

Education Research at the Faculty of Medicine, University of Maastricht: Fostering the Interrelationship between Professional and Education Practice

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ABSTRACT

An academic department of education serving the entire university and a strategic choice by the Faculty of Medicine to support educational innovation through education research are the historical cornerstones of the education research program of the University of Maastricht. Over the years, the department's initial exclusive research focus on the evaluation of problem-based learning has widened to include theory-based applied research covering the broad domain of education. The program focuses on themes: the learning of students and teachers, characteristics of powerful learning environments, and assessment and evaluation of learning and teaching. Although mod-

est in terms of resources, the program is firmly anchored within the Faculty's organizational structure. Educational relevance and professional alignment are the most prominent determinants of the success of the program. These features sustain the institutional mission of educational excellence as well as the high ranking of the Faculty of Medicine's medical training program among the training programs of the Netherlands' medical schools. A break in this self-perpetuating mechanism—due either to internal politics or to staffing problems—forms the main risk factor for the continuation of the department.

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In 1974, the Maastricht Faculty of Medicine was founded as the first faculty of a new university. The mission of this new university explicitly included educational innovation. A group of pioneers had discovered problem-based learning (PBL) as an attractive instruc-

tional method and adopted it from McMaster University. Although logical with hindsight, in those days it was quite revolutionary to include educationalists among the first group of trailblazers who shaped the university's mission.

During the discussions in which the organizational structure of the university was established, the educationalists vigorously championed an independent academic status for education and education research. The idea was to achieve this ideal by setting up a department dedicated to education and education research (including but not limited to medical education research). After many sessions in which the desirability of an educational unit that would provide more than educational service and support was hotly debated, the educationalists saw their wish fulfilled in 1977 when full academic status was granted to a department of education, now called the Department of Educational Development and Research. The decision to establish a department solely

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dedicated to educational matters was the cornerstone of education research in Maastricht. The foundation for research was strengthened by the decision to incorporate education research among the limited number of the core research themes of the medical faculty. Resources—albeit on a modest scale—were specifically allocated for education research. And, even more importantly, research on education gained formal recognition as a priority domain within the Faculty of Medicine. In 1982, the university granted the mandate for the research program on education.

Since 1977, several other faculties have been established. All the faculties of the University of Maastricht adopted PBL as their main instructional method. Currently, the University of Maastricht is a midsize Dutch university with seven faculties and approximately 12,000 students and 3,000 employees. The Faculty of Medicine has a student intake of 340 students per year, who enroll in a six-year undergraduate medical program. Educational innovation continues to be at the heart of the university's mission. (For more information about the university, see www.unimaas.nl.)

The two organizational prerequisites—academic status for educationalists and a recognized research program—have been crucial factors in shaping education research in Maastricht. However, other factors have probably been even more decisive in its survival and success. In this case study, we will attempt to shed more light on those factors. We will do so by first describing the goals and the contents of the education research program and then reflect on critical success factors, risk factors, and challenges for the future. We will limit this case study to the research activities associated with the Faculty of Medicine.

AIM AND RATIONALE

The goals of the research program are

- to investigate the nature of human learning and learning environments,
- to collect scientific evidence to underpin improvements in medical education,
- to stimulate educational innovation, and
- to educate staff in medical education research.

Program Focus

At the outset, the research program was exclusively tailored to matters related to PBL. This was the logical consequence of the university's radical choice to introduce PBL as the sole educational approach. Given the revolutionary nature of this choice at the time, the university had a societal obligation to be accountable for this decision. As a result, the prime focus

of education research was on the characteristics of PBL, such as issues relating to the role of the tutor and the development of instruments to assess the PBL program. Over the years, the research themes have diversified. Currently, education research focuses on human learning and the way learning environments can be arranged and evaluated to facilitate that learning.

Scientific Evidence for Medical Education

The drive to make education more evidence based would appear to be a logical incentive for education research, but actually this is by no means an accepted way of thinking about teaching and education. To this day, tradition and intuition continue to be the prime guiding principles of education.¹ However, just like medicine, education should be grounded as much as possible in the best evidence we can find. Although we acknowledge the parallel between evidence-based medicine and the importance of best evidence in medical education,² we would also like to emphasize that education should use research methods that are geared to the idiosyncrasies of the domain of education and, unlike much of medical research, the education research neither can nor should always use controlled experimentation as the method of preference^{3–6} The Maastricht education research program has moved away from broad evaluations of program effectiveness⁷ and has focused its attention on the scientific underpinnings of specific components of the learning environment. In addition, the program is characterized by the use of both quantitative⁸ and qualitative research methods⁹ or combinations thereof.¹⁰

Research Driving Educational Innovation

The Maastricht education research program is eminently suitable to drive educational innovation. This is not true only for medical education in general—by publishing research evidence and thereby contributing to the status of medical education as a scientific discipline—but is also true at the local level of the Maastricht medical curriculum. In various national evaluations the Maastricht medical training program invariably ranks high among such programs in the country's medical schools. This leading position attracts many students (from the Netherlands and abroad) and sustains the university's corporate image as a seat of innovative education. Education research bolsters this position and thereby justifies the allocation of (modest) resources for this program.

Educating Staff in Medical Education Research

Last, but by no means least, the education research program derives its right to existence from its contribution to faculty development. From a faculty development point of view education research should not be the exclusive domain of educationalists. Scrutinizing the conditions of one's education program, engaging in research, and contributing to the expansion of the scientific field of education may well be regarded as the highest forms of a teacher's professional development. Because we are committed advocates of faculty development through research, we strongly propagate active involvement of medical staff in medical education research. Educationalists have an important task to fulfill as facilitators in this professional development process. A clear advantage of education research by medical professionals is that the outcomes will have inherent credibility among their colleagues. This will promote the acceptability of the results and will greatly enhance the chance of success of the implementation of innovative changes in local educational practice.

PROGRAM DESCRIPTION

Research Themes

In Table 1 the research themes are shown, along with a small sample of ongoing projects and some illustrative examples of publications.

The logic of these themes is that they range from the theoretical foundation of learning to how learning environments can be arranged to facilitate those learning processes and finally how learning can be evaluated by looking at the education process as well as the outcome of this process. We are the first to admit that these themes are very broad. However, they provide flexibility in meeting the previously outlined objectives. In part the program follows our own research agenda, and we typically use our own medical training program as the place for experimentation. The amount of lab-based research projects is limited. Research initiatives from staff within our own and other Faculties of Medicine are never discouraged with the argument that they do not quite fit in with our thematic priorities. Generally, such proposals are reformulated in such a way that they become more in line with education theory or topical issues in the literature. Some research projects involve collaboration with other research groups within the Faculty of Medicine. For example, many insights into education and assessment are transposable to postgraduate residency training and continuous professional development, and successful projects have resulted from such joint efforts^{11,12}.

Over the years we have become aware of how difficult it is to steer research in a particular direction. Education research

is partly dictated by ongoing issues in the medical curriculum (the Maastricht curriculum recently embarked upon its third major curricular revision within the 30 years of its existence), partly by interesting themes that emerge from the literature, but mostly by the personal interests of those involved. The lack of central control over research topics as a result of personal preference is counterbalanced by the advantage that the people involved in the research are highly motivated and their choices match the stage of expertise they have reached in their development as education researchers.

Organization

The education research program staff consists of a little over three full-time equivalent (FTE) scientific staff (Table 2, top section), spread across 19 researchers. Organizationally, the research program is embedded in a matrix management system with programs on the one axis of the matrix and departments on the other axis. Over the last five years, approximately 2.5 FTE of education research staff have been employed within the Department of Educational Development and Research and the remaining education research staff are spread across various basic science and clinical departments within the Faculty of Medicine. These external staff members are partly assigned to education research, usually for several years (in order to allow departments to plan ahead). Table 2 states the number of FTEs of scientific staff, support staff, and PhD students involved in the research program. About 3% of the total education budget and about 1% of the total budget of the Faculty of Medicine is spent on education research.

For a better understanding of the data in Table 2, top section, some other contextual information may be helpful. Within the Department of Educational Development and Research, approximately eight additional FTEs are available for educational development activities (curriculum construction, staff development, program evaluation, assessment, information and communication technology, student counseling and guidance) and teaching tasks within the medical curriculum. Roughly 80% of the educational development activities are more or less structural activities, and about 20% are used for educational innovation projects. As can be seen in Table 2, approximately half of the Faculty's budget is matched by external funding. External research funding is difficult to acquire. Most external funding comes from education development projects (government and European Union funded) and from external consultation and training programs. This external funding is mainly used for contracting PhD students.

Table 1

Research Themes, Some Ongoing Projects, and Examples of Publications, the Education Research Program of the Faculty of Medicine, University of Maastricht, 2004		
Research Theme	Sample of Ongoing Projects	Sample Publications
Learning of students and teachers	Cognitive expertise development in medicine Epistemological beliefs of teachers Perceptions of residents' role in teaching Tutor perceptions and beliefs of group functioning Effect of staff training on supervision Learning from international clerkships Redesigning models for communication skills Self-directed learning	de Grave WS, Dolmans DHJM, van der Vleuten CPM. Profiles of effective tutors in problem-based learning: scaffolding student learning. <i>Med Educ.</i> 1999;33:901-7. Dornan T, Scherpbier A, Boshuizen H. Towards valid measures of self-directed clinical learning. <i>Med Educ.</i> 2003;37:983-91. Niessen TJH, Vermunt, JDHM, Abma, TA, Widdershoven, GAM, van der Vleuten CPM. On the nature of epistemologies: making explicit hidden assumptions through analysing instrument design. <i>Eur J School Psychol.</i> [in press]. Tigelaar DEH, Dolmans DHJM, Wolfhagen HAP, van der Vleuten C. The development and validation of a framework for teaching competencies in higher education. <i>Higher Educ.</i> 2004;48:253-68.
Characteristics of powerful learning environments	Strategies of collaborative learning Computer-assisted collaborative learning Factors influencing self-study in PBL Tailored multimodal approaches in continuing professional development Real patients as a starting point for learning Supervision in practice-based learning Clerkship characteristics and quality of learning Community-based education in rural Indonesia	van den Hurk MM, Dolmans DHJM, Wolfhagen HAP, van der Vleuten CPM. Testing a causal model for learning in a problem-based curriculum. <i>Adv Health Sci Educ.</i> 2001;6:141-9. Schmidt HG, Moust HC. Factors effecting small-group tutorial learning: a review of research. In: Evensen DH, and Hmelo CE (ed). <i>Problem Based Learning: A Research Perspective on Learning Interactions.</i> London: Lawrence Erlbaum Associates, 2000:19-51. Dolmans DHJM, Wolfhagen HAP, Essed GGM, Scherpbier AJJA, van der Vleuten CPM. The impacts of supervision, patient mix, and numbers of students on the effectiveness of clinical rotations. <i>Acad. Med.</i> 2002;77:332-5. Visschers-Pleijers AJSF, Dolmans DHJM, Wolfhagen HAP, van der Vleuten CPM. Group interaction processes in problem-based learning: elaborations and interactions. <i>Med Teach.</i> [in press].
Assessment and evaluation of learning and teaching	Transition from theory to practice Basic science proficiency of PBL students Portfolio assessment for student assessment Portfolio use for evaluating teaching competencies Feedback effects in progress testing In-training assessment in clerkship settings and residency training Optimizing final examinations	Prince CJAH, van de Wiel MWJ, Scherpbier AJJA, van der Vleuten CPM, Boshuizen HPA. A qualitative analysis of the transition from theory to practice in undergraduate training in a PBL-medical school. <i>Adv Health Sci Educ.</i> 2000;5:105-10. Schuwirth LWT, van der Vleuten CPM. Changing education, changing assessment, changing research. <i>Med Educ.</i> 2004;38:805-12. Charlin B, Roy L, Brailovsky C, Goulet F, van der Vleuten C. The script concordance test: a tool to assess the reflective clinician. <i>Teach Learn Med.</i> 2000;12:189-95.

Quality Control

In the Faculty of Medicine, five criteria are used in decisions regarding the continuation of research programs and every program must fulfill at least three of them:

- There must be at least six publications in international peer-reviewed journals per one FTE internal funding.
- The mean impact factor of the publications must exceed the average impact factor of the reference group (in our

case, Education, Scientific Disciplines) by a factor of over 1.5.

- There must be 0.5 doctoral dissertation per one FTE with internal funding.
- External funding must minimally match internal funding.
- There must be a critical mass of at least ten FTE.

So far, our education research program has been able to survive despite these criteria. We do not meet the requirements with respect to critical mass and external funding.

Table 2

Inputs and Outputs in Education Research, Faculty of Medicine, University of Maastricht, 2004	
Category	No.
Inputs	
Internal funding	
Scientific staff	3.2 full-time equivalent
Support staff	2.8 full-time equivalent
PhD students	2
External funding	
PhD students	5
International PhD students	11
Outputs*	
International peer-reviewed publications	21
National peer-reviewed journals	11
Books/book chapters/proceedings	14
PhD dissertations	3

*Approximate averages per year across the last five years.

Like any set of criteria of this kind, their relevance and strategic consequences are the subject of intense argument. On the other hand, they do provide an impulse for productivity.

In the Netherlands, all research is externally audited at regular intervals by a government-approved national accreditation body from the Association of Dutch Universities. The education research program has always been accredited in these audits. The quality, productivity, and viability of the program are judged as good, its relevance as excellent. Every six years, the research is also accredited at the national level by the Dutch School for Education Research. Table 2, lower section, shows some publication output results.

CRITICAL SUCCESS FACTORS

In our view, the pivotal factor in the success of the department's education research program is the strong relationship with the practice of medical education at our school. All staff members involved in education research also participate in educational development and teaching activities. Problems encountered in educational practice are often used as starting points for research. Because of this strong relationship with educational practice, our research is judged as highly relevant and contributes to educational innovations both within and outside our own medical program. Educational relevance also contributes to bridge-building across the notorious gap between education research and educational practice.¹³ This does not imply that our research is not theory-driven. In

many cases successful research has its origins in concrete problems in education, but in order to be successful it must be firmly embedded in the current literature and it must have a manifest added value. And although most of the research projects in our program are in applied research, fundamental research is not neglected. One of our most successful programs—the development of medical professionals' cognitive research expertise¹⁴—was quite fundamental in nature. But even for this fundamental research there was a credible and logical relationship with educational practice. In general, we believe that our research can be characterized as authentic, inductive, and design oriented rather than deductive and lab oriented, and this offers the advantage of increased relevance for educational practice.¹⁵

Another key aspect of the success of our research program is, in our view, that we have succeeded as much as possible in achieving professional alignment. Staff involved in education research represent a mix of medically trained professionals and educationalists or psychologists. This mix is the result of a deliberate strategy to enhance interdisciplinary synergy between education and the medical profession. The research program is carried out partly by professionals from the medical domain. As a result, these professionals become also proficient in education, which in turn facilitates the implementation of educational innovations and fosters education-mindedness among the medical professionals. In this way the research program makes an important contribution to the strategic institutional mission, thereby creating a self-perpetuating mechanism.

For successful education research, a supporting infrastructure is essential. This means primarily that the department should have staff with sufficient experience in education research and who are attuned to working in a profession-oriented manner. Therefore, several of our key researchers are professionals with a medical background who have elected to pursue an academic career in medical education. Education research rests heavily on social science research methodology and requires training and experience to become proficient in it. In our program we have specialists to provide that support: we employ specialists in research methodology and statistics, specialists to carry out data analyses, and someone specialized in English and editorial support, et cetera.

RISK FACTORS

From the above it will have become clear that the research program contributes towards innovative education both within and outside Maastricht. However, with every past budget problem and strategic reorganization of the Faculty of Medicine, the position of education research has been in

jeopardy. Whenever priorities have to be reconsidered, education research finds itself among the frills, a nonessential extra in the organization. Therefore, internal politics are likely to remain the biggest threat to the research program. It is not illogical in times of hardship to give priority to biomedical research over education research. The university in general and the medical school in particular are in transition from being an original pioneering organization to an established large and institutionalized organization. Excellence in medical research tends to be valued more highly than education and education research. Should this eventually reach the stage where the quality of education is compromised, the described self-perpetuating mechanism will come to a halt; this might also denote the end of educational research at our institution. Nevertheless, we think we will survive to tell the tale of the successes of our department because of our high education quality ratings, our contribution to the university's corporate image, and the general satisfaction with our educational services. These are persuasive arguments in the political debate.

The overall research input into the program in terms of staff and resources is limited. This means we are vulnerable in terms of critical mass and personnel changes. We alluded to the difficulty of effectively steering research, which is partly due to the limited size of the program and the preferences of the people in it. One might argue that a program of this size warrants concentration on fewer topics, but this would conflict with our strategic choice for professional alignment and practice orientation. Nevertheless, program size and the relatively small number of key researchers make the research program vulnerable to potential adverse effects of staff mobility. Recruitment and training of new young researchers who are eager to pursue a career in medical education research, particularly young researchers with a medical background, is a challenge that is often hard to meet. Moreover, it is not uncommon for successful recruitment and follow-up training to be rewarded by thankful competitor employers in the job market.

FUTURE CHALLENGES

To protect the continuation of education research and the academic position of the educationalists within the Department of Educational Development and Research, strategic choices have been made to establish our own teaching program in health professions education and a PhD program. This international Masters Program in Health Professions Education (MHPE), for which separate funding is obtained, has an entry of about 15 students per year from all over the world (for more information, see www.mhpe.unimaas.nl). The program is strongly driven by education research. Sev-

eral of the MHPE students go on to do their PhD degree at Maastricht. A doctoral dissertation in the Netherlands is purely research based and typically consists of four to six published research articles in international journals. Additionally, a stable number of international non-MHPE candidates have their PhDs in education research supervised by staff of our department. In all, both the MHPE program and PhD projects will hopefully provide additional academic anchors for enduring education research. A challenge for the future will be to further expand the educational masters program by offering a more flexible program that will attract more students both nationally and internationally and will give an additional impulse to our research activities.

Another challenge will be to take the research to a more mature level by embedding it even more firmly in educational theory or bringing it more in line with current issues in the literature. Yet another challenge that is not always easy to meet consistently and continuously is the building of bridges between general education theory and educational practice. General education research has different scientific platforms, and upholding and contributing to both scientific areas is not a realistic prospect. We compromise between the two, with a clear emphasis on the professions side of education research.

Finally, across the last 30 years or so we have seen an incredible professionalization of the medical education community. This has been greatly facilitated by the scientific forums that have been created in medical education. National and international conferences on medical education are thriving. Workshops, training programs, and master programs are prospering. There is no other profession in higher education that can pride itself on so many international education journals for disseminating education research information. These forums are fully targeted at the professional medical field and display the same type of interplay between health professionals and educationalists that has characterized our research program. We are convinced that this embedding of education research in educational practice and involvement by medical professionals in the field of medical education are the keys to the successes of the medical education community and therefore to the successes of the health professionals who are educated and trained by this community. Ultimately, the benefits of this approach will be reflected in the quality of health care delivery.

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Teaching and Learning Moment

WHO WILL REMEMBER YOU?

Reimbursements have decreased, we work harder for less, we have had to become more efficient in our practice of medicine, we have physician-extenders helping us capture more income. One thing we surely do not need in our very busy day is to work with medical students and residents. Unfortunately, such an attitude is increasingly prevalent among some physicians.

While making my way to New York University one afternoon I noticed a poster on the wall of a subway car. I was immediately struck by its congruity to what had been concerning me. Posted was the following interrogative: “You remember your first grade teacher’s name. Who will remember yours?” It was a call for help from educators to the community. That call does not just start or stop in the streets of the Bronx, it extends up and down the entire ladder of society and education.

The ancient Greeks had a word, *techne*, which means an art, craft, or skill involved in producing something, such as the practice of medicine. A virtue, on the other hand, is an admirable human characteristic or disposition that distinguishes good people from bad, an interesting concept in the context of this dialogue. Medical schools educate youth in a *techne* and send them out into the world to stamp out disease and pestilence. We then hope they endeavor to remain virtuous in the practice of their medical art. The question that remains in my mind is this: When physicians refuse to pass on their *techne* to the next generation, have they lost their virtue?

If physicians lose their virtue by not sharing their *techne*, a further question should be put to them, “Who taught you?” Someone must have held their hands, took a risk, and had confidence in them. Someone took the time to educate them, to pass on their *techne*. We must muster up our virtue as teachers, try not to scorn medical students and residents for their youth and inexperience, and pass on our *techne* to the next generation of physicians.

To some of us the practice of medicine is a job, to some of us it is a calling, and to all of us it has been intermittently frustrating and disappointing, especially with today’s malpractice climate and generally decreasing reimbursements. Nonetheless, I feel it is important for us to interact as much as possible with those who follow us. We all need to ride that subway car in the same direction. You never know if one of your students—these future physicians—might come up with a solution for the unsolvable. And when this happens you will know that you were in some way responsible for their success, but even better...they will remember you.

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