

**Leeds Institute of
Medical Education**

SCHOOL OF MEDICINE



UNIVERSITY OF LEEDS

CONNECTING FOR
EXCELLENCE

Annual Report 2014/2015

Section 1 MAKING CONNECTIONS

Welcome to the second LIME annual report. The production of a high quality publication like this does not occur without a lot of hard work and effort. When everyone is very busy we have to ask ourselves if there is still a need for such a document. I strongly believe there is and that its purpose is threefold. It is a chance for staff within LIME to understand the breath of work undertaken by the Institute and for us to celebrate colleagues' achievements. Secondly it is a way of demonstrating the value of having a defined and identified group of staff dedicated to the improvement of student education, and highlighting work they undertake to ensure Leeds stays at the forefront of medical education nationally and internationally. Finally, it is a testament to innovation and creativity within LIME which we are eager to convey to our many visitors and current and future collaborators.

I am proud to work in LIME and to have such talented and able colleagues. I hope you enjoy reading this report and finding out more about the work we do. If you need any further information about individual projects or work streams or would like to get involved more directly in teaching, please don't hesitate to contact us. I am very grateful to Martin McAreavey and his team for producing this report.

Trudie E. Roberts

Director, Leeds Institute of Medical Education



**Winner of ASPIRE Award Recognising
International Excellence in Student Assessment**

2014

www.aspire-to-excellence.org

Leeds Institute of Medical Education

excellence through scholarship





Section 2

CONNECTING STUDENTS WITH AN OUTSTANDING EDUCATION

National Student Survey – A Top Ten Medical School

The Medical Degree programme (MBChB) at Leeds has had another excellent result this year in the National Students Survey (NSS). Student satisfaction has increased from last year with 94% of final year students stating that they are satisfied with their medical educational experience at Leeds, this NSS result ranking Leeds as a top ten Medical School in the UK, an excellent result.

Category	2015 score (%)	Change between 2014-15 (percentile points)
Teaching	96	0
Assessment	66	-1
Academic support	91	+9
Organisation & management	87	+7
Learning resources	97	0
Personal development	97	+1
Overall satisfaction	94	+3

Report from the General Medical Council visit, October 2014

In autumn, 2014, the General Medical Council (GMC) made visits to medical schools, local education providers (LEPs) and the local education and training board (LETB) in the Yorkshire region in order to assess medical education and training within the area. During their visit to Leeds, the GMC met with students, medical school management teams and those involved in medical education. A very favourable report was written about our MBChB and many areas were outlined as good practice.

Technology Enhanced Learning was looked upon as innovative and impressive due to IT being embedded well in the curriculum and students actively engaged in developing and creating apps with staff.



Overall, how the school engages students in this area is innovative and very impressive, and it is clear that the school is open and supportive to students driving this agenda



GMC

Regional Review of Medical Education and Training in Yorkshire and the Humber: 2014-15.

The GMC met with members of the Patient | Carer Community and were told how they work in partnership with the medical school, having direct involvement in a range of activities within medical education.

“

We were impressed with how the group has become embedded into the teaching, management and research structure of the medical school, and has become an aspect of good practice

”

GMC

Regional Review of Medical Education and Training in Yorkshire and the Humber: 2014-15.

The IDEALS (Innovation, Development, Enterprise, Leadership and Safety) framework was mentioned as another area of good practice. This is a strand in the (2010) curriculum which prepares the students to be leaders and providers of healthcare in the future.

Finally, the school's approach to professionalism was mentioned as good practice where the inclusion of a 'Professionalism ceremony' at the end of Year 3 was both extremely positive and motivating, recognising the students' achievements on the road to becoming a doctor.

Graduation 2015, congratulating the first graduates from Curriculum 2010 and LIME postgraduates



L-R: Dr Ahmad Alamro, graduating with PhD; Professor Trudie Roberts; Nancy Davies; Dr Viktoria Joynes, graduating with PhD medicine; Dr Cait Dennis



L-R: Dr Anne-Marie Reid; Dr Ahmad Alamro, Dr Viktoria Joynes, Dr Alison Ledger; Professor Trudie Roberts



Luke McMenamin, graduating with MBChB and winner of the William Hey Medal

University of Leeds Ceremony to mark Medical Students' Professionalism

On Friday 24th October 2014 the fifth Professionalism Ceremony took place in the Great Hall at the University of Leeds, to recognise the professionalism and commitment of Leeds' Year 3 MBChB medical students.



Sir Graeme Catto

Professor Paul Stewart, Dean of the Faculty of Medicine & Health, opened the ceremony and Professor Trudie Roberts introduced the keynote speakers, Sir Graeme Catto, President of the College of Medicine, Chair of Dignity in Dying and former President of the General Medical Council (GMC) and Ms Sharon Oliver, Director of Learning and Development, Health Education Yorkshire and Humber. Sir Graeme shared with students some of his personal and career experiences as a doctor stressing the importance of making the patient, and patient safety, the centre of their practice.

Ms Oliver reflected on the many challenges that Healthcare faces now and into the future and highlighted the important role of the Doctor and team working in addressing these.



Ms Sharon Oliver

The ceremony was also an opportunity to recognise the long-standing dedication and contribution of members of staff to the education of our medical students.

Professor Paul Stewart presented Mrs Margaret Britton, an undergraduate clinical teacher in Leeds since 2002, Dr Rod Taylor, a Consultant Respiratory Physician since 1989 and committed to undergraduate medical education and Dr Georgina Haslam, a GP since 1986 and a Personal Tutor who was innovative in her approach to developing undergraduate primary care teaching, with the Excellent Longstanding Service Award for undergraduate medical teaching.



Dr Georgina Haslam receiving her award from Professor Paul Stewart



Mrs Margaret Britton about to receive her award

The award itself was designed by fine art student, Martin Derbyshire, studying at the Leeds College of Art. Martin's design is based on the stethoscope and the rod of Asclepius (the Greek god associated with healing and medicine), and was selected by a panel of judges from the School of Medicine.

“

From inability to let well alone. From too much zeal for the new and contempt for what is old. From putting knowledge before wisdom, science before art, and cleverness before common sense; From treating patients as cases; and from making the cure of the disease more grievous than the endurance of the same, Good Lord, deliver us.

”

Sir Robert Hutchinson



Three members of the School of Medicine Alumni who attended the ceremony, Left to Right: Dr Jon Lewis, Dr Brian Whitaker, Dr John Chippendale. All graduated in 1957.

School applies for ASPIRE award for student engagement

The Association for Medical Education in Europe (AMEE) presents the ASPIRE award in three areas of excellence each year

- Assessment of students
- Student engagement in the curriculum and in the medical school
- Social responsibility and accountability as a mission of a medical school

Following on from our success last year in receiving this award for Assessment of Students, we have now applied for an ASPIRE award in the area of student engagement.



MBChB Student puts skills into practice

Thomas Reynolds, a 1st Year Medical student, was the first on the scene of a serious car accident in early May. Thomas's act to the wider University evidences the impact of student education in the community.



I was dispatched to a road traffic collision involving a motorcyclist in cardiac arrest. When I arrived on the scene I found a Mr Thomas Reynolds, whom introduced himself as a 1st year medical student, performing basic life support on the patient. As I was on my own, Thomas aided me with advanced life support until the arrival of further ambulance colleagues. Thomas's basic life support was very competent and he was a credit to your faculty.



Jack Davies MCPara
HCPC Registered Paramedic
West Midlands Ambulance Service

MBChB Student Journal

A new MBChB Student Journal is to be established. The journal will be student-led and will capture research outputs of Leeds medical students, specifically as they relate to their ESREP and intercalated degree projects. Research reports will be peer-reviewed by academics with academic overview carried out by Dr Dan Stark and Dr Karen Lee. A representative from the library will provide guidance on publication. The first publication is expected in February 2016. The Chair of the steering committee (Editor) is Richard Cruttenden, a third year MBChB student.



L-R: Richard Cruttenden, Hafizul Haq, Dan Drayton.

Connecting with Intercalating students: BSc in Applied Health (Medical Education)

LIME staff work with BSc in Applied Health (Medical Education) students to develop exciting research projects in medical education



James Barnard, intercalating BSc student

The BSc in Applied Health (Medical Education) is one of only five intercalated degrees in medical education in the UK and is an important training ground for students who wish to pursue a career in medical education. As part of their training, BSc students undertake a medical education research project with support from an individual supervisor. Under the expert guidance of LIME staff, students learn about the whole research process, from research

design and ethical review through to data collection and analysis. The BSc in Applied Health (Medical Education) provides students with an excellent foundation for future research work. Previous students have gone on to present their work at conferences such as the annual scientific meeting of the Association for the Study of Medical Education (ASME) and are increasingly publishing their work in peer-reviewed journals.



With support from LIME, I was able to create a piece of research that was both interesting and worthwhile



James Barnard
BSc student 2014/2015

Further information at:

http://medhealth.leeds.ac.uk/coursefinder/21593/Applied_Health_-_Medical_Education?from=&categoryID=

Developing new Healthcare Professionals – Introducing a new Post Graduate Diploma in Physician Associate Studies.

A Postgraduate Diploma in Physician Associate Studies is now being offered at the University of Leeds. This new course is organised and delivered by staff within LIME and the School of Medicine, with the expertise and support of the Medical Education team at the University and clinical and placement partners around the region.



Health Education Yorkshire and the Humber (HEYH) funds tuition fees for the first cohort of 25 students starting September 2015.



Training alongside medical students to work alongside doctors



Trudie Roberts

Physician Associates (PAs) are part of a wider picture of workforce transformation and offer real solutions to the healthcare workforce crisis in this region. This is a relatively new profession in the United Kingdom and PAs are trained to a medical model to work under defined levels of supervision from a doctor.



PA Studies students are mostly health science graduates and their course has much in common with the MBChB. Although we recognise that PAs will have their own identity we are pleased with the way that the Medical Student Representative Council and staff are welcoming them into the Medical School.

For more information visit:

www.nhscareers.nhs.uk/explore-by-career/wider-healthcare-team/careers-in-the-wider-healthcare-team/clinical-support-staff/physician-associate/

Postgraduate child health taught courses go from strength to strength

The Postgraduate Diploma/MSc course in Child Health (from our Division of Women's and Children's Health) goes from strength to strength under the direction of Dr Tim Lee, with record student numbers from the Yorkshire and Humber Paediatric Training Scheme (currently 91 students on PG Dip and a further 26 undertaking the MSc). The courses complement and supplement clinical experience in paediatrics, fostering critical thinking and providing a framework for self-directed learning, peer support, and experience in research. Modules include topics such as childhood disability, developmental and behavioural paediatrics, research methods and statistics, evidence-based paediatrics, the critically ill child and chronic illness. There is a plan to adapt a module for distance learning, building on the very successful

e-learning part of the course. A range of interesting speakers have been invited to present their work; MPs and leading experts in the field of paediatrics from throughout Yorkshire and further afield, and speakers from national charities. The course has been represented nationally and internationally over the last 10 years, with many conference presentations and peer-reviewed articles. In 2015 there have been two publications in Archives of Disease in Childhood and four presentations at European conferences. Further success has been the development within the course of 'Ned the Nerve', a character created by Dr Fiona Blyth to explain complex neuropathology to children. Ned has been adopted by the United States Guillain-Barre Foundation for their website and widely circulated to paediatric patients.



Child Health PGDip and MSc graduates celebrate success

“

I'm just emailing to thank you again for organising and running the course. It has been really enjoyable and useful and I've learned a lot that I'm sure will help me throughout my career. It has also been really well organised and I've always felt very supported throughout the course, which I'm really grateful for.

”

Dr Michelle Hares
recent MSc student

Postgraduate Programmes in Clinical Education

The Postgraduate Programmes in Clinical Education, led by Mrs Helen Bradbury - Postgraduate Certificate and Masters in Clinical Education, will be delivered through LIME. Initially developed in the School of Continuing Education (later Lifelong Learning Institute) these part-time programmes are designed for experienced healthcare and healthcare-related professionals engaged with teaching, learning and assessment. Teaching and research supervision is a collaborative venture with colleagues from LIME and Healthcare.

Inter-professional learning is at the heart of the programme, which regularly attracts up to 11 different professions: dentists; dieticians; doctors from all specialities; midwives; nurses; occupational therapists; paramedics; pharmacists; podiatrists; radiographers and speech and language therapists.

Both programmes develop change agents within practice and leaders for learning. The Certificate highlights the policy and learning theories informing educational practice in, and for, the clinical workplace. The Masters adds leadership and management in relation to curriculum development, and supports students to complete small-scale empirical research. Recent topics have included: teaching calculations to pharmacy undergraduates; educational implications of electronic prescribing; evaluating peer assessment in Dental Foundation Training; learning to care for the dying; the educational needs of Health Care Assistants in Endoscopy; paramedic placements in rural and urban settings, and the impact of less than full-time working amongst specialist trainees.

For further information contact Helen Bradbury by email: h.m.bradbury@leeds.ac.uk



Clinical Education postgraduates

“

Overall, students receive a high degree of personalised attention and feedback, which is reflected in their performance and in the overall standards achieved in the assessed work. The attention given to teaching assessments in the workplace is a distinguishing feature of the programme and important for the standing of the award. Students comment very favourably on this aspect of the programme.

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Professor Karen Evans
Institute of Education, University of London, External Examiner

Section 3

CONNECTING WITH EDUCATIONAL RESEARCH AND INNOVATION



Connecting clinicians with educationalists and statisticians to produce world-class Student Assessment research

Research into student assessment remains an exciting area of partnership working, connecting clinicians with educationalists and statisticians within the Institute. The work carried out by the Leeds Assessment Research Group has been commended by the General Medical Council and has placed Leeds in a position of international repute in the field of assessment. This work has delivered impactful translational results with the use of mobile technology delivering workplace assessment; assessing highly authentic clinical performance and using sequential testing

formats – methods that have been adopted by medical schools worldwide. In recognition of the valid, reliable and authentic testing of students, along with student achievement and quality enhancement, an international ASPIRE award for excellence has been conferred. In direct response to the influential assessment practices developed by the Leeds Assessment Research Group, an increasing number of PhD students are being recruited and members have been invited to present their innovative work at leading educational and assessment conferences worldwide.

Research-led teaching: Technology Enhanced Learning

A series of papers exploring the impact of using mobile resources on student learning experiences, based upon research undertaken in LIME, have been accepted for publication this year. The most recent research findings highlight the importance of making mobile learning compulsory, and evidence how mobile learning influences the way in which students are able to learn “in the moment” on placement, as well as making better use of their free time. Members of the Technology Enhanced Learning team are now also able to draw upon this peer-reviewed research as part of new teaching that demonstrates innovation in education.

Theoretical perspectives and good practice in technology enhanced learning is now being taught as part of a Research, Evaluation and Special Studies (RESS) course on teaching skills, as part of the Learning and Teaching module for Intercalating Students in Applied Health and in a series of CPD workshops offered to academic and clinical teaching staff, as well as workshops specifically run for the Patient I Carer Community involved in teaching at Leeds.



Research-led teaching is an incredibly important aspect of medical education. The opportunity for us to be able to enhance student education with new technological resources and draw upon our own research to show students and educators what an impact it can have offers us a number of opportunities to demonstrate good practice in research, teaching and scholarship. With a research-led mobile programme that is expanding year on year, it's a really exciting time to be involved in Technology Enhanced Learning in both LIME and across the Faculty of Medicine and Health.



Dr Viktoria Joynes

Professional Identity and Inter-professional Working

LIME staff member Viktoria Joynes successfully defended her PhD thesis, entitled “Exploring the professional identity of health and social care staff via experiences of inter-professional education and collaborative practice” in December 2014. Her thesis questioned whether experiences of inter-professional education (IPE) and collaborative practice have any impact on perceptions of professional identity for those working in Health and Social Care (H&SC), and examined how socialisation processes influence the development of ‘professional identities’ as well as considering the implications for patient care.

A case study of a large-scale inter-professional programme – the Assessment and Learning in Practice Settings Centre for Excellence in Teaching and Learning (ALPS CETL) – was used to examine the long-term impact of IPE initiatives on the identities and roles of staff involved in inter-professional initiatives. Viktoria concluded that previous conceptualisations of professional identity aligned to a ‘whole’ profession do not relate to the way in which H&SC professionals actually perceive their identities, which has implications for the way in which IPE is ‘taught’. In order to address identified tensions between professional identities and cross-professional working, the thesis proposes that the concept of ‘inter-professional responsibility’ can and should be incorporated into the professional identities of all H&SC staff.

The findings from the thesis are being used to influence the direction of IPE at a number of West Yorkshire universities, as well as being written up in a series of journal articles.



Completing my PhD part-time while working full-time (and with a young son at home!) was certainly the most challenging thing I've ever done, but also the most rewarding – to develop a large scale piece of research from the beginning and see it through to the end where the findings can hopefully help to shape healthcare education in the future feels like a massive achievement. I'm delighted to have completed it, which I could not have done without the support of my PhD supervisors and my Line Manager from LIME.



Dr Viktoria Joynes

Connecting though research with industry (Learning Layers) – rewards for working outside your comfort zone

What happens when you put nine universities, seven businesses and the NHS together in a highly collaborative European research project? Learning Layers has brought together 17 EU partners to explore informal learning at the workplace and develop technology tools to support this learning. LIME is a key partner in this project, leading the healthcare pilot work.



Bringing research and business together has been challenging, but ultimately a very rewarding learning experience. Working with business partners has exposed us to new ideas and approaches and will mean the results of our research are more likely to be sustainable – bringing about change in the real world.



Tamsin Treasure-Jones

With such a multi-disciplinary consortium, everyone has been required to work outside their comfort zone. Researchers' motivations (to explore interesting research questions that will lead to new or revised theoretical models and publications) have to be balanced with business partners' desires to see

developments that align with user needs and will produce tools that have real commercial potential. Managing these potentially competing demands can be difficult, but also very rewarding, particularly at a time when funding bodies are putting ever greater emphasis on impact and exploitation. Working with our business partners has introduced us to the business incubation model, customer journey maps (adapted by the project into learner journey maps) and the Business Model Canvas approach. Using such exploitation planning tools from an early stage in the project increases the chances that the educational research will not only lead to academic insight, but will also produce sustainable results that make it into the real world and change lives.

So in answer to the initial question - discussion, confusion, arguments, new insights, understanding, learning and ultimately real world changes are ideally the outcome of bringing researchers and business together in this way. Learning Layers is a good example of this. Our learning tools are being embedded within commercial software and we are already developing new project and business ideas with our partners.

To find out more about the Learning Layers project and to get involved, look at the project website: <http://learning-layers.eu/> or email: learninglayers@leeds.ac.uk



Learning Layers

Scaling up Technologies for Informal Learning in SME Clusters



Connecting with technology: Technology in Medical Education (TIME) – one stop shop for mobile learning resources

Students coming to Leeds Medical School can expect an undergraduate medicine (MBChB) curriculum enhanced by the thoughtful integration of the latest research-led advancements in learning technology. Our dedicated Technology Enhanced Learning (TEL) Team works closely with clinicians, academics, students, patients and carers in order to develop innovative educational resources that complement every aspect of the MBChB course.

We engage students with a comprehensive range of educational resources to complement every aspect of the course—mobile learning, e-Portfolio, simulated learning, decision-making careers software, eBooks with quizzes and videos, practice placement orientation resources and 360 degree virtual tours. We aim to maximise learning and assessment opportunities, regardless of location, with content available on-and-offline in a variety of formats for smartphone, tablet and PC.

Through technology we ensure that students are supported equally on campus and on clinical placement. We also have many opportunities for students to contribute to educational material for national and international academic audiences, including the creation of apps. The University has been working with NHS partners to help remove any barriers to student and staff engagement with these innovative resources; for example, by improving the students' access to networks when undertaking clinical practice, and providing orientation resources for students prior to them joining a specific hospital or clinical firm.

The TIME website <http://time.leeds.ac.uk> showcases the Technology Enhanced Learning resources that have been developed at the University of Leeds Medical School. Members of the University can access all these resources from the website. Where appropriate, access to these resources is also available to external partners and stakeholders.



Clinical Skills eBook

The start of the academic year 2014/15 saw the launch of a new eBook produced to support clinical skills teaching across clinical teaching sites within the MBChB partner NHS Trusts.



The eBook, created through collaboration between the TEL team at LIME and the School of Medicine Clinical Skills Education Team, based at St James' Teaching Hospital, was designed to complement and support the face-to-face practical clinical skills teaching undertaken by MBChB students, particularly Years 1-3. The resource comprises a comprehensive guide to clinical skills taught during MBChB Years 1-3. The book is divided into Year 'chapters' and each chapter comprises a detailed breakdown of the skills required to be learnt during that year. Each skill is described in detail, including a written descriptor of the procedure, photographic illustrations of the equipment used and a step-by-step video demonstration of the skill itself. The eBook is intended to provide students with the opportunity to familiarise themselves with skills prior to attending face-to-face teaching, and to provide a reference guide which can be used post-skills teaching, something that could be particularly useful prior to assessments and attending clinical placements. This should also prove to be a valuable resource for clinicians who are involved in teaching and assessing clinical skills, especially for Direct Observation of Procedural Skills (DOPS) which assess the procedural skills essential to providing good clinical care. All the content has been developed in line with both national and Leeds Teaching Hospitals Trust clinical guidelines, and demonstrates best practice. Although predominantly aimed at Years 1-3, the resource is being updated and inclusion of further material for Years 4 & 5 are being produced. This additional content is being developed with help from both our partner Clinical Skills Teams and colleagues in Primary Care. The eBook is fully open access and can be seen at: <http://clinicalskills.leeds.ac.uk/>

In association with



2014

THE AWARDS

CELEBRATING 10 YEARS OF EXCELLENCE

CELEBRATING THE TALENT
AND CREATIVITY DRIVING
A WORLD-LEADING HIGHER
EDUCATION SECTOR

Supported by



LIME Success: Times Higher Education Awards 2014:

LIME Lecturer in Anatomy, James Pickering, was awarded the Times Higher Education 'Most Innovative Teacher of the Year' at their prestigious ceremony at London's Grosvenor hotel in November 2014. Dr Pickering faced competition from five other finalists, including academics from Queen Mary University London, Roehampton, Stirling, King's College London and Salford.

The award, which is sponsored by The Higher Education Academy, recognised how his imagination and passion could transform a course and inspire his students. Dr Pickering's use of technology to support his academic teaching both at Leeds and around the globe was a major factor in his success. He said: "I am delighted to have won this prestigious national award in recognition for my use of technology in supporting student education."



“

I am delighted to have won this prestigious national award in recognition for my use of technology in supporting student education.

”



The RRAPID® programme (Recognising and Responding to Acute Patient Illness and Deterioration) is a medical app developed by the LIME TEL team, was also shortlisted for the Times Higher Education 2014 award in the category of Outstanding ICT Initiative of the Year.





“

Connecting with our Community Stakeholders. Community Arts Initiative, service users from five voluntary groups in the city were involved in producing diverse works of art which were then displayed in the School.

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Full story on page 21

Section 4

USING CONNECTIONS TO CREATE AND ENHANCE PARTNERSHIPS IN EDUCATION, RESEARCH AND INNOVATION

Teachers and Careers Advisors attend an annual seminar at the School of Medicine

A seminar which focuses on the process of undergraduate admissions and widening participation is an annual event held at the School of Medicine. Drawing on the success of the 2014 event this year's seminar, held in March, attracted teachers and careers advisors from across the Yorkshire region and as far afield as Oxford. The aim of this year's event was to provide information on the admissions process and widening participation activities provided by the student-led group 'Widening Access to Medicine' (WAMS), their co-ordinator LIME's Nicky Danks and the School of Medicine Admissions Team.

The event continues to develop with participation from the wider university: Dentistry; Healthcare; Psychology; Faculty of Biological

Sciences; the Educational Outreach Team; Access to Leeds and STEM, and representation from the student-led groups WAMS and Open Wide. Each year, emphasis is placed on a different part of the selection process in MBChB admissions. This year, workshops focused on running mock multiple mini-interviews (MMI), UCAS application and work experience, which were all positively received.

Running an event like this enables delegates to receive a vast range of information. This year 85% of the delegates rated the overall event as 'excellent' with every delegate expressing an interest in attending future medical school events and continuing regular communication with the Admissions Team.

“

Useful and interesting. Good idea to have workshops.
The information updates are vital for ensuring advice to
students is accurate

”

Greenhead College

Setting the standards for MBChB placements

First produced by the Academic Unit of Primary Care (AUPC) in 2013/14 from a series of workshops including academics, tutors and students, the Quality Standards Framework is a simple guide to practices of the expectations of the School of Medicine. It has a generic element (see panel) and then specific guides for each year.

This year as part of the AUPC's quality improvement programme we started to collate information on our visits to practices about how they have found the guide and how they have used it.

Expected Standards for Undergraduate Teaching Placements (All Years)		
Bronze	Silver	Gold
Administrative Induction		
The practice has named clinical and administrative leads and informs the University of any changes in their contact details.	A practice pack containing details such as travel options, information about the practice and area and the content of the standard administrative induction is provided before the student arrives or on the first day.	The practice pack is available on an area of the practice website or e-mailed to the student, contact is established before the first day.
Attendance and behaviour are monitored. Any concerns are discussed with the student (and academic lead, if serious) as soon as possible to allow time for amelioration and adequate progress to place placement where possible.	A practice handbook or written information will include practice details, codes of behaviour, housekeeping issues, internet policy, health and safety, details of who to contact in case of illness or absence and confidentiality.	A written code of conduct is available for the student to consult.
Patients involved in student teaching do so with appropriate consent.		
The student will have an administrative induction including Health and Safety, Internet Policy, details of who to contact in case of illness or absence and confidentiality.		
Students will be conducted around the premises and introduced to staff.		
Student Facilities/Internet Access		
Students have easy access to a secure area or a locker for their belongings.	There is a dedicated student area for IT access and study. Library, internet facilities and resources are specifically organised for the students and appropriate to their level of experience.	Students have an exclusive use of areas for consultations, study and relaxation. 3G is available for students to access their e-portfolios and assessments.
There is space for the student to conduct consultations and examine patients. Any necessary clinical equipment is available in these areas.	Students have access to clinical records where needed (at least at year 3 onwards). There is reasonable access to printer/photocopying facilities. Students are given a verbal reminder of data protection issues.	Written policy on IT use consistent with practice policy provided. Individual log-ins provided. The practice can demonstrate audit of student use of clinical information systems.
When not working clinically there is a comfortable area for the student to work or relax. There are basic library facilities and internet access as required.		
Tutor/Practice Attributes		
Tutors are enthusiastic and provide a positive role model for the students. A safe and nurturing environment is provided, students feel welcome to ask questions.	Tutors teach with real skill and commitment. They show honesty and empathy in their practice and motivate the students to learn.	The tutors provide inspirational role models. Students are encouraged to strive for excellence by the quality of teaching.
Tutors demonstrate exemplary professional behaviour at all times.	The whole practice is interested in education with the team involved at all stages.	The tutors provide an enjoyable experience for the students while maintaining high academic standards.
Practice staff are friendly and approachable.		
CPD and Tutor Training		
The tutor attends at least one AUPC training session or relevant educational session a year.	All doctors of the practice who are involved in teaching include educational sessions in their CPD.	The tutor holds a recognised educational qualification.
OSCE training is maintained and a tutor from the practice examines once a year.	The practice has a structured plan to improve educational skills and can demonstrate quality improvement in the placement.	The tutors and the practice have a development plan for increasing educational activity and excellence in the practice.
The lead tutor has undergone peer review.	The practice has more than one peer reviewed tutor.	The practice can demonstrate specific and positive responses to evaluation and feedback from the students and University.
The tutor engages with the AUPC practice visiting process and in particular reflects regularly on their teaching experiences.		

By laying the guide out in three levels we felt that everyone would have areas they could look to improve on and this has been the case in every practice. This concept is in line with the increasingly popular nudge theory [Thaler and Sunstein 2008] and also relates to the documented behaviour of clinicians wishing to compete with other placements. One of the most common questions I get asked is not "how good is my evaluation?" it is "How good is my evaluation, compared to others?"

The Quality Standards Framework allows placements to compete between themselves and has a role in continuous improvement.

The only problem is we may have to set the bar higher next year!

“

Set high standards and few limitations

”

Anthony J. D'Angelo

GP Work Experience Initiative – providing career insights

In 2014 a pilot project developed at the University of Leeds in partnership with the Postgraduate Department of General Practice placed 24 prospective medical students on a three day placement in General Practice (GP). Supported by workshops at the medical school, students were helped to develop their transferable skills and provided with information to make informed career choices – both important aims for the project.

A pre-placement workshop tackled ethical issues raised by work shadowing and how to get the most out of a GP placement. One participant from the pilot project stated that this workshop “took the fear out of the placement.”

In a post intervention questionnaire students reported improved communication and presentation skills and a notable increase in self-confidence. The prospective medical students stated that the workshops provided them with some preparation for applying to medical school and an opportunity to network. Students also reported that the sessions provided insight into what it would be like to be a doctor and whether this career would be right for them.

The GPs involved commented that it was an “excellent opportunity for the students and great for the practice to support this initiative. It should be expanded further across more practices.”

The project has been expanded in 2015. Collaborative work between the School of Medicine at Leeds, Hull York Medical School (HYMS) and Sheffield Medical School has seen 60 widening participation students participate in the project and GP practice placements being recruited from across Leeds, Hull, York, Sheffield and Doncaster. Students will again be provided with a pre-placement workshop, a three day placement and a post-placement reflective workshop. Funding to support the project has been obtained from Health Education Yorkshire and Humber and the University's Outreach Team.

“

I'm more committed to becoming a Doctor.

”

Student from 2014 pilot study

Rewarding and Celebrating Teaching - Clinical Teaching Excellence & Development Awards

Clinical Teaching Excellence Awards – individual and team – are made to encourage and reward excellent undergraduate clinical teaching across the NHS in West Yorkshire & Harrogate and to support the development of medical, healthcare and dental staff in this area. Successful applicants have demonstrated evidence of promoting and enhancing the student learning experience, supporting colleagues and a commitment to ongoing professional development. Team Awards have also demonstrated how the development and integration of their team has enhanced excellent placement teaching. This year, following the exceptional quality of applications, we also awarded two Certificates of Merit.

Development Awards are made to junior staff who are within the first five years of starting their career in medical education, are active in clinical teaching and have shown that they have already received positive student feedback.

Winners:

Clinical Teaching Excellence Awards - individual:

Dr Amir Khan	GP at The Ridge Medical Practice & Caritas Group Practice
Dr Jennifer Russell	Consultant in Emergency Medicine, The Leeds Teaching Hospitals Trust

Clinical Teaching Excellence Awards - team:

The Situational On Call Survival Guide (SOS) team:
Drs Mark Lane, Victoria Watkins, Jemma White, Samantha Simpkins & Kate Jarrett-Peet
Medicine & Surgery at Pinderfields Hospital, Mid Yorkshire Hospitals NHS Trust

Development Awards:

Dr Mathew Alumkunnappuzha	Consultant Histopathologist, Dewsbury & District Hospital, Mid Yorkshire Hospitals NHS Trust
Dr Emma Firth	Foundation Year 2 Doctor, Pinderfields Hospital, Mid Yorkshire Hospitals NHS Trust
Dr Adam Burns	Speciality Trainee Year 4 Acute Medicine, The Leeds Teaching Hospitals Trust

Certificates of Merit:

Dr Fariha Kamal	Consultant Psychiatrist, South West Yorkshire Partnership Foundation Trust
Dr Oliver Prince	Speciality Doctor Anaesthetics, Harrogate & District NHS Foundation Trust



Dr Amir Khan receiving his award from Ms Laura Stroud, Director of Student Education, School of Medicine.



Winning an Excellence Award has really been a great opportunity for our practice. It recognised the hard work we put in to ensuring the medical students receive a quality placement in primary care and the money we received allowed us to further develop the multi-disciplinary approach to teaching we feel so strongly about. It really has opened doors for us at our surgery



Dr Amir Khan
Clinical Teaching Excellence Award
individual winner GP at The Ridge Medical Practice
& Caritas Group Practice

Good Practice in Student Placement

4th year students in Obstetrics placements at Calderdale & Huddersfield NHS Foundation Trust now have a named midwife mentor to oversee their time on delivery suite. The introduction of midwife mentors has been a great success, both in ensuring increased exposure to a wide range of experiences on delivery suite and in promoting further opportunities for interdisciplinary learning.

In April, the Trust again ran their hugely popular mock OSCE examination for final year students. Available free of charge to 80 students, this remains the only mock OSCE in the region to deliver the experience under exam conditions, with all stations being marked by qualified medical practitioners and constructive feedback given immediately following the event. Medical Education Manager Sue Burton said: "The mock OSCE is greatly appreciated by students preparing for their final exams and feedback from the event was once again exceptional. Our thanks go to all those who were involved in continuing to make the event a success".



Superb mock OSCE and has really helped me to prepare for the actual one, really well organised and credit to the organisers for putting it on, very realistic and has given me more confidence in my ability.



Final Year student 2015

Service User Focused Teaching for Medical Students

South West Yorkshire Partnership Foundation Trust, an Associate Teaching Trust, has introduced direct service-user-led teaching for medical students. The teaching was carried out in tutorial format and was supervised by an Associate Medical Director. The service-user was supported by her care coordinator throughout this session. The session focused on the service-user experience of mental illness, her journey through mental health services, her positive and negative experiences, outcomes of treatment and stigma attached to mental illness and her own diagnosis.

It was well received and both students and the service-user gave very positive feedback.

In an effort to create multi-professional teaching opportunities for medical students, the Trust has introduced a schizophrenia nurse-led tutorial. The session focused on the nursing perspective on treatment of schizophrenia and various pharmacological treatments options available. The students actively took part in the discussion around patient choices and involvement in their management plans.



Most positive aspect was first hand hearing of a patient's experience and understanding her feelings.



Medical Student

Connecting with our Community Stakeholders.

For over 15 years the School of Medicine has been working with the voluntary sector in Leeds and Yorkshire so that medical students recognise the importance of voluntary groups as potential partners in healthcare delivery. Medical students spend time with voluntary groups in the community and the groups come into the School to help with teaching. This community engagement work, as part of the curriculum, has enabled our students to become more holistic health practitioners.

The School has always tried to be innovative in its approach, and the most recent example is our Community Arts Initiative. Service users from five voluntary groups in the city were involved in producing diverse works of art which were then displayed in the School. The community organisations involved were Big Issue in the North, The Access Committee Leeds, People In Action, The Women's Health Befriending Project (on behalf of The City of Sanctuary), and Inkwel Leeds Mind. Representatives from all of the organisations involved were invited to attend the official launch of the works in the School

by the Dean of the Faculty and the Director of LIME, on the 8th of December 2014. A number of medical students also attended.

Patricia Fas, Regional Manager of the Big Issue in the North said, "The project created a great and rare opportunity for our vendors to have their voices heard."

The arts initiative was also featured in the University Reporter magazine, the Leeds School of Medicine Community Newsletter, the LIME newsletter and The Big Issue.



Doctors should be a day in the sunshine because they are warm and welcoming.



People in Action member with learning disabilities

Connecting with Bright Sparks – enhancing students' communication skills

In 2014 the Patient | Carer Community (PCC) worked together with Bright Sparks Theatre Arts company, with funding from Health Education Yorkshire and the Humber, to provide additional teaching opportunities to 2nd yr students to enhance their communication skills, specifically when communicating with Learning Disabled Adults.

Bright Sparks Theatre Arts Company is headed up by PCC Members John Hudson and Marc Walton. A series of workshops offered 2nd yr MBChB students a personal experience of working with learning disabled people (from the Potternewton Centre, Leeds) through drama, theatre techniques and story making, to better understand their needs in a safe, relaxed and enjoyable creative environment.

John explains; "Through creativity we can tackle often uncomfortable and difficult social interactions and gain a shared sense of ownership of an artistic venture. The direction of the project evolved as we learned more about the dynamic of the group."

Alongside the theatre sessions, the team shot a 'Talking Heads' style footage of all participants (students and learning disabled adults) before and after their workshops. This footage is currently being developed into a reusable on-line learning tool, giving many more students the opportunity to benefit from this exciting project.

The PCC and Bright Sparks Theatre Arts Company have also been successful in applying for further funding to build on this project and work with Dementia patients.

The patient and carer voice is recognised as informing patient care and the education of those providing care. National priorities include increased patient and carer involvement but also address dignity and respect. Clinical priorities include caring for patients with dementia and the elderly.

In this new project we will create specific exercises and communication-based activities so we are able to listen to patients' and carers' experiences and their hopes and fears for their future. In conjunction with the PCC team, Nancy Davies from the Technology Enhanced Learning Team and the Medical Teaching Centre will use this content to create an on-line learning resource. By sharing this knowledge students will gain a greater insight into the concerns of patients and carers, and their preferences for the type of care they receive.



Connecting with International Partners

In 2014/15, the medical elective component of the MBChB programme has moved in a new direction of developing international partners, opening the way for elective exchanges. In March, following a visit from Professors Kizuka and Mizuno, a Memorandum of Understanding was signed between Kyoto Prefectural University School of Medicine in Japan and the School of Medicine establishing an elective partnership. In July this year three Japanese medical students arrived in Leeds to participate in the first elective exchange between Kyoto Prefectural University and the School of Medicine.

Currently there are ongoing discussions between Karolinska Institutet (Sweden), Jikei University (Japan) and the Japan Medical Education Foundation for the development of partnerships. In December 2014 the School of Medicine hosted a visit from Dijon School of Medicine, University of Burgundy (France). Anne-Marie Reid, Laura Stroud and Tom Dessofoy have recently paid a return visit to Dijon School of Medicine at the invitation of the Dean, Professor Frederic Huet, with the aim of fostering exchanges of medical students and staff.



Visit to Dijon School of Medicine

L-R: Arthur Hacquin - Medical Student Dijon, Tom Dessofoy, Laura Stroud, Anne-Marie Reid, Anais Carnet - School of Medicine Dijon.



“

Bright Sparks has provided excellent learning resources for medical students to use.

”

Trish Walker
Undergraduate Partnership & Placements Manager

Section 5

CONNECTING THROUGH SHARING KNOWLEDGE, SKILLS AND EXPERIENCE.



MUMEENA Achievements and looking to the Future

The TEMPUS MUMEENA (Modernising Undergraduate Medical Education in Eastern European Neighbouring Areas) project has now reached its end after three very busy and productive years. The European funded collaboration, which has been led by the team in LIME, has been working with medical schools in Georgia, Ukraine and Azerbaijan to develop their curricula towards European standards in a post-Soviet era. The initiative has been underpinned by a spirit of collaboration and shared learning between partner medical schools across borders, languages and cultures.

The project has involved travel to all partners' countries for conference events and training events held by western partners in Leeds, Netherlands, Spain and Italy. The project has addressed national priorities in the partner countries for improvements in health and education and curricular reform. Teacher training centres have been established in each of the partner medical schools with Faculty Development programmes initiated. These programmes are supporting medical educators in understanding current learning and teaching methodologies, particularly focusing on student-centred learning approaches. The involvement of students in having a 'voice' in their education through the project has been a major achievement and fulfilling for both staff and students. Key stakeholders, including the Departments of Health and Education in each country, have been involved throughout the project and have given their approval to accreditation of new courses.

One of the greatest achievements of the MUMEENA project has been the friendships and development of a common sense of purpose in improving health and education, despite the difficult political context in which the post-Soviet partners work. Dissemination of the project achievements been celebrated in a number of conference presentations in Prague, Milan and Glasgow as part of the AMEE

(Association for Medical Education in Europe) annual event. The enthusiasm, commitment and hope for the future of Eastern European partners has been inspirational, and has encouraged us to seek funding in the next round of European funding bids to carry the work forward.

We have now been shortlisted for funding as part of the new ERASMUS PLUS stream, and are currently awaiting the final outcome.



Connecting with our Clinical Teaching Community through Continuing Professional Development (CPD)

The programme of CPD activities, delivered by in-house experts and clinical partnerships, has been designed to support and enhance teaching skills of Medical Educators. Harnessing the award-winning clinical teaching, together with the innovations arising from focused research, face-to-face workshops, eLearning exercises, a skills day conference, CPD dinner and mentoring network, have provided high quality educational opportunities for those with responsibilities in teaching - formal or informal. We have been responsible for delivering the face-to-face training for OSCE examiners which is a requirement for those who wish to examine in the University of Leeds OSCEs. Refresher on-line training is also provided by the CPD team before the exam season, thus helping to maintain the quality and validity of the exams.

The nature of the CPD programme is dynamic, responding to delegates' feedback and addressing their needs. All courses have been aligned with the GMC framework of standards and may be used in activities such as self-assessment for membership of the Academy of Medical Educators or in the Accreditation of Secondary Care Trainers. Workshops are all focused towards a specific area of teaching but 'bespoke' workshops

have also been delivered to teams at their workplace. These courses have proved successful and impactful, creating a network of engaged clinical educators.

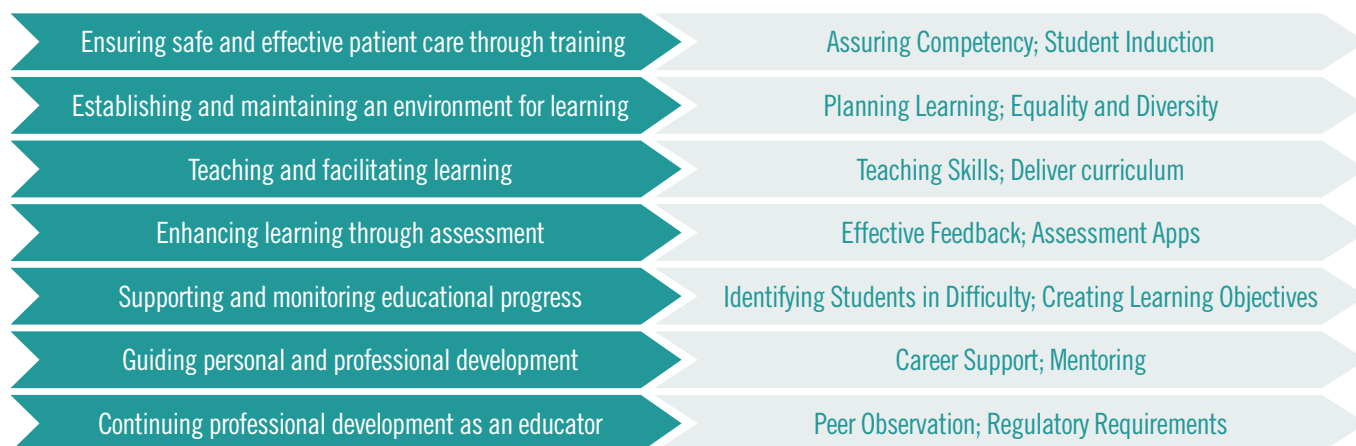
For more information, please contact the CPD team mededcpd@leeds.ac.uk

“

...what was great - hearing things about teaching from other people's perspective.

”

Delegate
at Skills Day



The seven areas within the GMC's framework of standards and how the CPD programme can align

RESEARCH WORKSHOPS Developing New and Early Career Research Skills

LIME provides research methodology and academic writing development for new and early career researchers through regular workshops and opportunities for 1:1 consultations with the academic writing development lead, Dr Rebecca O'Rourke. 'New and early career' is defined inclusively - an initial focus on full and part-time doctoral students was quickly extended to staff in the early stages of their academic careers and those new to educational research or supervision.

The main staff activity is a one day off-campus writing retreat, held three times a year. A workshop on feedback for doctoral supervisors is also delivered.

Three workshops on evaluation, covering purpose, design and data analysis, and a series of theory workshops exploring frameworks for education and learning in clinical settings and practice, were open to all. When the timings did not work for staff in the Clinical Skills Unit who are keen to develop pedagogic scholarship, a bespoke exploratory session was organised.

Doctoral students attend monthly academic writing workshops and five research training workshops: 'Working with your Supervisor', 'Method and Methodology', 'Keeping Momentum', 'Copy Editing' and 'Preparing for Submission'. They can also rehearse their transfer panel viva.

Staff and students report positive impacts from these activities on the quality of research practice and writing.

“

I've submitted two articles to journals in the last couple of weeks neither of which would have been completed as quickly without Rebecca's guidance and her excellent writing retreats which make such a difference to writing habits and head space.

”

Dr Viktoria Joynes

Research: Selected Publications

Archer J., McManus C., Woolf K., Monrouxe L., Illing J., Bullock A. & Roberts T. 2015. Without proper research funding, how can medical education be evidence based? *The BMJ*. Vol. 350, h3445.

Bardgett R.J., Darling J.C., Kime N., Webster E. 2015. What makes a good children's doctor? Exploring the child perspective in the OSCE setting. *Medical Teacher* (in press, doi 10.3109/0142159X.2015.1060301).

Bradbury H., Kilminster S., O'Rourke R., Zukas M. 2015. Professionalism and practice: critical understandings of professional learning and education. *Studies in Continuing Education*. Vol. 37(2):pp.125-130.

Boursicot K., Fuller R., Roberts T.E. 2014. 'Are our assessments really valid?' Using validity paradigms to design and evaluate programmes of assessment. Ottawa conference. 25-29 April, Ottawa, Canada

Cherry A.L., Dennis C.A., Baron A., Eisele L.E., Thommes P.A., Jaeger J. 2015. Hydrophobic and charged residues in the C-terminal arm of hepatitis C virus RNA-dependent RNA polymerase regulate initiation and elongation. *Journal of Virology*, 89(4), pp. 2052-2063.

Dennerlein, S., Rella, M., Tomberg, V., Theiler, D., Treasure-Jones, T., Kerr, M., & Trattner, C. 2014. Making Sense of Bits and Pieces: A Sensemaking Tool for Informal Workplace Learning. In *Open Learning and Teaching in Educational Communities* (pp. 391-397). Springer International Publishing.

Fuller, R. and Joynes, V. 2015. Should mobile learning be compulsory for preparing students for learning in the workplace? *British Journal of Educational Technology*, Vol. 46 (1):.153–158.

Green B., Kennedy I., Hassanzadeh H., Sharma S., Frith G., Darling J. 2015. (In press) A semi-quantitative and thematic analysis of medical student attitudes towards M-Learning. *Journal of Evaluation in Clinical Practice*.

Harden R.M. and Roberts T.E. 2015. ASPIRE: international recognition of excellence in medical education. *The Lancet*. Vol. 385 (9964), p230.

Homer M., Pell G., Fuller R., Patterson J. 2015. Quantifying error in OSCE standard setting for varying cohort sizes: A resampling approach to measuring assessment quality. *Medical Teacher*. DOI: 10.3109/0142159X.2015.1029898.

Homer M.S., Radhakrishna G. 2015. (In press) Direct Observations of Radiotherapy Planning Skills (DORPS). *Medical Education*.

Homer M.S., Whittle S. 2015. (In press) DREEM-S; validation of an instrument for evaluating the educational environment in undergraduate science courses. *Assessment and Evaluation in Higher Education*.

Jha V., Buckley H., Gabe R., Kanaan M., Lawton R., Melville C., Quinton N., Symons J.; Thompson Z., Watt I., Wright J. 2015. Patients as teachers: a randomised controlled trial on the use of personal stories of harm to raise awareness of patient safety for doctors in training. *BMJ Qual Saf.* Vol. 24 (1):pp.21-30.

Joynes V.C.T., Fuller R. 2015. (In press) Enhancement or replacement? Understanding how legitimised use of mobile learning resources is shaping how healthcare students are learning. *Journal of the European Association for Health Information and Libraries*.

Lawton R., O'Hara J.K., Sheard L. et al. 2015. Can staff and patient perspectives on hospital safety predict harm-free care? An analysis of staff and patient survey data and routinely collected outcomes. *BMJ Qual Saf.* Vol. 24, pp.369-376.

Ledger A., Kilminster S. 2015. Developing understandings of clinical placement learning in three professions: work that is critical to care. *Medical Teacher*. Vol. 37 (4):pp.360-365.

Ledger A., Slade B. 2015. Coproduction without experts: a study of people involved in community health and well-being service delivery. *Studies in Continuing Education*. Vol. 37 (2):pp.157-169.

Ley, T., Cook, J., Dennerlein, S., Kravcik, M., Kunzmann, C., Pata, K., Purma, J., Sandars, J., Santos, P., Schmidt, A., Al-Smadi, M. & Trattner, C. 2014. Scaling informal learning at the workplace: A model and four designs from a large-scale design-based research effort. *British Journal of Educational Technology*.

Newell S.J., Darling J.C.; *Paediatrics: Lecture Notes* (9th Edition). Oxford: Wiley Blackwell 2014.

Pell G., Homer M., Fuller R. 2015. Investigating disparity between global grades and checklist scores in OSCEs. *Medical Teacher*. DOI: 10.3109/0142159X.2015.1009425.

Pickering J.D. 2015. Introduction of an anatomy eBook enhances assessment outcomes. *Medical Education*. 49(5), pp.522-523.

Pickering J.D. 2015. Anatomy drawing screencasts: Enabling flexible learning for medical students. *Anat Sci Educ*. 8(3), pp.249-257.

Pickering J.D. 2014. Taking human anatomy drawings for teaching outside the classroom. *Surg Radiol Anat*. 36(9), pp.953-954.

Quinton N.D., Kilminster S., Roberts T.E. Room at the Top...or Not? Women in Elite Positions Within Medicine. In Stroud P, editors., *Feminism Perspectives, Stereotypes/ Misperceptions and Social Implications*. New York: Nova Publishers; 2014. p. 33-48.

Reid A-M. 2015. Teaching and Assessing. In: Northrop, M.J., Crow, J. and Kraszewski S. (Eds.) *Studying for a Foundation Degree in Health*. Oxford: Routledge.

Reid A-M. 2015. The role of the practice trainer as an agent of co-configuration. *Studies in Continuing Education*. Vol. 37 (2):pp.170-186.

Reid A-M., Ledger A., Kilminster S., Fuller R. 2014. Can the tools of activity theory help us in advancing understanding and organisational change in undergraduate medical education? *Advances in Health Sciences Education*. DOI: 10.1007/s10459-014-9553-1.

Roberts T.E. & Harden R.M. 2015. Coalition: the way forward for medical education. *The Lancet*. Vol. 385 (9977), pp.1479-1480.

Sandars J., Patel R., Steele H., McAreavey M. 2015. Developmental student support in undergraduate medical education. *AMEE Guide*. No.92. *Medical Teacher* (April).

Sheard L., O'Hara J., Armitage G. et al. 2014. Evaluating the PRASE patient safety intervention – a multi-centre, cluster trial with a qualitative process evaluation: study protocol for a randomised controlled trial. *Trials* Vol. 15 p.420.

Steurer, M., Thalmann, S., Maier, R., Treasure-Jones, T., Bibby, J., Kerr, M. 2015 (In press) Assessing Informal Social Learning at the Workplace – A Revalidation Case from Healthcare. *Proceeding of the Professional Knowledge Management conference (ProWM)* June 25-26 2015, Dresden, Germany.

Tomlinson M., Dennis C., El-Gendy R., Yang X., Kirkham J. 2014. Dental pulp stem cell markers for tissue engineering applications. *Journal of Tissue Engineering and Regenerative Medicine*, 8, pp. 292-292.

Tomlinson M.J., Dennis C., Yang X.B., Kirkham J. 2015. Tissue non-specific alkaline phosphatase production by human dental pulp stromal cells is enhanced by high density cell culture. *Cell and Tissue Research* (Open Access)



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