

Review Process for an Entry-level Degree Program in Pharmacy: A Successful Approach

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This paper describes the evaluation and review process conducted at the University of Montreal for the bachelor of pharmacy program. The study assessed the successful implementation of the program's educational objectives across the new curriculum. The assessment involved revisiting the educational objectives, describing the teaching and evaluation methods, evaluating the program strengths and weaknesses perceived by faculty and students and investigating student's academic workload. The analysis indicated that objectives related to intellectual skills were emphasized in all disciplines while objectives related to attitudes were weakest. The majority of teaching methods used a combination of lectures and low problem solving. Problem complexity could be increased to improve knowledge integration across disciplines. The workload analysis revealed that students allocate less hours per week than the recommended standard and that a better balance between semesters should be reached. Based on the information gathered, the academic policy committee, in collaboration with faculty members devised an effective tool to modify the program; the tool included an efficient reporting and recording procedure, a plan of action and an implementation schedule. The evaluation and subsequent modification process allocated clear responsibilities and used a step-by-step methodology that allowed all stakeholders to participate. The approach resulted in a broad buy-in and successful improvement of the program.

Keywords: Pharmacy education; Pharmacy curriculum; Pharmacy curriculum revision; Teaching methods; Evaluation methods; Student workload

INTRODUCTION

The University of Montreal pharmacy program was completely revised to be harmonized with the movement to professionalize pharmacy practice. More courses emphasized pharmaceutical care and problem-based learning to facilitate the integration of knowledge with practice skills. At the time of implementation, consensus and commitment to the program's educational objectives had not been gained throughout the faculty resulting in some resistance to implementation. To gain broader acceptance and to correct perceived deficiencies a complete revision of the program was instituted.

The academic policy committee, chaired by the associate Dean for academic affairs and staffed by heads of each discipline spearheaded the review process. An academic advisor assisted the committee throughout the process.

The review process was conducted in three phases.

1. revision and rewording of program goals to allow a comprehensive assessment;
2. comprehensive assessment of the program's strengths and weaknesses perceived by students and faculty members to allow the identification of the desired changes;
3. preparation of an implementation plan of the selected changes to achieve the buy-in of

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faculty and students and to consolidate the program.

REVISION AND REWORDING OF PROGRAM GOALS

Objectives

- Clearly state the objectives to facilitate a comprehensive assessment of the program.

Methods

Objectives are the expression of a desired result. Clearly expressed objectives allow the selection of the proper means to achieve the desired result. All faculty members were involved in the review and statement of objectives. Faculty members were divided into three working groups according to their teaching discipline: pharmaceutical sciences, pharmacological sciences and clinical and socioeconomic sciences. Discipline heads acted as facilitators for their respective group. Using the original version of the planned program, the working groups reviewed and rewrote goals, guidelines and educational objectives in terms that would allow evaluation of their implementation.

The framework guiding this activity included the objectives from other bachelor of pharmacy programs and the use of Bloom's taxonomy to clearly define and clarify general objectives as they relate to resulting behaviors (Tyler, 1949; Bloom and Krathwohl, 1956). This meant defining a certain level of educational outcomes in terms of specialized knowledge, critical thinking (analysis, synthesis, judgment), professional skills (practice-related problem solving, communication, etc.) and attitudes or values required for good professional practice (commitment, responsibility, autonomy, etc.).

Results

Each group of Faculty members submitted a working document to their facilitator and to the associate dean for academic affairs. The final document entitled "Goals, guidelines and general objectives for the bachelor of pharmacy program" was presented and adopted at a faculty meeting in June 1996 (Appendix A).

The document serves three functions;

1. confirms the broad base objective of the College, i.e. to prepare students to practice pharmacy in all areas of the profession;
2. defines the fundamental direction of the program which is the development of professionally and

socially responsible clinical pharmacists trained to master all aspects of drug usage;

3. supplies a complete list of objectives classified under 3 classes: knowledge, intellectual and professional abilities or skills and attitudes.

A COMPREHENSIVE ASSESSMENT OF THE PROGRAM

Objectives

The objectives of the program assessment can be set out in five principal statements.

1. To evaluate the internal coherence of the program to assess the likelihood of achieving program objectives and the contribution of each course to the objectives of the program;
2. to identify teaching and learning evaluation methods used to complete the internal coherence study;
3. to analyze the student workload in order to evaluate:
 - the relationship between the number of study hours allocated by students and the number of course credits;
 - the distribution in the workload over each semester;
 - if the learning conditions favor quality learning;
4. to obtain recommendations from faculty members on:
 - program structure including the distribution of credits by semesters number of credits allocated by courses, addition or deletion of courses;
 - level of integration of their individual courses in the program;
 - requirements for human and material resources for better teaching support;
5. to obtain feedback from students on:
 - perceived need to change courses or laboratory work and the required changes;
 - the choice of electives;
 - the quality of the preparation for the clinical clerkships;
 - the degree of difficulty of each course;

Methods

A non traditional program evaluation method, based on the relationship between quantitative and qualitative data was used (Madaus and Kellaghan, 1992). This evaluation examined whether the planned and implemented activities achieved the desired objectives. This program evaluation allowed the identification of the required adjustments; it was

a formative rather than a summative type of program evaluation aiming, first of all, at improving the program and providing recommendations for improvement (Scriven, 1993).

Internal Coherence

The internal coherence analysis used indicators such as relationship between course's objectives, as described in syllabi and program's objectives. A rigorous documentary analysis methodology coupled with a validation of the analysis by professors was used to:

1. identify to which program objective each course objective corresponds;
2. identify how each course contributes to the achievement of the program objectives;
3. identify which courses contribute to the achievement of objectives related to knowledge, intellectual abilities, professional skills or attitudes;
4. analyze course objectives according to Bloom's taxonomy to permit the identification of the level of intellectual development targeted by each objective including memorization, understanding, analysis, synthesis and critical evaluation;
5. describe the nature of the course content as planned.

Each faculty member participated to the analysis for validation. Adjustments to the analysis of the results were made following the input of each professor.

Inventory of Teaching and Evaluation Methods

The goal of the program is to have students master and integrate knowledge from all disciplines. This mastery and integration requires the use of superior intellectual abilities including analysis, synthesis, critical evaluation and application of knowledge. Since lectures do not facilitate the mastery and integration of knowledge, the inventory and review of course syllabi have concentrated on recording the activities and methods recognized to promote integration like the use of problem solving methods, particularly complex problems.

This inventory completed the known program's activities aimed at developing high order intellectual and professional abilities; clerkships, seminars, laboratories and the four courses created to emphasize the integration of knowledge from all disciplines. These courses used problem-based learning or case studies to foster the integration between all courses. All course syllabi were reviewed and the list of teaching and evaluation methods completed. The inventory was validated by a questionnaire sent to all faculty members.

Student Workload by Semesters

Research on the relationship between academic workload and the undergraduate student learning process showed that when students feel overworked, they adopt a superficial learning strategy relying on memorization, rather than an in-depth learning mode based on understanding and knowledge integration (Chambers, 1992). The workload indicator could prove useful since certain program objectives refer to mastery of knowledge, where understanding and integration are required rather than rote learning.

A questionnaire was distributed to all students at the end of each trimester. Students were asked to provide a retrospective assessment of the average number of working hours they spent on each course in each semester including hours spent in the classroom. Three workload indicators were used; the average number of hours per week per discipline and per trimester that students say they put into academic work (including time spent in class); the ratio (expressed as a percent) between the actual reported number of hours per week allocated divided by the number of hours students should allocate based on 3 h of work per credit standard recommended at the University of Montreal; and the balance between semesters indicated by the average number of hours allocated by students.

Satisfaction Survey

The student survey was conducted using two questionnaires that all students enrolled in the implemented program were asked to complete (Appendix B).

The surveys addressed four concerns; general areas of satisfaction and specific degree of satisfaction in program structure, organisation and in teaching and learning evaluation; program activities in need of improvement and the nature of improvements required; the availability and variety of electives; the level of preparation for clinical clerkships and finally the perceived degree of difficulty of each course.

To judge program satisfaction, the student survey used open-ended questions to identify the major likes and dislikes. This approach is based on the premise that responses would reflect the level of student satisfaction in regard to faculty members and teaching methods; courses and their sequencing across the curriculum; student assessment strategies; program orientation and session workloads.

To identify program activities in need of change and the nature of such changes, the survey used questions with both open-ended and closed components. A five-point Likert scale was used to estimate the degree of change needed for each

TABLE I Percent of objectives in each class attained by each discipline of the program

Class of objectives	Pharmaceutical sciences (%)	Pharmacological sciences (%)	Clinical and socio administrative sciences (%)
Knowledge	60	40	100
Intellectual and professional skills	50	63	100
Attitude	13	13	75

course. For courses requiring moderate to substantial changes, students were asked to specify what needed to be changed and why. Comments were recorded for possible changes to the program when the same opinion was shared by at least 50% of the students from each year. The perceived degree of difficulty was evaluated by students on a 5 point scale.

Faculty Survey

The faculty-member survey used a questionnaire soliciting recommendations concerning the structure, content and teaching resources of the program. Each recommendation was carefully reviewed and considered for the list of the final recommendations on the modifications required to the program.

RESULTS OF THE COMPREHENSIVE ASSESSMENT OF THE PROGRAM

Results of the Internal Coherence Analysis

The analysis identified program's objectives that a given course was attempting to achieve and objectives that were not being met by any of the courses.

The results of the analysis are summarized by classes of objectives shown in Table I. The analysis indicates that the clinical and socio-administrative sciences courses were the most likely to achieve all types of objectives, that objectives related to intellectual skills were emphasized in all disciplines and that all disciplines were weakest in achieving objectives related to attitude. General pharmaceutical knowledge related to pharmaceuticals, biomedical and social sciences were achieved by all courses, however, the more specific knowledge objectives related to new pharmaceutical developments, ethical issues, scientific methodology were covered extensively only in the clinical and socioadministrative

sciences discipline. Following the syllabi analysis and the adjustments made to the objectives, the program was found to be structurally coherent.

Inventory of Teaching and Evaluation Methods

The inventory of teaching methods is summarized in Table II. Complex problem solving evaluation methods used by faculty in each discipline are shown in Table III.

The majority of teaching methods in the pharmaceutical and clinical and socio-administrative disciplines use a combination of lectures and problem solving methods. Although lectures are considered the foundation of numerous courses, in the majority of cases, problem resolution and case studies are added to the teaching methods to improve knowledge integration. A detailed analysis revealed that the complexity of problems used could be increased both as a teaching device and a learning evaluation method; this would create an even greater impact on knowledge integration.

Student Workload

The program includes 142 credits distributed over 8 semesters, complete data were available on 6 semesters. Ideally, for perfect balance each semester would include 18 credits. Table IV summarizes the number of credits by semester and the estimated mean weekly hours allocated by students for each of those semesters; a ratio of actual (spent by students) to recommended weekly hours is calculated using the University of Montreal norm which recommends an allocation by students of 45 h per semester for a credit, or of 3 h per week for a credit.

The results of the survey indicate that for semesters I-VI students report allocating less than the standard 3 h per credit (Fig. 1). The ratio of actual hours to recommended hours is constantly lower than 100% (Table IV).

TABLE II Percent of courses by discipline using lectures and problem solving as a teaching methods

Type of teaching	Pharmaceutical sciences (%)	Pharmacological sciences (%)	Clinical and socio administrative sciences (%)
Lectures only	31	60	29
Lectures and problem solving	69	40	71
Problem solving only	0	0	0

TABLE III Percent of courses by discipline using complex problem solving as one of their evaluation methods

Type of evaluation	Pharmaceutical sciences (%)	Pharmacological sciences (%)	Clinical and socio administrative sciences (%)
Complex problem solving present	46	20	50

In the qualitative assessment, students reported being overworked during certain semesters of the program. This perception was not supported by the number of hours they reported allocating to their course load. However, this perceived overworked has to be taken seriously because it has an impact on the type of knowledge students really develop; profound or high ability order knowledge versus surface or memorization knowledge (Chambers, 1992). This perceived overload was probably due to some courses only; some were identified as being too demanding, given the number of credit hours that had been planned compared to the average number of hours that students reported having spent on those courses.

Satisfaction Survey

Forty-eight percent of students completed questionnaires

Structure and Organization

Students were satisfied with the clinical orientation of the program particularly pharmacotherapy, integration courses, antibiotic therapy and clinical biology. The students were mostly dissatisfied with the relative importance given to some courses. They commented that more time should be allocated to pharmacotherapy, antibiotic therapy, over the counter medications (including homeopathic medicines) and less time to pharmacognosy, management, galenic, biostatistics and physical chemistry.

The students felt the communication laboratories were particularly underutilized. The choice of electives was not broad enough for 25% of the fourth year students while 23% were concerned with the workload imbalance between semesters.

Teaching and Evaluations

Satisfaction and dissatisfaction were significantly focused on the teaching skills of some of the faculty. Students appreciated the dynamism and clinical experience of the younger faculty and were dissatisfied with faculty who cannot use concrete examples to support the learning process. Students were extremely satisfied with evaluation methods based on case studies and problem resolution.

The major weaknesses identified by a majority of students were:

- duplication of content between courses;
- too much content for some courses;
- content that is too easy and previously seen at the collegiate level.

Students specified that laboratories were not related with the theoretical part of the courses, that there was a lack of tutoring and the format of the laboratory report was complicated and fastidious.

The "integration courses" were not meeting their integration objectives of multidisciplinary content. Based on the problem-based learning approach, students evaluated that problems were not representative of the content studied in preceding

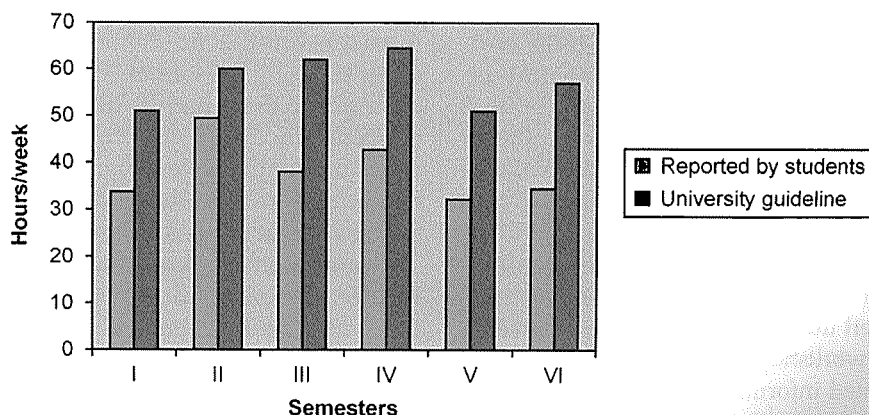


FIGURE 1 Hours per week allocated by students compared to University guideline.

TABLE IV Number of credits and mean weekly hours allocated to the course workload by students for each semesters

	I	II	III	IV	V	VI
Credits	17	20	21	22	17	19
Mean weekly hours	34	49	38	43	32	34
Ratio of actual to recommended weekly hours	66%	82%	61%	66%	63%	60%

semesters, problems were too simple, easy and the process of problem resolution not clearly defined.

Faculty Survey

Faculty identified two principal items as requiring improvement. Firstly, courses where not enough credits were allocated to permit the conduct of exercises that foster the application of knowledge and the resolution of problems and secondly, laboratory work where the laboratory assistant should come from the professional environment. Faculty also recommended that courses be integrated by "systems" instead of by "discipline" and that the number of students by class be decreased.

DISCUSSION AND CONCLUSION

The information provided on the implemented curriculum by both student and faculty-member surveys contributed to the identification of the program's strengths and weaknesses. The curriculum strategies of knowledge application were excellent but the achievement of objectives related to attitude were weak in most disciplines. The overall analysis indicated that the planned activities had the potential to attain objectives dealing with knowledge and skills provided that a better variety of teaching and assessment methods were used. Most courses used a combination of lectures and problem solving. The complexity of problems should be increased to achieve the level of integration required at the University level.

Students were appreciative and enthusiastic of the clerkships in the fourth year of the program and agreed with the adjustments in the integration courses. A redistribution of the imbalance between semesters was particularly important since courses in semesters II-IV represented the foundation for the clinical clerkships and the integration courses given in the later part of the program.

The surveys allowed the collection of interesting ideas but did not deliver a collective perspective. It would have been useful to follow-up the surveys with Delphi style workshops or discussion groups to obtain more targeted information. The new planned curriculum needed some adjustments to be fully implemented and the program evaluation phase

permitted the identification of those necessary adjustments.

A final report, submitted by the associate dean for academic affairs in May 1997 presented the results of the program analysis and the recommendations for the development of a program modification project.

THE PROGRAM MODIFICATION PROJECT

The modification project used a step-by-step tandem approach to identify the adjustments necessary and to implement a process for integrating these adjustments to ongoing program.

Method

The program modification project was divided into 5 tasks:

1. communication of the results of the comprehensive assessment and recommendations;
2. prioritization of the proposed modifications;
3. modifications or selection of priorities for implementation;
4. approval of the modifications;
5. and implementation of the selected modifications;

Communication of Results and Recommendations

All faculty members received a copy of the completed program assessment report. To prepare the ground work for subsequent workshops, meetings were arranged with faculty members, students, members of the academic policy committee and other teaching personnel. The meetings ensured that all stakeholders had a full understanding of the process and that the assessment results and recommendations were well founded, with everyone committed and ready to direct their efforts to the success of the program modification.

The academic advisor made the presentation to faculty members during professional development sessions. Faculty members were provided with the assessment report and a summary of the results for their respective working group. During an open house, the associate Dean for academic affairs informed students of the progress of the program

review and the commitment to pursue the process. The academic policy committee reiterated their commitment in an article published in the student's pharmacy bulletin. The program assessment data were used to explain decisions made concerning the curriculum.

Other teaching personnel were apprised of the assessment results via a summary report outlining the rationale for the program review, the methodology used to undertake the first phase of the project and the results regarding their respective courses. This established a good base for future communication.

Prioritization and Preparation of Modifications

The Academic Policy Committee was mandated to proceed with the program modification project. The terms of the mandate were to:

- define the required modifications and the means needed for implementation;
- prepare a plan of action, showing the steps required to implement the selected modifications and reach the objectives;
- and prepare the official program revision proposal required for approval by faculty and institutional bodies.

Before planning the modification and implementation activities, the Committee prioritized the recommendations in the assessment report and focused their efforts on the highest priorities. Using the nominal group technique (Cornesky, 1993) 17 of the initial 33 recommendations were selected and eight of these classified in the high priority group. The priorities were to:

1. revise the content of identified courses;
2. revise the four multidisciplinary knowledge-integration courses so that they achieve their stated objectives;
3. revise the objectives, content and organization of laboratories;
4. revise the student evaluation strategies;
5. harmonize the curriculum to ensure logical sequencing of courses;
6. eliminate redundancy in the content of courses;
7. encourage the use of computerized teaching/learning tools;
8. increase the number of elective courses.

Modifications of Selected Priorities

In the first year of their mandate, the Committee worked on recommendations 1, 2, 3 and 8 since the modifications required approval by institutional

bodies. Using a framework borrowed from the planning strategies for program improvement (Diamond, 1989) and planned change (Berquist and Armstrong, 1986) the Committee was able to address each recommendation systematically and efficiently. This approach included:

- defining objectives;
- identifying ways and means of attaining objectives, bearing in mind available resources and existing constraints;
- assigning responsibility for each task;
- developing appropriate strategies for effective follow-up;
- establishing a realistic schedule to meet the September 1998 deadline for implementation.

The framework provided enough flexibility to encourage open discussion and an easy flow of ideas between stakeholders. However, it was not until the objectives had been defined and all mitigating factors considered that the committee selected the possible solutions and planned the appropriate implementation strategies. If, in spite of this open, collaborative type of approach, a given group of stakeholders disagreed with a proposal, the academic advisor was responsible to conduct further discussion and to build consensus. The associate Dean for academic affairs intervened only when there was a stalemate.

By adopting a specific reporting and recording format, the academic policy committee was able to streamline its meetings and facilitate the development of the program modification project according to schedule. Meeting reports were presented in point form as follows:

- the identification of the recommendation under study;
- a statement of the modification of objectives related to the recommendation;
- justification of the objectives based on the program assessment information;
- implications relative to the program revision request for institutional approval;
- targeted activities and action strategies to reach the modification objectives;
- task assignment and methods for efficient follow-up on activities and follow through to ultimate implementation of modifications;
- the preparation of the implementation schedule;
- establishment of a date for modification to take effect;
- the development of a plan for evaluation and feedback after implementation.

An example of this planning tool is given in Appendix C.

The program modification project was completed according to the set schedule and was approved by appropriate faculty and institutional bodies.

Implementation of Modifications

The academic policy committee developed a time-frame for the implementation of the modifications on a year-by-year, semester-by-semester basis. This was an extensive process that enabled the committee to set priorities for implementation according to an appropriate sequence. Each committee member was assigned responsibility for initiating and overseeing a number of actions to bring about a modification and for reporting work progress on a regular basis.

Close follow-up was necessary to meet the proposed schedule. Regular feedback to faculty members on the work in progress was both stimulating and motivating. Students were kept informed of the rationale for modifications and progress made toward implementation. In this way, everyone could claim ownership for the project. To date all modifications involving courses and laboratories have been completed. Through the cooperative effort of faculty members from various teaching disciplines, the four knowledge-integration courses have been completely revised. Course sequencing has been harmonized and content redundancy adjusted. The academic policy committee has worked on the development and implementation of new elective courses and computerized teaching tools.

CONCLUSION

To be successful, a program review and revision process must meet certain criteria. It should: (a) use a step-by-step approach allowing adequate time for the completion of each step; (b) be founded on objective data as well as on an evaluation of the appropriate resources; (c) involve faculty members in all of the steps and assign responsibilities within each work team; (d) ensure follow-up on a regular basis. By following this procedure the Faculty of pharmacy at the University of Montreal completed its program review and was successful in implementing the necessary modifications.

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APPENDIX A

Goals, Guidelines and General Objectives for the Bachelor of Pharmacy Program

Program Goals

The bachelor of pharmacy program prepares students

- to practice in any of the professional areas.
- to pursue specialized studies in scientific and professional areas related to drug therapy.

The following guidelines and general objectives are used to achieve the goals of the bachelor of pharmacy program.

Program Guidelines and Objectives

General orientation of the training: The bachelor of pharmacy program is oriented toward the training of a clinical pharmacist who will be socially as well as professionally responsible and who, as a pharmacotherapy specialist, masters all aspects of the field. In addition to the multidisciplinary training, the program develops the ability to think independently, critically and objectively and to structure knowledge within a clinical context. The program also develops skills and attitudes fostering cooperation, openness to others and the ability to change in a rapidly evolving field. This training confers the capability of exercising various functions in pharmacotherapy-related fields and lays the foundation for pursuing graduate studies.

Knowledge: Training of pharmacy students focuses on the acquisition and integration of a body of

knowledge in the sciences which constitute the basis of pharmaceutical treatment and practice, as well as on a knowledge of the stakes related to pharmacy and health care.

Skills: Training of pharmacy students focuses on

- applying knowledge acquired in classes to practical situations;
- developing competencies in pharmaceutical care;
- developing critical thinking, clinical evaluation and scientific rigor concerning knowledge acquisition and the profession;
- acquiring communication and care-giving skills;
- and developing of lifelong learning skills.

Attitudes: The following attitudes are

- motivation to update skills regularly;
- a sense of responsibility, professional liability, ethical judgment and self-questioning regarding actions taken;
- respect toward people
- fostering inter- and intra-professional cooperation;
- the will to accomplish and excel;
- an open mind toward progress including new information and communication technologies;
- proactive and creative pharmaceutical approaches to the profession,
- a feeling of belonging toward the profession and the Faculty.

APPENDIX B

Program Evaluation by Students

Questionnaire 1

Objective: to identify program activities needing adjustments and the nature of the adjustments required. Examples of questions from the questionnaire addressed to third year students.

Open-ended Questions

1. Considering the bachelor program as a whole, indicate by order of importance **what you find most satisfactory** in the program. (1 = most satisfactory, 2 = second most, 3 = ...)
2. Considering the bachelor program as a whole, indicate by order of importance **what you find least satisfactory** in the program. (1 = least satisfactory, 2 = second least, 3 = ...)

Questions on Courses According to Each Discipline:

Example for the clinical and socio administrative sciences

In your view, do the clinical sciences and socio-administrative courses require changes? (Circle one number only: 0 = no change, 1 = few changes, 2 = more or less, 3 = moderate change, 4 = substantial change, N/A = non applicable).

For courses requiring substantial (4) or moderate (3) change, what types of changes are required in your view? (teaching, content, sequence in the program, number of credits, etc.)

Course acronym

Recommended change

Questionnaire 2

Objective: to examine student learning conditions according to academic workload.

Example for courses offered for the Fall 1995 session

	None	Few	More or less	Moderate	Substantial	N/A
PHM 1120-Introduction to the Profession	0	1	2	3	4	8
PHM 1210-Non Prescription Drugs	0	1	2	3	4	8
PHM 3541-Pharmacotherapy 1	0	1	2	3	4	8
PHM 3642-Pharmacotherapy 2	0	1	2	3	4	8
PHM 3520-Communication						
Lectures	0	1	2	3	4	8
Labs	0	1	2	3	4	8
PHM 3525-Legislation, Ethics in Pharmacy	0	1	2	3	4	8
PHM 3526-Management and Marketing	0	1	2	3	4	8
PHM 3527-Dermopharmacy	0	1	2	3	4	8
PHM 3630-Non prescription Drugs and Med. Instrument	0	1	2	3	4	8
PHM 3625-Pharmacy and Health Services	0	1	2	3	4	8

	PHM 4032	PHM 4720	PHM 4229	PHM 4131	PHM 4138
	hrs/wk	Theory —hrs/wk Labs — hrs/wk Include classroom hours	Labs or Assignments — hrs/wk Include classroom hours	— hrs/wk Include classroom hours	— hrs/wk Include classroom hours
Q.1 Indicate the average number of working hours you have spent each week for each course (include hours spent in the classroom).	1 Very easy 2 Easy 3 Average 4 Difficult 5 Very difficult X Non applicable	1 Very easy 2 Easy 3 Average 4 Difficult 5 Very difficult X Non applicable	1 Very easy 2 Easy 3 Average 4 Difficult 5 Very difficult X Non applicable	1 Very easy 2 Easy 3 Average 4 Difficult 5 Very difficult X Non applicable	1 Very easy 2 Easy 3 Average 4 Difficult 5 Very difficult X Non applicable
Q.2 Circle the number representing the level of difficulty of each course.	1 Very weak 2 Weak 3 Average 4 Good 5 Very good X Non applicable	1 Very weak 2 Weak 3 Average 4 Good 5 Very good X Non applicable	1 Very weak 2 Weak 3 Average 4 Good 5 Very good X Non applicable	1 Very weak 2 Weak 3 Average 4 Good 5 Very good X Non applicable	1 Very weak 2 Weak 3 Average 4 Good 5 Very good X Non applicable
Q.3 Rate the previous level of training you received in order to pass these courses.					
Q.4 My level of studies before entering the Faculty of Pharmacy was:	<p>CHECK</p> <p><input type="checkbox"/> DEC ?</p> <p><input type="checkbox"/> University without bachelor's degree</p> <p><input type="checkbox"/> University with bachelor's degree</p> <p>Other: specify -----</p>				

APPENDIX C

Example of modification development tool.

- *Priority recommendation:* Pharmacy Practice Workshop courses (integration courses)
- *Modification objectives:* The program offers four Pharmacy Practice Workshop courses over four years. These courses were intended to facilitate the integration of multidisciplinary knowledge and the application to pharmacy practice. Students work in teams and use the problem-solving approach to learning. The program assessment revealed that the courses failed to meet their stated objectives and therefore required modifications.
- *Justification:* Given in the program assessment summary charts prepared for these courses.
- *Implications relative to request for institutional approval:* None.
- Activities and action strategies
 - (a) Activities
 - Develop a general plan to review/revise:
 - i) the problems/content of the four courses;
 - ii) the problem-solving process given the types of problems to be resolved;
 - iii) student small-group interaction to resolve problems
 - (b) Actions
 - Develop the problem profile for the four Pharmacy Practice Workshop courses.
 - Identify the types of problems that pharmacists encounter in their daily practice and illustrate each problem.
 - Propose a list of typical practice related problems for each of the four courses built around the content knowledge acquired in courses that appear earlier in the curriculum.
 - Propose a problem design process that will enable input and participation of faculty

members from the various teaching disciplines.

Propose a problem-solving process applicable to different types of problems to encourage students to use previously acquired knowledge to solve a given problem.

Propose models for small group interaction that will facilitate the flow of relevant discussion toward possible solution(s). This method will encourage both autonomy and teamwork skills.

Develop the different types of case problems starting with those to be used in the first Pharmacy Practice Workshop courses and proceeding sequentially through to the fourth course with each building upon the former. This is to be completed within a given timeframe to meet targeted startup dates.

State the educational objectives for the courses. Revise each course in light of the new case problems developed, pharmaceutical as the practice philosophy, and the team interaction approach.

- Task assignment and follow-up strategy
 - (a) *Task assignment.* The Academic policy committee was responsible for implementing the first three action items and a working committee was charged with carrying out the activities related to the last five action items.
 - (b) *Follow-up strategy.* This remains to be developed.
- *Implementation schedule.* The Academic policy committee developed this.
- *Implementation start-up date;* Fall 1998 was the start-up date for the first of the revised Pharmacy Practice Workshop courses.