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WEB PAPER

What Do Medical Students Understand By Research And Research Skills? Identifying Research Opportunities Within Undergraduate Projects

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Abstract

Background: Undergraduate research exposure leads to increased recruitment into academic medicine, enhanced employability and improved postgraduate research productivity. Uptake of undergraduate research opportunities is reported to be disappointing, and little is known about how students perceive research.

Aim: To investigate opportunities for undergraduate participation in research, recognition of such opportunities, and associated skills development.

Method: A mixed method approach, incorporating student focus and study groups, and documentary analysis at five UK medical schools.

Results: Undergraduates recognised the benefits of acquiring research skills, but identified practical difficulties and disadvantages of participating. Analysis of 905 projects in four main research skill areas – (1) research methods; (2) information gathering; (3) critical analysis and review; (4) data processing – indicated 52% of projects provided opportunities for students to develop one or more skills, only 13% offered development in all areas. In 17%, project descriptions provided insufficient information to determine opportunities.

Supplied with information from a representative sample of projects ($n = 80$), there was little consensus in identifying skills among students or between students and researchers. Consensus improved dramatically following guidance on how to identify skills.

Conclusions: Undergraduates recognise the benefits of research experience but need a realistic understanding of the research process. Opportunities for research skill development may not be obvious. Undergraduates require training to recognise the skills required for research and enhanced transparency in potential project outcomes.

Introduction

All clinicians need to understand research and the research process, even if they are not actively engaged in research themselves. Evidence-based medicine requires clinicians to make informed judgements on the best possible care for their patients or populations, and base this upon the best available evidence. To undertake such critical appraisal, they need to understand how evidence is derived and hence appreciate the principles of research. Education about research must start at the level of the undergraduate medical student. In the UK, the recently released *Tomorrow's Doctors* consultation document emphasises the importance of developing medical students' research skills (General Medical Council (GMC) publications - GMC 2009; GMC 2003). Student selected components (SSCs) are a requirement of undergraduate training in the UK, intended to provide all students with opportunities to select and study areas of particular interest, and predominantly involve project work. SSCs are offered at several stages of the

Practice points

- Students and academic staff have different perceptions of what constitutes research and the research skills that will be acquired from specific projects.
- To fully benefit from research opportunities and develop essential skills, undergraduate students must be given training in 'what research is' and project descriptors should be explicit about the research skill development opportunities provided.
- Medical students should engage with research from the initial stages of their undergraduate education, and medical educators must facilitate significant student engagement with research and associated skills.

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students undergraduate career, dependent on the medical school curriculum, and thus can make especially good vehicles for the development of skills related to research and critical appraisal (Murdoch-Eaton et al. 2004; Stark et al. 2005) as well as general education about research processes.

Current emphasis on research in medical education mirrors preoccupations in higher education more broadly. Research skill development is increasingly being seen as "an underlying principle" of undergraduate programmes (Katkin 2003). Students value opportunities for conducting research, seeing research experience as a means to establish professional credibility, gain skills, acquire specific mindsets, and confirm future career plans (Seymour et al. 2004). For medical students in particular, intense competition for training posts makes research experience, especially if evidenced through peer-reviewed publication, an important commodity. However, providing opportunities for the development of effective and diverse research skills within undergraduate medical education is not without difficulty (Robinson et al. 2007a; Robinson et al. 2007b). Current pressures within the undergraduate medical curriculum mean that students wishing to obtain significant research experience may well need to extend their studies, for example through pursuing a BSc or even PhD. For the majority of students, exposure to research with development of research skills within the curriculum is a more realistic goal.

Student awareness of opportunities to conduct research and their abilities to make choices leading to the development of their own research skills are crucial to embedding a research culture into undergraduate medical education. However, to date there have been no published studies of whether medical students appreciate the nature of research and if they readily identify research skills and the opportunities offered to acquire them. In this paper, these key elements are examined using data from projects undertaken within SSC programmes from five UK medical schools as well as investigating student perceptions from student participation, observation and discussion. SSC programmes in all UK schools provide opportunities for individual projects, as required by the GMC (GMC 2003), however the timing, duration of projects and breadth of specialties offering project supervision will differ between schools. The schools within the consortium additionally represent a diversity of curricular approaches, from problem based models through to integrated systems-based curricula.

Evaluation across these 5 schools thus provides an opportunity to investigate commonality and diversity of the research opportunities for undergraduate medical students. Three research questions are addressed: (1) What research skill development opportunities are available within the undergraduate programmes, and specifically within the SSC components? (2) What do students understand by research and research skills? (3) Can they easily identify research opportunities? The results are evaluated to suggest how student identification and selection of research opportunities can be better informed. The work reported here has important implications not only for our knowledge of current undergraduate awareness of research within medical curricula but also for best practice and future programme development, especially pertinent in the wake of the GMC consultation document updating *Tomorrow's Doctors* (GMC 2009) .

Methods

Five UK medical schools (Hull York, Leeds, Liverpool, Newcastle, and Sheffield) participated in the study. Ethics clearance was obtained from the University of Leeds, the lead institution, and augmented with approvals from ethics committees at the other participating institutions. A mixed method approach was used, incorporating student focus groups, documentary analysis and student discussion. Figure 1 outlines the research method.

Focus groups

Five semi-structured focus groups, one from each participating school involving a total of 37 students were held. Students were within the penultimate year of study and all thus would have previous experience of a number of project opportunities through their SSC programmes. A hierarchical questioning technique was used, designed to explore students' understanding of research, and how students had made project choices. Of particular interest was whether students were able to identify research opportunities within projects offered by supervisors and if they actively chose them. Groups were recorded, transcribed and commonly expressed views identified after thematic analysis. Transcripts were independently analysed by 3 authors (DME, SD and MM). Research themes were clarified after discussion and final thematic analysis of aspects pertinent to the research questions was undertaken by SD and MM.

Documentary analysis

As part of the triangulation of data, documentary analysis was conducted. Project data were compiled from individual school records (total 905 projects). Although each school provides students with project selection information in slightly different formats, they all give the titles of available projects as well as short synopses. Synopses were typically a single paragraph, with no differentiation in style or format reflecting differing types of projects. To ensure comparability, therefore, only titles and synopses (and not other descriptors that varied between schools, such as reading lists) were included in the database.

Research skills were defined following the description in Stark et al. (2005; Table 1). These can be divided into four main skill areas: (1) research methods; (2) information gathering; (3) critical analysis and review; (4) data processing. On the basis of the title and synopsis, each project was assessed on how many and which of these skill areas were covered. Where there was insufficient information to make a judgement about the presence or absence of a particular research skill, that project was listed as 'undetermined'. This process was initially undertaken by a single researcher (SD), who scored all the projects in the database.

A database subset ($n = 130$), comprising 26 randomly-selected projects from each school, was

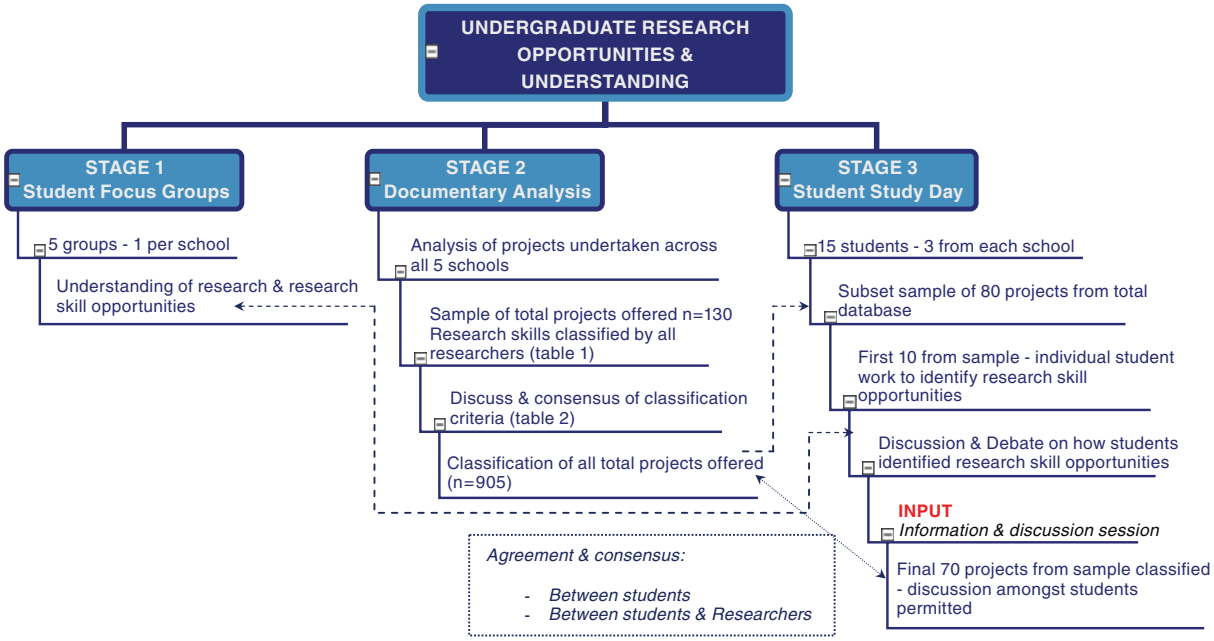

Figure 1. Research Methodology.

independently and separately assessed by all other members of the research team, using the same scoring criteria. The subset and whole database scores were visually inspected, compared and discussed. This process highlighted a number of challenges to effective and robust scoring of the data. Some of the published research skill definitions (Stark et al. 2005; Table 1) were too imprecise to use confidently and consistently in classification of project research potential, and these were subsequently clarified (Table 2). It was also evident that as the members of the research team were experienced SSC project administrators and/or teachers, 'hidden knowledge' about the projects offered at different schools and by individual tutors affected their interpretations of the descriptions and thus influenced their scoring. Examples of such hidden knowledge included the project supervisors' track record in previous years, or detail about working environment. Working on the assumption that students would be unlikely to have such 'hidden knowledge', school and supervisor names were removed from the database, so that the information presented replicated the likely state of student knowledge during project selection. The project descriptions were then re-scored by the initial assessor, using the revised criteria and database. Two of the research team (SD, SW) conferred to check any that were potentially unclear. The final resulting judgements by the research team were used in comparison with student judgements to assess their perceptions of the research skills on offer.

Student Study Day – documentary analysis + discussion

A further group of penultimate year students from each of the participating medical schools were recruited to score SSC project descriptions, in order to explore how students perceived research opportunities and identify skills that could be acquired from such project work. Following an open call for volunteers, three students from each school (total $n = 15$), representing a range of academic abilities and interests, were selected to participate. Each student received an information sheet about the study and provided informed written consent.

Prior to the meeting, the research team created another subset of the main database, comprising 80 projects (16 from each school), representing a range of project types, including some that clearly provided research skills, and others in which the research component was apparently minimal. The study day was split into two components: (1) an exercise designed to assess whether students, with minimal guidance, could identify the opportunities for acquiring research skills within the projects, using the framework and four main research skill areas outlined above; (2) following an information and discussion session conducted to convey a common understanding of the key skills involved with research, students then classified the remaining projects.

For the first part, students were provided with electronic copies of the database subset and were initially asked to score, individually and with no discussion, the same 10 project descriptions, randomly selected from the database subset of 80 projects. The instructions were "*given this information on each project, which of the following skills would you expect to have the potential to develop? Please classify each project as if you were selecting your project.*" The students recorded whether they considered the projects provided opportunities for the four main research skill areas, using the 'undetermined' category as appropriate. Unlike the researcher-scored exercise, however, students at this initial stage were not given the published classification (Table 1) or the agreed and revised criteria (Table 2). This reflected practice in all schools where students are able to choose from a menu of projects offered, and are not given specific instruction on what underpins

Table 1. Purposes common to research skill development within SSC programmes.

Purposes common to all SSC programmes: *the programme will provide the opportunity to:*	**Learning outcomes:** *It is expected that the student will be able to:*	**Key tasks:** *the student will:*	**Demonstrated by (for example)**
Apply & develop research skills in relation to:			
(a) Research methods	(ai) Formulate research questions	Write a research question	Presenting the research question clearly in report
	(aii) Demonstrate the ability to identify, select & apply appropriate methods when conducting a research study	Employ appropriate research methods	Defend the rationale of selected methods in report Describing fully the methods in report
	(aiii) Recognise the limitations of the research	Describe strengths & weaknesses of research study	Identifying the limitations of study design & outcome of own research in report
	(aiv) Develop an academic argument	Discuss rationale for the study Integrate evidence from ''literature'' & new evidence from research study Discuss the outcome & implications for the study	Discussing the research study in report to an appropriate standard Describing how work contributes to advance of knowledge Producing work of a publishable quality Recording discussions with supervisor in reflective log
	(av) Develop an awareness & understanding of the ethical aspects of research	Consider ethical dimensions of research Submit research proposal to ethics committee if necessary Recognise & acknowledge collaborators	Documenting consideration of ethical aspects including method of obtaining consent Completing ethics proposal form & relevant documentation Complying with local research governance Acknowledging the degree of contribution of others in report
(b) Information gathering	(bi) Identify & utilise a wide range of sources of information	Undertake a focussed literature search, which includes paper-based resources, selective use of databases & www sources	Selecting appropriate references in report/essay Discussion in reflective log
	(bii) Acknowledge all sources of information	Consult with informed sources	Appropriate referencing within report/essay
(c) Critical Analysis & Review	(ci) Undertake critical reviews of research papers	Identify appropriate references & bibliography Demonstrate critical review, evaluation & interpretation of research evidence	Completing critical, reviews of research papers
(d) Data processing	(di) Use appropriate analysis tools	Critically evaluate own research	Providing critical discussion of own research study Describing the analysis method in report
	(dii) Undertake analysis & present statistical information	Demonstrate the use of appropriate tools for analysing research data Effectively present numeric & statistical information	Presenting the results in a report

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Table 2. Agreed criteria to identify if research skills area development within content of projects offered.

Project Description	*Research skills area identified (from Table 1, Stark et al. 2005, 4)*
1. if the word ''research'' is stated in the project description	Evaluate the project description to determine which skills are likely to be developed e.g. is there collection of new data? All 4 criteria are identified if the project context indicates that opportunities for all 4 research skill areas to be covered
2. if the word ''audit'' is stated in the project description	Assume that skills areas that will be covered are 3b) information gathering (*consult with informed sources)* and 3d) data processing (*undertake analysis and present statistical information)*
3. if the word ''audit'' is stated in the project description, but there is further information in the description that indicates that the student will only be collecting data, not undertaking any information gathering and consultation with informed sources	Only 3d) data processing (*undertake analysis and present statistical information)*skill area to be identified
4. project description clearly states that the student will be interpreting and critically evaluating data collected during the project, or the literature searching / information gathering involves critique and interpretation of research evidence	3c) critical analysis and review identified
5. literature review only i.e. not explicitly stated that students do more with the data collected	3b) information gathering is the skill area identified
6. description limited with insufficient detail to determine likely content of project	Classify as undetermined (i.e. not yes or no) for the skills areas

research skills at the time of project selection. Similarly, although all the project descriptions had previously been scored by the research team, the students were not given access to this information. The students were encouraged to discuss, justify and reflect on their initial classifications on these first 10 projects. As the students were working around computer clusters, audio recording of the discussion was not technically possible. Contemporaneous notes of this discussion were taken by the researchers (SD, DME), and transcribed immediately after the meeting, using verbatim quotes as often as possible.

Prior to classifying the remaining 70 project descriptions, the students participated in a briefing session in which they were firstly given written information about the skills involved in research; the classification and criteria contained in Tables 1 and 2. They then participated in a facilitated group discussion on the key components that define research skills. The second part of the study day followed this interactive briefing (learning) session, when they were then asked to identify the opportunities for acquisition of research skills presented in the remaining projects. They were allowed to confer and share views within small groups (three to four students) during this study component - this was to replicate more realistically the process by which students choose their SSC projects, which often involves peer discussion. It also reflected the process by which the final classification of research skill opportunities had been achieved by the research team. This allowed later comparison of student scoring of research opportunities within the project descriptions with that of the research team.

Thematic analysis was undertaken to identify commonality of expressed views. Student responses on research skill identification were taken as 'consensus' if 10 or more students out of the 15 participants agreed. For there to be 'total agreement' between student and researcher in identification of the research skills on offer in a project, there had to be identical scoring across all four skill areas.

Results

Focus groups

Students stated an awareness of the *benefits of developing research skills* during these projects, commenting "even if you just contribute to a research project then you do get a lot of experience that you can use .... in the future if you want to", "it's the development of a skill that you're going to have for the rest of your life". They also identified the recognition of the skills developed, even when projects were not selected for this particular purpose; "I'd never had to write a questionnaire before and it seems like a very simple thing to do, but once I started trying to write I realised that you've got to pitch it and that's one of the things that came out of it", "I didn't actually choose mine with either research or publication in mind, in retrospect I think I would have".

Longer term *career benefit* of participating in research, and the potential for publication, was identified; "There's a slight distinction I think between getting your name on a paper which is sort of an application tick box ... and learning the skills that are involved. I think both are important, I mean ideally you want a paper and the skills, just because it's worthwhile in itself", "I think it starts to enter your mind when you're thinking about applying for (foundation year) jobs".

Students identified *practical difficulties* in preparation before the project commenced, including time commitment and applying for ethical committee approval, as potential impediments to choosing a project that might provide research

experience; "it's a very nice idea at first but actually the practicalities of it in the short amount of time, and what you do and where, ...", "We were really warned off doing research, doing anything that required getting ethical approval because of the timescale and because it's such an absolute nightmare . . . .". ". . . so it wasn't proper research, it wasn't long enough . . .; "Research (SSCs) have a reputation of being harder, they take more effort . . .". Some students however cited these practical challenges to be a potentially valuable learning experience; "Not to do an audit that is research and passed off as audit. . . (so as to avoid the project needing to go through an ethics committee) . . . ."

Lack of appreciation of the *methodical rigor*, and time consuming repetitive (often tedious) tasks required in research led to some students expressing negative perceptions of the experience; "if it gets published then that's a positive experience but if it doesn't, it will be, well you know, they got some free labour out of it"; "I did the research and found the patients. . .I was basically doing the donkey work for what was coming next. . .";

"I did find the (data collection) and you know it was labour intensive but it wasn't really taxing on the brain . . . . . ".

Documentary analysis

905 projects were undertaken by students across the 5 schools; 273 projects did not offer any identified research skill developmental opportunities and in 17% (157 projects) there was insufficient information in the project synopsis for the skills components to be reliably identified and were thus 'undetermined'. The research skill areas covered in the remaining 475 projects (52%) are shown in Figure 2; Information Gathering (88%) and Data Processing (64%) were the commonest skill areas. 61 projects (13%) offered experience in all 4 research skills areas (Figure 3) with 142 (30%) projects offering only one type of research skill area experience.

Student Study Day – documentary analysis + discussion

The ***first component of the student study day*** indicated some striking differences between perceptions and judgements of the students and those of the research team in assessing the opportunities for development of research skills. Consensus (both within the students, and between students and the research team) regarding research skill opportunity was found in only two out of the ten projects initially examined. For both of these projects, there was total agreement that there were no opportunities for the development of research skills. For the remaining eight projects, there was no agreement either among the students or between the students and the research team over the likely research skills that would be covered.

The subsequent discussion revealed considerable differences amongst the students in their interpretation of what constituted research and the skills involved in research. This consequently influenced how students perceived the opportunities for acquiring specific research skills. It was also clear

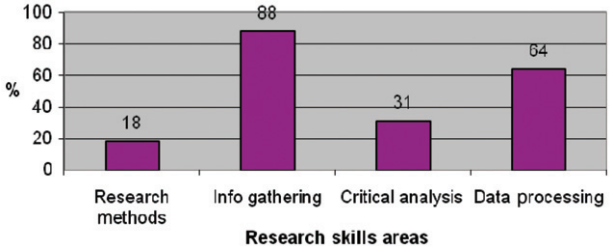

Figure 2. Project content analysis: distribution of research skill areas identified in documentary analysis by research team.

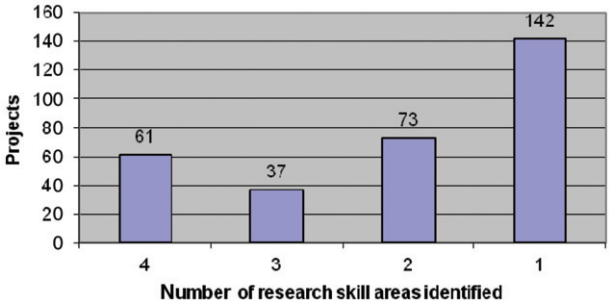

Figure 3. Project content analysis: Number of research skills areas identified within projects.

that students' perception of research and attendant skills differed from the assumptions evident in the research team. Clear discrepancies could be identified in several areas related to the definition of research and its components.

The *basic parameters of research were unclear* to some students. For example, when discussing the differences between clinical attachments and research, a student comment that 'If you're observing then you're not gathering information' was contradicted by others, who said 'you're always gathering information every time you're in a different situation'.

Extending this were the differences in *student perceptions of what constituted research methods*. Critical analysis was variously described as 'a clinical skill and not a research skill'; 'critical analysis is analysing papers'; '(it) is the same as data processing'. Students also argued that 'Data processing can be defined as writing a report, you are reviewing the literature to write the report therefore you are processing the data', and 'it's not research if you're not comparing papers'. There was confusion over what defined audit versus research, and conflicting views were expressed; one student, for example, commented that 'audit is research' whereas another stated 'audit is not a type of research, you're just looking at the guidelines: the research has already been done'.

There were also differences in the *interpretation of project description*. One comment was that there was "not enough information in (the description given) to determine whether research methods (were a component of the project)", and another 'there are no outcomes therefore it doesn't say what you're actually going to be doing, it's just a description of the research project'. The lack of clarity amongst the students over determining opportunity for acquiring research skills was

exemplified by "just looking for something or learning about different research methods" and "blurring of gathering info with research methods".

Improved consensus among the students over classification and identification of the four key research skills areas was apparent in the ***second component of the study day***, after the briefing session at which the agreed criteria had been made available (Tables 1 and 2) and clarification through discussion about what constituted research. In 44 (63%) of the 70 projects there was consensus among the students and with the research team about the opportunities for acquiring each of the four main research skills. In six (9%) of these projects with consensus, the students and researchers agreed that the projects' skill content were 'undetermined' with insufficient information within the synopsis to make judgement. For the remaining 26 projects, there was no consensus within the group. Areas of disagreement were mixed, but nearly half the student group (47%) did not agree about the opportunities for the development of critical appraisal skills in these projects, and 36% disagreed over opportunities for information gathering.

Interaction with peers was observed to be influential in scoring the projects. Students clearly engaged in discussions with their nearest neighbours, and location was observed to be a factor in reaching consensus, with clustering of responses. In student discussion during the second round of scoring, members of each group were observed to influence and clarify the opinions of other members.

There were more similarities than differences between the views expressed by *students from different schools* in both the focus groups and the study day. There was no consistently or significant different view expressed by students from any individual school.

Discussion

Research underpins clinical governance and all aspects of effective clinical practice require an understanding of research skills. This is reinforced by the emphasis placed on the acquisition of research skills in the GMC's recommendations for training of undergraduate medical students (GMC 2003; GMC 2009). Undergraduate research is also seen as a fundamental element of general higher education, in the UK, US and elsewhere (Katkin 2003; Seymour et al. 2004). There is agreement in the educational literature that undergraduate students who participate in research rate the experience highly, with "significantly greater enhancement "in cognitive and personal skills and an increased likelihood of continuing into postgraduate education (Lopatto 2003). Healey (2005) argues that undergraduate research experiences should "induct students into the role of research in their discipline and present knowledge as created, uncertain and contested" (p 15), thus fostering the spirit of enquiry. Nonetheless, providing opportunities for research and integrating it effectively into the curriculum are not trivial matters (Katkin 2003; Lopatto 2003; Robinson et al. 2007a). This is illustrated well by the study reported here. Elective aspects of the curriculum, like SSCs provide an ideal vehicle for research projects and acquisition of skills, although they should not be the exclusive mechanism through which students are exposed to research. However, the opportunities available in project-type work are not always adequately described, and when they are, many students might be unable to identify them, especially when stated indirectly.

An important aspect of encouraging medical students to undertake research lies in enabling them to identify relevant opportunities. Our data indicate that although students are broadly aware of 'research', they are not necessarily clear about what it actually constitutes. Consensus was more frequently reached when no research skills were offered within projects; this is not surprising as it is often easier to see the absence of something. Less clarity is expected if inexperienced in the area being evaluated, with the challenge in interpreting between extremes of all or nothing. This is exemplified by comments indicating confusion over how clinical attachments differ from research projects, or the definition of audit compared to research. One major challenge for effective integration of research skills and projects into the medical curriculum is therefore educating students about the basic parameters of research from very early on in their undergraduate careers. Student participants in this study were drawn from two separate cohorts, across five different medical schools with a range of different learning approaches, including both systems-based and problem-based learning curricula, yet each group shared this lack of certainty. This indicates that the observations of this study could not be attributed simply to the dynamic of one particular and possibly unrepresentative student group.

Identifying opportunity also requires an appreciation of past experiences and how they contribute to their 'research education'. In the focus groups, some students commented that they considered they were being used, effectively, as the 'hired help' in research projects. There seemed to be relatively little realisation that research often involves repetitive tasks and unglamorous work. The role of the supervisor is therefore crucial to promoting research ethos, and ensuring students understand the many facets of research: project funding and design, ethical approval, endless (and sometimes tedious!) data collection and analysis, through to publication. This requires experienced researchers to contribute in the curriculum areas that promote research without viewing the time spent as wasted or detracting from their primary role- "Research skill development can be seen as an underlying principle in all education and not restricted to "researchers" engaging in activities that compete with their teaching demands" (Willison & O'Regan 2007, p 395).

Student perception of research varies (Robertson & Blackler 2006), and may arise because of the ways in which the basic skills of research are presented. Although there is little controversy about research 'basics' within science – reading the literature, coming up with a testable idea, collecting or collating the data required to test it – it is not always evident among students that skills acquired in one realm may translate to another. Critical analysis, for example, is an important clinical skill, but it is also a fundamental of research, and can act to connect the clinical and research spheres through evidence based medicine. The poor initial consensus among the student study cohort demonstrates why medical educators

need to be more explicit in pointing out these transferable skills. When presented with information and given the opportunity to discuss what was meant by 'research', student participants were better able to identify not only those projects that offered research opportunities but also the specific skills they might acquire. This illustrates very well that if students are given guidance on the nature and scope of research, they are likely to be able to make more informed decisions about how to shape their learning and skill acquisition in this area. However, there is no straightforward briefing 'checklist' for research. Conceptualising the journey of enquiry-based learning which underpins the development of research is a major challenge for educators. The undergraduate research experience is a cumulative one, and it is important that students realise that on the research continuum they will use the same core set of skills but the level of specialisation and complexity will change. As well as specifying the end points (learning outcomes) of research-based tasks (e.g. Stark et al. 2005), published frameworks that facilitate conceptualisation and track the 'journey' of enquiry (e.g. Willison & O'Regan 2007), can therefore be usefully applied in curriculum planning.

A number of practical recommendations arise from the study reported here which, given the statements in the GMC consultation document (GMC 2009), are of great relevance to the development of SSCs and the role of such project work in undergraduate (and probably postgraduate) training. The participation of five medical schools, with different curricular organisation, and spanning 'old' and 'new' institutions, means that the results of this study are generalisable across medical education. Almost one fifth of SSC projects reviewed in this study contained insufficient information for either the research team or the student participants to make judgements about their research potential and the skills that might be acquired. This has implications for both staff and student training. Comparison of the ways in which academics and students interpreted such information indicated that students found it less easy to identify the opportunities for research and pinpoint which research skills they might acquire. Knowledge about a supervisor's working environment, or research interests that appear obvious to course organisers may be effectively hidden from students. Curricular elements incorporating student choice should have accompanying information that explicitly describes their purpose and outcomes, and hence what students might gain from them. Where relevant, this should include specific information about the research skills offered, even in projects where 'research' may not be the primary focus. It is probable that by providing students not only with more explicit descriptions of projects offered but also giving them the means to assess the degree to which each attachment will expose them to research and skills, they will become more comfortable with the notion of research and therefore with conducting and directing it. The potential value of a similar intervention to increase teaching staff clarity about research skills components, as occurred during the students' study day, has implications for faculty development, a and a topic for further study.

The benefits of participating in research as an undergraduate are well documented for graduates, institutions and the academic community as a whole (Jacobs & Cross 1995; Greenhalgh 2003; Houlden et al. 2004). Undergraduate research experience can enhance employability (with the application forms for foundation year placements in the UK awarding credit to medical graduates for publications). Evidence for longer term benefits comes from enhanced postgraduate research productivity, irrespective of the duration of the undergraduate research experience (Dyrbye et al. 2008). At a time of crisis in recruitment into academic medicine, Metcalfe (2008) in a recent editorial highlighted the value of students' participation in research through inculcating the culture of evidence based medicine in clinical medicine and that "Only in these ways can we secure a future for academic medicine and foster a genuine respect for EBM in tomorrow's doctors" (p103). Medical educators must value student participation in research and facilitate real engagement with the research skill development agenda.

Notes on contributors

All contributors to the paper are active members of the Northern medical schools Student Selected Components (SSC) Consortium, and are involved in the development, implementation and evaluation of student- selected projects within their medical School.

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Conflict of Interests

All authors declare that there are no competing interests.

Ethics Approval

Main ethics clearance for the study was obtained from EdREC (Educational Research Ethics Committee, Faculty of Medicine & Health, University of Leeds) within the lead institution, and augmented with approvals from ethics committees at the other participating institutions.

Participant consent

Obtained.

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