

A Masterclass to Teach Public Health Professionals to Conduct Practice-Based Research to Promote Evidence-Based Practice: A Case Study From the Netherlands

Maria W. J. Jansen, PhD; Marjan Hoeijmakers, PhD

Introduction: Public health professionals have a pivotal position in efforts to obtain more practice-based evidence about what people need and what works in real circumstances. Close collaboration with researchers should enable public health professionals to design and conduct research in practical settings to address today's complex public health problems and increase the external validity of results. This requires expanding the research competencies of public health professionals. We developed and implemented a masterclass for public health professionals, modeled on an existing scientific training course for general practitioners and rehabilitation physicians. **Method:** The masterclass was evaluated using a multiple method design, involving quantitative and qualitative methods. Evaluation took place during, at the end of, and 9 months after the masterclass. **Results:** Twenty-one candidates (mean age, 41 y) started the program, 66% of whom completed it. Teaching materials, lectures, organization, and facilities were favorably evaluated. At the end of the masterclass, participants were able to design and implement a research proposal in their daily work setting, write a draft article, and critically appraise scientific research for practice and policy purposes. Participants had become more confident about their research competence. Management support from their employer proved crucial. Results obtained with the different methods were consistent. **Conclusion:** The masterclass appeared to be an effective instrument to increase the practice-based research skills of public health professionals, provided the research is implemented in a supportive organization with management backing and supervision by senior

university researchers. We recommend using masterclasses to contribute to the improvement of practice-based evidence for projects addressing current and future public health problems.

KEY WORDS: evidence-based practice, practice-based research, public health competences, research capacity building

The Netherlands, and especially the southern province of Limburg, faces major public health problems, especially relating to health risks among young people, unhealthy lifestyles, chronic diseases, and unhealthy aging. Addressing these problems requires practice-based evidence. Nowadays, the use of practice-based evidence in public health is generally recognized as an essential tool to improve the quality of public health services.¹⁻⁴ However, there is a gap between research and practice. The perception of research and practice as representing 2 separate entities has a long tradition in intellectual thought, and has contributed to the gap between public health research institutes on the one hand and organizations delivering public health services and interventions on the other.⁵⁻⁷ Hence, research results are often insufficiently tailored to specific patients or populations and to practical

Author Affiliations: Academic Collaborative Centre for Public Health Limburg, Geleen and Public Health Services South Limburg, Geleen (Dr Jansen and Hoeijmakers); and CAPHRI School for Public Health and Primary Care, Maastricht University, Maastricht (Dr Jansen), the Netherlands.

This research was supported by the Netherlands Organisation for Health Research and Development (ZonMw), project number 7125.0001. The funding agency had no role in the design, conduct, and data analysis of this study.

The authors declare no conflicts of interest.

Correspondence: Maria W. J. Jansen, PhD, Academic Collaborative Centre for Public Health Limburg, PO Box 2022, 6160 HA Geleen, the Netherlands (maria.jansen@ggdzl.nl).

DOI: 10.1097/PHH.0b013e318225158a

circumstances.^{4,8} In addition, researchers have no regular opportunity to give immediate feedback to practitioners⁹ and most practitioners lack the competence to communicate with researchers. Although public health professionals in the Netherlands are trained in basic scientific research and analytical reasoning skills, these skills do not belong to the core business of their everyday practice routine. Professionals are not even customarily involved in practice-based research projects. Most professional and policy organizations consider research as something to be done separately from practical work. Scientific research and analytical reasoning competences are therefore not adequately maintained or trained any further among public health professionals.

Nevertheless, these professionals can play a pivotal role in generating knowledge for evidence-based practice if they are able to incorporate the principles of scientific research and analytical reasoning in their practice routines.¹⁰

In the last decade, many so-called practice-based research networks have been established in Western countries.¹¹⁻¹⁵ Such an integrated infrastructure for practice- and policy-based research has also been established in the Netherlands in 2006, to improve evidence-based practice in public health.^{8,16} The aim of this so-called Academic Collaborative Centre for Public Health is to link research, practice, and policy to achieve participation, support, and commitment for evidence-based program implementation, evidence-informed policy development,^{17,18} and service delivery, all intended to promote the health of the population and specific at-risk groups.

Active involvement of public health professionals in practice-based research is deemed to require them to improve their academic competences. To this end, the Academic Collaborative Centre has set up a Masterclass on Scientific Research Training for Public Health Professionals in its catchment area (hereafter called the masterclass).

Maastricht University, Maastricht, the Netherlands, had already successfully developed and implemented masterclasses to assist general practitioners (in the 1980s) and rehabilitation physicians (in the 1990s) in gathering practice-based evidence, which greatly accelerated the integration of research and practice. The essence of these masterclasses was that they combined problem-based research in an actual practice setting with regular courses on theory and methodology, closely supervised by university staff members. We used their experience to design a masterclass for public health professionals.¹⁹

This article describes the content and evaluation of this masterclass. If successful, the masterclass will be repeated and embedded in the activities of the Academic Collaborative Centre, to meet the key compe-

tence requirements of current and future public health professionals.

● Masterclass for Public Health Professionals

Description

The masterclass was developed between 2006–2007 by a small steering group with members from the policy, practice, and research domains. The basic principle was to integrate the training with the participants' regular professional activities, focusing on practice-based problems, active learning, interdisciplinarity, and teamwork.²⁰⁻²³

The main goals were to train public health professionals to design and conduct scientific research based on a problem in practice or policy. Secondary goals were interacting with experienced researchers, critically appraising the results and translating them into interventions in complex real-life settings, and finally, gaining more confidence in their own research competence.

The target group for the masterclass was broad and included public health professionals from different organizations and public health policymakers from the municipalities in the southern part of the Netherlands. Entry requirement was a bachelor's degree or higher in health science, public health, medicine, or social sciences.

Program content

Participants were expected to learn how to describe a relevant problem from their own practice or policy setting, define a concise problem statement, convert it into a research question, select the most appropriate research design, write the research protocol, implement the research project in their own work setting, analyze the results, and, finally, write an article about it. Teaching relied on active learning²⁴ by means of lectures and practical exercises, often tailored to the participants' research questions.²⁵ Lectors and tutors from Maastricht University were responsible for the content and student coaching, while a coordinator was responsible for supervising the process.

The masterclass was divided into six 1-week courses taught over a time period of 18 months, from January 2008 until May 2009. The content of the lectures was adapted to the process of formulating the research proposal, to avoid information overload²⁶ (Table 1).

Facilities

The 1-week courses were given in a neutral environment (a conference hotel), to get the participants away from their regular duties. The total time investment

TABLE 1 ● Masterclass Program

Preparation: formulating a problem statement from their own professional work setting	
Wk 1: problem statement	Participants learn to develop an initial, concise, operational problem statement that would be relevant to their own professional work.
In between: 2 wk to formulate a practice- or policy-based research question	
Wk 2: overview of research methods	Participants are introduced to quantitative and qualitative research methods and ethical considerations.
In between: 10 wk to write a draft research proposal	
Wk 3: research proposal	Participants learn about internal validity, selection of study populations, data collection, and choosing an appropriate research design with corresponding measurement instruments. Each participant has to present their research protocol for critical review by the other participants. On the basis of a participant's progress, the tutor decides whether they are allowed to continue the masterclass.
In between: 6 mo to conduct the research in one's own work setting	
Wk 4: data analysis	Participants receive an overview of descriptive and analytic epidemiology, statistical methods, and theory validation. Participants analyze their own data during practical exercises using the SPSS ^a and QSR NVivo ^b software packages for quantitative or qualitative analysis.
In between: 10 wk to analyze data	
Wk 5: writing a manuscript	Participants are given a booster session about internal validity, the meaning of external validity, the world of science, and the way it works. Participants learn how to write a manuscript.
In between: 3 mo to write the manuscript	
Wk 6: implementation in practice and policy	Participants discuss the way research findings can be translated into practical interventions and policies, as well as issues of implementation and dissemination. Invited speakers, like a local government officer responsible for public health, and national and European policy experts, discussed the way the policy arena functions at the local, national, and European levels, as well as aspects of knowledge transfer between research and policy.
Extension: 6 mo to finalize the manuscript	

^aSPSS Inc, Chicago, IL.

^bQSR International Pty Ltd, Doncaster, Victoria, Australia.

was estimated at 660 hours, that is, an average of 8 hours a week: 180 hours for the 6 course weeks and 480 hours for independent studies, research, and writing. The management of the institute employing the participant was advised to allocate 50% of the total time investment, that is, 330 hours. Candidates had to apply for participation in the masterclass by letter, demonstrating their motivation for research in practice or policy, from the perspective of either public health or their own career. Participants were given access to the university library to search for international literature about topics related to their subject. Each participant was allocated a university tutor who supervised him or her during the entire period. A masterclass certificate was issued if the participant had submitted a manuscript for publication in a peer-reviewed journal to the tutor within 6 months after the final course week, and the tutor and a second independent reviewer had given them a positive evaluation.

● Method

This study evaluated the masterclass using a multiple-method design,^{27,28} to make our results more robust.

We used 4 methods. First, we recorded the number of persons who showed an interest in the masterclass, applied for it, started it, were absent, withdrew, were delayed, and completed it. Second, participants were asked to complete formative evaluation forms with report marks (1–10) for each lecture, as well as for the role of the tutor and the masterclass coordinator. These forms were derived from those that had been used for masterclasses for rehabilitation physicians (in the 1990s), and were meant to identify shortcomings of the teaching activities with respect to instructiveness, clarity, relevance, presentation, structure, professionalism, and the tutor's role, and to assess the match between participants' previous knowledge and the teaching offered, particularly the lectures. Third, we held focus group interviews with the masterclass participants by the end of the masterclass (in week 5) and 6 months after completion. The interviews were carried out in 2 groups of 8 participants each, led by the same moderator, who used a semistructured interview plan. The first interview in week 5 focused on 3 topics: the participants' experience of attending the training courses, professional development and changes in the work environment, and future expectations. The 2 interviews

were taperecorded, and transcribed to produce a summary report including the above-mentioned topics and particular subtopics. The report was checked and approved by the interviewees. The second interview focused on 2 topics: use of the scientific knowledge and skills acquired, and whether their expectations had been met. This time the interviews with the 2 groups were transcribed verbatim and coded on the basis of the above topics and subtopics.

Fourth, participants completed a questionnaire at the end of the final course week to assess the results in terms of personal learning objectives and career prospects. A 36-item questionnaire, using agree-disagree answers on a 5-point Likert scale, was developed with the assistance of the Department of Health Sciences Education at Maastricht University, which has extensive expertise in the assessment of active learning.

● Results

Participants' characteristics

In all, 31 professionals applied for the masterclass. Twenty-one of them actually started the program: 2 civil servants, 8 youth physicians, and 11 health promotion professionals. Three applicants had bachelor's degrees and the other 18 master's. Five participants withdrew, stating lack of time and insufficient management support ($n = 2$), chronic disease ($n = 2$), and incompetency ($n = 1$), as the main reasons. The mean age of the 16 participants was 41.5 years (range, 28–59 y; median = 39.5 y). Their professional career in public health had lasted an average of 17 years (range, 3–29 y; median = 17.5 y) and they worked an average of 4 days a week. (Table 2)

Nine participants completed the masterclass within the intended timeframe of 18 months, 5 within the extended timeframe of 2 years. Two candidates did not complete their manuscript and therefore did not receive a certificate.

Participants' appreciation of the content

The formative evaluation showed high mean report marks for the lectures (42 lectures in total) with respect to instructiveness (7.9 of 10), clarity (7.6), relevance for public health (7.8), relevance for the participant (7.6), presentation (7.8), structure (7.8), and professionalism (8.5). Participants reported having gained sufficient knowledge about research methodology (94%). The mean appreciation scores were 4 of 5 or more for clarity, instructiveness, and linking up with their previous knowledge. Scores below 4 were mainly given

to presentation skills, research implementation, article writing, and dissemination of results in one's own work setting (Tables 2 and 3).

Fourteen participants (88%) reported, at the end of the course, that knowing what they knew then they would take the same decision to start the masterclass as they did in 2007.

Participants' appreciation of the organization and facilities

The organization of the masterclass was favorably evaluated, with a score of 4.7 on the 5-point scale. The formative evaluation yielded high mean report marks for tutor's contribution (7.9 of 10), course coordination (8.2), and access to the university library (8.2). The mean rating for the tutor meetings was 4.6 (on a 5-point scale). Eighty-one percent of the participants said they had received sufficient supervision (Tables 2 and 3).

Most of the participants ($n = 13$) had been supported by their employers, who had allowed them to attend the course weeks, and 10 participants had been allocated time by their employer (maximum 25%) for independent studies. Approximately half of the group ($n = 7$) reported that the estimated time investment (660 h, on average 8 h/wk) corresponded with the real time investment, whereas the other half had invested more ($n = 5$, on average 11 h/wk) or less ($n = 4$, on average 4 h/wk) time.

Absenteeism was permitted if it did not exceed 24 hours over all 6 course weeks (maximum 4 h/wk). Nobody broke this rule.

Participants' experiences during the masterclass

The focus group interviews revealed that participants had generally perceived the masterclass as an inspiring and effective adventure in research. Participants felt very positive about attending the masterclass. They regarded themselves as well equipped and confident to initiate and carry out scientific research in their own professional domain. They also said they had obtained a new and broader perspective on public health.

The participants did not encounter many barriers to attending the course. The main facilitators mentioned were time (permission to attend during working hours), motivation, and social support (by management, colleagues, and their private social environment). In working out their research proposal and writing their manuscript, participants reported a continuous struggle to balance the demands of their everyday practice and doing research. The former is, in many ways, much more compelling, and professionals tend to respond to them almost automatically. Time

TABLE 2 ● Characteristics of Masterclass Participants and Appreciation of Masterclass

Applicants total	n = 31
Withdrawn	n = 10
Started masterclass	n = 21
Participants dropped out during course	n = 5
Participants given a certificate (October 10, 2009)	n = 12
Mean age at start (n = 16)	41.5 y (28–59 y) (median = 39.5 y)
Professional career (n = 16)	17.4 y (3–29 y) (median = 17.5 y)
Master's degree	n = 14
Bachelor's degree	n = 2
Job size (full-time equivalent)	0.82 (0.5–1) (median = 0.95)
Management support for course weeks (~ 75% of time)	n = 13 (81%)
Management support for independent studies (maximum ~ 25% of time)	n = 10 (62%)
Agreement with estimated time for masterclass (660 h)	n = 7 (average 8 h/wk) (44%)
Needed more time	n = 5 (average 11.6 h/wk) (31%)
Needed less time	n = 4 (average 4.25 h/wk) (25%)
Delay	n = 8 (50%)
Delay due to	
Medical ethics approval procedure	n = 2 (12%)
Preparing research proposal	n = 5 (31%)
Research implementation: organizational/logistics	n = 3 (19%)
Data collection	n = 5 (31%)
Data analysis	n = 4 (25%)
Writing	n = 2 (12%)
Barriers perceived	n = 8 (50%)
Time	n = 4 (25%)
Insufficient supervision	n = 3 (19%)
Certificate	n = 14 (88%)
within 1.5 y	n = 9 (56%)
within 2 y	n = 5 (31%)
Appreciation of masterclass (report marks 1–10):	Mean report mark =
clarity of lecture	7.6
instructiveness of lecture	7.9
relevance of lecture for public health	7.8
relevance of lecture for student	7.6
lecturer's presentation	7.8
structure of lecture	7.8
lecturer's professionalism	8.5
tutor's contribution	7.9
contribution of masterclass coordinator	8.2
access to university library	8.2

and social and material support were perceived to be crucial factors in applying new knowledge and skills to complete the masterclass successfully and in time. The supportive role of their management, in terms of appreciation and allowing participants to use working hours for research activities, was perceived as indispensable. Other facilitators were the favorable group dynamics and the unique opportunity to study those issues that matter in their job.

The masterclass led to changes. Above all, participants mentioned personal growth. They had adopted

a more critical, reflective attitude and had added scientific knowledge and skills to their professional expertise. They also felt more confident about working in this domain. Some participants had perceived little interest from colleagues or management in their research, or even resistance because the results might change the way they had to work. On the contrary, some participants had been asked to participate in other activities and felt that their research work was appreciated by the organization. In addition, participants were very enthusiastic about the extension of their

TABLE 3 ● Opinions and Progress of Masterclass Participants (N = 16)

	Mean Score
Opinions (fully disagree = 1, fully agree = 5)	
Objective was clear	4.6
Was tailored to my earlier knowledge	4.0
Literature offered was supportive and relevant	4.5
Lectures were supportive and instructive	4.7
Skills training was supportive and instructive:	4.8
SPSS	4.2
NVivo	4.3
presentations	4.4
Have learned sufficiently from scientific articles	4.2
Able to translate a policy or practice problem into a research question	4.2
Able to develop satisfactory presentation skills	3.8
Able to develop satisfactory research skills	3.7
Able to develop satisfactory scientific writing skills	3.4
Able to publicly defend my research	3.7
Sufficiently able to disseminate research by presentations in my own professional setting	2.5
Masterclass is an adequate training opportunity	4.7
Masterclass met my expectations	4.5
Organization was good	4.7
Masterclass was coherent	4.6
Tutor meetings were supportive and instructive:	4.6
worked well	4.2
stimulated independent studies	4.6
Opinions (yes/no)	Yes (%)
I have sufficient knowledge to set up questionnaires	9 (56)
I have sufficient knowledge about research methods	15 (94)
I'm able to express my opinion about scientific research	7 (44)
I have a clear understanding of the practical consequences of research in real-life settings	16 (100)
I have a clear understanding of the translation of research findings into policy	12 (75)
I have a clear understanding of the translation of research findings into practice	14 (87)
I'm able to translate policy or practice problems into research questions for a broader range of public health problems than my own masterclass subject	12 (75)
I'm sufficiently prepared to develop research proposals for a broader range than my own masterclass subject	12 (75)
I'm sufficiently prepared to manage the development of research proposals for a broader range than my own masterclass subject	7 (44)
I'm able to express opinions about evidence-based public health	11 (69)
My career prospects have been changed by the masterclass in that I will	
try to set up research in practice	9 (56)
try to stimulate colleagues to do research in practice	6 (37)
try to supervise colleagues doing research in practice	7 (44)
try to start a PhD project	2 (12)
Looking back, participating in the masterclass was the right decision	14 (87)
Progress: being able to do in the future without supervisor's help (yes/no)	Yes (%)
I'm able to develop a research proposal from a research question	7 (44)
I'm sufficiently prepared to follow the medical ethics approval procedure	4 (25)
I'm able to implement a new research proposal in practice	7 (44)
I'm able to analyze data from new research	5 (31)
I'm able to write a scientific article in Dutch (native language) about new research we did/may do	10 (62)
I'm able to write a scientific article in English about new research we did/may do	4 (25)
I'm able to give an oral presentation about new research findings	15 (94)
I'm able to contact university staff for cooperation in new research project	12 (75)

(professional) network into the scientific world. Getting to know university staff was seen as a basis for further collaboration.

Participants' expectations

Participants expected to disseminate and implement the results of their research after having completed the masterclass. They expected to do this by sharing the results with colleagues and managers by means of presentations, reports, writing protocols for improved care, and policy proposals. Most of the participants hoped to continue their involvement in research activities after having completed the masterclass. They regarded the integration of research and professional practice as important. Only a few had the ambition to specialize in scientific research. These findings are in agreement with those from the questionnaire completed at the end of the masterclass (Table 2).

The participants mentioned changes in career prospects. Two participants revealed their ambition to start a PhD research project. One had already been able to start a PhD course during the masterclass period, another reported that she was trying to do so, and indeed succeeded in obtaining such a position 9 months after completing the masterclass. Others reported that they would try to set up ($n = 9$), stimulate ($n = 6$), or supervise ($n = 7$) research in practical settings. Twelve participants (75%) thought they would be able to translate problems into research questions and to develop a research proposal for topics other than their own masterclass topic, and 44% felt able to manage such a research project. With regard to new research ideas, participants indicated that they would need the assistance of a tutor who could supervise the development and implementation of the research proposal (56%), the medical ethics approval procedure (44%), the analysis of data (69%), and writing an English article for peer-reviewed journal (44%). No assistance would be needed for writing an article in a Dutch specialist journal (62%) or to give an oral presentation in their native language (93%), or for contacting university staff to involve them in new research initiatives (80%).

Fulfillment of participants' expectations

The results of the second focus group interview, 6 months after completion of the masterclass, showed that most participants had not taken up new research or research themes on their own. Nevertheless, they were involved in research activities in many ways. Three participants had presented their research findings at an international conference and 5 at a national conference. Six participants were in the process of submitting their

articles to a Dutch professional journal. Three participants had initiated practice- or policy-related research proposals. And approximately half of the participants had initiated contacts with university staff to participate in research groups or assist university participants who were doing internships. They acted as intermediaries for their organization. Thus, masterclass participants were still actively using the knowledge and skills they had acquired, and were gaining further experience in the field. Again, the support and commitment of the organization's management were reported to be crucial in creating favorable conditions to take up research-related activities and changes in their job content.

Participants remained positive about their personal growth and the changes they were able to introduce in their daily duties and the role they played in the organization. Although not many participants had been given a different position or had seen major formal changes to their tasks, they were more often being asked to participate in policy-oriented and evaluation activities at the team, department, or organizational level. They felt they had some unique qualities to offer and had become more visible and respected in the organization, helping them to function more effectively. Outside the organization, the masterclass participants had become part of an extended network, and having obtained the masterclass certificate had also given them access to new education and job opportunities.

The less positive expectations that participants had voiced about changing public health care processes and policies came true. It appeared to be difficult to retain the attention of colleagues, management, and directors for long enough to be able to implement the research findings and introduce the corresponding changes. Although participants had tried hard to disseminate conclusions and recommendations of their research projects by presentations, reports, and newsletters, many of the implementation processes did not proceed beyond that stage. The reasons that were reported included that results were hard to accept for the organization, as well as the dual role of the researcher, the research topic being considered not important enough, people involved having overloaded diaries, and enthusiasm weakening over time. Attempts at publishing a scientific article had not yet been successful for all participants.

● Discussion and Conclusions

This article has addressed the content and evaluation of a masterclass offering public health officials training in practice-based research to promote evidence-based practice.

On the whole, the participants were highly satisfied about what they had learned, in terms of knowledge, and insights and skills with regard to their own research subject, and they expected to be able to apply these insights and skills to a broader range of public health issues as well, if assisted by an experienced researcher. The lectures were valued as highly instructive, clear, and relevant. Appreciation of the lectures was high because of the professionalism of the presenters and their clearly structured presentations. The roles of the tutor and the coordinator were satisfactory in every respect.

These findings suggest that the goals of the masterclass as described earlier were all achieved. Specific results as assessed 9 months after the end of the masterclass were as follows: 16 trained participants, 14 of whom (66%) had received the certificate; 14 draft manuscripts; 14 oral presentations for participants' employers; 3 international and 5 national conference presentations; 6 articles in progress for submission to Dutch professional or scientific journals; 14 professionals having become familiar with researchers and the language of research; at least 3 newly initiated practice- or policy-related research proposals; improved personal skills; self-confidence about engaging in practice-based research; newly initiated contacts with university staff; improved career prospects; and 2 new PhD positions.

This study assessed short-term effects by a combination of qualitative and quantitative methods, applied during, at the end of, and 9 months after the masterclass. The results of the focus group interviews were consistent with those from the formative evaluation and the questionnaire. The multiple-method design we used provided more compelling and robust evidence than a single method could have done. Nevertheless, our study did have some limitations. First, participants may have given socially desirable answers, as they were offered special service and extra support by their organization. There are 2 arguments against this risk of social desirability: the results of the 4 methods were fully consistent, and participants showed great dedication and enthusiasm during all course weeks, which was confirmed by their managers and the university staff at informal meetings. The second limitation might be the size of the group. The number of program participants was small and might not be representative of the entire group of public health professionals. Early adopters (in Rogers' terminology)²⁹ are often the first to apply when new initiatives arise, driven by their enthusiasm and risk-taking behavior. They serve as models but function beyond routine practice, and their innovative strengths are liable to suffer from undermining activities by colleagues or management who hold on to existing routines and conservatism, the so-called late adopters and laggards. Overrepresentation of early

adopters is likely but inevitable at the start of this type of course.

Our results confirm the feasibility of the masterclass and the added value of extra training in research competence for public health professionals and policymakers; as such, they correspond to the universal call to train public health professionals to obtain more practice-based evidence in this domain.³⁰⁻³⁴ Although we recommend continuing the masterclass, we want to make 2 comments on necessary conditions and a final comment on requirements for the course. First, the masterclass can only be effective in public health practice if the management of the organization for which participants work is genuinely involved and commits itself to improving the quality of their public health performance based on practice-based research projects.^{7,21,23,35} Individual training does make a difference, but training and improved competency require organizational support to actually result in better job performance.^{21,36} Poor management support is often associated with a lack of earmarked research time. Individual and organizational learning should therefore be linked. We tried to apply this concept by embedding the research done by participants within the organization employing them. However, 9 months after the end of the masterclass, participants were still cautious as to whether research conducted in practice would be consolidated in the organization. The masterclass needs to be offered again because a change process that aims to actively engage public health professionals in research will take 5 to 10 years.^{29,37}

Second, accelerating the development of evidence-based practice and the process of generating knowledge about context-driven methodology seems to require organizing linkages and partnerships for each student.³⁸ During our masterclass, each student was assisted by a university-based tutor. Expansion of the team by one or more of the participants' colleagues and a representative of the management might lead to spin-offs of the research, in terms of both methodology and results, in everyday practice, all the more so as participants gave their lowest scores for the dissemination of results in their own work setting. To increase the spin-off from practice-based research, we may learn from the experiences gained with the so-called Designated Research Team approach in the United Kingdom, which proved particularly effective in developing linkages, collaboration, and skills.³²

Finally, we want to comment on one of the main requirements to obtain the certificate. Certificates were awarded when a draft publication for a peer-reviewed journal had been completed. Although this may be a useful outcome to measure traditional research capacity, it insufficiently addresses individual progress, especially among novice researchers. The masterclass

participants generally showed great progress in developing practice-based research skills, confidence, and initiating supportive linkages and partnerships. Not all of them, however, managed to produce a draft manuscript for a peer-reviewed journal. Certificate requirements were therefore adjusted to preparing a draft publication for a peer-reviewed journal or a professional journal without peer review. Publication in such a professional journal was more achievable and captured societal impact to ensure that the research was relevant to practice and policy in order to contribute to practice-based evidence.³¹ The adjustment was justified because all participants were novice researchers, and publications in non-peer-reviewed journals are highly valued for their contributions to the uptake and implementation of research results in practice.

We may conclude that our masterclass seems to be an effective instrument to increase the practice-based research capacity of public health professionals. We argue that the training program, as well as the implementation of the evidence, needs a supportive organization with management backing and supervision by senior university researchers. On the basis of these initial results, our Academic Collaborative Centre will continue to offer the masterclass, to give candidates suitable opportunities to contribute to quality improvement in public health services. It also adds to a network infrastructure in which public health professionals, policymakers, and researchers can collaborate in addressing current and future complex public health problems. It also creates opportunities for the university to achieve creative linkages between existing master's degree modules and postgraduate modules, and to organize research traineeships, training fellowships, postdoctoral career prospects for public health professionals, and apprenticeship arrangements. The public health sector obviously needs such investments in workforce development and research infrastructure.

REFERENCES

1. Kohatsu ND, Robinson JG, Torner JC. Evidence-based public health: an evolving concept. *Am J Prev Med.* 2004;27(5):417-421.
2. Tang KC, Ehsani JP, McQueen DV. Evidence based health promotion: recollections, reflections, and reconsiderations. *J Epidemiol Community Health.* 2003;57(11):841-843.
3. Brownson RC, Fielding JE, Maylahn CM. Evidence-based public health: a fundamental concept for public health practice. *Annu Rev Public Health.* 2009;30:175-201.
4. Green LW. Making research relevant: if it is an evidence-based practice, where's the practice-based evidence? *Fam Pract.* 2008;25(suppl 1):i20-i24.
5. Brownson RC, Royer C, Ewing R, McBride TD. Researchers and policymakers: travelers in parallel universes. *Am J Prev Med.* 2006;30(2):164-172.
6. Brownson RC, Simoes EJ. Measuring the impact of prevention research on public health practice. *Am J Prev Med.* 1999;16(suppl 3):72-79.
7. Baker EA, Brownson RC, Dreisinger M, McIntosh LD, Karamehic-Muratovic A. Examining the role of training in evidence-based public health: a qualitative study. *Health Promot Pract.* 2009;10(3):342-348.
8. Jansen MW, De Vries NK, Kok G, Van Oers HA. Collaboration between practice, policy, and research in local public health in the Netherlands. *Health Policy.* 2008;86(2/3):295-307.
9. Koelen MA, Vaandrager L, Colomer C. Health promotion research: dilemmas and challenges. *J Epidemiol Community Health.* 2001;55(4):257-262.
10. O'Neill MA, Brownson RC. Teaching evidence-based public health to public health practitioners. *Ann Epidemiol.* 2005;15(7):540-544.
11. Department of Health. *Best Research for Best Health: A New National Health Research Strategy.* London, UK: Department of Health; 2006.
12. North American Primary Care Research Group. What does it mean to build research capacity? *Fam Med.* 2002;34(9):678-684.
13. De Leeuw E, McNess A, Stagnitti K, Crisp B. *Acting at the Nexus: Integration of Research, Policy and Practice.* Geelong, Australia: Deakin University; 2007.
14. Delaney B. Engaging practitioners in research; time to change the values of practice rather than the way research is carried out? *Fam Pract.* 2007;24(3):207-208.
15. Green LW. The prevention research centers as models of practice-based evidence two decades on. *Am J Prev Med.* 2007;33(suppl 1):S6-S8.
16. Jansen M. *Mind the Gap: Collaboration Between Practice, Policy, and Research in Local Public Health, in Health Promotion.* Maastricht, the Netherlands: Maastricht University; 2007:295.
17. Fafard P. *Evidence and Healthy Public Policy: Insights from Health and Political Sciences.* Québec, Canada: Canadian Policy Research Networks & National Collaborating Centre for Healthy Public Policy; 2008.
18. Lavis JN, Oxman AD, Moynihan R, Paulsen EJ. Evidence-informed health policy 1—Synthesis of findings from a multi-method study of organizations that support the use of research evidence. *Implement Sci.* 2008;3:53.
19. Kocken RJJ. *Samenwerking en Academisering Huisartsgeeneeskunde: Van Pragmatisme tot Modelontwikkeling: Theoretische en Praktische Bijdragen aan het Proces van Samenwerking Tussen Huisartsen en Universiteiten [Academic Collaboration in General Practice: From Pragmatism to Model Development: Theoretical and Practical Contributions to the Process of Cooperation Between General Practitioners and Universities].* Maastricht, the Netherlands: Maastricht: Rijksuniversiteit Limburg; 1995: 232.
20. Thorpe A, Griffiths S, Jewell T, Adshead F. The three domains of public health: an internationally relevant basis for public health education? *Public Health.* 2008;122(2):201-210.
21. Potter MA, Barron G, Cioffi JP. A model for public health workforce development using the National Public Health Performance Standards Program. *J Public Health Manag Pract.* 2003;9(3):199-207.
22. Long K. Health professionals education. *Policy Polit Nurs Pract.* 2003;4(4):259-262.

23. Dodds JM, Calleson DC, Eng E, Margolis L, Moore K. Structure and culture of schools of public health to support academic public health practice. *J Public Health Manag Pract.* 2003;9(6):504-512.
24. Anderson J. *Learning and Memory: An Integrated Approach.* New York, NY: John Wiley & Sons; 1995.
25. Servan M, Soto E, Murillo JF, Sola M, Perez AI. Problem-based learning and action research in postgraduate teaching: the interdisciplinary core. *Educ Action Res.* 2009;17(3):373-389.
26. Kirschner P. Cognitive load theory: implications of cognitive load theory on the design of learning. *Learn Instr.* 2002;12:1-10.
27. Hatala R, Guyatt G. Evaluating the teaching of evidence-based medicine. *JAMA.* 2002;288(9):1110-1112.
28. Shaneyfelt T, Baum KD, Bell D, et al. Instruments for evaluating education in evidence-based practice: a systematic review. *JAMA.* 2006;296(9):1116-1127.
29. Rogers EM. *Diffusion of Innovations.* New York, NY: Free Press; 2003.
30. Connelly J, Knight T, Cunningham C, Duggan M, McClenahan J. Rethinking public health: new training for new times. *J Manag Med.* 1999;13(4/5):210-217.
31. Cooke J. A framework to evaluate research capacity building in health care. *BMC Fam Pract.* 2005;6:44.
32. Cooke J, Nancarrow S, Dyas J, Williams M. An evaluation of the 'Designated Research Team' approach to building research capacity in primary care. *BMC Fam Pract.* 2008;9:37.
33. Reynolds M, Leahy E. Developing a public health training institute through public health improvement efforts: Montana's story. *J Public Health Manag Pract.* 2002;8(1):83-91.
34. Public Health Science Working Group. *Public Health Sciences: Challenges and Opportunities.* London, UK: Wellcome Trust; 2004.
35. Potter MA, Ley CE, Fertman CI, Eggleston MM, Duman S. Evaluating workforce development: perspectives, processes, and lessons learned. *J Public Health Manag Pract.* 2003;9(6):489-495.
36. Mayer JP. Are the public health workforce competencies predictive of essential service performance? A test at a large metropolitan local health department. *J Public Health Manag Pract.* 2003;9(3):208-213.
37. Berwick DM. Disseminating innovations in health care. *JAMA.* 2003;289(15):1969-1975.
38. Kottke TE, Solberg LI, Nelson AF, et al. Optimizing practice through research: a new perspective to solve an old problem. *Ann Fam Med.* 2008;6(5):459-462.