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ORIGINAL ARTICLE

# Developing public health competencies through building a problem-based learning project

**Isabel Loureiro · Nigel Sherriff · John Kenneth Davies**

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**Abstract**
*Aim* In order to tackle the major challenges faced by public health over recent decades, there is a pressing need for an appropriately competent work force. Therefore, investment is required in the development of the necessary pedagogical strategies to deliver such competencies and thereby enable public health professionals to effectively perform their core functions. Drawing primarily upon on the work and experiences of the EC-funded PHETICE (Public Health Education and Training in the Context of an Enlarging Europe) and EUMAHP (European Masters in Health Promotion) projects, in this article an appropriate training method that integrates several public health models is introduced and discussed in order to deliver key public health competencies.
*Methods* A student-centred learning (SCL) approach is recommended, from both theoretical and practical perspectives, as a more effective way of delivering training to achieve these competencies than traditional pedagogical methods. An ecological and educational approach to planning in public health is demonstrated by using a problem-based Learning (PBL) approach to the acquisition of basic public health competencies.
*Conclusions* In outlining the PBL approach, the authors go on to explain how it can enable learners to gain systematically the necessary competencies to carry out comprehensive planning and decision making based on a comprehensive assessment, using the practical skills of compromise, negotiation, teamwork, and leadership.

**Keywords** Competencies · Student-centred learning · Public health · Training · Health promotion

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## Introduction

In our complex and ever changing world, public health structures have to be robust enough to respond adequately and appropriately to a wide range of new threats. Such threats include step shifts in the epidemiological pattern of chronic diseases (WHO 2008a) combined with outbreaks of new infectious diseases (such as the H5N1 virus), the occurrence of acts of terrorism or catastrophes, and situations provoked by climate change. Due to rapid globalisation these complex challenges are not limited to one geographical area or nation state. This emerging pattern of unpredictability requires radical new professional approaches that can empower individuals and communities to promote their own health and to prevent disease. The challenge for health professionals, however, is that they have to be prepared to react both quickly and competently.

There is therefore a need for a strong and competent public health workforce to face these new challenges, to empower citizens to become partners in the fight against disease and in health promotion, and to build networks at local, national, and international levels. The development of

such a workforce should reflect the increased need for a dynamic nature of changing human resources and socio-economic health determinants over recent decades. This process offers an opportunity for building capacity and comprehensive networks for concerted actions on an international level by sharing knowledge and providing practice-based evidence.

Modern public health has reflected a health promotion approach whereby citizens are enabled to exercise control over the determinants of their health and politicians take responsibility for carrying out healthy public policies to improve health, reduce poverty, and facilitate access to resources to minimise suffering and increase quality of life (WHO 1986). This approach encourages public health as an empowering process, enabling active participation by people to promote their health and defend their rights to achieve social justice and equity. It is crucially important to prepare public health professionals to deal adequately with health problems, preparing them to build partnerships with other sectors and partners to improve health and tackle public health inequalities, considering bio-psycho-socio-economic determinants of health (WHO 2008b).

Competence has to do with the capacity to face changes and new contexts and respond to new challenges. In this paper we attempt to illustrate how a student-centred learning (SCL) approach can be applied effectively to public health training in order to build the necessary competencies for public health practitioners within the context of an enlarging Europe. In this regard, we draw upon learning from the recently completed PHETICE project (Davies et al. 2008; Loureiro 2008) and from practical experiences in applying problem-based learning (PBL) to project building (problem-based learning project–PBLP) to post-graduate training in public health.

## Public health competencies

Competency is the capacity to act effectively in a specific situation, supported by knowledge, but not limiting to them (Perrenoud 1995). Competencies should mobilise knowledge and put knowledge into action. Competence is not only knowledge ('know-how'), but also includes the skills and attitudes needed to perform a professional role ('show-how').

Several reviews of public health competencies have been conducted in different regions of the world (Public Health Association of Canada 2007; Shilton et al. 2008; Melville et al. 2006). A strong consensus has been reached by several European projects concerning general competences in the field of public health and health promotion (ASPHER 2008; Kosa and Stock 2006; Meresman et al. 2006). Although public health professional competencies are considered differently from country to country, there is some broad agreement concerning core competencies, such as communication, information processing, teamwork, leadership, problem solving, planning, and decision making. These competences are underpinned by *Health for All* principles and values, such as health as a human right, social justice, equity, participation and empowerment, and built through continuous reflection (Davies et al. 2000a, 2004a, b, 2008). The specific competencies required for addressing certain issues are related to the various specialist fields of public health and their related domains of knowledge, such as public health nutrition and epidemiology, for example.

In considering competencies on a more theoretical level, a salutogenic approach to health (Antonovsky 1996) was built firmly into the development of the European dimension of health promotion when creating common ground for improving the performance of health professionals in Europe (Davies et al. 2000a; Lindstrom and Eriksson 2006; Eriksson and Lindstrom 2008). Constructivism has been stressed by the members of the EUMAHP Consortium as a reference for the understanding of the process of learning (Davies et al. 2000b). This is reflected in the EUMAHP European dimension of health promotion core module when developing objectives from broadly strategic to deeply personal.

Attempts have been made to ascertain both public health and health promotion functions and competencies. The core functions of public health have been defined in a cycle composed of three basic functional areas: assessment, planning development, and assurance of implementation (Davies et al. 2008). The European Masters in Health Promotion Project (EUMAHP) established a method of applying quality criteria to health promotion core competencies (Hall and Lindstrom 2004; Meresman et al. 2006). Investing in functions and core curriculum in health promotion and in the European dimension, a specific focus was placed on quality assurance and credit transfer across European countries in the context of the Bologna Agreement to ensure common standards.

In practical terms, long-established international teaching and learning experiences, such as the European Training Consortium in Public Health-Health Promotion (ETC-PHHP) annual summer courses, organised with the EUMAHP consortium since 2002, have demonstrated the feasibility of effectively building a common training project by different professionals from many countries. These summer courses have used a student-centred learning approach to group work-based project development. Guidelines for training trainers have been produced by both consortia, based on a historical perspective of Europe, using the principles of the Ottawa Charter (WHO 1986) within a salutogenic framework (Hall and Lindstrom 2004; Eriksson and Lindstrom 2008). These training guidelines have adopted a strong humanistic approach (Colomer et al. 2002).

The theoretical framework of the EUHPID health development model is adopted in this paper to illustrate the application of student-centred learning philosophy to public health training. Based on general systems theory, health development is defined as "the ongoing process of (re)producing health through autopoetic self regulation in a given socio-ecological environment" (Bauer et al. 2006, p.155). The EUHPID health development model stresses the salutogenic approach in health promotion interventions. The model relates the socio-ecological and systemic perspective to the pathogenic approach that dominates risk assessment, preventive and health care approaches.

## Student-centred learning

There is an ongoing debate regarding the most effective pedagogical methodologies to prepare students to solve problems or deal with complex situations in the world of work (Mezirow 1997). Traditional methods, such as lecturing, are sometimes required, but knowledge can also be acquired when the student searches for answers and reviews bibliographies recognised as reliable and valid. Experiences in the field can also provide effective opportunities for learning.

To make sense of the process of learning, knowledge has to be meaningful, theoretically sound, and applicable to real world situations. Learning processes should be contextualised, active, and cooperative, and relevant to the professional functions in order to provide the required competencies in public health. Students learn more effectively when they feel well motivated and are reinforced in their achievements. Student-centred learning (SCL) methodology appears to be an effective approach for building such competencies among public health professionals. SCL can be characterised by the following criteria:

- It is the student who acquires the knowledge and is at the centre of the learning process.
- Both the content and the context of learning are important.
- The student is in control of his/her own learning process.
- The student has the opportunity to experience and articulate his/her learning process in conjunction with other students.

An example of this SCL approach is problem-based learning (PBL). Savery and Duffy (2001) consider PBL one of the best exemplars of an instructional model with a clear link between the theoretical principles of constructivism, the practice of instructional design, and the practice of teaching. For some authors (e.g., Barrows 1985, 1986, 1992; Savery and Duffy 2001), PBL can enhance an array of abilities in students, including problem-solving, finding and using relevant sources of knowledge, reflection and critical thinking, presenting knowledge, autonomy and self motivation, leadership and team work skills, communication skills, social and ethical skills, and encouraging them to become process oriented. These abilities seem to be very much in accordance with the desired learning outcomes identified by the PHETICE project for public health professionals related to the following domains:

- Core public health sciences
- Assessment and analysis
- Policy development and program planning, implementation, and evaluation
- Partnership and collaboration and advocacy
- Communication
- Socio-cultural competencies
- Leadership and systems approaches.

In Canada the core competences are understood within a broader context of public health values: commitment to equity, social justice and sustainable development, recognition of the importance of the health of the community as well as the individual, and respect for diversity, self-determination, empowerment, and community participation (Public Health Association of Canada 2007). "Such values are rooted securely in an understanding of the broad determinants of health and the historical principles, values, and strategies of public health and health promotion" (WHO 1986).

## The Problem-Based Learning Project (PBLP)

PBLP is an example of a student-centred learning approach that contains some of the key components of problem-based learning and includes real or simulated problems. In this approach the problem provides the key issue to kick-start a project. Sometimes students are expected to resolve a real problematic situation; at other times the problem can be simulated, but should be as near to reality as possible. In any situation the problem includes didactic intentions that promote hypothetic-deductive thought.

All training situations should take into account the learning needs of the students as well as their expectations and motivations. It is important to clarify how this pedagogical methodology is related to the principles and practices in public health and how the desirable skills can be acquired by PBLP. Since this methodology requires a different investment by students and by teachers, it is important to establish a learning contract between students and teachers, the latter who assume roles of facilitators. It is important that both students and teachers/tutors understand fully what is expected from each

side. This is why tutors are required to explain to the students about project methodology, to include SCL philosophy, explaining what is expected from them and from their tutors as a foundation to the establishment of learning contracts between both parties.

The acquisition of the skills obtained through using this methodology is related to the capacity of being flexible, simultaneously creative and accurate, being able to find solutions for new problematic situations, and to accomplish commitments. This is why developing a project can be an enabling experience considering that project work emerges from a problem, that answers a need within a real world context, corresponds to an intention, and is solved through a plan of work.

## Conducting a PBLB

A PBLP should be conducted after students have already successfully completed courses/modules that enable them to make an assessment on the quality of life and health of populations (for example, modules on epidemiology and qualitative research methods), health determinants (for example, introduction to public health and foundations of health promotion), and planning interventions (for example, partnerships and health strategic planning). It is an opportunity for students to apply what they have learned in previous courses, and it can reinforce their skills and self-confidence. It also can be a useful mechanism for tutors to acknowledge how much students have learned in areas that are crucial for their professional performance, as well as their ability to acquire interdisciplinary knowledge, problem-solving skills, access, organisation, interpretation, and communication of information. The PBLP experienced at a masters level or other post-graduate training is especially fruitful where students come from different disciplinary backgrounds (Loureiro 2008). Ideally, students should be organised into working groups from a minimum of three to four to a maximum of seven to eight students.

The PBLP is a learning process based in the SCL philosophy, using PBL as a methodology at the different steps of planning, but combining a free and autonomous thinking and solving problem approach with the structure of a comprehensive health planning.

### Selecting a problem/issue

When identifying a case study, it is important to take into consideration the following criteria:

- Relevancy to public health (national and international)
- Interests of the involved students
- Accessibility to research the problem
- Potential usefulness as a research question
- Feasibility for action within the time frame
- Familiarity of the tutor/s with the main concepts.

A case study can be related to a real world problem, such as a life event that demands action, or a simulated situation close to reality. In the context of the situation given, students are required to carry out a detailed exploration of the problem.

Tutors should prepare PBL sessions with a package of issues/problems (including some real-life issues) and to organise each one appropriately, including:

- Description
- Context
- Relevant questions (for example, some questions to orient and stimulate students as well as the provision of working answers)
- Relevant documents to be consulted (national and international)
- Identification of several sources of data (stakeholders, institutions, documents, previous projects, locations, for example)
- Availability of a specialist contributor, with experience in each issue, and able to deliver a lecture related to the issue to be tackled by the project methodology.

When the case study is real, usually it is identified within a specific setting where line managers are aware and interested in active participation by students. In such circumstances, there should be preparatory negotiation concerning their main concerns and priorities. Also this should include potential outcomes from the project problem learning task and the process through which students can have access to the information and to the contacts they need.

After the students have selected the issue/problem, time should be allowed for them to:

- Brainstorm around the issue
- Clarify concepts
- Identify the main ideas
- Write down key words
- Identify key questions
- Write down their learning objectives.

The tutor should firstly assess the group's knowledge in the field related to the problem/issue under study. The group should attempt to understand the problem. What is it? How can it be defined? The PBL technique (Fosse 2007) can be used during the brainstorm sessions to systematise and categorise associations. Students should then define problem statements, reflect on these, and develop them for further study. At each stage, learning objectives have to be clear and periodically presented to the group and tutor/s.

All situations where the students have to try to reach a consensus will contribute to teamwork, to the identification of leadership abilities, and to the development of communication skills. Students should discuss and agree jointly to an equitable division of labour. Tutors should be available periodically to orient students and ensure they are not going off track. They should be present, especially during the transition stages in the PBL process.

## Clarifying values and choosing a theoretical framework

To prepare the theoretical framework, students have to make a strong case to demonstrate the importance and relevancy of the problem/issue, the theories or models that can support the intervention, including the effectiveness of some interventions, legislative documents related to the problem, and the previous work carried out in the same area. Public health values should always underpin this process. Participation and equity, as key values in public health, have to be continuous and permanent issues for the development of the project. Investment in human resources is essential to ensure the sustainability of the project. In order to formulate the problem, it is crucial to understand its context as well as to make decisions about changes to be planned.

For the planning framework, following the initial phases of the PBL process, it can be helpful to use a systemic approach, such as that used in the ecological and educational planning model PRECEDE-PROCEED (Green and Kreuter 2005; Blank 2006), to help to structure the different dimensions for a logic, but comprehensive planning in public health. A critical component of this comprehensive health planning model is participation and the need to understand the specific context of the health problem/issue, its determinant factors, the resources available and required to plan an appropriate program. A supervision tool should be used to monitor implementation of the program, and evaluation has to be conducted, assuring that perspectives of participants should always be considered in all stages.

Students should be asked to look for different tools and methods to assess the situation in terms of health, quality of life, beliefs, and capacities required to understand and to involve stakeholders to think about the possible approaches to face the health problem or health issue.

## Project structure

The structural dimensions of a project include relevancy, feasibility, theoretical framework, objectives, methodology, and evaluation. The project structure in the problem-based learning project (PBLP) follows the following steps:

- Identifying a focal issue related to a concern/problem relevant for the student(s)
- Formulating the problem/issue
  - should be relevant
  - solution is feasible
- Identifying and working together with stakeholders
- Contextualising the issue
- Working within an appropriate theoretical framework
- Designing the project
  - defining priorities and general objectives, which should be clear and feasible
  - identifying the required resources
  - establishing targets and appropriate strategies
  - planning a timetable to accomplish the project objectives
  - pre-defining how to evaluate
  - considering information dissemination about the project

The title of the project should be derived from the definition of the problem, its context, and main goals. The participative planning process should include the following steps:

1. Assessing needs, including a short description of the issue (its relevancy for public health)
2. Identifying evaluation methods and tools (for assessment and process, impact, and outcome evaluations)
3. Carrying out diagnostic methodology (situation analysis and resources: quality of life, epidemiological, behavioural, environmental, educational, and socio-ecological assessment, administrative and policy assessment. Use of appropriate methods and tools selecting priorities with stakeholders/partners)
4. Identifying mission statement, goals, and objectives with partners
5. Defining strategies through action/research, participative methodology
6. Identifying opportunities and constraints
7. Clarifying and highlighting expected results
8. Allocating an appropriate budget, as necessary.

## Selecting priorities and goals

Students can question tutors as well as stakeholders, if it is the case, in order to secure the necessary data and information needed. A SWOT analysis (strengths, weaknesses, opportunities, and threats), shared among partners, can help to choose priorities and to set goals. To look for relevant indicators of predisposing, enabling, and reinforcing factors for a better understanding of the behaviours and problem-solving, which can be measured in the short or medium term, can help to find gaps, cultural specificities, and appropriate strategies to plan a relevant intervention oriented to the needs and cultural specificities.

Having selected the problem/issue and having adequate information about its context, students should move on to define their goals and formulate their solution. The selection of priorities should be carried out following discussion among students and partners (if the case), in order to obtain joint agreement. The role of the tutor here should be as a mediator to facilitate the negotiation process, keeping in mind that whilst it is a learning situation for students, it may be also be of special interest for an institution or organisation.

## Planning the solution

With the information coming from the data analysis, the literature review, and the results of the different methods used in the discussion, it is possible to select the priorities, establish the main goals, and make a plan. After selecting priorities in conjunction with stakeholders/partners, students should clarify their mission statement, together with their goals and objectives. At this stage students should explore and access literature on the effectiveness of relevant interventions, and in particular focus on the following issues:

- Highlight interventions in a similar situation
- Explore alternative solutions
- Which hypothetic-deductive thoughts come to mind?
- Can a strategy be established?
- Engage in discuss with colleagues
- Goal planning as a common task for all the members of the group
- Presentation on progress.

Work with colleagues, tutors, and other stakeholders involved in the study should be systematised. This can facilitate better understanding of what makes sense, what is feasible, and what are the constraints and challenges to face in the current situation. Resources are an essential part of the planning process, and include human resources, time frame, and funding for the activities and materials needed. Usually there is insufficient time in the academic environment for implementation. Often therefore it has to be left to others to implement, such as the stakeholder members of the organisations/institutions with whom the project was developed.

## Process evaluation and outcome

The selection of appropriate indicators for monitoring and evaluation should be consistent with the theoretical framework used for the development of the public health project. For example, if the health model is a salutogenic one (Antonovsky 1996), a socio-ecological health development model (Bauer et al. 2003), or predominantly a socio-economic determinant of health model (Dalgren and Whitehead 2006), then the indicators should include quality of life measures, gains in capacity-building, political and economic changes, for example. In terms of evaluation, students should initially carry out a library search and identify relevant work in specific areas—for example, health capacity building (Hawe et al. 2000), social capital development (Campbell et al. 1999), and understanding the political context (de Leeuw 2001). Health indicators should be identified and appropriate to the health model in use, in order to plan a relevant and consistent intervention as well as to evaluate the expected changes.

Intermediate indicators need to be selected to monitor changes occurring during the process of the intervention itself. In addition, indicators to measure the level of participation in the project are important (Molleman et al. 2005). In order to monitor the progress of the project, epidemiological and qualitative data on physical and social environment should be gathered from primary or secondary sources that can determine shifts in strategy. The collection of data also varies, depending on the goals and targets; sometimes it only makes sense to collect them in the long term. Students should also consider problems related to the expectations of the different stakeholders in a project: for example, the funders, the professionals, the politicians, and the population involved. Advocacy is a competency that is required for sustaining the project since most of the structural changes take a long time to occur, and most funders or politicians are not ready to deal with this reality. Several pedagogical methods can be used, such as role play, for improving advocacy skills.

At each stage students should be confronted with novel situations and be challenged to investigate and explore.

## Evaluating students' progress and achievement

It is recommended that each time the group meets (usually 2–4 h per week), students should organise the session following these steps:

- Analyse progress
- Present new findings
- Discuss the next step
- At the end of each meeting, evaluate the session and the progress achieved at that point.

Each student should register his/her findings, experiences, and thoughts and reflect on them in a personal diary in order to help build his/her own portfolio. The most appropriate way for formative evaluation is for students to carry out a self-evaluation at the end of their participation in PBLP. For that purpose, the student should take into consideration the learning outcomes previously established for the PBLP process. The presentation of the results of the

team work can play a significant role in the overall evaluation, since it represents the final product and added value achieved by working in a group.

### Student learning outcomes

It is important that student learning outcomes are related directly to the required competencies in the field. A relevant teaching/learning competency should be related to the functions that a public health professional has to perform in practice. There is a consensus around some of the functions public health professionals should perform, and therefore the training they receive has to be consistent with these functions. Examples of such expected professional functions include: assessment of the health status of populations and communities and their determinants; research on health and disease, their determinants, and strategies to improve health; evaluation of implemented solutions to improve health; planning policies and action in an empowering way to improve health; implementation of policies and actions in an empowering way; enforcement of laws and regulations to protect health and ensure safety; lobbying and advocacy; assurance of a competent public health workforce; networking with other sectors. Learning in a stimulating environment, where incentives are created for students to reflect, to question, to look for, to create, to establish relationships, and to interact with partners outside their academic setting, whenever possible, contributes to the capacity to work autonomously and enhances professional performance.

## Conclusion

Training in public health should enable students or professionals to interact continually with a world in change and reflect life-long learning. The learning process is affected by internal and external factors, and in many schools student-centred learning philosophy and methods, such as stimulating students to solve problems, is not yet well understood. “Instrumental problem solving characteristically involves more than cognition alone. Motives, will, intuition, self-concept, interpersonal considerations, and emotions are also important ingredients of task-oriented problem-solving” (Mezirow 1996). Therefore, training public health professionals demands a cultural change.

The work discussed in this paper has been stimulated by the PHETICE project. The PHETICE project has made a contribution at the pan-European level to the change process highlighted above by supporting and combining contributions from various public health networks (Davies et al. 2008). It has contributed to a European strategy in public health specialist training by building on experiences and investments from existing training programmes; it has identifying commonalities and synergies and developed a common understanding of the core competencies of professionals within public health; developed further methods for public health training and integrated areas of inequality, health monitoring and best practice; and finally disseminated guidelines for public health training in Europe.

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