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How do undergraduate medical students learn ophthalmology in a clinical environment?

GERALDINE R. MCBRIDE[1] MSc FBDO (LVA Hons) BSc (Hons) AND
PETER CANTILLON[2] MB BCH BAO MSc MRCGP MHPE

[1]Orthoptics, Ophthalmology Department, University Hospital Galway, Galway, Ireland

[2]Department of General Practice, Clinical Science Institute, National University of Ireland Galway, Galway, Ireland

Abstract

Aim: **This phenomenological study looked at the nature of undergraduate medical student learning in an ophthalmology environment. The study set out to identify what influences the quality of medical students' educational experience in ophthalmology. The study was conducted on 17 final-year medical students from a medical school in the west of Ireland, after undertaking their 3-week combined clinical-based ophthalmology/neurology programme at a tertiary referral teaching hospital.**

Methods: **Learning diaries were used as a reflective tool for recording the learners' personal learning experiences. A primary analysis of the diaries was used to formulate a topic guide for semi-structured interviews with each of the participating students. Template analysis was used to code the data, create themes and establish thematic hierarchies.**

Results: **Individual students' learning experiences were affected by intra-personal and inter-personal factors. Inter-personal factors included the quality of the learner–teacher relationship and the interaction between peer learners. Intra-personal factors were individual perceptions of what was expected of the students by tutors and by the medical school.**

Conclusion: **To create positive and effective learning environments for learners in ophthalmology and orthoptics, teachers should become much more aware of themselves as models of practice and should take time to observe students perform as well as provide feedback.**

Key words: Learning environment, Medical students, Ophthalmology

Introduction

The clinical learning environment is a vital component in the education of health professionals.[1] Classroom learning provides guidance on what to learn but it is immersion in the clinical environment that influences integration of knowledge in the context of real cases. Real patient learning seeks to situate students in contexts that integrate classroom and clinical knowledge in a manner that is 'meaningful, motivating and that deepens understanding'.[2] In clinical settings students are motivated to learn through active participation with patients and immersion in the activities of clinical teams.[1]

Clinical learning environments have been described as 'an interactive network of forces within the clinical setting which influences the students' clinical learning outcomes'.[3] The learning environment is the physical space and the people within this space; it is the relationships between the learners and the teachers, and the wider community.[4] The learning environment is affected by how the curriculum is delivered and assessed, the quality of the teaching and support mechanisms, the individual teacher's style and enthusiasm, and how the physical environment is utilised.[5] The clinical learning environment provides a rich matrix of material for students to learn from; but it is also a workplace, and learning needs must match the demands of providing a service.[4] To create positive learning environments students must feel part of the clinical team, and learn through participation (i.e. an apprenticeship model).[4] The relationships between clinicians, managers, patients and learners are critical determinants of what are regarded as positive learning environments.[3]

Learning in an ophthalmology environment is poorly understood. There has been a lack of research undertaken which can explain the phenomenon fully and the research that has been published consists of surveys with poor response rates. A survey of Canadian graduates found that most students (66.8%) rated the quality of their ophthalmology education highly but their own skill level poorly. The authors concluded that this was likely to be a result of insufficient time for development and refinement of skills.[6] The Canadian survey demonstrated that some learning might have occurred, but not *how* the learning occurred. A second Canadian survey[7] looked specifically at ophthalmoscopy skills acquisition in medical students in different years of study. The authors compared learning from one clinical skills session in years 1 and 2, with 2.5 days of real patient learning in an ophthalmology clinic in year 3.[7] They were able to establish that real patient learning was more effective

Correspondence and offprint requests to: Geraldine McBride, Senior Orthoptist, University Hospital Galway, Galway, Ireland. e-mail: geraldine.mcbride@hse.ie

than classroom-based clinical skills acquisition in ophthalmology, but they were not able to discern how learning in the presence of patients helped students to develop ophthalmoscopy skills.

We know from studies done in other disciplines such as nursing and medicine that clinical learning is inhibited by problems with the student–clinician relationship, a lack of feedback, a lack of opportunities to practise skills and a lack of time to reflect on experience, given rapid patient throughputs.[2] There are no such studies of what hinders or helps student learning in ophthalmology, thus the need for this research.

In order to conceptualise clinical learning, we need to define what we mean by learning. In this research we used a social cognitive perspective on learning. Coined by Bandura,[8] social cognition recognises that learning is both intra-individual and inter-individual. In other words learners construct their own meanings and understandings inside their heads but are also heavily influenced in what they know and how they know it by their social contexts.[8] Within social cognitive theory, learners motivate themselves and choose courses of actions based on behavioural consequences.[9] Learners use self-monitoring and self-guidance to inform their self-efficacy[9] (i.e. their sense of confidence in their own competence). Learners derive a sense of self-efficacy in relation to particular tasks or competencies by *mastery* – i.e. successfully completing tasks; vicariously by *observing* the successful actions of others – role models, peer influence and self-judgement; and through *verbal persuasion* of others.[9] The aim of this research was to elucidate how students develop self-efficacy in terms of their ophthalmology skills in relation to their participation in clinical learning environments.

Methods

This was a phenomenological study which set out to describe the lived experiences of ophthalmology learning by undergraduate medical students from one medical school. Phenomenology is a qualitative research paradigm in which the primary concern is to describe participants' actual lived experiences of a phenomenon rather than their perceptions or beliefs.

The students were final-year medical students from a medical school in the west of Ireland who were undertaking a combined 3-week ophthalmology/neurology clinical-based programme. The programme was delivered through lectures, and clinical experiences in an adjacent university teaching hospital. Students from four sequential clinical placement cohorts were invited to participate in this research. Participation involved keeping a learning diary during each student's ophthalmology placement and an end-of-placement semi-structured interview.

The learning diaries were used to encourage recall and reflection and allowed the participant to explore his/her personal reactions to their clinical learning experiences. The content of the learning diaries was used to inform the content of the topic guide for the subsequent semi-structured interview with each participant.

The semi-structured interviews took place immediately after the ophthalmology/neurology 3-week rotation was completed. The interviews took between 30 and 60 minutes to complete per student. During the interviews, students were asked to recall learning situations and discuss the impact of patients, clinicians, tutor, peers and the facilities on their learning.

Interviews were transcribed verbatim and entered with the learning diary data into NVivo 9 software. There was a cyclical approach to data collection and analysis in which each interview analysis informed the content of the next interview topic guide. An open coding approach (i.e. coding each line or sentence within the transcript for its inherent meaning) was used to create an initial coding frame. The researchers coded a limited set of transcripts separately and then met to establish an agreed open coding frame that was subsequently applied to all the interview transcripts. Having coded the full set of transcripts, template analysis was used to develop an interpretive framework. Template analysis is a well-established qualitative approach in which researchers identify similarities and distinctions between descriptive codes, group codes into categories, and then create hierarchies of categories that subsequently facilitate interpretation. The hierarchy of categories is demonstrated in the Appendix. In keeping with sound qualitative research practice, all participating students were asked to view their interview transcripts and to validate the coding framework and interpretations. Students did not suggest any changes to coding frameworks or interpretations. The ethics committee of the National University of Ireland, Galway reviewed and approved the study. All participants gave written consent before undertaking the learning diaries.

Results

Demographics

A total of 17 final-medical year students were involved in this study, representing four sequential cohorts of student placements in ophthalmology. Whilst this is a convenience sample, the demographic and ethnic distribution of the sample was almost identical to that of the entire final medical school population (Fig. 1).

What did the students learn in this environment?

Students described their learning in terms of gaining specific ophthalmology knowledge and skills, which would allow them to examine and diagnose their future patients. They gained an understanding of how ophthalmic conditions are managed by ophthalmologists and orthoptists. The students also acquired an insight into how an ophthalmology clinic functioned, and they gained a good understanding of the dynamics of a very busy and in-demand clinical service, thus preparing them for their new roles as qualified doctors.

How ophthalmology is learnt

Theme 1: Inter-personal factors influencing learning

Students' participation in the ophthalmology clinical environment was influenced by their relationships with patients, peers, the clinical tutor and the other clinicians.

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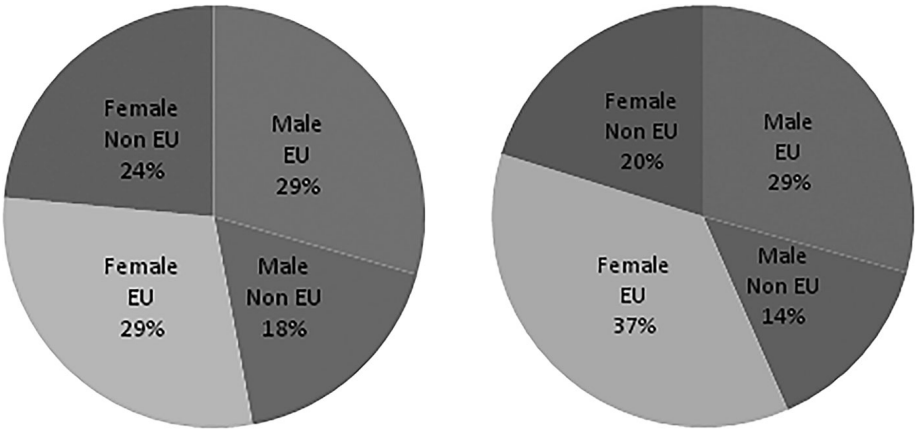

Fig. 1. *Left:* Sample demographics. *Right:* Classed demographics.

Learning from patients has previously been identified as the key to learning in medicine, nursing and allied health. However, as ophthalmology is a visual subject, the opportunity to learn from real patients, with real and often atypical signs, cannot be replaced with learning from textbooks and lectures. It is only through the student's own experience of examining patients that it can be learnt and understood, and this was strongly reflected in the data, with 86 references from 16 participants highlighting the importance of learning ophthalmology through interaction with patients:

> It's not enough to look into the books, it's kind of different from when people show you pictures and when you actually see it in the patient's eyes. (*Student 14*)

The relationship of the students with their peers played a significant role in this environment as they attended the clinic in groups of approximately 6. There were issues with attending in groups: students felt concerned about the patient's comfort, they felt rushed and sometimes they felt inadequate when they compared themselves with their peers. However, 13 participants reported some degree of peer learning, students reporting supporting each other, practising skills on each other, observing and listening to each other and using their individual experiences to quiz and discuss cases among themselves:

> … as a group we would piece it together and if you hadn't seen it and somebody else had you might go back and look again. (*Student 5*)

In terms of relationship with teachers, students distinguished between their relationship with the designated ophthalmology clinical tutor and that with other teachers (consultant ophthalmologists). The student's relationship with the teacher was reported to be the most significant inter-personal factor influencing learning in this environment. The designated clinical tutor was described as someone who established an engaging learning environment by involving the students in aspects of clinical care by questioning them, by providing them with explanations and most importantly by giving the students feedback. The clinical tutor also facilitated their learning by finding appropriate patient cases, setting clear learning objectives, encouraging and supporting the students and ensuring every student had an opportunity to practice.

> I find that seeing the patient and then having someone standing next to me saying this is how to do it, this is what you're looking for, and then this patient's got this … then [that enables] you see it. (*Student 8*)

However, this interaction led to a dependency on the one designated clinical tutor, with 14 participants reporting that there was limited learning opportunity without the designated clinical tutor present. They felt incapable of learning without the clinical tutor and they were not motivated to attend clinics led by another consultant ophthalmologist:

> The only caveat I would say with that is, that as an environment for learning it is entirely based on who you're with … if you're with a doctor that's not interested then you won't get much out of it. (*Student 9*)

The students derived most learning by doing or practising skills with patients and through their question/answer interactions with the designated clinical tutor. The students reported that learning by observing ophthalmology teachers or performing skills without being observed or receiving feedback was essentially ineffective:

> People interacting! I think people telling you what's going on, because it's hard to see what's going on whenever they're working in someone's eye. They're so small and whatever, and if you're up the other end of the room and no one is saying 'this is what we're doing now', there is probably no benefit in being there at all. (*Student 7*)

> Maybe we should have been more enthusiastic but it's very hard when you're with this group of students to

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> approach someone and say you have to teach us. So it's tough. (*Student 5*)

Theme 2: Intra-personal factors influencing learning

The data showed that the learning and ophthalmology was influenced by intra-personal factors (i.e. internal to the student). These internal factors can explain how students who participated within the same group and in the same context might potentially emerge with very different learning outcomes.

The facilities and space did not influence participation; however, the fast pace of the eye clinic with its high volume of 'cases' provided the students with ample opportunities to practise their skills. Repetition was a key producer of learning, with 14 participants saying that repetition reinforced learning and made them feel confident, and supported self-efficiency. The high volume of cases also allowed the students to view the same condition with varying severity and with various presentations, thus providing them with a deeper understanding of the condition. However, this high volume of patients meant each student had less individual time with the patient, producing feelings of pressure and of being rushed, and also meant they did not have an opportunity to learn from the patient's history.

Final medical school examinations and the possibility of having an 'eye' patient in the examinations was the most significant motivator to learning. However, there were other motivators including not wanting to 'let the designated clinical tutor down'. For example, students sometimes confabulated rather than indicate to the tutor that they could not see some feature on the retina that the tutor was trying to demonstrate:

> ... after a while I was kind of embarrassed and so sometimes I would actually lie and say I had seen it. (*Student 15*)

Discussion

This study has shown that learning in clinical environments is influenced by intra-personal and inter-personal factors. In relation to learning ophthalmology there was strong evidence to show that the acquisition and transfer of theoretical knowledge requires learning from real patients; supported by questions, observation and feedback from clinicians. It has been suggested that an 'unsafe' learning environment is an ineffective learning environment, diverting the student away from learning.[10] To create a safe learning environment the student must feel supported and included.[10] The student must receive good-quality feedback, and the social dynamic of the group should be monitored and managed.[10]

Within the ophthalmology environment studied there appeared to be a marked dependency on one designated clinical tutor and a concomitant lack of opportunity to learn in the absence of that tutor. Learning in medicine is still based on a traditional apprenticeship approach where learners witness clinical practice and learn from hands-on activity when permitted to do so.[11] Clinical learning would arguably be a lot more effective if teachers adopted a more structured apprenticeship approach. An apprenticeship should involve: *modelling* – where the student observes the clinician at work; *scaffolding* – where the clinician supports the student in performing tasks; *fading* – where the clinician slowly removes support whilst the student performs; and *coaching* – where the clinician provides feedback on the student's performance. It has been suggested that by giving students access to many clinicians they will get an opportunity to observe many models of expertise, learn alternative ways of performing tasks, and learn to recognise that no one individual exemplifies all knowledge and expertise.[11] This study's findings suggest that for a successful clinical learning environment, all clinical teachers should be much more aware of how their own practice provides a model for learners and should attempt, where possible, to get learners to perform knowledge and/or skills with associated feedback.

In terms of credibility, the lead researcher's status as a member of staff could arguably have affected what the students chose to talk about. However, as the researcher was not an examiner or an ophthalmologist, it is also arguable that the students' relationship with the researcher was more open and honest than it would have been with a clinical teacher. Being single-site and qualitative this study does not claim generalisability, but we do believe our findings are both important and transferable to other clinical settings and disciplines such as orthoptics.

Conclusion

This study has highlighted the importance of paying attention to the teacher–learner relationship and to how apprenticeship learning should work in clinical settings. Future research should look more specifically at the inter- and intra-personal factors that characterise clinical education, i.e. relationships, learner participation and the influence of social context, as these are likely to be critical determinants of the quality of clinical education.

Suggestions from this study which could be applied to orthoptic student clinical placements

1. Ophthalmological learning environments need to promote learner self-efficacy in terms of knowledge and skills.
2. Positive learning environments should be characterised by attention to inter-personal relationships between teachers and students.
3. Positive learning environments should also involve a more structured approach to apprenticeship, with conscious modelling of practice and making temporal space for students to perform as well as receive feedback.

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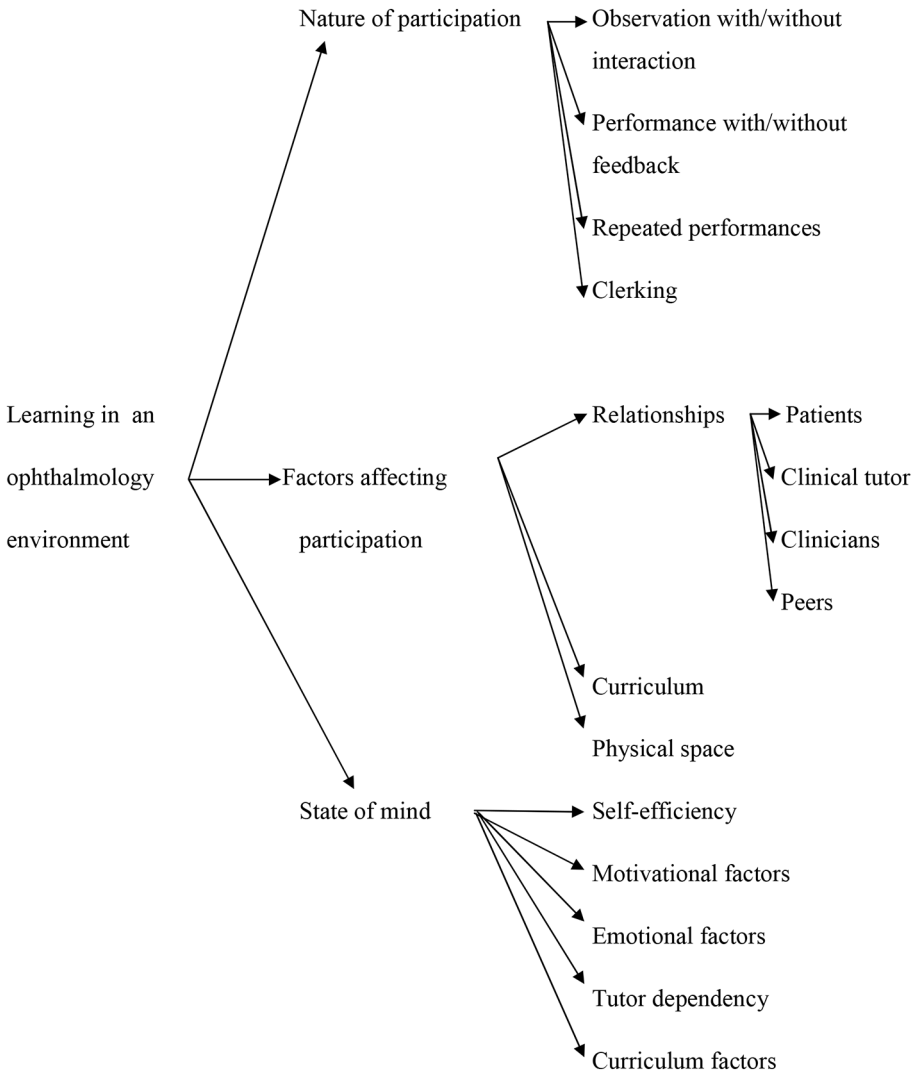
Appendix. Template analysis output



The authors declare there are no competing interests.

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