

ORIGINAL ARTICLE

The introduction of new teaching methods in pharmacy education—I. Lessons learned from history

PASCALE PETIT^{1,2}, ANDRÉ FORIERS^{1,2}, & BART ROMBAUT¹

¹School of Pharmacy, Vrije Universiteit Brussel, Laarbeeklaan 103, Brussels B-1090, Belgium, and ²Faculty of Medicine, Learning Resource Centre, Vrije Universiteit Brussel, Laarbeeklaan 103, Brussels B-1090, Belgium

(Received 27 November 2007; revised 18 December 2007; accepted 21 December 2007)

Abstract

This article is the first paper in a series that describes the reform of the pharmacy curriculum at the Vrije Universiteit Brussel (Belgium). In this paper, we show the reasons (background and history) for the implementation of a new curriculum. Our goal is to educate pharmacists who are able to face the challenges of the twenty-first century. Due to the new role of the pharmacist in this contemporary society, pharmacy students must acquire new and other competences (communication skills, teamwork). These competences can only be learned using new educational methods. This paper describes innovations that were implemented in the educational system and the steps taken to create a framework for these innovations. The new curriculum conforms to the Bologna Declaration.

Keywords: Bachelor–master reform, curriculum, new teaching methods, pharmacists

Introduction

This paper presents some essential background, history and guidance for our curriculum reform. By the end of the previous millennium, the faculty members of the School of Pharmacy—of the Vrije Universiteit Brussel and all other schools through Belgium—were convinced that a reform of pharmacy studies and curriculum was necessary. There were several incentives to do so:

- (i) The profession of the pharmacist in the community, in the hospital environment and, to a lesser extent, also in industry was rapidly changing. An important evolution was the introduction of clinical pharmacy (Leufkens, Hekster, & Hudson, 1997) and pharmaceutical care (Hepler & Strand, 1990; Tromp, 1999) in the profession. Moreover, pharmacy practice in particular, but also pharmacy in general, is heading towards a patient centered, rather than a medication-centered

setting. This evolution in the pharmacy profession alone (or is it a revolution?), required a substantial reform for pharmacy studies.

- (ii) After signing the Bologna Declaration (1999), the Flemish Minister of Education started a process to reform the Flemish higher education system. The Flemish Parliament (2003) adopted a new Higher Education Act on the 4th of April 2003. The degree structure is based on three main cycles (Bachelor–Master–Doctorate) and constitutes the core of the Act, which introduced this new structure for all programmes in the 2004/2005 academic year. The School of Pharmacy had to adapt the programmes to this Act.
- (iii) The Act on a new Higher Education Structure in Flanders (2003) also lays down the implementation of an initial accreditation system. To prepare this accreditation system and to ensure the quality of higher education, not only in Flanders but also in the Netherlands, an independent organization

Correspondence: B. Rombaut, Department of Pharmaceutical Biotechnology and Molecular Biology, VUB, Laarbeeklaan 103, Brussels B-1090, Belgium. Tel: 32 2 477 4497. Fax: 32 2 477 4495. E-mail: brombaut@vub.ac.be

NVAO (<http://www.nvao.net>, November 21, 2007) (in Dutch: Nederlands—Vlaams Accreditatie Organisatie) was established. The Accreditation Organization of the Netherlands and Flanders contributes to the quality of higher education in the Netherlands and Flanders by assessing and accrediting programmes. This organization is a further development of the so-called “Visitation Commissions”, which were installed by the Flemish-Interuniversity Council (in Dutch: Vlaamse Interuniversitaire Raad, <http://www.vlir.be>, November 21, 2007) to assess the quality of higher education in Flanders. In 1993 and in 2002, a Visitation Commission was installed to assess the Pharmacy programmes in the different Schools of Pharmacy in Flanders (VLIR, 2003). Both commissions formulated some general recommendations and some specific recommendations. We wanted to implement these in the new curriculum and felt that a new curriculum was also necessary to ensure accreditation by the NVAO.

In conclusion, all three incentives pointed in the same direction. We had to implement a completely new curriculum if we wanted to produce pharmacists who were able to face the new challenges of the twenty-first century in a mobile and prosperous Europe.

Formulating the new pharmacy curriculum

The making of our new programme consisted of a three step process:

- (i) Collecting data on the competences of contemporary pharmacists and analyzing literature.
- (ii) A Working Group was set up to translate the competences (see (i)) into a set of goals and objectives, which should be reached by each student at the end of the pharmacy programme. Members of this Working Group were all young academics from all disciplines in pharmacy. The Working Group was chaired by the Dean of the School of Pharmacy.
- (iii) The goals and objectives formulated by the Working Group were sent to a large number of pharmacists working in community pharmacies, hospital pharmacies or working in industry, for evaluation.

Literature on competences of a pharmacist was reviewed. The first formal document identified was the new Directive on Recognition of Professional Qualification of the European Union (Directive 2005/36/EC), which was at that time under study. A second document which was taken into account was the WHO Report (1997) on the role of the pharmacist in the health care

system, in which for the first time “The Seven-Star Pharmacist” was described. Seven important roles were described for a contemporary pharmacist: (1) care-giver, (2) decision-maker, (3) communicator, (4) leader, (5) manager, (6) life-long learner and (7) teacher. A third document was the European Pharmaceutical Students’ Association (EPSA) Report (1999) on Pharmacy Education: a vision of the future. This document reported on a comprehensive collaborative study by pharmacy students worldwide of essential developments in pharmacy education.

Finally, we studied documents from the International Pharmaceutical Federation (FIP) and from the Algemene Pharmaceutische Bond (APB, Association of Belgian Pharmacists). It is worthwhile mentioning the FIP Statement of Policy on Good Practice in Pharmacy Education (www.fip.org, November 21, 2007) and an APB document “Taa-komschrijving van de apotheker” (Job description of the pharmacist) (www.apb.be, November 21, 2007). In addition, curricula from other Schools of Pharmacy throughout Europe were analyzed (Healy et al., 1996). Finally, the Working Group (see (ii)) was able to formulate a set of goals and objectives, which would be the basis of a new curriculum. These goals and objectives were presented to a large number of students from the School, many of whom are now professionals working either in community pharmacies, hospital pharmacies or working as an industrial pharmacist either in a pharmaceutical or the cosmetic industry.

All were invited to make amendments. All amendments were discussed within the Working Group and a final list of goals and objectives were formulated. These can be found in Table I.

Implementing the new pharmacy curriculum

The newly formulated goals and objectives to the curriculum were required to conform to the Act on a new Higher Education Structure in Flanders (2003). The higher educational system consists (at the university level) of a two-tier Bachelor’s and Masters degree system. The Academic Bachelor’s degrees prepare students for studies at Masters level. These Bachelor’s degrees can be obtained after successfully completing a programme of 180 ECTS-credits. Masters programmes are characterised by the integration of education and research and a Masters thesis. They cover, in general, at least 60 ECTS-credits. Depending on the field of study, some programmes last longer. In Pharmaceutical Sciences the Flemish Government decided that the Masters degree consists of 120 ECTS-credits.

The four universities in Flanders providing pharmaceutical education (KULeuven, UGent, UAntwerpen and the Vrije Universiteit Brussel) decided to organize the studies in Pharmaceutical Sciences as follows and also shown in Figure 1:

Table I. Goals and objectives of the masters in pharmaceutical sciences.

A. Master of pharmaceutical care
<p><i>Objectives</i> Pharmacists who duly meet the requirements held out by present-day society in terms of knowledge, skills and attitudes</p> <p><i>Objective 1. To enable students to become expert scientists</i> 1.1. Masters graduates are expected to be duly capable of conducting experimental research on a self-dependent basis:</p> <ul style="list-style-type: none"> • Masters graduates should be capable of identifying, defining, analysing, appraising and resolving pharmaceutical problems and gathering any missing knowledge/information for a given issue • Masters graduates should be able to evaluate (English language) medical–pharmaceutical literature • Masters graduates should be able to conceive, conduct and interpret scientific experiments relevant to any given (pharmaceutical) issue <p>1.2. Masters graduates are expected to be duly capable of reporting on insights and issues:</p> <ul style="list-style-type: none"> • Masters graduates should have relevant computer skills • Masters graduates should have verbal fluency skills and be able to function as a member of a group • Masters graduates should have due written skills <p>1.3. Masters graduates are expected to have acquired a due scientific attitude:</p> <ul style="list-style-type: none"> • Masters graduates should be duly disciplined, conscientious and creative, have organisational skills and be open to constructive criticism • Masters graduates should be favourably inclined towards lifelong learning • Masters graduates should be duly aware of the ethics of the science <p><i>Objective 2. To enable students to become specialists in medicinal drugs</i> 2.1. Masters graduates are expected to have the due knowledge and skills relating to the properties of medicinal drugs and the biological systems they impact on:</p> <ul style="list-style-type: none"> • Masters graduates should have a due understanding of the biopharmaceutical properties of the dispensed medicines as well as of the evaluation of the bioequivalence of the pharmaceuticals • Masters graduates should have an in-depth knowledge of the therapeutic use of medicinal drugs and their administration • Masters graduates should know the structure–activity relation of pharmaceuticals, including physico–chemical aspects and the active effects and operating mechanisms on a molecular level <p>2.2. Masters graduates should have due understanding and skills in the area of the development, analysis, production and preparation of medicinal drugs</p> <ul style="list-style-type: none"> • Masters graduates should have a due command of the methods for perfecting and preparing dispensing methods for pharmaceuticals in due respect of quality aspects • Masters graduates should have a due command of the methods for the analysis of medicinal drugs and their ingredients • Masters graduates should duly apply the statutory regulations regarding packaging, storage and delivery of pharmaceuticals <p><i>Objective 3. To train students to become pharmaceutical care specialists</i> 3.1. Masters graduates are expected to be duly capable of dispensing information and advice to patients and health care workers on the use of pharmaceuticals and the choice of pharmaceuticals available to them, with due attention for the responsible use of pharmaceuticals (the choice available, methods of prevention, safety and information)</p> <ul style="list-style-type: none"> • Masters graduates should be able to offer advice on the use of pharmaceuticals, on over the counter medications, and prescription-only pharmaceuticals as well as on the products used in alternative therapies

Table 1. *continued*

<ul style="list-style-type: none"> • Masters graduates should be able to make a due selection from the offering of over the counter medications and dermatocosmetic products available, which serves the needs of the patient <p>3.2. Masters graduates should have a due understanding of, and be attentive to, the integrated care of individuals and assume due responsibility in the medical sector</p> <ul style="list-style-type: none"> • Masters graduates should be able to critically analyse each prescription, to take appropriate action if required, to acknowledge various personal factors and take due consideration thereof • Masters graduates should have due verbal communication skills in the area of pharmacist–patient interaction. They are to effect and promote medication compliance on the part of patients and promote the rational use of pharmaceuticals • Masters graduates should assume their share of social responsibility in health care and should be duly aware of the rules of pharmaceutical deontology • Master graduates should be duly capable of assisting in putting in place a medically and economically responsible pharmaceutical policy <p><i>Objective 4. To familiarise students with the practise of their chosen professional career</i></p> <ul style="list-style-type: none"> • Masters graduates should be able to assess the significance of the profession of dispensing community or hospital pharmacist • Masters graduates should be able to work together with other caregivers (fellow pharmacists, dentists, physicians, nursing staff, and alternative healers) • Masters graduates should have an understanding of the key aspects involved in working in a hospital setting as a pharmacist • Masters graduates should duly apply social security regulations
<p>B. Master of drug development</p>
<p><i>Objectives</i> The Masters in Drug Development course is designed to train pharmacists who duly meet the requirements held out by present-day society in terms of knowledge, skills and attitudes</p> <p><i>Objective 1. To enable students to become expert scientists</i> 1.1. Masters graduates are expected to be duly capable of conducting experimental research on a self-dependent basis:</p> <ul style="list-style-type: none"> • Masters graduates should be capable of identifying, defining, analysing, appraising and resolving pharmaceutical issues and gather any missing knowledge/information for a given issue • Masters graduates should be able to evaluate (English language) medical–pharmaceutical literature • Masters graduates should be able to conceive, conduct and interpret scientific experiments relevant to a given (pharmaceutical) issue <p>1.2. Masters graduates are expected to be duly capable of reporting on insights and issues</p> <ul style="list-style-type: none"> • Masters graduates should have relevant computer skills • Masters graduates should have verbal fluency skills and be able to function as a member of a group • Masters graduates should have due written skills <p>1.3. Masters graduates are expected to have acquired a due scientific attitude:</p> <ul style="list-style-type: none"> • Masters graduates should be duly disciplined, conscientious and creative, have organisational skills and be open to constructive criticism • Masters graduates should be favourably inclined towards lifelong learning • Masters graduates should be duly aware of the ethics of the science

Table 1. *continued**Objective 2. To train students to become specialists in pharmaceuticals*

2.1. Masters graduates are expected to have the due knowledge and skills relating to the properties of medicinal drugs and the biological systems they impact on:

- Masters graduates should have a due understanding of the biopharmaceutical properties of the dispensed medicines as well as of the evaluation of the bioequivalence of the pharmaceuticals
- Masters graduates should have an in-depth knowledge of the therapeutic use of medicinal drugs and their administration
- Masters graduates should know the structure–activity relation of pharmaceuticals, including physico-chemical aspects and the active effects and operating mechanisms on a molecular level

2.2. Masters graduates should have due understanding and skills in the area of the development, analysis, production and preparation of pharmaceuticals

- Masters graduates should have a due command of the methods for perfecting and preparing dispensing methods for pharmaceuticals in due respect of quality aspects
- Masters graduates should have a due command of the methods for the analysis of medicinal drugs and their ingredients
- Masters graduates should duly apply the statutory regulations regarding packaging, storage and delivery of pharmaceuticals

Objective 3. To train students in the area of pharmaceutical care

3.1. Masters graduates are expected to be duly capable of dispensing information and advice to patients and health care workers on the use of pharmaceuticals and the choice of pharmaceuticals available to them, with due attention for the responsible use of pharmaceuticals (the choice available, methods of prevention, safety and information)

- Masters graduates should be able to offer advice on the use of pharmaceuticals, both on over the counter medications, prescription-only pharmaceuticals as well as on the products used in alternative therapies
- Masters graduates should be able to make a due selection from the offering of over the counter medications and dermatocosmetic products available, which serves the needs of the patient
- Masters graduates should assume their share of social responsibility in health care and should be duly aware of the rules of pharmaceutical deontology

Objective 4. To train students in the field of drug development

- Masters graduates should have the necessary knowledge and skills to design and accompany the various stages of clinical trial procedures for potential pharmaceuticals
- Masters graduates should have the necessary understanding of the characterisation of medicinal drugs
- Masters graduates should have the necessary knowledge of and skills for the industrial-scale preparation of pharmaceuticals
- Masters graduates should be duly familiar with the pharmaceutical applications of molecular biology
- Masters graduates should be duly experienced in operating in a research environment

Objective 5. To familiarise students with the practise of their chosen professional career

- Masters graduates should be able to assess the significance of the profession of dispensing community or hospital pharmacist
- Masters graduates should be able to work together with other caregivers (fellow pharmacists, dentists, physicians, nursing staff, and alternative healers)
- Masters graduates should have a due understanding of the key aspects involved in working in a hospital setting as a pharmacist
- Masters graduates should duly apply social security regulations

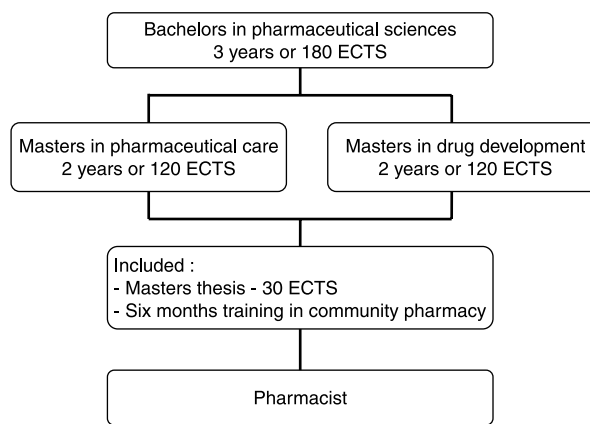


Figure 1. Pharmacy studies in Belgium (Flemish community) after the reform of the structure of higher education (Higher Education Act of 4 April 2003).

- An Academic Bachelor in Pharmaceutical Sciences (180 ECTS), which is not profession-oriented and prepares students for Masters studies (in Pharmaceutical Sciences).
- In order to meet the much-varied tasks of a pharmaceutical scientist in this rapid evolving society, two different Masters programmes are offered after the bachelor's programme:
 - Masters in Pharmaceutical Care (120 ECTS)
 - Masters in Drug Development (120 ECTS).

A Masters graduate in Pharmaceutical Care has the knowledge, skills, competences, but also the attitude of a community pharmacist in contemporary society. That is, in the new curriculum (when compared to the old curriculum) there is less attention on manufacturing and analysis of drugs and more focus on pharmaceutical care, pharmacotherapy and communication skills.

A Master in Drug Development has also again the knowledge, skills, competences and attitudes to act as a community pharmacist (but not at the same advanced level as the Master in Pharmaceutical Care), but receives more training in drug development in order to function in the pharmaceutical industry, cosmetic industry, food industry and government.

Both Masters must prepare and present a Masters thesis (24 ECTS). They both have training (Stage) of six months in a community pharmacy.

The implementation of the main part of all goals and objectives (Table I) in the curriculum of the Bachelor's degree and both Masters degrees (Figure 1) was realized via rather classical disciplines and can be found on the website of the School of Pharmacy (<http://www.vub.ac.be>, November 21, 2007). However, some goals and objectives could only be implemented by introducing into the curriculum some new disciplines and courses using new educational methods.

A framework for innovation in the educational system in the school of pharmacy

To summarize: (i) a new curriculum needed to be implemented and (ii) using traditional educational methods, some goals and objectives could not be implemented in the curriculum (such as communication skills, teamwork, etc.). Therefore, the introduction of new educational methods within the curriculum was a necessity. A new curriculum, however, can only be realized by a stepwise approach. Each step should be carefully studied and even then, the introduction of an innovation in the curriculum might not be successful or is done at the wrong time in the curriculum. Two of the challenges we had to deal with, are discussed here.

The first challenge was to address the lack of communication skills and teamwork abilities during their studies. Therefore, problem-solving learning (PSL) was introduced into the curriculum. Literature shows that PSL may help students in gaining communication and teamwork skills (Duch, Groh, & Allen, 2001). As a consequence, PSL was introduced in different courses in the third year of the Bachelor in Pharmaceutical Sciences Programme. There were no preparatory courses in the first 2 years of the programme and as a result, PSL methodology was rejected by the students. They found it difficult to understand and they were not familiar with self-study and other aspects of PSL. In conclusion, student appreciation of PSL courses was very low (results not shown) and introduction of PSL in the middle of the curriculum without any introductory or preparatory courses appears not to be successful.

A second challenge was the introduction of a course “Introduction to Pharmacy” (6 ECTS) in the first year of the Bachelor of Pharmaceutical Sciences. The introduction of the course was a response to the criticism of the “Visitation Commission” (quality commission installed by the Flemish-Interuniversity Council) that there was a lack of contact with the profession within the first years of the curriculum. In “Introduction to Pharmacy”, 10 topics of the

profession (pharmacy and medicines) were introduced by 10 professors of the School of Pharmacy. Here again, student evaluation was very poor and the attendance of students in this course was low. In Table II, the student evaluation of this course was compared to the evaluation of the course “Line Project I”, which is now present in the curriculum. This unequivocally shows that the course “Introduction to Pharmacy” was not successful. Again we conclude that introduction of courses should be planned very well.

In Table III, the project track including new teaching methods is shown schematically. Implementation of new educational methods should start immediately in the first year of academic studies and should be built up gradually. The project track consists of three courses: Line project I–III. The first year of the Bachelor Programme starts with Line project I (for more and detailed information, see Petit et al., submitted for publication). This course is basically project-based learning with some other small innovations, such as a portfolio. In the second year of the Bachelor Programme, Line project II was introduced. This is again project-based learning, but an electronic portfolio is added to (Questier et al., in preparation). The first contact with a community pharmacy is also implemented within this course (Petit et al., in preparation). Finally, in the third year of the Bachelor Programme, Line project III is introduced (which is again project-based learning, but ending in a Bachelor thesis). Problem-solving learning is also introduced in several other courses. Finally, an Integrated Practicum in which integrated research is prominently visible, was added. By doing so, a gradual process of learning is built up. *Problem-solving* courses are now better accepted by students, because they were prepared for them by the project-based learning in the first 2 years of the Bachelor Programme (Petit et al., in preparation). The Line project is also a course in which students build up an important contact with the profession (see Petit et al., submitted for publication).

Table II. Student evaluation of course “Introduction to pharmacy” (2000–2001) compared to “Line project I” (2002–2003)*.

	Introduction to pharmacy [†]		Line project I [‡]	
	Level (percentile 33)	Marks (.../20)	Level (percentile 33)	Marks (.../20)
Educational method	Moderate	11.3	Good	17.5
Study material	Good	13.3	Very good	18.1
Skills	Moderate	12.3	Very good	17.3
Examination	Good	12.5	Very good	18.1
Overall	Moderate	12.3	Very good	17.7

* The course evaluation survey was conducted on-line and covered all courses. The survey was held after each semester. Due to this frequency, the perceptions of the students are up-to-date, and action can be taken swiftly where necessary. The survey also gathers information on the time the students really spend on their studies, compared to the study time indicated in the course programmes. Students are obliged to log into the site in question, using their free VUB-e-mail account. However, responding to the survey is optional, and naturally their participation is anonymous; [†] Academic year 2000–2001; participation: 10 of 31 students (32.3%); [‡] Academic year 2002–2003; participation: 14 of 29 students (48.3%).

Table III. Introduction of new teaching methods within the different disciplines of the curriculum.

Model trajectory	Courses with new teaching methods	
First year of bachelor	Line project I: from molecule to patient	Project based learning (basic)
Second year of bachelor	Line project II: from molecule to patient	Project-based learning (electronic portfolio)
Third year of bachelor	Line project III with bachelor thesis: from molecule to patient Analytical chemistry Pharmaceutical microbiology	Project-based learning (+ bachelor thesis)
First year of Master (either pharmaceutical care or drug development)	Integrated practicum	Project-based learning Problem-solving learning Integrated research
Second year of Master (either pharmaceutical care or drug development)	Stage	GIMMICS

Using the experience gained in the project track in their Bachelor years, students are ready to absorb successfully new integrated learning methods in their Master years. This is shown at its best in the second year of the Master programme. Here, GIMMICS was introduced. This is essentially a very practical pharmacy game (Sarre et al., in preparation). In this pharmacy game, all courses are integrated.

Conclusion

- (i) The profession of pharmacy is rapidly evolving; Schools of Pharmacy should anticipate this by implementing a new curriculum if required.
- (ii) New learning methods should be introduced within the curriculum to implement new competences, such as communication skills, teamwork, etc.
- (iii) The new learning methods should be introduced from the first year of the programme and built up gradually.
- (iv) A mix of traditional learning methods, such as lectures and practicals, and new innovative learning methods, such as Project-based learning and problem-solving learning, provides the student with a broad learning environment for a successful start to his or her profession, and to prepare him or her for future challenges.

Acknowledgements

We thank all tutors (professors and assistants) of the School of Pharmacy, Vrije Universiteit Brussel (VUB). We also appreciate the design work of Frank Vanderkelen and we are grateful to Ruddy Verbinnen for critical reading the manuscript. We also want to thank all members of the OSC (Educational Service Centre of the VUB) and especially Mrs Thea Derks. This project was funded by the Covenant 2002–2005 (Ministry of the Flemish Community, education and VUB).

References

- Bologna Declaration. (1999). The European Higher Education Area. Joint declaration of the European Ministers of education, Convened in Bologna on the 19th of June 1999.
- Duch, B. J., Groh, E., & Allen, D. E. (2001). *The power of problem-based learning*. Sterling, VA: Stylus Publishing.
- EPSA Report. (1999). Pharmacy education—a vision of the future. A comprehensive collaborative study by pharmacy students worldwide on essential developments in pharmacy education, European Pharmacy Students Association
- European Union. (2005). Directive on Recognition of Professional Qualification of the European Union (Directive 2005/36/EC).
- Flemish Parliament. (2003). Higher Education Act of 4th April 2003.
- Healy, T., Kone, K., Marshall, I., & Wilson, C. G. (1996). Student centred learning and its implementation at the University of Strathclyde. *Pharmaceutical Journal*, 256, 127–131.
- Hepler, C. D., & Strand, L. E. (1990). Opportunities and responsibilities in pharmaceutical care. *American Journal of Hospital Pharmacy*, 47, 533–542.
- Leufkens, H., Hekster, Y., & Hudson, S. (1997). Scenario analysis of the future of clinical pharmacy. *Pharmacy, World and Science*, 19, 182–198.
- Petit, P., Fories, A., & Rombaut, B. (in preparation). The introduction of new teaching methods in pharmacy education at the school of pharmacy at the VUB 3, Stripping and rebuilding projects: A conceptual approach leading to a problem based project.
- Petit, P., Fories, A., & Rombaut, B. (in preparation). The introduction of new teaching methods in pharmacy education at the school of pharmacy at the VUB 4, The PBL-track and the bachelor thesis.
- Petit, P., Fories, A., & Rombaut, B. The introduction of new teaching methods in pharmacy education at the School of pharmacy at the VUB 2, The Starting point, Pharmacy Education (in press).
- Questier, F., Petit, P., & Rombaut, B. (in preparation). Use of an electronic portfolio in pharmacy education.
- Sarre, S., De Paepe, K., Vanhecke, S., & Rombaut, B. (in preparation). The pharmacy game “GIMMICS”, used to enhance pharmacy practice competences.
- Tromp, T. H. F. J. (Ed.) (1999). Report of the task for implementing pharmaceutical care. In *European association of faculties of pharmacy*. Groningen, Kampen: Quality Institute for Pharmaceutical Care.
- Vlaamse Interuniversitaire Raad. (2003). Brussels, Belgium *De Onderwijsinspectie Farmaceutische Wetenschappen*.
- WHO Report. The role of the pharmacist in the Health care system, report of a third WHO consultative group on the role of the pharmacist, Vancouver, Canada (1997).