

Students' perception of the learning environment in a distributed medical programme

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Background: The learning environment of a medical school has a significant impact on students' achievements and learning outcomes. The importance of equitable learning environments across programme sites is implicit in distributed undergraduate medical programmes being developed and implemented.

Purpose: To study the learning environment and its equity across two classes and three geographically separate sites of a distributed medical programme at the University of British Columbia Medical School that commenced in 2004.

Method: The validated Dundee Ready Educational Environment Survey was sent to all students in their 2nd and 3rd year (classes graduating in 2009 and 2008) of the programme. The domains of the learning environment surveyed were: students' perceptions of learning, students' perceptions of teachers, students' academic self-perceptions, students' perceptions of the atmosphere, and students' social self-perceptions. Mean scores, frequency distribution of responses, and inter- and intrasite differences were calculated.

Results: The perception of the global learning environment at all sites was more positive than negative. It was characterised by a strongly positive perception of teachers. The work load and emphasis on factual learning were perceived negatively. Intersite differences within domains of the learning environment were more evident in the pioneer class (2008) of the programme. Intersite differences consistent across classes were largely related to on-site support for students.

Conclusions: Shared strengths and weaknesses in the learning environment at UBC sites were evident in areas that were managed by the parent institution, such as the attributes of shared faculty and curriculum. A greater divergence in the perception of the learning environment was found in domains dependent on local arrangements and social factors that are less amenable to central regulation. This study underlines the need for ongoing comparative evaluation of the learning environment at the distributed sites and interaction between leaders of these sites.

Keywords: *distributed programme; satellite sites; learning environment; technology enabled learning; evaluation*

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In the complex and unique milieu of a medical school, students experience numerous interactions with multiprofessional staff, patients, and peers. They have a heavy workload and are required to conform to professional norms of behaviour and dress (1). The atmosphere in a medical school is often competitive and at times even hostile (2). Students may feel humiliated and even abused in the course of learning (2, 3). Working closely with teachers, students are influenced by both positive and negative role models (3, 4). Recent reforms in curriculum strategies leading to more student centred and problem-based learning (5) along with vertical

integration (6) have impacted the learning environment positively, but such changes are neither uniform nor consistent.

In his seminal papers, Genn (7, 8) proposes that the students' experiences of the learning environment 'are related to their achievements, satisfaction and success'. He postulates that the environment is a function of the curriculum and its desiderata. Citing Stenhouse, Genn (7) understands curriculum as 'everything that is happening in the classroom, department, Faculty or School or the University as a whole'. Like Genn, Hafferty (9) proposed that the medical school is best thought of as a

learning environment and that reform initiatives must be undertaken with an eye to what students learn instead of what they are taught.

A motivating learning environment fosters deep self-directed learning in the student and subsequently good medical practice in the physician. Consequently demotivating elements such as perceived bias, poor role models, information overload, teacher centred or disorganised teaching need to be identified and eliminated.

Ensuring positive and equitable learning environments across geographically separated sites in distributed undergraduate medical programmes poses new challenges. Several such programmes are being developed and implemented in Canada and elsewhere; the importance of equitable learning environments at separated sites is implicit in these programmes.

Purpose

The purpose of this study was to examine the learning environment at the three geographically separate sites (the main campus and two satellite sites) of the University of British Columbia (UBC) Medical School and to identify those aspects of the learning environment that are shared across sites and those which set them apart in the context of a new distributed programme.

Context

The first fully distributed programme in Canada commenced at the University of British Columbia Medical School (main campus and two satellite sites) in 2004 (10). At UBC, 20 to 30% of the curriculum in the first 2 years is delivered through synchronous videoconferencing, and approximately two-thirds of these sessions are delivered from the main campus at Vancouver. The shared curriculum is competency-based and integrated and, includes problem-based learning with an aim to promote self-directed learning. All students spend the first term (4 months) of their education at the main campus in Vancouver and then proceed to complete their medical education at one of the three distributed sites. The class of 2008 (graduation year) was the pioneer class of the new distributed programme. At the main campus, students in this class had senior peers and access to a large faculty, whereas at the new satellite sites the faculty was smaller and students did not have senior peers. The male:female ratio for the class of 2008 and 2009 was 42.5:57.5 and 42.9:57.1 and the mean age at entry was 25 years and 24.4 years, respectively (10). Site specific demographic data is protected, but there is no reason to believe that demographic characteristics were different at the three sites.

Methods

After obtaining the Behavioural and Ethics Board (UBC) approval (B06-0804), the Dundee Ready Educational Environment Survey (DREEM) was sent to all students in the class of 2008 (pioneer class of the distributed programme) and 2009 in November 2006 via a web-based platform.

The numbers of subjects at individual sites were as follows: the class of 2008 at the main campus: $n=152$, satellite site 1: $n=21$, satellite site 2: $n=24$. The class of 2009 at the main campus: $n=179$, satellite site 1: $n=23$, satellite site 2: $n=23$ (3 students in the class of 2008 at satellite site 1 were posted elsewhere and could not be contacted). At the time of this survey, the class of 2008 had spent just over 2 academic years in the school and the class of 2009 had completed 1 year.

In the description below, 'class' refers to the students in the same academic year in the distributed programme. The class year (2008 and 2009) refer to the year in which students are expected to graduate and 'site' refers to a distributed site (main campus, satellite site 1 and satellite site 2) of the Medical School. 'Group' refers to students who belong to one class (2008 or 2009) at a particular site. There were six groups in all (two at each site; three each in the class of 2008 and 2009).

The DREEM (11) is a 50-item validated inventory with five subscales. The survey is answered on a 5-point Likert scale (strongly disagree, disagree, uncertain, agree and strongly agree) with a maximum global score of 200. The five subscales are students' perceptions of learning, students' perceptions of teachers, students' academic self-perceptions, students' perceptions of the atmosphere and students' social self-perceptions.

The last item on the DREEM inventory is an open-ended question: 'Could you please list any other factors which you feel have an influence on the learning environment?'

Statistical analysis was carried out in 'R version 2.4.1 (2006-12-18)' and SPSS version 15. The mean, median, mode, standard deviation and frequency distribution of responses were calculated for all items in the inventory. The analysis of the students' perception of individual items was based on mean scores and the frequency distribution of responses. For the review of frequency distribution of responses, a score of 3 and 4 (agree and strongly agree) was taken together to indicate positive perception and 0 and 1 (strongly disagree and disagree) were taken together to indicate negative perception.

The *t* test was used to determine the statistical significance of intra- and intersite differences between the mean subscale and the global scores at the three sites in the same class and across the two classes at the same site. The non-parametric chi-square test was used to

Table 1. DREEM: response rate (percentage) by class and site

Class	Main campus	Satellite 1	Satellite 2	Total
2008	40.8 (62/152)	47.6 (10/21)	66.6 (16/24)	44.6 (88/197)
2009	65.4 (117/179)	52.1 (12/23)	91.3 (21/23)	66.6 (150/225)

determine the significance of differences (proportion of frequencies) for individual items.

Results

The response rate for the class of 2008 was 44.6% and for the class of 2009 the response rate was 66.6%. Site and class specific response rates are shown in Table 1.

Global inventory and subscale scores

The global mean scores ranged from 121.2 to 139.2 (Tables 2 and 3). There was no significant difference in the global mean score between sites in either class, but the range of the global mean score was wider in the pioneer class of 2008 than in the class of 2009. It is interesting to note that in the class of 2008, satellite site 2 had the lowest score (121.2), but this was reversed in the class of 2009 in which satellite site 2 had the highest global score (134.6).

Mean scores for subscales were between 50 and 75% of maximum scores in all domains of the learning environment. In the class of 2008, satellite site 1 had the most positive and satellite site 2 the least positive perceptions in all subscales, but differences between the three sites did not reach statistical significance. In the class of 2009, the range of mean subscale scores was narrower, but there was a significant difference between sites in the domain of academic self-perception, with satellite site 2 having the most positive perception. At satellite 2, a more positive perception was evident in all domains in the class of 2009 as compared with the class of 2008, though differences did not reach statistical significance. Students' perception of teachers was the most positively perceived subscale in all groups (except at satellite site 1, 2009) where it was second to the students' perception of the atmosphere.

Table 2. DREEM: mean global score for each site in the class of 2008 and 2009

	2008			2009		
	Main campus (n = 51)	Satellite 1 (n = 10)	Satellite 2 (n = 14)	Main campus (n = 97)	Satellite 1 (n = 10)	Satellite 2 (n = 19)
Global score (maximum score = 200)	133.5	139.2	121.2	131.1	130.0	134.6
Score (%)	66.8	69.6	60.6	65.6	65.0	67.3

Individual items

The responses to individual items are reviewed within the context of subscales (Tables 4–8). The score for negatively phrased items have been reversed.

Interpretation of mean scores

Based on the 5-point Likert scale (strongly disagree = 0, disagree = 1, uncertain = 2, agree = 3 and strongly agree = 4), a mean score of 0–1.50 implied a predominantly negative perception; 1.51–2.50 implied a mixed or uncertain perception; 2.51–3.0 implied a more positive perception with room for improvement; 3.01–3.50 implied a positive perception; and >3.51 implied an excellent perception of the item. If more than 80% of students in a group agreed or strongly agreed with the statement, this was considered a strongly positive perception.

Students' perception of teachers

The distributed programme as a whole was characterised by a positive perception of teachers (Table 4). Teachers were mostly perceived to be knowledgeable and well prepared. They did not get angry, did not ridicule students, were not authoritarian, had good communication skills and were patient with patients. Teachers' ability in providing feedback was, however, perceived to be questionable.

The positive perception for most teacher attributes was strongest in the class of 2008 at satellite site 1. Reflecting the lower scores for the subscale at satellite site 2 (2008), the perception of teachers was comparatively less positive in this group.

Students' perception of learning

The perception of learning was lukewarm compared to the perception of teachers in all groups (Table 5). No item was perceived positively by all groups (mean score >2.51), while one item stood out as being perceived least favourably by all groups, which was 'The teaching over-emphasises factual learning'.

Students' academic self-perceptions

The most outstanding observation in this subscale was the uniformly negative perception of 'I am able to memorise all I need' (Table 6). At satellite site 2, the

Table 3. DREEM: mean subscale scores for each site in the class of 2008 and 2009

	Perception of learning Maximum score = 48 ^a	Perception of teachers Maximum score = 44	Academic self-perception Maximum score = 32 ^b	Perception of atmosphere Maximum score = 48	Social self-perception Maximum score = 28
	Score (%)	Score (%)	Score (%)	Score (%)	Score (%)
2008					
Main campus	31.3 (65.3)	30.6 (69.5)	20.2 (63.0)	32.5 (67.7)	18.4 (65.6)
Satellite 1	32.7 (68.1)	32.6 (74.1)	21.1 (65.9)	33.6 (70.1)	19.1 (68.2)
Satellite 2	28.1 (58.5)	28.7 (65.2)	18.1 (56.6)	30.9 (64.3)	16.4 (58.5)
2009					
Main campus	29.1 (60.6)	31.1 (70.7)	19.4 (60.5)	32.2 (67.1)	18.5 (66.1)
Satellite 1	28.9 (60.0)	30.0 (68.2)	21.4 (67.0)	32.9 (68.6)	18.3 (65.5)
Satellite 2	31.2 (65.0)	31.4 (71.3)	19.7 (61.5)	32.9 (68.5)	18.5 (65.9)

^aSignificant intrasite differences: $P < 0.05$; main campus.

^bSignificant intersite differences: $P < 0.05$; class of 2009.

academic self-perception of students in the class of 2008 was weak for several items. Half of the class was uncertain or negative about 'passing this year'.

Students' perception of the atmosphere

Although there was still room for improvement, the atmosphere in tutorials and lectures was perceived to be relaxed by most students (Table 7). At the main campus, both classes expressed some difficulty in being able to ask questions. By comparison, students at satellite 1 had a 'strongly positive' perception of being able to ask questions and more than 80% of the students found the atmosphere motivating, they were socially comfortable and were not disappointed by the experience. However, all groups scored 'The enjoyment outweighs the stress of studying medicine' low within the subscale.

The class of 2008 at satellite 2 demonstrated a high level of ambiguity, with more than 30% of students being uncertain about 9 out of 12 items on the scale. They also returned the lowest mean score of all groups for 'The atmosphere motivates me as a learner'.

Students' social self-perceptions

This scale had a wide range of scores for different items (Table 8). Several perceived uncertainties or weaknesses in the social environment were expressed. There were more significant intersite differences in this subscale than any of the others.

All groups (except satellite site 2, 2008) had a positive perception of having good friends at school and of their accommodations. A more mixed perception was evident for the following items: 'I am too tired to enjoy this course' and 'I am rarely bored on this course'.

Satellite site 1 was set apart by a significantly more positive perception of the support system for students who get stressed compared with the other two sites, in both classes. At satellite site 2, the perception of social life and accommodations being pleasant was significantly more positive in the class of 2009 than 2008.

The following are responses to the open-ended question: 'Could you please list any other factors that you feel have an influence on the learning environment?' A small number of students opted to answer this question (39 students from the main campus, 5 from satellite site 1 and 9 from satellite site 2). Several students from the main campus commented on the difficulty in asking questions and peer related disruptions during videoconferenced sessions. This was in keeping with the responses in the perception of the atmosphere at the main campus (previously). The learning environment in videoconferenced sessions was evaluated in a companion study (unpublished observations).

Discussion

At UBC, the global scores at all sites (121.6–139.2) were comparable with the global score of 139 at the Dundee University Medical School from Scotland (12) and of 132 at another UK school (11), both of which have student centred, integrated curricula. Global scores at this distributed programme portray a more positive learning environment than that reported by most traditional schools (using the DREEM): Saudi Arabia (13), Nigeria (14) and India (15) with scores of 102, 118 and 107.44, respectively. Roff (12) reports the use of DREEM at a multicampus Brazilian school, but no published reports of evaluation of the learning environment in a distributed medical programme using the DREEM were found.

Table 4. DREEM: students' perception of teachers: mean scores for items in the subscale

Students' perception of teachers	Whole survey Mean score (Std Dev.)	Class of 2008 Mean score			Class of 2009 Mean score		
		Main campus	Satellite 1	Satellite 2	Main campus	Satellite 1	Satellite 2
The teachers are good at providing feedback to students	2.15 (0.982)	2.16	2.90	1.88	2.11	2.33	2.10
The teachers have good communication skills with patients	2.89 (0.586)	2.97	3.00	2.75	2.88	2.67	2.95
The teachers are knowledgeable	3.16 (0.537)	3.16	2.90	2.94	3.23	2.92	3.19
The teachers give clear examples	2.59 (0.625)	2.75	2.60	2.63	2.49	2.58	2.71
The teachers are well prepared for their classes ^a	2.93 (0.609)	2.98	2.70	2.56	2.96	3.00	2.95
The teachers provide constructive criticism here	2.55 (0.781)	2.75	3.00	2.38	2.43	2.67	2.48
The teachers (do not) ridicule the students	3.00 (0.815)	2.85	3.30	2.69	3.10	2.58	3.19
The teachers (do not) get angry in class ^{b,c}	3.20 (0.741)	2.95	3.10	2.94	3.36	3.08	3.33
The teachers are (not) authoritarian	2.64 (0.808)	2.54	2.90	2.69	2.63	2.67	2.86
The teachers are patient with patients	2.87 (0.573)	2.85	3.20	2.81	2.87	2.75	2.86
The students (do not) irritate the teachers	2.78 (0.817)	2.47	3.00	2.44	2.96	2.75	2.76

^aSignificant intersite differences: $P < 0.05$; class of 2008.

^{b,c}Significant intrasite differences: $P < 0.05$; main campus, satellite site 2.

Note: No significant intersite differences in the class of 2009.

Table 5. DREEM: students' perception of learning: mean scores for items in the subscale

Students' perception of learning	Whole survey Mean score (Std Dev.)	Class of 2008 Mean score			Class of 2009 Mean score		
		Main campus	Satellite 1	Satellite 2	Main campus	Satellite 1	Satellite 2
I am encouraged to participate in class	2.51 (0.876)	2.56	2.70	2.63	2.44	2.50	2.52
The teaching is sufficiently concerned to develop my self-confidence	2.36 (0.861)	2.34	2.60	2.31	2.26	2.58	2.71
The teaching encourages me to be an active learner	2.70 (0.757)	2.83	2.80	2.38	2.63	2.92	2.81
The teaching is well focused ^a	2.56 (0.774)	2.70	2.80	2.50	2.46	2.33	2.76
The teaching is sufficiently concerned to develop my competence	2.65 (0.752)	2.77	2.70	2.44	2.56	2.83	2.81
I am clear about the learning objectives of the course	2.42 (0.887)	2.51	2.70	2.25	2.38	2.17	2.52
The teaching is often stimulating	2.74 (0.754)	2.80	3.10	2.50	2.73	2.64	2.70
The teaching time is put to good use	2.36 (0.862)	2.57	2.70	2.19	2.22	2.58	2.38
The teaching is student centred	2.58 (0.816)	2.62	3.00	2.25	2.48	2.92	2.86
Long-term learning is emphasised over short-term	2.43 (0.893)	2.64	2.60	2.31	2.37	2.08	2.43
The teaching is (not) too teacher centred ^b	2.53 (0.780)	2.53	2.90	2.33	2.53	2.17	2.71
The teaching (does not) over-emphasise factual learning	2.06 (0.926)	2.16	2.10	2.00	2.07	1.58	2.05

^aSignificant intrasite differences: $P < 0.05$; satellite site 1.

^bSignificant intersite differences: $P < 0.05$; class of 2008.

Note: No significant intersite differences in the batch of 2009.

Table 6. DREEM: students' academic self-perception: mean scores for items in the subscale

Students' academic self-perceptions	Whole survey Mean score (Std Dev.)	Class of 2008 Mean score			Class of 2009 Mean score		
		Main campus	Satellite 1	Satellite 2	Main campus	Satellite 1	Satellite 2
I am able to memorise all I need	1.33 (0.978)	1.25	1.40	1.13	1.32	1.75	1.57
Much of what I have to learn seems relevant to a career in medicine	2.73 (0.714)	2.88	2.80	2.63	2.73	2.67	2.38
I feel I am being well prepared for my profession	2.60 (0.719)	2.62	2.70	2.19	2.61	2.67	2.67
Last year's work has been a good preparation for this year's work	2.61 (0.742)	2.59	2.90	2.25	2.61	2.92	2.62
My problem solving skills are being developed here	2.75 (0.737)	2.80	2.90	2.69	2.69	3.08	2.76
I am confident about passing this year	2.63 (0.860)	2.69	3.00	2.44	2.59	2.75	2.62
I have learned a lot about empathy in my profession ^a	2.58 (0.849)	2.73	2.90	2.31	2.50	2.75	2.52
Learning strategies that worked for me before continue to work for me now	2.41 (0.938)	2.52	2.50	2.50	2.28	2.83	2.52

^aSignificant intrasite differences: $P < 0.05$; main campus.

Note: No significant intersite differences.

Table 7. DREEM: students' perception of the atmosphere: mean scores for items in the subscale

Students' perception of atmosphere	Whole survey Mean score (Std Dev.)	Class of 2008 Mean score			Class of 2009 Mean score		
		Main campus	Satellite 1	Satellite 2	Main campus	Satellite 1	Satellite 2
The atmosphere is relaxed during lectures ^a	2.89 (0.665)	2.70	3.10	2.69	2.96	3.17	3.00
I feel able to ask the questions I want	2.40 (0.993)	2.41	2.80	2.50	2.30	2.75	2.48
I feel comfortable in class socially ^b	2.96 (0.668)	2.93	3.20	2.75	2.96	3.08	3.00
There are opportunities for me to develop interpersonal skills	2.87 (0.689)	2.95	2.90	2.40	2.92	2.75	2.71
The atmosphere is relaxed during seminars/tutorials ^b	2.85 (0.614)	2.88	2.90	2.81	2.80	3.00	3.00
The enjoyment outweighs the stress of studying medicine	2.65 (0.948)	2.74	2.60	2.44	2.65	2.17	2.81
The atmosphere motivates me as a learner ^b	2.68 (0.813)	2.73	2.80	2.19	2.70	2.58	2.76
I am able to concentrate well	2.50 (0.811)	2.65	2.60	2.63	2.46	2.50	2.19
The atmosphere is relaxed during clinical teaching	2.43 (0.823)	2.42	2.90	2.63	2.41	2.33	2.29
The school is well time tabled	2.37 (0.929)	2.40	2.30	2.50	2.24	2.83	2.67
I (do not) find the experience disappointing ^{b,c,d}	2.80 (0.896)	2.68	2.90	2.50	2.82	2.73	3.19
Cheating is (not) a problem in this school	2.87 (0.946)	2.85	2.70	3.00	2.87	3.00	2.76

Significant intrasite differences: $P < 0.05$; ^amain campus; ^dsatellite site 2.

Significant intersite differences: $P < 0.05$; ^bclass of 2008; ^cclass of 2009.

Table 8. DREEM: students' social self-perception: mean scores for items in the subscale

Students' social self-perceptions	Whole survey Mean score (Std Dev.)	Class of 2008 Mean score				Class of 2009 Mean score				
		Main campus	Satellite 1	Satellite 2	Main campus	Satellite 1	Satellite 2	Main campus	Satellite 1	Satellite 2
I have good friends in this school ^a	3.15 (0.729)	3.16	3.20	2.63	3.18	3.25	3.24			
There is a good support system for students who get stressed ^b	2.50 (0.948)	2.53	3.10	2.38	2.41	3.25	2.35			
I am (not) too tired to enjoy this course	2.15 (1.018)	2.30	2.30	2.19	2.18	1.83	2.43			
I am rarely bored on this course	2.42 (0.729)	2.50	2.20	2.31	2.41	2.42	2.48			
My accommodation is pleasant ^{a,c}	3.14 (0.640)	3.24	3.00	2.63	3.16	3.25	3.19			
My social life is good ^{a,c}	2.46 (0.998)	2.41	3.00	1.88	2.55	2.25	2.38			
I seldom feel lonely	2.45 (1.029)	2.41	2.30	2.38	2.58	2.08	2.24			

Significant intersite differences: $P < 0.05$; ^aclass of 2008; ^bclass of 2009.

Significant intrasite differences: $P < 0.05$; ^csatellite site 2.

While recognising that schools with innovative curricula tend to report higher scores on DREEM, two confounding factors must be kept in mind: that the DREEM specifically seeks out features of such curricula, and that the extent of student centredness may lag behind purported change in teaching strategies. This was evident in a score of 109.9 reported from a Trinidad school (16) with a problem-based curriculum. On the other hand, a school from Nepal (14) reported a global score of 130.

Subscale ranking at UBC's distributed programme contrasts with the ranking at most traditional schools where academic self-perception was ranked above the perception of teachers. The score for perception of teachers at the UBC sites was higher than all traditional schools and comparable to or higher than that of a UK innovative school (11). Subscale scores clearly indicate that all groups perceived their teachers positively. To understand the implication of the perception of teachers, certain aspects of the UBC Medical School need to be considered. Firstly, although the three sites are geographically separated, teachers who deliver lectures, conduct tutorials in anatomy and histology, and chair the PBL blocks (via synchronous videoconference) are common to all sites, while facilitators for PBL, preceptors for clinical teaching and the faculty who assist laboratory sessions are based locally. Secondly, teachers who use synchronous videoconferencing technology undergo training in this mode of delivery. Finally, a large proportion of the student-teacher interaction in this programme takes place via the videoconference or PBL sessions. It has been documented that teachers tend to be better prepared when using videoconferencing (17), and this may have a bearing on the positive perception of teachers' knowledge and preparedness at UBC. In the training to facilitate PBL sessions, respect for the individual is emphasised. Teachers act as facilitators rather than information providers and participate on a more equal footing with students. Thus, both learning through videoconferencing and PBL may have a favourable impact on the students' perception of teachers.

Despite a largely positive perception of teacher attributes, their ability to give feedback was considered questionable. Weakness in giving feedback has been identified by medical students in most of the studies cited above. Teachers hesitate to give negative feedback and require training to develop skills in giving both positive and negative feedback in a timely and sensitive manner.

The perception of the atmosphere ranked only second to that of teachers. The finding that the atmosphere in clinical sessions is less relaxed than lectures and tutorials is not surprising as students attend clinical sessions at family practices or hospitals, where the working environment is geared to serve the patient ahead of the student. Seabrook (1) notes that in a clinical session 'students often perceived that they were in the way and their individuality was not

valued'. In an integrated curriculum, this experience corresponds to the beginning of clinical- or hospital-based training in more traditional schools.

The major area of concern in the learning domain was that teaching overemphasised factual learning. Clearly medical students everywhere seem to share this perception as reported in studies using the DREEM from Nigeria, Nepal (14), Saudi Arabia (13), India (15) and Trinidad (16). Additionally students were not confident that long-term learning was emphasised over short-term learning. It is interesting that both areas of concern are related to what is taught rather than how it is taught and allude to the curriculum content rather than its delivery.

The domain of academic self-perception was rated less positively than the other domains. It appears that although the students perceived their teachers and atmosphere positively, this did not directly translate into their self-confidence. Academic self-perception may therefore be more closely related to the ability to cope with the workload. Difficulty in coping with workload is reflected in the uniformly poor perception of being able to memorise all that is needed. This perception appears to be universal among medical students, both in traditional and innovative schools, as demonstrated by studies using the DREEM. Medical students everywhere feel overwhelmed by the workload.

All groups felt positive about some aspects of their social self and were concerned about others. All groups rated having good friends at the top of the subscale; however, there were significant differences in the strength of positive perception. Interestingly, even schools with low global scores, such as Saudi Arabia (13), have reported high mean scores (3, 4) for having 'good friends'. On the other hand, 'I am (not) too tired to enjoy this course' was rated much lower by all groups. This perception probably reflects work overload and was also expressed in lower scores of other related items.

The major strengths of the programme at UBC's distributed programme reside in the perception of teachers and their humane attitude towards students. The teachers at UBC have been successful in creating a humane and safe environment for students and have fulfilled UBC's mission goals to a large extent. Teacher training for giving good feedback is an area that requires attention.

Its weaknesses relate to the content and volume of the formal curriculum, which are shared with the medical education at large. The common perception of work overload and related desiderata at all sites underlines the need for review of the formal curriculum. The students' perception of what needs to be learned may be at odds with that of curriculum planners, and the extent to which curriculum content can be decreased without compromising outcome competencies is debatable. Nevertheless it is

clear that academic strain contributes to stress and minimises enjoyment of the course.

Aspects of the learning environment, which are shared by all sites, pertain to those areas of the learning environment that are managed by the parent institution, namely, attributes and skills of the faculty and the formal curriculum. A greater divergence between sites/groups was found in areas of the learning environment that were dependent on social arrangements, personalities of students/classes and local factors (including class size) that are less amenable to institutional regulation. Significant differences in the perception of the learning environment between sites were largely class specific and more evident in the class of 2008. A few trends and differences were consistent across batches, such as the perception of student support, which was consistently better at satellite 1 than at the other two sites. Apparently identical student support services are in place at all sites; therefore, insight into why students at one site are more satisfied may help other sites to adopt new strategies for improvement.

The sense of greater satisfaction with the learning environment in the class of 2009 at satellite site 2 compared with the class of 2008 raises a few possibilities: that early teaching issues, which impacted the pioneer batch, have been ironed out; that the collective personality of the class of 2009 is different from that of the pioneer batch; that more students have been posted to their choice of site in 2009; that senior peers have a favourable impact on the batch of 2009; and that as the second batch they do not have the same anxieties as the pioneering batch. Further research using qualitative methodology and involving the faculty may help clarify the reasons for the differences in the perceptions of the two classes and how, or if, these were addressed.

It is clear that for student satisfaction, all sites must be perceived as equitable and, if differences exist, the advantages must offset the disadvantages. The absence of perceived equity may have a deleterious effect on the learning environment at a site and influence the choices of satellite sites for future students. An attempt to improve the perception of the learning environment at all sites and make it equitable is a challenge in a distributed programme. In a collaborative and collegial atmosphere, each site of a distributed programme can develop its own identity and traditions within the context of an overall positive environment. This will serve to enhance the confidence of the local site rather than detract from the cohesiveness of the programme.

In a new programme, such as at the UBC Medical School, the learning environment is likely to remain dynamic and be influenced by intentional and unintentional changes and developments. However, it appears

reasonable to assume that this dynamism will be more evident in the early years of the programme. During this time, keeping a finger on the pulse of the climate through both quantitative and qualitative measures is imperative.

Limitations and considerations

This study describes the learning environment within the explicit context of UBC's distributed programme. Within this context, it demonstrates the potential for inequity in the learning environment at separated sites despite a shared curriculum and underlines the need for ongoing evaluation of the learning environment and collaboration between sites. These pointers may be transferable within the context of similar distributed programmes that are being implemented in Canada (18) and elsewhere.

The focus of this study was to evaluate the quality of the learning environment and its inequities in a new distributed programme. At the time of the study only two classes had completed a year in the programme, therefore students from all 4 years of the programme could not be included and the study was cross-sectional in design. We acknowledge that a longitudinal study triangulated by qualitative data and faculty input will flesh out a more global and evolving perspective. Another limitation of the study is the low response rate from the class of 2008. Low response rates may have resulted through a combination of factors, that is, voluntary participation, imminence of examinations, and survey fatigue (as this was the first batch of the new programme).

Although using the DREEM has helped to establish the profile of the learning environment in UBC, the DREEM is not equipped with questions to uncover comparative perceptions of sites or the effective use of technology-enabled learning. A validated instrument that includes these aspects of a distributed programme is unavailable at this time and needs to be developed.

Conclusion

This study illustrates the challenge of maintaining an equitable and positive learning environment at all sites of a distributed programme and underlines the need for careful ongoing evaluation of the learning environment and intersite cooperation to execute timely remedial actions. Ideally such an evaluation should include the perception of both students and teachers through qualitative and quantitative methods. Survey instruments need to include measures for evaluating the comparative perceptions of the sites as well as technology-enabled learning.

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