Medical Education in the Mountains - The Educational Environment in the Diploma of Mountain Medicine

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Abstract

Aims: The Diploma of Mountain Medicine is a postgraduate blended learning course, combining online and distance learning with fully immersive face-to-face components. Utilising the Dundee Ready Educational Environment Measure (DREEM) to evaluate educational environment, alongside overall global course evaluation using the Postgraduate Taught Experience Survey (PTES), we aimed to further an understanding of the educational environment in this dynamic and increasingly popular method of course design.

Methods & Results: All participants completing the Diploma between 2012-2015 were invited complete the online survey. Answers were recorded using a modified Likert scale. Response rate was 57% (n=68). Overall course satisfaction was positive using the PTES, with an overall mean score of 3.77 (out of 5). Only 9.4% of responses were negative. Educational environment using the DREEM was scored as "Excellent" (mean total score of 150.68; range 100-199). When the two tools used were compared, overall scores showed close agreement (r=0.775). The DREEM domain, Perception of Learning was most closely correlated with PTES overall score (r=0.714).

Female participants rated the course lower than their male counterparts using both DREEM and PTES tools. Those who had <1 year since their most recent education, and those for whom highest study was at undergraduate level had lower DREEM scores than those with previous postgraduate experience. This may reflect differences in expectations and learning objectives.

Conclusions: These multifaceted tools demonstrate a close alignment between educational environment and overall course satisfaction. Managing learner expectations and gender differences are potential challenges to overcome.

Keywords: blended learning, postgraduate, learning environment, DREEM
Introduction

Blended learning provides a mixture of learning in terms of mode, distance, time and technology. It is growing in popularity and availability, and has developed to encompass a wide range of courses. As the uptake of these courses increases and extends into those with a greater inter-professional approach, the need to ensure quality remains tantamount and therefore the evaluation and subsequent improvement of the students’ learning experiences should be performed.

There are a number of advantages of blended learning – broadly divided into personal, institutional and pedagogical (1). The busy professional lives of postgraduate learners, necessitates a flexible approach to learning (2) - one reason for increasing availability of blended courses. Delivery is not without its challenges, including the potential for perceived isolation (3). This is one component of the learning environment. In healthcare the learning environment has been shown to be the strongest predictor of preparedness for independent clinical practice (4). It involves all aspects of the learning surroundings, which potentially might be challenged or augmented by a blended approach. As such, measuring the learning environment is important and the DREEM questionnaire (Dundee Ready Educational Environment Measure) questionnaire (5) is one of the most widely used tools available.

As well as assessing the Learning Environment, increasingly a more global evaluation of students’ experiences is performed. The Postgraduate Taught Experience Survey (PTES) is a nationally used postgraduate course evaluation tool (6) that continues to undergo refinement ensuring robustness and quality (7).

This case-study using the postgraduate medical education course, the Diploma of Mountain Medicine, is therefore designed to help those involved with course design and provision to understand and therefore overcome some of the challenges involved in blended learning.

Methods

In accordance with institutional guidelines, ethical approval was given by the Board of Studies as part of the research approval process (Minute 15/M07). An online survey link (www.esurv.org) was circulated to all participants completing the final residential module between 2012-2015.

In addition to demographic information, the survey utilised the PTES tool; 39 questions divided into six domains and one overall evaluation question. One domain (dissertation) was omitted from the latest iteration (7) this was not applicable. The final section was the DREEM questionnaire (5).

All data was anonymous, and underwent processing using Microsoft Excel 2010. Statistical procedures undertaken included correlation coefficients for measuring the association between pairs of variables, with standard critical values assigned (r=0.11, p<0.05; r=0.15 p<0.01). The level of alpha (significance) was set at p=0.05.

Setting

The Diploma of Mountain Medicine is a multi-disciplinary postgraduate medical education course combining electronic and distance-based pre-course essays and learning, with fully immersive and residential components. Originally established in 1997, and validated by the Medical Commissions of the UIAA/IKAR/ISMM. It is taught in
12 countries worldwide with over 3500 Diplomas issued globally (8). Participants include nurses, paramedics and doctors from a range of specialities and grades.

**Results**

A total of 81 surveys were completed (response rate 68%) of which 13 were excluded from analysis due to incomplete data. Cronbach’s alpha was 0.92 for the PTES and 0.93 for the DREEM.

52 (76.4%) participants were male. Ages and years since academic study are shown in Table 1. 67.6% had an undergraduate degree as their highest previous qualification.

Overall scores demonstrated good results with a PTES mean score of 3.77 out of a maximum of 5 (Table 2), and the learning environment classified as "Excellent" (mean 150.68, range 100-199, sd 18.47, see Table 3).

In both the PTES and the DREEM, the course was scored less positively by female students (p=0.00094 and p=0.00012 respectively). Other trends of note relate to delays since previous study. Those who had a delay in studying of ten years or more had significantly higher scores in the PTES domain of engagement scores (p=0.0017, 0.0019, 0.046) than those in all other groups. Likewise, DREEM outcomes were lower in those with longer delays scored higher than other groups (p=0.0025, 0.0026). Lower scores were also found in those participants whose highest previous study was at undergraduate degree (p=0.024).

When the two overall scores were compared (see Table 4), they showed close agreement (r=0.775). When compared with both overall PTES score and the final question, the Perception of Learning was consistently the most closely correlated domain (r=0.71 & 0.720). By contrast the DREEM domain Social Self Perception showed the least agreement (r=0.548 & 0.281).

The overall DREEM score showed good correlation with the PTES final question (r=0.695). Of the PTES domains, Organisation and Management showed the closest correlation with the DREEM score (r=0.631). The least closely associated domain was Learning Resources and Support Services (r=0.355).

**Discussion**

This study has evaluated the learning environment using the DREEM, and the overall course satisfaction using the PTES in participants undertaking a postgraduate blended learning course with a broad intake of different healthcare professions, medical specialities, experience and backgrounds. In doing so, we have demonstrated high levels of satisfaction the learning environment, and the course as a whole.

There participants demonstrated heterogeneity in terms of ages, previous higher education and delays between prior formal education. Some differences emerged between the groups, including female participants scoring lower in both the PTES and DREEM scores compared to male counterparts in overall scores, and in several domains. This is not consistently found elsewhere (7), and this may be influenced by relatively lower proportions of female participants. However, conversely it may have been that the low numbers of women on the course may have meant those who were involved had a poorer experience. This would be an interesting avenue for future research, as the tools used in this study are too crude to elucidate this.
Another area where interesting patterns emerged was in delay between most recent academic study. Those who had studied more recently (<1 year) had a tendency to score worse compared to those who had longer delays. This may represent differences in expectations, and highlight the improvement in the quality of higher education provision (7,9). On a similar note, those whose highest previous study was at undergraduate had lower DREEM scores than those with previous postgraduate experience. This may reflect an appreciation of the difference in teaching styles, supervision, feedback and assessment i.e. the many but subtle differences that compose the learning environment. In this sense, the DREEM is the perfect tool for evaluating this difference.

One of the potential challenges of blended learning in the literature is potential isolation. However, we can see that this was not the case e.g. Social Self Perception scored second highest. This may be due to recall bias as the most recent component was a residential week, or the extent of the immersion in the face-to-face component something that may be of relevance to those involved in course design.

Some subtle challenges of a blended approach are evident - questions relating to sufficient contact time [Q5] and sufficient opportunities to discuss work with other students [Q9] both scored relatively badly. Maintaining a community of learning in online and blended teaching can be challenging (10) and these results reflect this. However, despite these potential challenges the learning environment was classified as "Excellent", and the overall PTES scores were overwhelmingly positive.

When overall scores between the two tools were evaluated, they were closely correlated. The impact of the learning environment on numerous outcomes including course satisfaction, is well established. However, an evaluation using these tools in a blended course structure has not been performed previously. This study adds weight not only to the importance of the learning environment, but also the extent to which the perception of the learning environment is interwoven with course satisfaction and evaluation.

The learning environment domain most consistently correlated with the PTES scores was the Perception of Learning. This suggests that it is perhaps the learning experience that candidates value above all else, although clearly the other aspects should not be overlooked. Although some PTES domains such as Organisation & Management, showed close correlation DREEM scores, it is vital to highlight that not one single domain showed a greater correlation with the overall score than that between the overall DREEM and the overall PTES scores. Overall course evaluation and the learning environment are both complex concepts, that will have elaborate interactions between their different domains. These closely allied scores demonstrate that in elucidating the relationships within these concepts it is ultimately the whole is greater than the sum of the parts.

In this case study of a multidisciplinary postgraduate medical blended learning course, the learning environment showed close association with overall course satisfaction. As with any postgraduate course, numerous challenges exist. Ones highlighted for potential development and exploration include managing the community of learning and avoiding any gender and discrepancies resulting from delays in prior education. As blended learning grows in popularity and availability, educators should continue to consider the importance of the learning environment on course satisfaction, and be aware of the challenges that may manifest within this course design.

**Take Home Messages**

- Both tools showed overwhelmingly positive results, and both tools showed close correlation.
- Perception of Learning was the DREEM environmental domain most closely linked to the overall course evaluation score.
Female participants and those with the least delay since last formal education scored worse than other participants. Therefore managing learner expectations is vital.

This multidisciplinary postgraduate course featuring diverse participants shows that the blended approach was successful in terms of learning environment and overall course evaluation.

Notes On Contributors

Lawrence Kidd is an Anaesthetic Registrar in the Bristol, United Kingdom. Interests include mountain and expedition medicine, course design and cognitive barriers in human factors.

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**Appendices**

| Age       | Number of participants | Years since academic study | Number of participants |
|-----------|------------------------|----------------------------|------------------------|
| ≤30       | 15                     | <1                         | 10                     |
| 31-35     | 29                     | 1-3                        | 40                     |
| 36-40     | 11                     | 4-9                        | 13                     |
| 41-50     | 7                      | ≥10                        | 5                      |
| ≥51       | 6                      |                             |                        |

**Table 1.** Demographics of Diploma participants (n=68).

| Domain                  | Number | Agreement | Neutral | Disagreement | Mean score |
|-------------------------|--------|-----------|---------|--------------|------------|
| Teaching & Learning     | Number | 309       | 70      | 29           | 3.98       |
|                         | %      | 75.74     | 17.16   | 7.11         |            |
| Engagement              | Number | 268       | 57      | 15           | 4.04       |
|                         | %      | 78.82     | 16.76   | 4.41         |            |
| Assessment & Feedback   | Number | 148       | 68      | 55           | 3.36       |
|                         | %      | 54.61     | 25.09   | 20.3         |            |
| Organisation & Management| Number | 261       | 56      | 21           | 3.91       |
|                          | %   | 77.22 | 16.57 | 6.21 |
|--------------------------|-----|-------|-------|------|
| Learning resources &     | %   | 67.46 | 23.41 | 9.13 |
| support services         | Number | 170  | 59    | 23   | 3.68 |
| Development of skills    | %   | 49.75 | 38.44 | 11.81|
|                          | Number | 198  | 153   | 47   | 3.48 |
| Final Question           | %   | 89.71 | 4.41  | 5.88 |
|                          | Number | 61   | 3     | 4    | 4.25 |
| Overall                  | %   | 68.19 | 22.46 | 9.35 |
|                          | Number | 1415 | 466   | 194  | 3.77 |

Table 2. Overall scores in PTES (Postgraduate Taught Experience Survey) tool.

| Overall response rating | Learning (%) | Course Organisers (%) | Academic Self (%) | Atmosphere (%) | Social Self (%) | Overall (%) |
|-------------------------|--------------|-----------------------|-------------------|----------------|-----------------|-------------|
| Negative (0/1)          | 6.8          | 6.84                  | 12.86             | 5.37           | 3.22            | 7.08        |
| Equivocal (2)           | 14.64        | 9.66                  | 21.35             | 58.93          | 9.59            | 24.54       |
| Positive (3/4)          | 78.57        | 83.5                  | 65.79             | 35.7           | 87.18           | 68.52       |

Table 3. Overall score summary in DREEM (Dundee Ready Educational Environment Measure) tool.

| Measure A                      | Measure B                      | Correlation |
|--------------------------------|--------------------------------|-------------|
| PTES Overall                   | DREEM (total)                  | 0.78        |
| PTES Overall                   | Perception of Learning         | 0.71        |
| PTES Overall                   | Perception of Course organisers| 0.69        |
| PTES Overall                   | Academic Self-Perception       | 0.66        |
| PTES Overall                   | Perceptions of Atmosphere      | 0.63        |
| PTES Overall                   | Social Self Perceptions        | 0.55        |
| PTES Final Question (Q44)      | DREEM (total)                  | 0.7         |
| PTES Final Question (Q44)      | Perception of Learning         | 0.72        |
| PTES Final Question (Q44)      | Perception of Course organisers| 0.66        |
| PTES Final Question (Q44)      | Academic Self-Perception       | 0.51        |
| PTES Final Question (Q44)      | Perceptions of Atmosphere      | 0.61        |
| PTES Final Question (Q44) | Social Self Perceptions | 0.28 |
|--------------------------|-------------------------|------|
| Teaching & Learning      | DREEM (total)           | 0.54 |
| Teaching & Learning      | Perception of Learning  | 0.53 |
| Teaching & Learning      | Perception of Course organisers | 0.49 |
| Teaching & Learning      | Academic Self Perception | 0.48 |
| Teaching & Learning      | Perceptions of Atmosphere | 0.46 |
| Teaching & Learning      | Social Self Perceptions | 0.26 |
| Engagement               | DREEM (total)           | 0.58 |
| Engagement               | Perception of Learning  | 0.55 |
| Engagement               | Perception of Course organisers | 0.56 |
| Engagement               | Academic Self Perception | 0.39 |
| Engagement               | Perceptions of Atmosphere | 0.39 |
| Engagement               | Social Self Perceptions | 0.39 |
| Assessment & Feedback    | DREEM (total)           | 0.47 |
| Assessment & Feedback    | Perception of Learning  | 0.37 |
| Assessment & Feedback    | Perception of Course organisers | 0.49 |
| Assessment & Feedback    | Academic Self Perception | 0.26 |
| Assessment & Feedback    | Perceptions of Atmosphere | 0.43 |
| Assessment & Feedback    | Social Self Perceptions | 0.43 |
| Organisation & Management | DREEM (total)        | 0.63 |
| Organisation & Management | Perception of Learning | 0.55 |
| Organisation & Management | Perception of Course organisers | 0.55 |
| Organisation & Management | Academic Self Perception | 0.53 |
| Organisation & Management | Perceptions of Atmosphere | 0.49 |
| Organisation & Management | Social Self Perceptions | 0.58 |
| Learning Resources & Support Services | DREEM (total) | 0.36 |
| Learning Resources & Support Services | Perception of Learning | 0.28 |
| Learning Resources & Support Services | Perception of Course organisers | 0.34 |
| Learning Resources & Support Services | Academic Self Perception | 0.39 |
| Learning Resources & Support Services | Perceptions of Atmosphere | 0.21 |
| Learning Resources & Support Services | Social Self Perceptions | 0.33 |
| Development of Skills    | DREEM (total)           | 0.53 |
Table 4: Comparison between PTES (Postgraduate Taught Experience Survey) and DREEM (Dundee Ready Educational Environment Measure) outcomes. Correlations calculated using Microsoft Excel for Mac v.15.22.

| Development of Skills   | Perception of Learning  | 0.53 |
|-------------------------|-------------------------|------|
| Development of Skills   | Perception of Course organisers | 0.37 |
| Development of Skills   | Academic Self Perception | 0.59 |
| Development of Skills   | Perceptions of Atmosphere | 0.41 |
| Development of Skills   | Social Self Perceptions  | 0.3  |

Declaration of Interest

The author has declared that there are no conflicts of interest.