. The cognitive presence

The cognitive presence is defined as 'the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a community of inquiry' [31]. The concept is based on the Practical Inquiry, a model of critical thinking, which is eventually higher order thinking both as a process and product [1][30][31]. In relation to the model of critical thinking, a learning experience should take the learner through four segments: action, perception, deliberation, and conception to achieve the learning objectives. In this flipped classroom, critical thinking as a process was enhanced through the four steps of the flipped task and critical thinking as a product was assessed at the end of the semester in summative assessment. This experience prepared students to construct the meaning of their learning experience through sustained communication among a community of learners which equipped them to be critical thinkers.



Figure 3. Critical thinking in cognitive presence by Garrison, Anderson and Archer [1] reproduced with permission

Critical thinking in cognitive presence consists of four components to design a pedagogical strategy: triggering event, exploration, integration, and resolution [1][30][31].

In the first phase of the triggering event, an issue, dilemma, or problem that emerges from experience is identified or recognised. In an educational context, the teacher often explicitly communicates learning challenges or tasks that become '*Triggering Events*' [1][10][30][31]. Here the content of critical introspection was delivered to students as a pre-class activity. The article to be critically analysed was shared with students a week before allowing time to read and explore with the help of a critical analysis guideline.

The second phase of the process is '*Exploration*'. In this phase, participants shift between the private, reflective world of the individual and the social exploration of ideas [1][30][31]. In this flipped activity, students reacted to the triggering event by reading and exploring the article and offering their ideas and

queries to be shared in the learning community by posting them on the discussion board.

The third phase 'Integration' is important to construct the meaning from the exploratory stage. The learner is encouraged to use higher order thinking to construct the meaning out of the learning experience [1] [30] [31]. The constructivist theory and Bloom's (YR) Taxonomy of intense intellectual activity can explain and represent this pedagogical approach [1] [30] [31]. In this flipped activity students engaged in an online discussion moderated by the lecturer and the discourse was invigorated using probing questions, comments, and information collected from the discussion board posts of the explorative stage. The integration of the critical analysis was further emphasised by another community learning activity, a reflective task. Students were encouraged to reflect on the critical analysis experience and share this on the discussion board.

The fourth phase - '*Resolution'* - is the implementing phase of the learned skill [1][30][31]. In this context, the first phase of the resolution was the summative assessment connected to this activity. In this summative assessment, students selected an original research article of their interest and critically analysed the research elements using the given critical analysis guideline. The student performance in the summative assessment showed significant improvement from the previous semester. However, the ultimate success of the flipped activity relies on the students' ability to apply the critical analytical skills in their professional practice and their ability to evaluate research evidence for its trustworthiness, validity, and reliability.

B. Social presence

Creating a safe, open, non-threatening environment is the primary responsibility of the teacher [1][30][31]. Open communications with reciprocal, respectful discourses are of prime importance in creating a social presence and this is the responsibility of both the teacher and the learner [1][30][31]. The learning experiences of this unit were consciously and carefully planned to embrace every opportunity of communication with the students. The expectations and the possible enhancement of learning related to the flip activity were clearly explained to the students to elicit engagement. Moreover, the student interactions on the initial pre-class activity (discussion posts) were collated and discussed in the third phase of the flip which creates a sense of belonging and ownership of the whole process. Sharing and explicitly expressing the value of student interaction positively denotes the importance and significance of a trusting and facilitating environment.

One of the major challenges to the social presence in this flipped task was the external students who wish to study at their own pace. This group missed the real-time engagement with fellow students in the online discussion session. However, the strategy to create a maximum social presence and elicit engagement was to reward the participation in the task. Students engaged in this teaching activity were rewarded by adding marks towards the final grade of their critical analysis essay.

C. Teacher presence

Teacher presence in the traditional classroom is defined by the physical presence of the teacher, however, the online or distance education pathways challenge that concept. Teacher presence can be defined as the design, facilitation, and direction of cognitive and social processes for the purpose of realising personally meaningful and educationally worthwhile learning outcomes [30]. In the Community of Inquiry framework (2010), the concept of teacher presence is constructively aligned to three categories: design and organisation, facilitating discourse, and direct instruction [1, 30]. In this flipped activity, instituting the teacher presence demanded far-sightedness and thoughtful planning and implementation of the task with discretion.

1) Design and Organisation

Use of technology and multifaceted pedagogical preparation present challenges for academics involved in the design and organisation of blended teaching activities [1][3][5][10][20][30][32]. In this flipped task, the components of designing and planning the learning experience started well before the teaching period and thoughtful measures were taken to decide the pedagogical strategies used in this module. The type of instructional method, its appropriateness to the content and context of the module was made explicit to the learners. Deciding what to flip and how to flip was a strategic decision by the teaching team. In this task, the whole unit was not flipped, and this was a deliberate decision taken at the planning stage of instruction. Planning and designing of the four components of the flip task aimed to engage students who were accessing the LMS synchronously or asynchronously. The reinforcement for participation by using reward points in the activity was designed to enhance student engagement.

2) Facilitating Discourse

Facilitating and sustaining student interest during the task is vital for active learning and student engagement [1][3][10][20][30][31]. The context and the purpose of the flip activity must be evident to students to elicit motivation and sustained engagement with the activity [2][6][10][14][15]. The following strategies were used to facilitate the learning in this flipped classroom: clearly outlining the expected engagement from the students, reinforcing the importance of the activity in achieving learning outcomes, regular email reminders about the task and feedback on engagement.

3) Direct Instruction

The final component of the teacher presence is the direct instructional activity or the process of instruction [30]. Teacher presence in instruction must meet the intellectual and scholarly expectations of the student cohort to keep them engaged and motivated [1][30]. The role of the teacher in any context involves direct instruction that makes use of the pedagogical expertise of the teacher in delivering the subject matter. In this context, the instruction method and the content were sharpened and designed to meet the expectations of the students and 'tales from the field' which involved the teachers' own experience with research were shared to stress the relevance of the context.

VIII. RECOMMENDATIONS TO PRACTICE

One of the major challenges posed by the flipped classroom model is the student's lack of engagement with the pre-class activity which then affects the preparedness of students for further analysis and synthesis of the in-class information. Students could be reluctant to accept the additional time and commitment needed for new pedagogical approaches. Reinforcement about the task and being more explicit about what is expected out of the task could improve student engagement with this learning activity. Rewarding students for active participation is one of the successful strategies to improve engagement. Both teaching team and students need to be fully engaged for the success of the flipped classroom .To achieve student engagement, the type of instructional method, its appropriateness to the content and context of learning must be distinctly visible to the learners.

There is now pressure on academics to adapt flipped classroom approaches as part of cost-effectiveness and the online shift of university education; however, additional time and technical support are needed to fulfill this demand. The higher education providers must be aware of this prerequisite and universities should provide support staff and technology to encourage and assist these innovative educators.

Another substantial aspect in the flipped classroom model is the choice of content and context of flip. Academics should be free to decide 'what to flip, when to flip and how to flip'. Thoughtful planning is needed to prepare the flipped classroom activities and the planning needs to be commenced well ahead of the beginning of the semester. The teacher needs to be comfortable with the task and technology to create scholarly interactions and trusting associations with the learner.

IX. CONCLUSIONS

Active learning strategies and different pedagogical approaches such as blended learning and flipped classroom models are needed to prepare new age learners. The educators will need passion, vision, and resilience to try and experiment with new pedagogical strategies and to forge new paths in terms of instructional design. Although the flipped classroom method is widely used, there has been limited research evidence on the attainment of learning outcomes by the students. Most of the research literature did not reflect a robust method to evaluate higher order thinking, critical or creative thinking and problem-solving abilities gained through flipped classroom models. The student's accountability to engage in the task, in a student-centred model of pedagogical strategy which reinforced higher order thinking was the key to this successfully flipped task.

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