Social Media for Learning and Teaching Undergraduate Sciences: Good Practice Guidelines from Intervention

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Abstract: In 2013, Facebook was used in learning and teaching clinical problem solving in a Pathology and a Clinical Sciences course delivered at a South Australian university. It involved first- and second-year Medical Radiation students and second-year Nursing students, Of the 152 students enrolled in the Pathology course, there were 148 students who participated in the Facebook group. Of the 148 students, 61 (41%) completed the invited post-intervention questionnaire. At the same time, all 17 nursing students enrolled in a science course at the regional campus of the same university participated in the Facebook initiative, however, only 10 (59%) completed the post-intervention questionnaire. A good practice and checklist were developed from the post-intervention evaluations, which consisted of 25 Likert- and open-type questions. Both student cohorts found the use of Facebook beneficial for them in terms of providing an innovative way of learning; fostering greater interaction amongst co-students and staff; and effectively engaging them with the content of courses. The importance of clear communication of goals and objectives to students was identified from student comments. Six good practice principles were identified relating to: goals and objectives, expectations, communication, engagement with the course content, active participation, and learning environment.

Keywords: Facebook, social media, medical radiation, nursing, guidelines for good practice, engagement

1   Introduction

In the age of internet, social interaction and engagement has evolved. Social media has become an integral avenue of social interaction. Given that engagement with peers is an important component to student success in higher education (Thalluri, O'Flaherty, & Shepherd, 2014), Contemporary teaching methods have been adapted to include social media, specifically the Facebook, a very popular networking website amongst all age groups. In order to maximise the potential of Facebook for collaboration and interactivity, various universities have attempted to incorporate it in their learning and teaching approaches. Medicine, pharmacy, medical radiation, veterinary students and library users have reported using Facebook (Thalluri & Penman 2014; Black et al. 2010; Hendrix et al. 2009; Cain 2008; Thompson et al. 2008). Undergraduate students are deeply immersed in this social network; for example, in the United States, over 90% of undergraduate students participate in Facebook (Ellison et al. 2007; Stutzman 2006).

The real and potential benefits of Facebook are documented. It presents a relaxed, accessible, friendly and comfortable environment that promotes promotes collaboration, social exchange of knowledge/ideas, and student engagement in learning outside the classroom. Whittaker, Howarth and Lymn (2013) posit that technologies used in learning promote a social constructivist educational approach which is student focused, highlighting open dialogue and collaborative construction of knowledge. There is also collegial support and enhanced networking opportunities (Wodzichi, Schwammlein & Moskaliuk 2012; Bosch 2009).). Together this represents many of the skills and supports that are necessary for positive engagement and continued learning beyond the university degree into the professional career. In this way, social media may be key to modern professional engagement and continued learning.

On the other hand, the educational value of Facebook may be questioned. For instance, Hew (2011) in reviewing current published research studies on the use of Facebook by students and teachers concluded that there is very little educational value and that its application is limited to staying connected with others. Wise, Skues and Williams (2011) corroborate this view, stating that Facebook promotes social but not academic engagement. Further, this new digital paradigm is changing how we relate to society (Madden 2013). In the midst of proliferating social connected devices and websites, there are feelings of isolation and loneliness. It

looks like an "illusion of companionship without the demands of relationship" (Madden 2013, p. 13). This concern has merit, but may be mitigated by attention to maintaining Facebook and other social media as an adjunct to more meaningful social/academic interactions such as meeting in person for lectures, tutorials, practicals, and group study sessions. To this end, several authors have already argued.

The need to provide guidelines for its use (Ponce et al. 2013; Black et al. 2010; Gray, Annabell, & Kennedy 2010; Cain 2008; Thompson et al. 2008). University students are already using the platform as it is accessible, quick and convenient, and there is a real potential for its application on learning and teaching provided that it is carefully and appropriately structured.

This paper reports on an investigation into the success of Facebook as an educational tool for a Pathology course for Medical Radiation students and a Clinical Sciences course for Nursing students. The focus is on the development of good practice principles relating to learning and teaching utilising Facebook groups. This is important because learning and teaching in Facebook is not the same as classroom teaching; all the forces at work are different. In this intervention Facebook was used as a means of studying particular topics, contructing knowledge, signposting relevant resources, solving problems and/orreflecting on understanding and practice. The rationale behind the development of these post-intervention evaluations include: to inform and guide academics how to effectively use social media to enhance the learning and teaching of science concepts to undergraduate students, to provide them with key principles specifically related to Facebook learning and teaching, to assist in developing effective Facebook learning and teaching resources, and to ensure high quality learning and teaching of sciences using social media and high quality and satisfying academic experience for students.

2   Methodology

The service offered by Facebook Inc. was used as a platform for a Pathology class (identified as a common-interest user group), divided into groups in order to decipher case scenarios (Penman & Thalluri 2013; Thalluri & Penman 2013). Six pre-determined real-life case scenarios with problems and corollary questions were distributed to students who grouped themselves and divided the work to address the requirements of the scenarios. A case typically reported on a client presenting to the hospital with various medical complaints. The present illness, past medical history, family history, investigations, and treatments completed the case. Students used the approach to solve the general problems of: explaining disease processes of medical conditions, conducting and interpreting diagnostic procedures and rationalising the medical interventions undertaken. The lecturer/s posted the real-life case scenarios on Facebook for groups to access and discuss online. The culmination of the group process was a student-created product in the form of PowerPoint presentations and short videos clips which were to be presented to the lecturers, tutors and entire class, and made available on Facebook. The same procedure was undertaken for the Clinical Sciences course for nursing students, using case scenarios with similar content; the difference was emphasis on nursing interventions rather than clinical investigations and radiological medical interventions.

Prior to the Facebook activity, approval for the initiative was obtained from the university's ethics committee. Information letters were sent informing students about the initiative and inviting them to participate in the study being undertaken, the aims of which were to understand the impact of the use of Facebook on the learning and teaching of science concepts in the undergraduate Medical Radiation and Nursing programs and to determine the perceptions about the use of this medium. Assurances of confidentiality of information and the voluntary nature of involvement were given. The lecturers/administrators organised the groups to enhance interaction and facilitate support for students, allowing for both synchronous and asynchronous electronic communications.

Evaluation of the learning that transpired using Facebook was conducted at the conclusion of the course using a post-intervention questionnaire administered via web-based TellUs2. A Likert- and open type questionnaire was used to cover various aspects such as: 1) the flexibility of Facebook; 2) opportunities to learn with peers; 3) opportunity to work with others; 4) opportunity to direct own learning of topics; 5) development of learn life-long learning skills; 6) engagement with content of the course; 7) learning opportunities; 8) increase interest on subject matter; 9) ability to synthesise past and present knowledge; 10) honing of research skills; 11) adequate introduction; 12) acceptable duration; 13) assisted in learning of the topic; 14) provided opportunities to interact with the lecturer; 15) opportunities to collaborate with peers; 16) pleasant learning

experience; 17) substitute for classroom; 18) effective way to learn; 19) innovative; 20) understanding of disease processes; 21) recommend to other students; 22) best things in the use of Facebook; 23) areas for improvement; 24) most important outcome; and 25) additional comments.

3 Results

Of the 152 students enrolled in the Pathology course in 2013, there were 148 students who participated in the Facebook activity. Of the 148 students, 62 opened the survey but only 61 completed the post-intervention questionnaire, representing a 41% response rate. The majority of the students rated the use of Facebook positively in the pre-defined categories. Of the 17 nursing students enrolled in the science course at the university's regional campus, all participated in the Facebook group. Of those, 10 completed the post-intervention questionnaire representing 59% response rate. (Note that regional campus enrolments are smaller by comparison to the university's main campus enrolments, explaining the significant difference in sample sizes.)

Post-intervention results reveal positive perceptions about the application of Facebook in the Pathology course. Students reported that Facebook gave them flexibility in their learning (they recommend this initiative to other students (92% and 100% of Medical Radiation and Nursing students respectively responded that they strongly agree or agree). Most agreed that Facebook provided them with opportunities to learn with peers (92%; 100%) and work with others (87%; 100%), as well as the opportunity to direct their own learning (81%; 80%). Many considered the Facebook initiative to facilitate the development of lifelong learning skills (58%; 80%). They engaged well with the course content (68%; 80%). Many attested that there were many opportunities in learning this medium of learning and teaching (66%; 100%). The initiative increased students' interest in the subject (66%; 100%). Students had mixed opinions on whether the initiative allowed them to synthesise past and present knowledge (76%; 30%), or honed their research skills (48%; 60%). They did feel the initiative was adequately introduced (95%; 80%) and that the duration of attention required was acceptable (92%; 100%). Most asserted that the initiative their learning about the topics (87%; 90%). Students agreed that they were provided with opportunities to interact with the lecturer (97%; 100%) and learn from peers (95%; 90%). They considered it a pleasant learning experience (90%; 80%) but were of mixed opinions on whether it made a good substitute for classroom learning (53%; 40%). Regardless they found it an effective (79%; 80%) and innovative (87%; 80%) way to learn. Most found that the initiative enhanced their understanding of disease processes (73%; 80%), and would recommend it to other students (89%; 100%). See Figures 1 and 2summarising the perceptions of students about the Facebook activity.
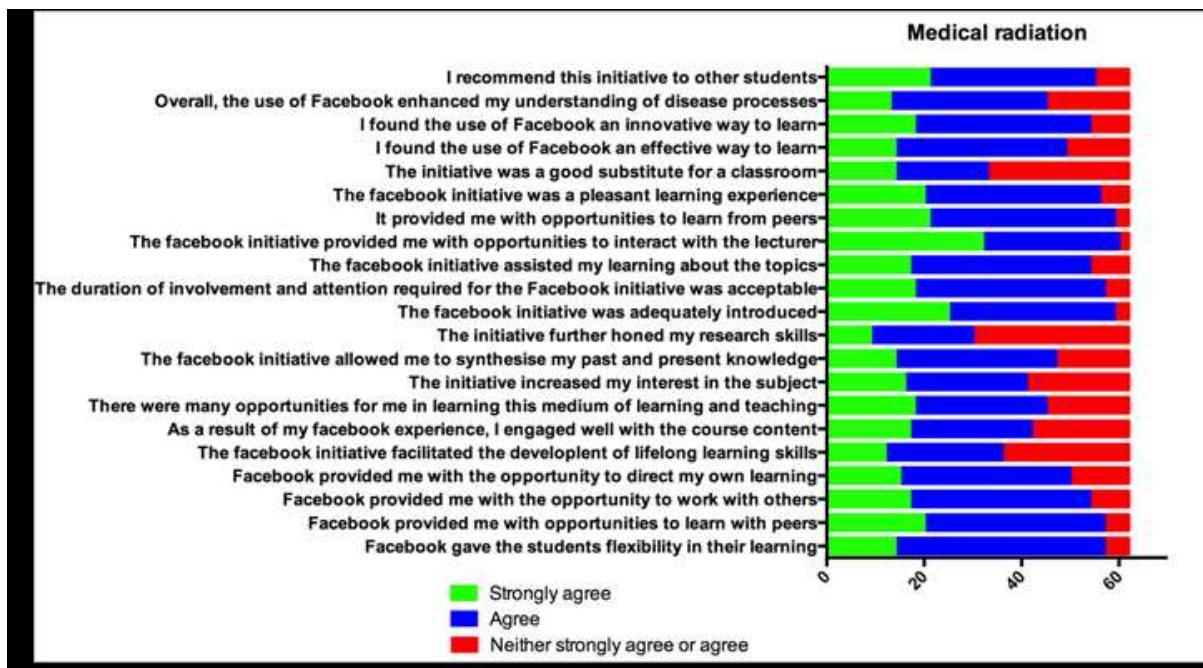

Figure 1: Likert survey of medical radiation students' perceptions about Facebook after completing the course. n = 62.

The following tables, Table 1 and 2, summarise the responses to the open questions. Students' diverse responses were grouped into categories, counted and tabulated.
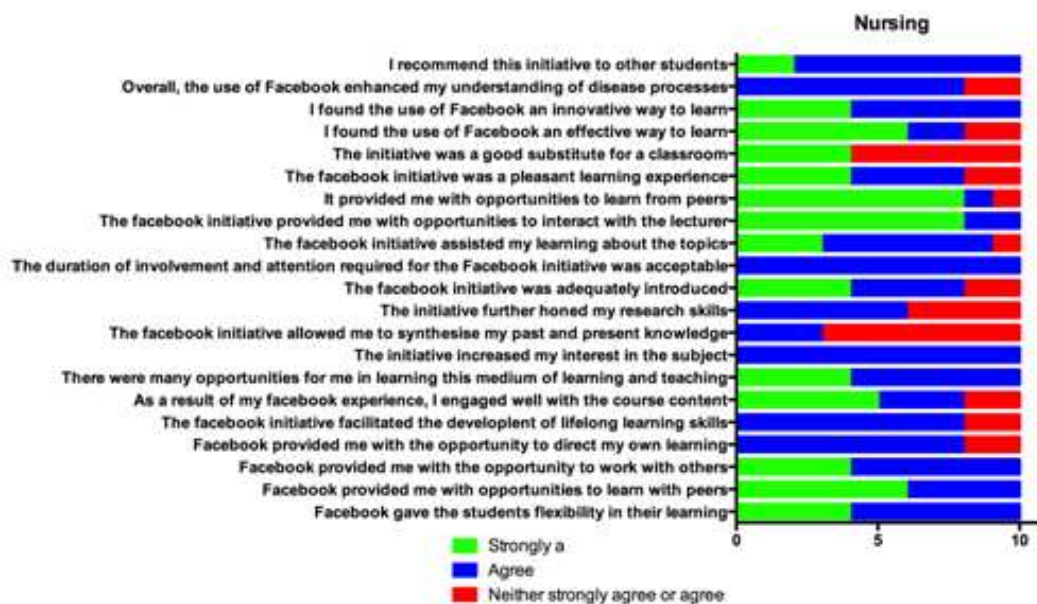

Figure 2: Likert survey of nursing students' percaptions about Facebook after completing the course. n = 10.

Table 1: Post-intervention responses for open questions (Perceptions about Facebook after Pathology course) n=62

Open questions	Response	N*
The best things about the use of Facebook are:	Ease of access, quick and easy to use, convenient	24
	Extra resources	20
	Interaction with lecturers and students	15
	Familiarity	10
	Response to questions	8
	No anwer	18
Some things that I think would improve future offerings are:	Post more questions	11
	Provide explanation to answers	4
	Posting more additional readings and resources	3
	No answer	42
What was the most important outcome gained from this initiative?	Knowledge and understanding	11
	Friendly learning environment	9
	Collaborative learning with peers	7
	Engagement	7
	Easy access	7
	Interaction/communication to lecturers and peers	2
	No answer	30
Additional comments	Positive comments	7
	Negative comments	4
	No answer	50

*Number of times the item was identified

Table 2: Post-intervention responses for open questions (Perceptions about Facebook after Clinical Science course) n=10

Open questions	Response	N*
The best things about the use of Facebook are:	Interaction/quick replies with peers and lecturer	4
	Gives students the opportunity to learn from each other and discuss uni related issues	3
	Instant feedback	2
	Continuation of learning outside of class room time	1
	Easily accessible	1
	Able to share and access information freely	1
	It gives a glimpse of how and what other peers are thinking.	1
	Group study could be achieved	1
.Some things that I think would improve future offerings are:	Having a Facebook learning page for each course	1
	Clarify more fully the use of this program	1
	No answer	8
What was the most important outcome gained from this initiative?	Closer relationship with lecturer	3
	Communication with classmates	2
	Instant feedback on all questions about the course or other subjects from the lecturer and peers	1
	Extra information from lecturer	1
Additional comments	Positive comments	3
	Negative comment	1
	No answer	6

*Number of times the item was identified

4   Discussion

The   use of Facebook as a platform for a group learning activity for the majority of students in this initiative. Facebook assisted students' learning about the topics (87%; 90%), helped them direct their own learning (81%; 80%), and enhanced their understanding of disease processes (73%; 80%). Most students maintained that Facebook was an innovative (87%; 80%) and effective way to learn (79%; 80%). The Facebook activity provided students with a pleasant learning experience (90%; 80%) and flexibility in their learning (92%; 100%). In this way, Facebook appears to be an education tool that is well suited to the modern students' dynamic learning style(s).

Student engagement is a strong contributor to student success in higher education but is difficult to facilitate and promote. Student engagement includes that with course content, with lecturer(s), and with peers. The current trend for mass higher education has resulted in very large cohort sizes and the opportunity to interact directly with lecturers has become minimal despite open door policies. Also, large groups are correlated with a decrease in interpersonal interaction, such that forming a group of peers for friendship and learning becomes more difficult. More direct opportunities for interaction with peers would be beneficial. In this study, students reported that Facebook facilitated their engagement with the course content (68% and 80% for the Medical Radiation and Nursing students, respectively).

Moreover, it increased students' interest in the subject (66%; 100%), provided opportunities for greater interaction with the lecturer (97%; 100%), facilitated learning with peers (92%; 100%), learning from peers (95%; 90%), and working with others (87%; 100%). Furthermore, while the graded group activity was concluded the Facebook group and Facebook 'friends' remained. These peers had the opportunity to further their friendships and professional learning collaborations in the future. From this it appears that Facebook could become an integral part of a rounded, engaging, and lasting experience in higher education.

Approximately half of the Medical Radiation students and a minority of the Nursing students were of the opinion that Facebook could be a good substitute for classroom learning (53%; 40%). In actuality, Facebook cannot substitute for face-to-face learning and teaching; it was applied here as an additional tool to enhance the core modes learning and teaching that are lectures, tutorials and practicals.

Nursing students expressed a poor positive response (30%) for the statement querying the effect of Facebook on synthesising past and present knowledge, while the Medical Radiation students' response qas positive. . The Nursing students did not do research or synthesise past and present knowledge while on Facebook in real time, but if they engaged actively in the initiative in the way it was designed, they would have undertaken research and connected with their past and present knowledge. It is interesting to note that while the majority of students reported increased engagement (68% and 80%) and interest (66% and 100%) in the subject, this did not necessarily translate to increased initiative for research and learning. A possible explanation can be discerned from the Medical Radiation students' report that the initiative did not contribute considerably to honing their research skills (48%). When combined with the finding that students were appreciative of an adequate introduction to how Facebook would be used (95%; 80%), it appears that attention should be given to introducing tools and methods for research and learning that students can use both independently and as a part of group learning in their own time away from classes. Again, the trend for mass education has brought an increasingly diverse cohort to higher education, so such skills should no longer be assumed. Proficiency in research and learning skills would increase the likelihood of effective and active engagement in Facebook activities and many other areas of higher education.

This study indicated overwhelmingly that using Facebook offered many benefits and advantages for students. In providing an interesting, interactive, gratifying and productive way of learning and teaching via Facebook, students could be assisted to be successful learners (Irwin et al. 2012; Ferdig 2007). Good practice guidelines may be drawn from this study when one considers the features of the Facebook initiative that appealed and worked well for both cohorts of students. Six good practice principles for academics, namely 1) defines goals and objectives, 2) clarifies expectations, 3) facilitates communication with co-learners and staff, 4) engages students with the course content, 5) encourages active participation, and 6) provides a conducive and safe learning environment. Earlier pieces of work by Chickering and Ehrmann (1996) and Chickering and Gamson (1987) on good practices on teaching utilising technological advances have relevance on this Facebook good practice guidelines.

4.1   Good practice defines goals and objectives

Objectives to be achieved in utilising Facebookinclude: to enhance learning and teaching experience of students, increase communication and interaction, promote student-student/student-teacher engagement, get to know other students and the lecturer on a more personal level, stay connected, reduce student disengagement, guide students and new staff, and ensure quality delivery of course. These goals were evident to the administrators of the initiative and the survey assessment, but appeared unclear to participating students, as seen by a nursing student's suggestion to:

> *Clarify more fully the use of this program* [Facebook] *to enhance the communications between students to ensure their understanding and progress.*

The students' statements emphasise the need to communicate the goals and objectives at the very outset for optimal use of Facebook in higher education.

4.2   Good practice clarifies expectations

The majority of students were appreciative of the meticulous organisation of the Facebook activities which they considered to include adequate introduction (95%; 80%). The extent and duration of involvement as well as the expectations from each student participant were made clear. Students needed to know exactly what is their involvement, what is expected of them, what is required in terms of time and participation, and the knowledge and skills to be gained and used to optimise the use of Facebook as a learning and teaching tool. The lecturer/s expectations and what might be expected of them are important as well as these would indicate to students how they might succeed in this aspect of the course. It was important also to recognise that students may be unfamiliar in the use of Facebook as a learning and teaching environment. Some students may struggle with inadequate hardware/software, slow internet connections, and/or lack the technology know-how (Keengwe & Kidd 2010). This was not a major concern since the majority of students were internal so wireless internet, computers and a data allowance were readily available to them on campus. Care was taken to introduce the procedural aspects so students felt comfortable with the new learning format.

The need to elucidate the expectations is illustrated in this sentiment from a student:

Facebook is distracting. … I don't like Facebook as a medium for learning." (This student explained how it led to visiting her Facebook account and being distracted from the task at hand.)

On the hand, a Nursing student remarked:

I am not an avid user of Facebook. However, this experience has been a positive experience and has encouraged me to use Facebook as a learning tool, and a tool to further my involvement with groups associated with nursing.

Possible distraction is a valid concern for some participants and cannot be separated from using Facebook as a learning platform. However, the efficacy of Facebook learning in facilitating student engagement is an important outcome that is increasingly difficult to promote elsewhere (tutorials etcetera), and as such the benefits of Facebook as a learning platform outweigh any potential diversion.

4.3 Good practice facilitates communication with co-learners and staff

Greater communication with peers and staff was one of the desirable outcomes students reported in participating in the Facebook initiative. The activity facilitated this communication by allowing students to work and collaborate, contribute to the discussion, and affirm or challenge each other's understanding. The "presence" of the staff member/s was equally important (Penman & Ellis 2012). The best online academics are those who are actively present at the course site multiple times a week or even daily (Boettcher 2012). Interactions with students and staff do not happen only in the university but extend beyond the university.

The Medical Radiation and Nursing students attested:

It really allowed students to engage with each other in a friendly online environment and the immediate response from the lecturers was good.

Collaborative learning with peers, sharing information between teaching staff and students are important outcomes.

There was better and faster interaction between the students and the lecturers. There was open communication and connection too.

Using Facebook for me was excellent as I live away and travel to campus, so this was a quicker way to keep in contact and gain info from other peers and the lecturer.

4.4 Good practice engages students with the course content

The interactions centred mostly on the case scenarios and these allowed the formation of a learning community where participants were connected and fully engaged with the topics. At the same, there were meaningful and enriching activities (e.g. the quizzes, multiple choice questions You Tube clips, online resources, other extra information and updates) supplied by the lecturer/s and peers from time to time. These value-adding materials contributed in increasing interest, better understanding, and closer engagement with the course content. Knowledge was conveniently and easily accessed.

Following are comments from the students:

The questions and extra resources helped tie things together and gain more understanding.

It kept me thinking about pathology.

Improved my learning and made me engage in this subject.

… helped to keep me engaged in my learning rather than just putting it aside after the lecture or workshop.

Enhancing learning and enthusiasm for Pathology

… sharing resources with peers and communicating with them. Being immediately notified of updates e.g. by mobile.

After the students' case presentations, students who presented posted photographs of the presentation and also tips on what worked and what did not work for them on their experiences of preparing the case

presentations on the Facebook. These assisted other groups while they prepare their presentations. This not only assisted peer to peer learning, but also allowed learning from other students' mistakes and promoted reflection and consolidation of the new learning process.

4.5 Good practice encourages active participation

The Facebook initiative required the participants to be active in their learning and take responsibility of the same. The focus was on what students will do to meet the requirements of the case scenario assignment. Active participation meant working closely with the group members for a purpose, brain storming ideas, searching literature to find the answers, debating, problem-solving, finding alternatives, critical thinking, and reflecting on decisions made. Threaded discussion is an excellent strategy to promote critical thinking (Ehrmann n.d.), and so with other meta-cognitive tasks as goal setting, self-monitoring and evaluation (Online Teaching in Learnonline 2010). After the groups delivered their presentations, other students were expected to peruse their work and more discussions would be undertaken. The entire class would be actively involved in deciphering the cases which maximised learning. The dynamic written format allows both real time and delayed responses, which is beneficial for shy, reticent or ESL students who find it hard to contribute in real time face to face activities such as tutorials. In this way, Facebook group activities promote active participation from a wider range of students than traditional group activities in higher education.

In using Facebook to learn about a clinical case, Pathology and Nursing students revealed:

> *Accessing course information so easily and being able to ask questions as well as read answers to questions other students have asked was awesome.*
>
> *I have Facebook on my phone so it was super easy to access all the time.*
>
> *On Facebook it's easier to use than the uni website, quick and easy to get extra information.*
>
> *We could know what was happening with the course any time as students may frequent Facebook more often than the Moodle site. Additionally, students were able to ask questions any time and get immediate response from peers or lecturers.*
>
> *The multiple choice questions posted every week and also the lecturer provides feedback on the right and wrong answers. You can also interact with the teacher.*
>
> *Good medium to discuss past exam questions.*

Active participation was also illustrated in comments such as "Group study could be achieved [in Facebook]." and "Most useful for the group presentation." as students endeavoured to contribute their bit in solving the problems required in the case scenarios. The student comments reveal that group engagement had burgeoned beyond the set group activity to include more general achievement and opportunity to prepare for the final examination for the course. This is an ideal outcome beyond the expectations of the initiative.

4.6 Good practice provides a conducive and safe learning environment

The Online Teaching in Learnonline (2010), Learning and Teaching Unit Academic Development of the university provides additional information and examples of good practice in online learning and teaching which are applicable to the creation of Facebook learning groups. Facebook staff members do not simply set a group, provide the case scenarios, and retreat waiting for students to take control. They support the learning activity actively; they help the students understand what is required and assist students to work toward the course learning objectives. Staff need to develop their communication skills to keep students interested and engaged. Their role demands that they attend to pedagogical, managerial, social facilitative and technical support aspects of the online initiative. Under pedagogical roles, Facebook staff members facilitate educational processes for students' understanding of critical science concepts and principles, while managerial roles would include the organisational, procedural, and administrative tasks associated with Facebook as a learning environment. The technical roles refer to making the students comfortable with the system, referring students to technical support resources, and addressing technical concerns.

Equally important is the psychosocial component of Facebook teaching, promoting a friendly, pleasant and safe environment and eliciting feelings of support for the cognitive learning processes of participants. "Such social functions include developing harmony, group cohesiveness, and collective identity. Online social roles require instructors to develop nurturing skills by encouraging participation, giving ample feedback and reward,

attending to individual concerns, and using a friendly, personal tone." (Online Teaching in Learnonline 2010). Students stressed the importance of psychosocial factors such as:

A friendly online environment

… ability to ask questions in a non-confrontational manner

Getting to know medical radiation students and lecturers

Closer relationship with lecturer

… collaboration and cooperation between students

These emotions, feelings, attitudes and values have a place in effective learning (Penman & Ellis 2012; Kolb & Kolb 2005). Koballa (2011) refers to this as creating a "hospitable place for learning". In order to achieve this ideal environment for learning, some rules of engagement or rules of conduct, also known as Facebook etiquette, is in order. Specifically, behaviours such as "putting down" a peer, using inappropriate language or visual, or posting irrelevant and inappropriate message, are not acceptable.

5   Checklist for the use of Facebook

The six principles outlined above are translated into a 16-item checklist that might inform and guide academics how to effectively use social media to enhance the learning and teaching of science concepts to undergraduate students, to assist in developing effective Facebook learning and teaching resources, and to ensure high quality learning and teaching of sciences using social media.

CHECKLIST FOR THE USE FACEBOOK
FOR LEARNING AND TEACHING

- Bear in mind that Facebook is used as an additional learning and teaching tool. Involvement in the Facebook group is not compulsory, it is optional. Students may choose to use the university discussion board and/or Facebook group.

- Organise the Facebook methodically by creating a 'Closed group' before the start of the study period. Invite teaching and other relevant staff members to the closed group. (A closed Facebook group means only group members can see who are in it and can read the postings contributed by the members).

    1) Set clear goals and objectives to be achieved in utilising Facebook, emphasising engagement with course content, peers and staff.

- .Privacy of users must be respected. Instruct students to set their privacy settings as appropriate from their end. Students have a choice of creating a new Facebook account or they can use an existing account with the appropriate privacy settings.

- Clarify expectations with students, level and duration of involvement. Encourage high level of participation.

- Provide adequate introduction. Explain how and why Facebook is being used as an educational tool. Discuss the benefits from the literature as well as from previous years' evaluation data.

- Consider the educational, technical and administrative aspects as well as the psychosocial aspect when using Facebook.

- Allow adequate students opportunities to interact, communicate and collaborate.

- Resource sharing such as You Tube, online links, articles etc. is encouraged. However, if the material is not relevant to the course, it will be deleted by the administrators.

- Promote student-teacher interaction by providing prompt feedback, engaging discussions, and enriching and meaningful activities.

- Encourage active learning and provide opportunities for students to show evidence of their learning.

- Note the teacher's Facebook 'presence' is important.

- Make sure to provide a pleasant experience. Observe Facebook etiquette. Note that inappropriate postings will be deleted by the administrators.

- Use a variety of teaching approaches to suit varying learning backgrounds and learning styles.

- Provide opportunities for students' to clarify their issues and concerns regarding assessments, final exam, class standing and other academic issues.

- Evaluate the Facebook activity and determine how to continue improving its application in higher education.

6   Conclusion

This study asserts that there is merit in the use of Facebook as an adjunct in the learning and teaching of science concepts and principles. In fact, a Nursing student suggested to "[Have] a Facebook learning page for each course" of the program, while three Medical Radiation students offered: "Definitely keep this initiative going!"; "A valuable initiative, please do keep it in place for future students to benefit."; and "It's a good program and best to continue." In order to ensure that goals and objectives are met and that high-quality course is delivered, good practice guidelines and a checklist for good practice were formulated. These were informed from the post-intervention evaluations administered to students which considered the features of the Facebook that were satisfactory and less satisfactory for the students.

The outcome of a well-maintained and structured Facebook group is the formation of a learning community, where participants are connected and fully engaged with content, co-students and staff, and where knowledge is conveniently and easily accessed. This represents a relatively easily incorporated way to facilitate and encourage student engagement in contemporary higher education. The good practice guidelines and checklist presented in this paper will guide academics how to effectively use social media to enhance the learning and teaching of science concepts to undergraduate students, and help provide high quality and satisfying academic experience for students thereby contributing to academic success and ongoing professional development. .

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