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## **On-line case discussion assessment in Ultrasound: The effect on student centred and inter-professional learning.**

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### **Abstract:**

In 2009 an asynchronous on-line case discussion assessment was introduced, to replace an existing traditional case-study assessment, within the Medical Ultrasound Programmes at City University London, to help extend collaborative, interprofessional student-led learning skills. Two clinical modules were used to develop the on-line learning method with associated assessments. Students selected and led a clinical case from their department, uploaded anonymised images and case details with questions, to encourage interaction from other colleagues.

Thirty students participated in the on-line case discussions. The assessment was evaluated via informal feedback, end of module feedback and an on-line questionnaire. Some students completed two modules, using the on-line discussion, others were involved in only one module, of which 21 out of 26 students completed end of module feedback for the 1<sup>st</sup> module and 18 out of 20 students completed feedback from the 2<sup>nd</sup> module. Twelve students out of 30 completed the on-line questionnaire.

Feedback suggested that the on-line case discussions were a good learning tool, providing a wide range of cases for students to participate in or read and learn from each other. All students found the cases interesting, engaging and useful, but time consuming.

Despite the small numbers involved, useful feedback was provided to assist further development of the assessment, particularly in relation to the number of cases being assessed and length of availability. On-line case discussions are an innovative, engaging method to encourage self directed, collaborative learning which could be utilised in the health care setting to share interesting cases, promote inter-professional and self-directed learning.

## **On-line case discussion assessment in Ultrasound: The effect on student centred and inter-professional learning.**

### **Introduction:**

Evidence-based and reflective practice is increasingly used by advanced practitioners to inform practice developments<sup>1</sup>. The Department of Health (DoH) in their best practice guidance for advanced practice nurses states that “Nurses working at an advanced level use complex reasoning, critical thinking, reflection and analysis to inform their assessments, clinical judgements and decisions.”<sup>1</sup>. The DoH guidelines suggest that these skills are also transferable to Allied Health Professionals (AHPs) and any advanced practitioner should be working in “collaboration” with others to provide the best health outcomes for patients<sup>1</sup>.

The postgraduate ultrasound programme at City University, London is designed to develop health care professional’s (HCP) skills in a new area of practice, which differs from many traditional Master’s level courses that build on current skills and knowledge, to achieve a higher level of learning. In an effort to move towards more student centred learning, also a requirement of professional accreditation<sup>2</sup>, an on-line case discussion forum was initiated in 2008. As the discussion forum was optional and learners were in full time employment, there was minimal input from the cohort. As research has shown that learners engage with the learning process to a greater extent when linked to assessment<sup>3,4</sup> an on-line case discussion assessment was designed to engage students in collaborative learning for implementation in 2009, replacing the traditional written case study assessment.

There is a wealth of literature relating to on-line forums, however to the authors’ knowledge no evidence has been published on the use of medical imaging clinical case study discussion in higher education. The process of developing an on-line discussion forum will be

considered including some of the benefits and pitfalls encountered with this type of clinical case study assessment.

### **On-line method:**

Asynchronous on-line discussion forums are increasingly used in higher education to provide distance learning opportunities for students and colleagues to engage with each other, at a time convenient to the user<sup>5</sup>. Digital media and social networking is used in many areas of life<sup>6,7</sup>. To exploit the use of social networking and the collaborative nature of discussion forums, on-line case discussions were introduced into the ultrasound programme in 2009 for two clinical modules. Case discussion has been shown to provide deeper, more meaningful learning in health care, allowing students to develop their problem solving skills for future practice by sharing experiences and discussing issues in depth<sup>8</sup>. Grossman et al<sup>8</sup> utilised the case discussion approach in the classroom for critical care nurses and demonstrated an improvement in final exam scores for those who engaged in case discussions in each session, compared with students who had more formal lectures and less exposure to case discussions.

The asynchronous method of using the case discussion was preferred to meet the needs of the students, many of whom work a range of shift patterns and / or have family commitments.

Hartford<sup>9</sup> proposes that on-line methods of learning can allow students to incorporate the work around personal commitments. It has been suggested that the asynchronous discussion method allows time for research and reflection on-action, which has the potential to lead to deeper learning<sup>5,10,11</sup>, although some research suggests the asynchronous nature of discussion forums can cause disjointed discussion and at times affect the confidence of the students who are awaiting a response to their posts<sup>11</sup>. Wang and Woo<sup>12</sup> compared the opinions of a small number of postgraduate students using on-line discussions and face-to-face discussions and found that on-line discussions allowed all participants to contribute and research the topic in

advance, however discussion is limited by the delay in response and lack of non-verbal feedback.

The potential for shared inter-professional learning was another key motivator for the introduction of this method of learning and assessment, to meet DoH<sup>1</sup> recommendations for advanced practice, with staff working interprofessionally to improve patient care. Inter-professional working, in practice, develops from collaborative inter-professional learning<sup>13</sup> and allows HCPs to learn together and share experiences<sup>14</sup>. Soloman et al<sup>15</sup> reported that students can gain a better understanding of interprofessional roles when undertaking asynchronous interprofessional discussions, hence the development of a case discussion forum for the ultrasound programme.

### **Method:**

### **Assessment:**

Initially for the pilot, following introduction of the case discussion, students were asked to participate in as many cases as they chose, then to select three to be marked and receive feedback on. In addition to this was a requirement to write a short reflective piece considering one element of learning during the discussion, without repetition of work from within the discussions. Marks were awarded for the discussion board: engagement (18%), relevance (17%) and quality of posts (20%) in addition to a written reflective essay of their learning during the discussion (45%). Detailed assessment criteria and grade-related criteria were produced, in addition to tutorial support, a written example and a “live” demonstration.

### **Feedback:**

Feedback from students was obtained in a number of ways including the University end of module feedback questionnaire, ad-hoc discussions, comments within reflective essays and

via an anonymous on-line questionnaire at the end of the academic year. Ethical approval for the dissemination of findings was granted by City University London's School of Health Sciences ethics committee chairman. The on-line questionnaire, using SurveyMonkey™, had a number of questions relating to student's perceptions of learning and their views on the on-line discussions. Likert scale questions, offering a choice of responses "a lot", "a little", "not a lot" and "not at all" were used, with free space for further comments. A range of possible feelings, relating to the case discussion, were given in the questionnaire "did you find the case studies...". Positive and negative comments were randomly placed within the questionnaire, to reduce the chance of bias in responses. The statements used in the questionnaire were selected following informal discussions with students during the module.

### **Results:**

Thirty students participated in the study, 26 undertook the obstetrics module and 20 completed the general medical module, of which 16 also completed the obstetric module. The cohort contained a number of different professionals, the majority being radiographers across a wide age range from 23 to 56 years and predominantly female (85%). As can be seen in Figure 1, the students on the ultrasound programme are a heterogeneous group in terms of sex and professional background, with professional experience ranging from just over 1 year to 35 years.

### **Figure 1: Professional background and sex distribution of the cohort for the two modules using the on-line case discussion**

Twenty one of 26 (81%) students were present and completed the end of module feedback for the first module (obstetrics) and 18 of 20 (90%) for the second module (general medical). The on-line questionnaire was sent to all 30 students within the cohort, to obtain views from the whole student group. The on-line questionnaire response rate was low (40%), with only 12



students responding. This was possibly due to the request to complete the questionnaire being sent to the students at the end of the academic year. Reminders were sent three times to all students, however as the questionnaire was anonymous direct follow-up of non-respondents was unfeasible.

From the on-line questionnaire it can be seen that most students learnt a lot about the case itself, sharing of information and knowledge in relation to the case (Figure 2). Views relating to the on-line case discussions are shown in Figure 3 and 4. The majority of students felt that the on-line case discussions were labour intensive, competitive and frustrating, however they mostly found them to be a good learning experience, engaging, interesting and enjoyable, with most of the students (82%) thinking they were in some way collaborative. One respondent provided negative responses to almost all the questions, otherwise there were a range of opinions from respondents.

**Figure 2: Response to the question: How much did you learn about...**

**Figure 3: Responses to the positive questions: Did you find the on-line case discussions...**

**Figure 4: Responses to the negative questions: Did you find the on-line case discussions...**

Comments in italics are free text comments from the on-line questionnaire responses. End of module feedback included a number of comments about the on-line case discussion assessment within the free text sections (Figure 5).

**Figure 5: End of module feedback comments relating to the on-line discussions**

## **Discussion:**

Responses for the end of module feedback were high (81% and 90%) and whilst the response rate to the on-line questionnaire was low (40%), the results provided useful information to help develop the on-line case discussions further. The results have to be considered with caution, when applying the views of such a small number of students to the wider health care population.

## **Challenges for students:**

Case discussion assessments were seen as time consuming by all respondents, with 83% stating “a lot” when asked if the case discussions were time consuming. This was reflected in comments, from the on-line questionnaire, such as:

*“very time consuming and at times became competitive with everyone racing to add information at the same time”.*

These findings were supported by Caan et al<sup>16</sup> who found some students spent over 3 hours researching information for a single discussion post. It was interesting to note that one learner had understood the need for the time commitments by stating:

*“Any academic writing is time consuming if the research and background knowledge is performed correctly”*

Changes will be made to the assessments, following this pilot study to reduce the assessment burden to students, by a reduction in the minimum number of cases to be assessed, from three to two. It was also hoped that a reduction in the number of compulsory cases will ensure students have more time to read the other discussions and learn from “lurking”, which is a valuable learning exercise in itself<sup>17</sup>. One respondent in this study reinforced the benefits of “lurking” with their comment:

*“invaluable learning tool, would not have learnt as much about OBS if we had not participated in these. My knowledge base now is far more extensive! Even cases you did not engage in you could still read about anomalies and management of case studies.”*

All participants felt that some of the discussion posts were labour intensive or became competitive (82% said “a little” or “a lot” competitive). Initial guidance was given that posts should be clear and succinct, covering just one topic, ending with a question to stimulate further discussion, however adherence to guidelines was variable. This competitiveness led to difficulties for some students, e.g.

*“I found it difficult to know how many words to write in a post, when someone wrote a lengthy post with lots of questions and issues, I found I had to match this lengthy post in answering and discussing the issues.”*

Caan et al<sup>16</sup> also noted “too much detail” being included within posts from the initial contributors, in a study of 70 students, despite the marks only being worth 3% of the overall course marks. In comparison the on-line case discussions used for the ultrasound programme contributed 25% of the overall module mark, which might have led to more competition and an eagerness to write as much as the previous student’s post.

Discussion posts had a range of word counts ranging from 16 words to 926. Formative feedback was provided, to encourage a more collaborative approach to the discussions, reminding participants that marks were awarded for engaging others and encouraging group discussion. No specific advice on the length or word count of individual posts was given, due to the expectation, at M-level, that students would be able to interpret assessment criteria and develop their own independent style and judgement skills necessary for clinical practice at an advanced level<sup>1</sup>. If students kept their posts to a more manageable length, this could potentially impact on their perception of how labour intensive the case discussions are. Attle

& Baker<sup>18</sup> propose that competition and co-operation within the learning environment can help students' learning and professional development. If case discussions are to be implemented within health care education it is important to incorporate a student rule setting session at the outset to ensure ownership of the discussion forum and produce student negotiated rules, to help reduce competition and develop a collaborative learning forum.

There was an even split between students thinking the discussions lacked focus "a little" (45.5%) and those who thought "not at all" (45.5%), with one respondent replying "not a lot" to that question. Staff were unable to compare the responses to the actual discussion cases, because of the anonymous nature of the questionnaire. From the markers perspective some cases were well structured, clearly related to the case discussion and interesting to read, whilst others lacked focus and direction at times. The role of the facilitator and the guidance provided for peer facilitation is an area for lecturers to consider, when introducing students to this method of learning.

It was also impossible to determine whether there was a correlation between the students who responded negatively and the length or complexity of their discussion posts. This is an area that could be assessed in future studies. In comparison to the work of Wang and Woo<sup>12</sup>, in this current study, there were no negative comments relating to delayed response or lack of non-verbal cues, when using the asynchronous discussion method.

### **Benefits:**

Whilst there were a number of issues raised by the students, the majority found the case discussions to be a good learning experience, interesting, useful and engaging. One of the rationales behind the introduction of the case discussion was to encourage shared inter-professional learning, which appears to have been achieved for some, as suggested by the responses such as:

*“I have found that my on-line communication skills have improved. As discussions progressed I learned how to engage with other students when researching for more information about a particular case.”*

The health agenda has been focussing on interprofessional collaboration for a number of years, so it is encouraging to find that most students did find the case discussions collaborative, with 9 / 11 (82%) saying they found the discussion in some way collaborative. From the responses it seems that students learnt about the cases and associated issues, with 92% responding that they learnt a lot about the case itself. All students learnt a lot or a little about background information relevant to the case and justifying their own opinions. Not surprisingly there were more mixed views about whether the case discussions assisted students to challenge other people’s opinions, with one respondent stating

*“I picked 'A Little' for challenging other people’s opinions, as I feel it was not appropriate to comment on whether other people’s opinions were wrong”.*

There were also comments in ad-hoc discussions about whether the discussion posts should be anonymous. On questioning the cohort during the module there were mixed feelings about this and one respondent in the on-line questionnaire stated:

*“if the post were anonymous this would help prevent a person being 'isolated' from a discussion. However there are pitfalls to anonymity - how to identify students to mark and of course students will tell their friend what they have posted and who they are called hence loss of anonymity! Aside from that I thoroughly enjoyed this learning experience.”*

As independent practitioners newly qualified sonographers will have to defend their own practice, but as part of the professional code of conduct must also ensure safe effective service provision from others. As a professional there is a need to take responsibility for any actions or opinions. There is no anonymity in face to face discussions or interactions in the workplace. The Health Professions Council<sup>19</sup> and the Nursing & Midwifery Council<sup>20</sup> state

that HCP registrants must ensure protection of the public at all times, even if this leads to conflict with other HCPs and colleagues. There may well be times during their career that HCPs will be faced with challenging the opinion of others, to ensure effective, evidence-based best practice is delivered. Developing these skills in a non-threatening learning environment should be further encouraged.

In this current study most students did not think the case discussions were a waste of time. Only 1 (8%) respondent said “ a little” when asked if the discussions were a waste of time, in comparison to the work of Wu and Hiltz<sup>21</sup> who found almost 34% of respondents suggest that they strongly agree (6%) or agree (27.6%) that the “online discussion wastes my time”. Their results do not differentiate between the undergraduate and post graduate responses, whereas in the current study all students were postgraduate, which may have some influence on motivation and perception of value.

### **Lecturers’ reflections:**

Informal discussions took place between the three staff involved in the assessment. It was agreed that a wide range of interesting cases were shared with the cohort, In comparison to the traditional case study assessment, students had to contribute a little and often, undertaking research over a longer period of time, in place of an end of module submission. Whilst no evidence was collected to determine the effect of the assessment on learning it was interesting to note that students had quoted comments or findings from the discussion boards, during lectures. The ultrasound lecturers’ opinions were in agreement with those in Caan et al’s work<sup>16</sup>, in that staff satisfaction was with the “additional reading and research beyond the lectures”. Further formal research into the quality of the discussion posts and the effect of the discussions on background knowledge and clinical decision making skills would be useful to determine if this perception is justified.

Lecturers agreed that the on-line case discussions were effective as a learning tool, which increased inter-professional learning and encouraged on-going background reading and study, in conjunction with formal lectures and tutorials. As an assessment tool areas for improvement were identified, such as evaluating the number of cases assessed, to reduce the assessment burden whilst still ensuring all students participated in a range of cases. The final marks awarded clearly discriminated between candidates M-level contributions, although this did not necessarily relate to time spent on the case discussions. The time taken to facilitate the case discussions should not be underestimated. For staff this was noticeably more than the traditional case study assessment, due to the continuous nature of the discussions. The time taken for summative marking was similar to the traditional case study assessment.

### **Limitations of this study**

The study is limited by the small number of participants and a low response rate to the on-line questionnaire. Respondents to the on-line questionnaire were self selecting, so may have included those with strong opinions. The current study was part of a blended learning programme, similar to that of Hew and Cheung<sup>22</sup>. Students met on a day release basis, so were able to discuss the cases informally or ask colleagues to respond in a timely manner to their discussion posts. This may impact on the transferability of the findings to other courses particularly distance learning options.

Unlike the study by Xie and Ke<sup>23</sup> and Xie et al<sup>24</sup> this study did not assess student's motivation or confidence with the use of the computer or the task itself, which might have had an impact on participation or enjoyment of learning. All students participated in the case discussions. The level of interaction varied, however most students made regular and relevant contributions, although factors relating to whether motivation was intrinsic or if indeed there were extrinsic motivators linked to assessment were not considered in this study.

The role of the peer facilitator was not considered, despite studies having suggested that the facilitator can influence participant's enjoyment or interaction<sup>25</sup>. It is possible that this could influence students on the ultrasound programme. Future analysis of the on-line case discussions should include feedback on facilitation styles, learning preferences and engagement, enjoyment, critical evaluation skills and overall learning.

### **Conclusion:**

Within the medical ultrasound programme staff viewed the case discussion as an effective learning and assessment tool, which discriminated well between student's M-level abilities. In its current format this method of assessment did increase staff workload over a longer period of time, whilst facilitating the discussions. Summative marking time was similar to that of the traditional case study assessment. For students the workload was spread over a longer period of time, however this reduced the pressure of assessments at the end of the module. Student feedback was similar to that in other studies of on-line discussions, suggesting that although time consuming and at times frustrating, they provided a good learning experience. Most students enjoyed the assessment method and learnt a great deal from it. If this style of assessment is to be introduced more widely into health care education, ways to reduce staff and student workload need to be considered whilst still ensuring student engagement with a range of cases at appropriate depth for M-level. Lecturers need to find ways to encourage further motivation for collaborative on-line learning, to reduce the competitive, long posts that were found in some case discussions. It is proposed that students will form groups to negotiate their own netiquette rules for subsequent assessments, which might help increase their sense of ownership and thus intrinsic motivation and encourage confident peer facilitation. Evaluation of changes will be necessary to determine effectiveness. Additional studies looking at motivation and links with peer facilitation and assessment, are required to further explore the issues relating to the on-line case discussions.



The on-line case discussion forums are a novel method of encouraging interactive, student led, inter-professional learning and could be utilised in a range of different health care educational settings to stimulate self-directed and peer supported learning.

### **Conflict of Interest Statement:**

There are no conflicts of interest

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Figure 1:

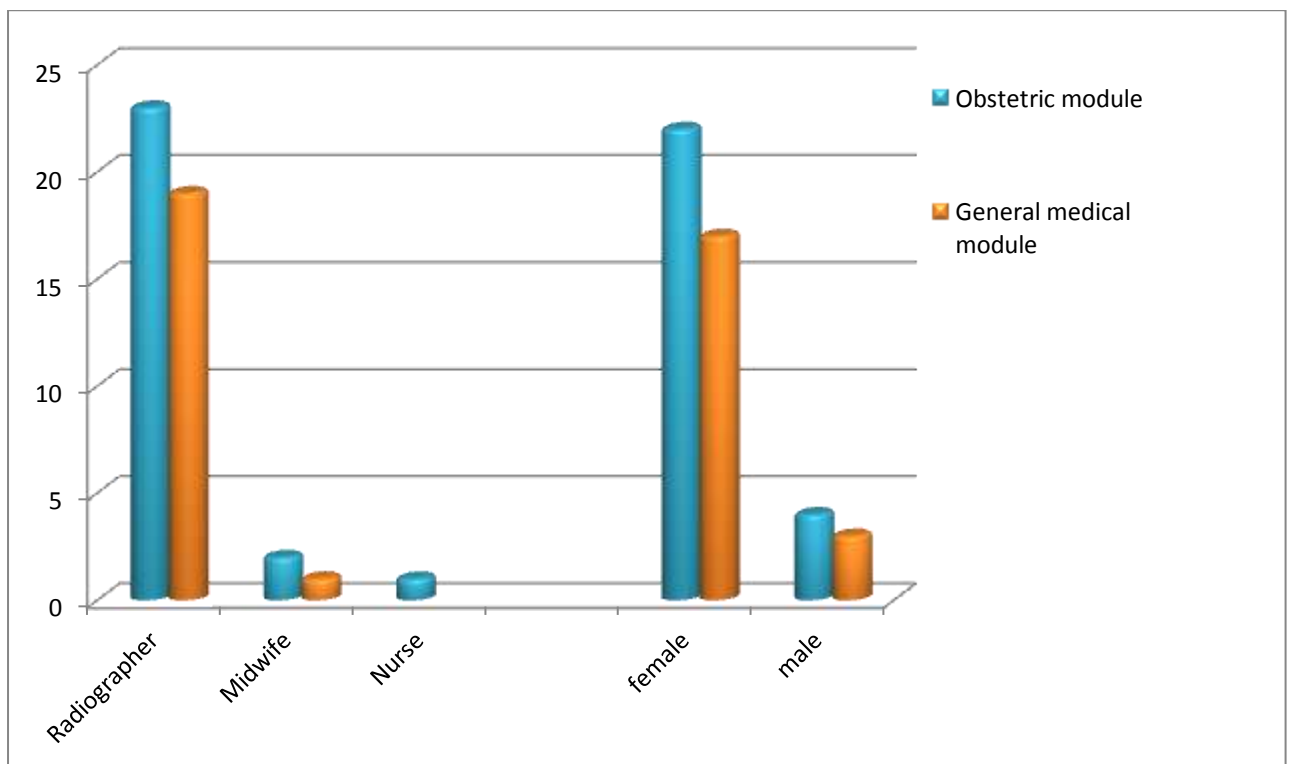


Figure 2:

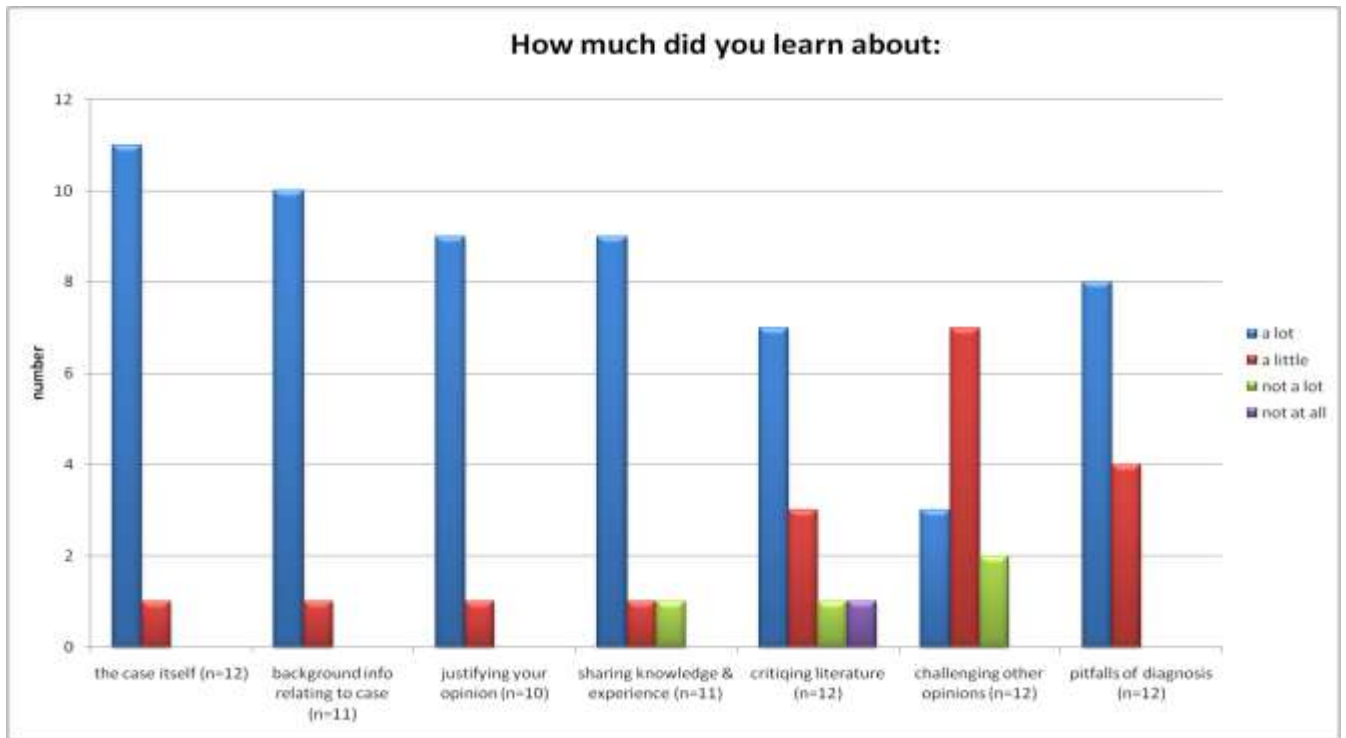


Figure 3:

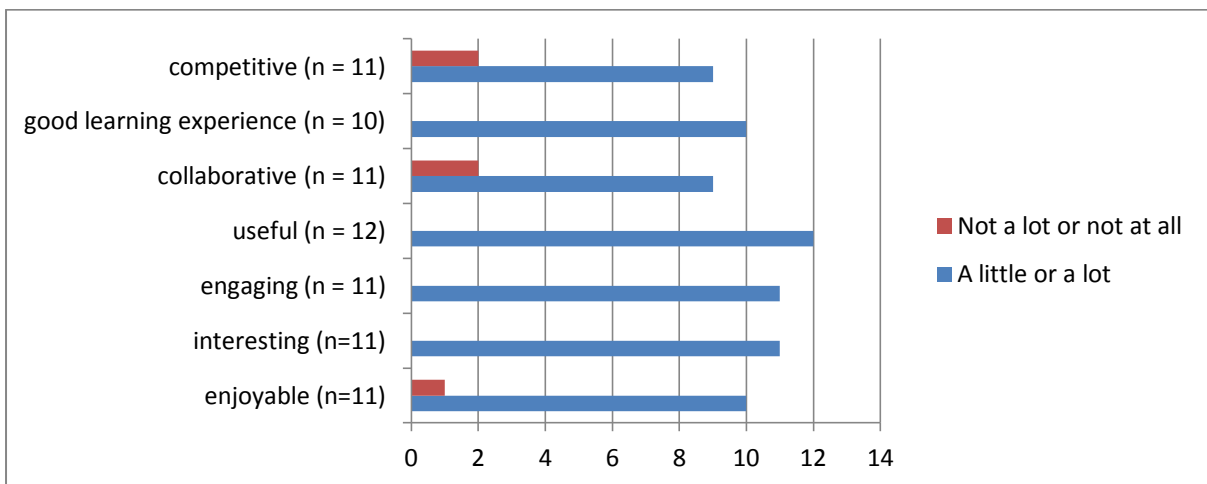


Figure 4

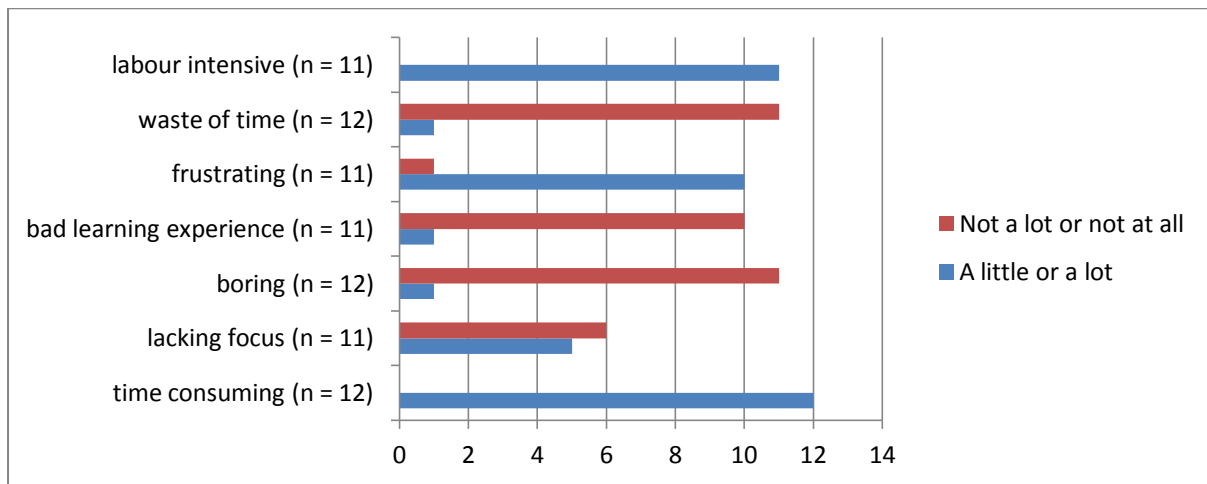


Figure 5:

What were the best/most useful aspects of the module	What were the worst/least useful aspects of the module
<b>I loved the case discussion, Very helpful</b>	<b>Time consuming and difficult</b>
<b>Good and enjoyable to take part in</b>	<b>Difficult to do 3 in space of a month</b>
<b>Good class integration</b>	<b>Very demanding in terms of time I believe 3 is too many</b>
<b>A very good learning experience</b>	<b>Remove one case study to have only two and have them spread out rather than removing simultaneously</b>
<b>Discussion board was good...</b>	<b>IT issues with discussion board</b>
<b>Discussion board was a good way of learning</b>	<b>...but it needs to go on for longer time to get maximum benefit</b>
<b>Discussion board was a very good, interactive approach to learning</b>	<b>I did not learn as much as if I had done it myself</b>
<b>Case studies were really good not only to study but to get to work with</b>	<b>Prefer to have 2 cases</b>
<b>Case discussion was invaluable...</b>	<b>I prefer case studies to on-line case discussion</b>
<b>Encourage more online case discussions to share interesting cases</b>	<b>...however – needs a minimum word limit for short posts and anonymous ID.</b>
<b>More online cases</b>	