

The Concept and Implementation of “Distributed Learning” – Our Early Experience

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Introduction

The concept of “distributed learning” (DL) is not new and is probably still evolving. A suggested definition for this is the inclusion of students in situations where learners and teachers aim to achieve the same educational objectives in a variety of different decentralised learning sites. While the concept was developed through necessity due to increased student numbers and teaching sites, it coincides well with the imperative to expose students to a sufficiently wide range of medical practices for proper learning of medicine as a whole. There are different models on the implementation of “DL” and this paper discusses the issues related to the implementation of distributed learning, focusing on the model adopted by the International Medical University and sharing results of a preliminary study carried out on our students in their final semester.

Historical Perspective

Sir William Osler exposed medical students to ambulatory patients in the outpatient setting, thereby first drawing medical education away from traditional medical ward setting and introducing the concept of community-based learning in medical education.¹ It could be argued that the concept of “distributed learning had had its beginning from this novel idea.

Distributing medical students outside of the teaching hospital setting may have developed over time out of necessity. It is obvious that an increasing number of students are saturating hospital wards and creating problems of patient fatigue i.e., there are too many students examining a few selected patients. It is also clear that there are many clinical materials as well as teaching expertise outside the environment of teaching hospitals and academia. What has been recognised over time too are changing disease patterns, which necessitate the learning of medicine in various settings i.e., hospital and health facility outside the main hospital in the community, and the flow of patients between

these sites. It then becomes imperative that students are exposed to and become familiar with these differing levels of patient care. DL then appears to be a necessity rather than an alternative.² In DL, the core content of curriculum could still be delivered through novel methods which optimally harness the teaching human expertise and clinical opportunities. In fact, some have argued that DL actually makes medical education affordable, as students can be trained in the environment in which they will eventually serve.³

Definition

A suggested definition of DL is the involvement of students in situations where learners and teachers aim to achieve the same educational objectives in a variety of different decentralised learning sites. This definition asserts that the process of learning through various teaching settings outside the teaching hospital can achieve the same educational goals of making doctors and is therefore as important as any other traditional teaching sites. In the context of teaching medicine, it involves more than distance learning or computer-aided learning.

Evidence for its Effectiveness

For many years, most district hospitals in the United Kingdom have been used to teach medical students, indicating the already widespread practice of DL and its acceptance.⁴ In Australia, studies have shown that the clinical experiences and academic performance of students studying in rural and urban setting is comparable.^{5,6} It provides further evidence that rural primary care is an excellent setting for high-quality clinical and educational experiences with an increased overall exposure to core clinical problems that correlated with an improved academic performance.⁶ In the same study, students in the rural secondary hospital reported increased exposure to common conditions and no significant differences in the opportunities to undertake common procedures.

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Furthermore, doctors graduating from such medical schools seem to find it less difficult to practice medicine in rural areas. The Australian experience is considerable in this area; preliminary evidence from Queensland shows that rural clinical schools have a positive impact on rural intern choice.⁷ Change of place, change of pace and change of status were shown to be instrumental in the junior doctor's decision making.⁸ On the other side of the globe, positive experiences in terms of assisting rural communities recruit physicians have been reported from Canada and the United States.^{9,10}

Implementing “Distributed Learning”

There are no set patterns as to how to implement DL. It is obvious that the model of implementation should take into account the nature of the curriculum adopted by the university and the availability of teaching facilities and sites. Three possible models of DL have been used separately or concurrently by various universities worldwide:

- 1. All students pass through learning sites in a specified sequence—tertiary and district hospitals, and community clinics;
- 2. Student cohorts rotate through different centres for the same nature of clinical rotations; and
- 3. Student cohorts in one centre are assigned to different settings within the same discipline e.g., nephrology or cardiology centres to learn general medicine.

Like any other teaching/learning process, there need to be adequate structure and teaching staff in place before the curriculum can be properly implemented. Undeniably, delivering the stated curriculum in such varied and distributed sites will be a major challenge. A suitable environment would be one where students are able to collaborate with motivated staff to enhance their learning. Essential to implementing DL as an educational strategy is establishing a system consisting of an adequate learning environment which will include teachers, students, patients, and resources (library, the internet, discussion rooms etc.) and the processes, which refer to the curriculum delivery and assessment. The expected final outcome as well as the course objectives should be clearly stated in advance (Fig. 1). Experiences reported from Australia show that the key factors guiding the successful outcome for tuning

medical education for rural-ready practice were the resourcing and implementation of the infrastructure and the teaching and learning pedagogy.¹¹

Curriculum Delivery: Outcome-based Curriculum and the Use of Study Guides and Student Portfolio

A possible problem relating to the coordination of teaching/learning activities is ensuring that the curriculum, delivered at differing sites and levels of healthcare, achieves the intended outcomes of undergraduate medical education.¹² DL naturally involves a much greater number of teaching staff and a larger range of learning environments, and runs the risk of misguidance, from either the perspective of teachers or students, in the learning journey. Successful implementation of DL in remote settings is also linked using appropriate teaching and learning pedagogy and having a curriculum that is suited to the local needs.^{13,14} At IMU, the final outcomes of our university teaching/learning process are defined by 8 clearly identified educational objectives (Table 1). The latter drives the direction of the whole curriculum development and delivery. It would be an advantage if the programme identifies the core curriculum and clearly states the intended objectives organised under the main outcome domains. Also, as in many modern methods of teaching medicine today, study guides that cut across all conventional boundaries of medical disciplines can provide the means of helping the students navigate through the sea of subjects and diseases, in order to identify priorities in learning. Our university seeks to use these study guides during DL for this purpose. Complementing this is the use of the student portfolio in which the student

Table 1. International Medical University Eight Outcome Domains

1. Application of basic sciences in the practice of medicine
2. Clinical skills
3. Communication skills
4. Disease prevention and health promotion
5. Family and community issues in healthcare
6. Professionalism, ethics and personal development
7. Self-directed life-long learning and information management
8. Critical thinking and research

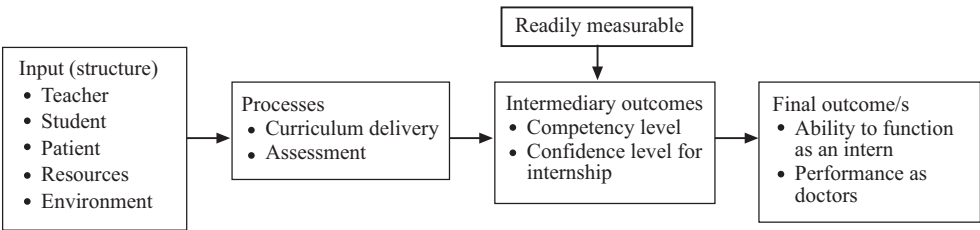


Fig.1. Implementing and evaluating distributed learning.

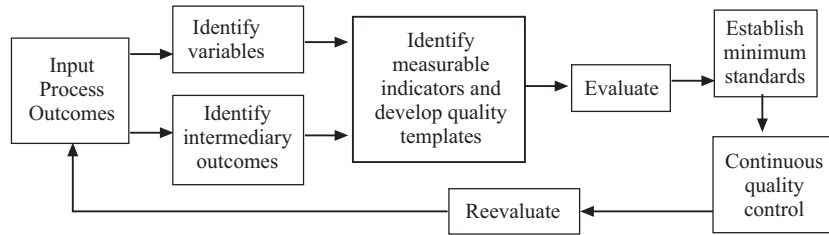


Fig. 2. Developing measurable indicators and continuous quality control.

records cases clerked and observed, and in which lecturers regularly check and comment upon to provide feedback to students. Such means encourage the development of self-learning and a sense of responsibility in one's own learning journey.

Quality Assurance in Distributed Learning

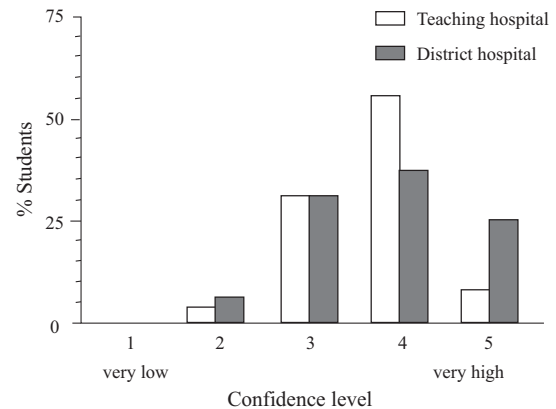
The two major concepts of quality assurance in medical education i.e., standards and fitness for the purpose, also apply when evaluating DL. We should attempt to see whether the required standards are being met and whether the students we prepare are able to do what they are expected to do (product/outcome). This is addressed at the next logical step i.e., in identifying the variables, developing measurable indicators and quality templates for the purpose of continuous evaluation.¹⁵ A proposed model for establishing a quality assurance process is shown in Figure 2.

Distributed Learning in IMU and Evaluation of Outcomes

In our university, the first 2 cohorts rotated through the main teaching hospital (Seremban Hospital) and its key community-based healthcare centres for the entire clinical phase (year 2002/2003). However, starting from the third cohort (the year 2003 onwards), clinical students spent the last 6 months (Semester 10) in a general district hospital (Batu Pahat Hospital) as a DL approach. Our model is therefore one where the students passed through learning sites in a specified sequence.

The final outcome of any programme will be measured or rated by the quality of its products. Ideally, this should be carried out by tracking the graduates and evaluating their performance as interns and residents. However, for logistical reasons, this is difficult in our situation, as graduates from various schools are pooled and assign to Ministry of Health hospitals all over the country. Therefore, certain intermediary outcomes that are more readily assessable are identified to gauge the success of such curriculum delivery. Since our university teaching/learning process is defined by 8 clearly identified educational outcomes, we utilised some of the specific measurable competencies under the outcome domains for our study. Comparisons have been made between 2 cohorts (unpublished data); those who

(A) In performing common procedures



(B) In commencing internship

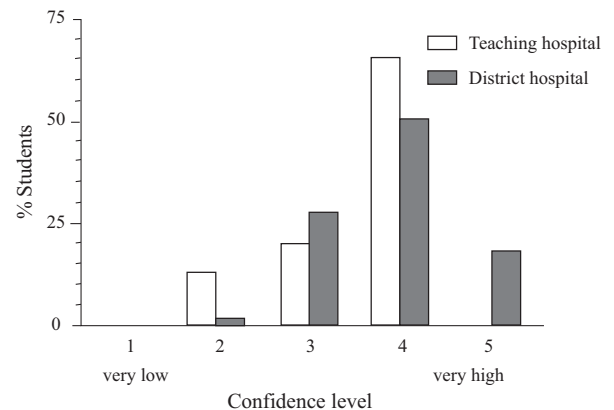


Fig. 3. Confidence level as reported by medical students on completion of final semester in teaching and district hospitals.

were and who were not rotated to the general district hospital setting.¹⁶

Sixty students who stayed back in our main tertiary teaching hospital throughout their clinical years (between February and August 2003) and 76 students who rotated to district general hospital (between February and August 2004) rated their confidence level on a numerical scale accompanied by ordinal descriptions expected for each level. The results were studied from the perspective of competence in defined common procedures and preparedness for internship. The following elements were considered:

- a) Confidence in commencing internship;
- b) Confidence in performing common procedures;
- c) Ability to defend a clinical action; and
- d) Ability to communicate with patients.

Our results showed comparable patterns of ratings between both groups, with over 50% of the students reporting above-average ratings (Fig. 3). While our findings do not show any superiority of one group over the other, they certainly suggest that sending students to a decentralised environment for learning is not detrimental.

Conclusions

DL is an educational concept that has become necessary and will continue to evolve. That all concerns and questions that local medical educators and physicians have about students undertaking their teaching and learning outside tertiary institutions seems to have been addressed in several centres around the world. Concerns that students' academic performance in the tertiary hospital would be better than that of students' regional hospitals or community settings is not justified and it challenges the orthodoxy of a tertiary hospital education being the Gold Standard.²

The favourable preliminary study findings reported here illustrate this potential and chronicle our own university's attempt to implement it. Admittedly, there is much room for improvement and that the notion of DL can be explored further. For example, decentralised sites for teaching medicine can include many other types of healthcare sites, such as day care medical and surgical units, community and urban subspecialty services. Utilising multiple sites with differing clinical recourses and medical expertise, especially in places with minimal resources, make teaching/learning activity relevant to DL a challenging proposal. The scope of potential skilled teachers outside the academia available for teaching/learning activity also makes DL an attractive proposition; however, appropriate training and education of teachers would be a prerequisite for the system to succeed. The adoption of an outcome-based curriculum and the use of study guides and portfolio offer a unique vehicle for DL to be effectively carried out. Many of the issues related to DL can be overcome through a system of standardisation and continuous quality assurance.

Through DL it is now possible for universities to address the medical workforce imperatives of the communities they serve and at the same time provide intrinsic educational advantages to their students.¹⁷

REFERENCES

1. Bliss M. William Osler—a life in Medicine. Toronto, Canada: University of Toronto Press, c1999:239.
2. Worley P, Esterman A, Prideaux D. Cohort study of examination performance of undergraduate medical students learning in community settings. *BMJ* 2004;328:207-9.
3. Shipengroven JA, James PA. Measuring instructional quality in community-orientated medical education: looking into the black box. *Med Educ* 1999;33:846-53.
4. Catto GR. Interface between university and medical school: the way ahead? *BMJ* 2000;320:633-6.
5. Waters B, Hughes J, Forbes K, Wilkinson D. Comparative academic performance of medical student in rural clinical settings. *Med Educ* 2006;40:117-20.
6. Worley P, Strasser R, Prideaux D. Can medical students learn specialist disciplines based in rural practice: lessons from students' self-reported experience and competence. *Rural Remote Health* 2004;4:338.
7. Wilkinson D, Birks J, Davies L, Margolis S, Baker P. Preliminary evidence from Queensland that rural clinical schools have a positive impact on rural intern choices. *Rural Remote Health* 2004;4:340.
8. Nichols A, Woley P, Toms L, Johnston-Smith P. Change of place, change of pace, change of status: rural community training for junior doctors, does it influence choices of training and career? *Rural Remote Health* 2004;4:259.
9. Gray J, Steeves L, Blackburn J. The Dalhousie University experience in training residents in small communities. *Acad Med* 1994;69:847-51.
10. Smucny J, Beatty P, Grant W, Dennison T, Wolff L. An evaluation of the rural medical education program of the State University of New York Upstate Medical University, 1990-2003. *Acad Med* 2005;80:733-8.
11. Maley M, Denz-Penhey H, Lockyer-Stevens V, Murdoch JC. Tuning medical education for rural-ready practice: designing and resourcing optimally. *Med Teach* 2006;28:345-50.
12. Harden RM, Crosby JR, Davis MH. An introduction to outcome-based education. *Med Teach* 1999;22:7-14.
13. Worley P, Silagy C, Predeaux D, Newble D, Jones A. The parallel rural community curriculum: an integrated clinical curriculum based in rural general practice. *Med Educ* 2000;34:558-65.
14. Denz-Penhey H, Murdoch JC, Lockyer-Stevens VJ. 'What makes it really good, makes it really bad.' An exploration of early student experience in the first cohort of the Rural Clinical School in the University of Western Australia. *Rural Remote Health* 2004;4:300.
15. Bowen JL, Stearns JA, Dohner C, Blackman J, Simpson D. Defining and evaluating quality for ambulatory care educational programme. *Acad Med* 1997;72:506-10.
16. Ramesh JC, Sivalingam N, Lai NM, Kew ST, Latif AM. Setting the scene for distributed learning in an undergraduate medical programme – benefits of quality templates [abstract]. 5th SEAAIR Conference, Bali, 14-16 September 2005.
17. Worley P, Prideaux D, Starsser R, Silagy C, Magarey J. Why we should teach undergraduate medical students in rural communities. *Med J Aust* 2000;172:615-7.