DOCUMENT RESUME

ED 227 812 HE 016 084

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TITLE A Methodological Approach to Selective Cutbacks.
INSTITUTION Association for Institutional Research.
PUB DATE 83
NOTE 9p.; Adapted from a paper published in the "Canadian Journal of Higher Education."
AVAILABLE FROM Association for Institutional Research, 314 Stone Building, Florida State University, Tallahassee, FL 32306.
PUB TYPE Journal Articles (080) -- Reports - Research/Technical (143)
JOURNAL CIT AIR Professional File; n14 Fall-Win 1982-83.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Budgeting; *College Programs; *Departments; *Evaluation Methods; Faculty Workload; Financial Problems; Foreign Countries; Higher Education; Organizational Change; Productivity; *Program Evaluation; Research Methodology; *Resource Allocation; *Retrenchment
IDENTIFIERS *University of Montreal (Quebec)

ABSTRACT

Universite de Montreal has implemented a program review formula that is a standardized approach to relating program offerings, faculty resources, and institutional budgetary reduction requirements. The methodology was based on normalization of the number of credits that a unit is authorized to offer. For a typical degree program structure, the analytical scheme consisted of the following five steps: description of basic data, normalization of credit offerings, reduction of credits and full-time equivalents, verification of teaching resources vs. normalization, and recommendations. Information is provided on teaching resources, degree programs and their structures, and productivity factors related to instructional data. Attention was also directed to how the parameters used in the reduction formula related to one another and to other variables describing departmental teaching activities and how the level of proposed reduction related to these indicators of activities and resources. A second analysis of the reduction pattern determined whether a substantial reorganization of teaching had been occurring among units and across disciplinary lines. (SW)

THE AIR PROFESSIONAL FILE No. 14, Fall-Winter 1982-83
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A METHODOLOGICAL APPROACH TO SELECTIVE CUTBACKS*

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Budget cuts have become less and less a news item as postsecondary institutions around the world have increasingly become targets of local and national governments trying to patch up faltering economies. In a survey of European universities conducted by the Organization for Economic Cooperation and Development (OECD), participating institutions were unanimous in deploring both the regression of consumable financial means and the budget decline, worsened by an overproportional increase in personnel costs (Bender and Henning, 1980). At the United Kingdom's forty-five universities, some administrators in the spring of 1981 were privately toying with the idea of asking faculty members to take voluntary pay cuts to avoid massive layoffs (Walker, 1981). The situation was not less severe in North American institutions. Many American legislatures had forced universities to operate with huge deficits and to declare a state of financial emergency (Magarrell, 1981; Watkins, 1981). Canadian provincial and federal governments also were being accused of having added colleges and universities to their "hit list" (Winter, 1981).

In the Province of Quebec alone, the balance sheets of the six universities were expected to show a $60-million reduction in the total $816-million university grant by the end of May 1982 (Imbeault, 1981). That austerity in higher education spending was only the beginning of a long-term plan to reduce expenditures in the public sector. In 1981, the Quebec government unveiled a triennial plan for the financing of its universities, according to which the Université de Montréal can anticipate a $45-million deficit between 1982 and 1985 (Carbonneau, 1981). That news came after the university had already imposed substantial horizontal reductions for the fiscal year 1981-82.

Selecting a Course of Action

Confronted with a critical situation, Université de Montréal officials took the position that the quality of academic programs and the vitality of the institution, to say nothing of its solvency, could no longer be safeguarded by continuing to make across-the-board compressions of its $200-million operating budget in order to erase a $15-million annual average deficit during three consecutive years. These officials had to decide whether everybody would starve or someone would be thrown overboard. Two committees were established and mandated to examine both the academic units and the administrative units and to make recommendations to the University Planning Committee (UPC) by October 1981. Both committees completed their work on schedule and submitted their reports to the UPC for discussion and approval before presenting them through appropriate channels. As could be expected, many options—termination of academic and nonacademic positions, deletion of services, voluntary pay cuts, early retirements with built-in incentives, protection of tenured positions on a part-time basis, and numerous others—were seriously considered in the course of deliberations of both task forces.

The study of instructional units included detailed scrutiny of all degree programs (COPER, 1981). The general objective was to reduce teaching resources by use of the following means: (1) reducing course offerings, (2) reducing section breakdowns, (3) eliminating courses with low enrolment, (4) promoting cyclical course offerings, (5) increasing section sizes, (6) raising discontinuance questions on low productivity programs, and (7) making more efficient use of teaching resources.

There are no universal program evaluation formulae that could fit all institutions. The combination of teaching methods (lecture, laboratory, practicum), the mix of disciplines, the degree program structures, internal capabilities, external needs and constraints, the historical context of each unit, and the institutional mission itself produce unique patterns. These factors and others have received extensive coverage in the literature, especially in the light of some rather dramatic institutional experiences (Shirley & Volkwein, 1978; Smith, 1980; Herman, 1982). In addition, a number of authors have spelled out the difficulties and modi operandi involved in program discontinuance (Brewer, 1978; Davis & Dougherty, 1979; Dougherty, 1981; Melchiori, 1981).

Where program reviews are done in the context bordering financial exigency planning, institutions have a particulary difficult task in reconciling budgetary, programmatic, and personnel considerations to produce rapid results (Moore, 1978). Despite these critical retrenchment

*Adapted from a paper published in the *Canadian Journal of Higher Education*

pressures, universities must find ways to reallocate resources to growing fields such as computing and biotechnology (Mims, 1980) and to revitalize and retrain their instructional staff (Calhoun et al., 1980; Fleming, 1980). It was with that awareness, but not necessarily with full understanding of the obstacles that lay ahead, that the task force members went about the business of recommending reductions of course offerings and teaching personnel.

Methodological and Analytical Scheme

Before becoming involved with the technicalities of the approach described in a recent article by Bélanger (1981), it is important to note (1) that most bachelor's degrees (with the exception of a few professional ones) comprise widely heterogeneous proportions of compulsory, optional, and elective courses amounting to 90 credits; and (2) that most professional programs in the health sciences area were evaluated on a basis substantially different (student-teacher ratio) from that presented below.

Essentially, the methodology was based on *normalization* of the number of credits that a unit was authorized to offer, taking the following factors into account: (1) its existing undergraduate degree program structures, (2) the average number of students in sections, (3) teaching resources, (4) other obiligations such as service courses, (5) disciplinary characteristics, and (6) protection of graduate programs. The analytical scheme was intended to reduce, on a selective basis, the current level of resources. For a typical degree program structure, it consisted of the following five steps: (1) description of basic data, (2) normalization of credit offerings, (3) reduction of credits and full-time equivalents (FTEs), (4) verification of teaching resources vs. normalization, and (5) recommendations.

Table 1
Presentation of Basic Data of a Typical Department

Teaching Resources				
FTE* career faculty members				22.0
FTE part-time instructors				5.7
Total FTE teaching staff				27.7
Degree Program Structure (Undergraduate)				
	Compulsory	Optional	Elective	Total Credits
Bachelor's	21	60 (15)**	9	90
Major	21***	33***	6	60
Minor	3***	24***	3	30
Instructional Data				
Course credits taught (undergraduate)				225
Section credits taught (undergraduate)				236
Average section size (undergraduate)				37
Course credits taught (graduate)				51
Service course credits				21
SCHs* (teaching)/ Total FTE teaching staff				323
SCHs (tutoring)/ FTE career faculty members				63

*FTE = full-time equivalent; SCH = student credit hour.
**The number in ( ) indicates that a minimum of 15 optional credits out of a total of 60 must be taken outside the discipline.
***These are already included in the bachelor's credit offerings.

Table 2A
Normalization of Credit Offerings

Categories of Credits	Number of Degree Program Credits	Multiplication Factor*	Normalized Credits
Compulsory	21	1.0	21
Optional courses	45	2.3	104
Service courses	21	1.0	21
Protected credits**	35	1.0	35
TOTAL			181

*The factor is 1.0 except for optional credits. See Table 2b.
**Refer to introduction courses that have to be broken down in sections.

An application of that methodology for a selected department is presented in Tables 1 through 3b. Table 1 gives a brief overview of actual teaching resources, degree programs and their structures, and various raw products and productivity factors related to instructional data. Table 2a uses the degree program credits of the various categories and multiplies them by a factor to arrive at a number of normalized credits. Multiplication factors (Table 2b) were determined from the observed number of students per section and kept constant for all units. The recommended reduction of credits and FTEs (Table 3a) was simply derived from a direct subtraction of actual course credits taught from normalized course credits. The verification of teaching resources vs. normalization was a necessary step taken to check whether the department could meet the demands of the normalized number of course credits with its reduced teaching credit potential. With the example used in this presentation, one can observe (Table 3b) that the department could still maneuver with a margin of 22 credits, assuming it chose to offer the same number of graduate credits. Therefore,

Table 2b
Multiplication Factor Used for Optional Courses

N = Number of Students per Section	Multiplication Factors
$N < 16$	1.5
$16 \leq N < 19$	1.6
$19 \leq N < 22$	1.7
$22 \leq N < 25$	1.8
$25 \leq N < 28$	1.9
$28 \leq N < 31$	2.0
$31 \leq N < 34$	2.1
$34 \leq N < 37$	2.2
$37 \leq N < 40$	2.3
$40 \leq N < 43$	2.4
$43 \leq N < 46$	2.5
$46 \leq N < 39$	2.6
$49 \leq N < 52$	2.7
$52 \leq N < 55$	2.8
$55 \leq N < 58$	2.9
$58 \leq N$	3.0

Table 3a
Reduction of Credits and FTEs

Course credits taught (undergraduate)	225
Course credits normalized (undergraduate)	181
Reduced number of credits	44
Reduced number of FTEs (44 ÷ 12*)	3.7

*12 credits = average teaching load per FTE

Note: Graduate credits were not used in the above normalization formula since they were all protected as is.

the final step of the process was to recommend (1) a reduction of 44 optional credits, (2) a reduction of 3.7 FTEs, (3) an increased student credit hour (SCH) productivity, and (4) a sustained effort in research.

The methodology which has just been described is a *standardized* approach designed to relate program offerings, faculty resources, and institutional budgetary reduction requirements. The premises leading to its development were simple: It had to be developed quickly; it had to relate to the teaching and programmatic activities of departments; and finally, it had to take into account the teaching resources required to sustain a sufficient level of activities. The assumption that current program structures and course offerings were adequate, if not optimal, in attaining each department's educational goals was the basis for the rationalization of course offerings and faculty resources that would take place through the application of this methodology.

Table 3b
Verification of Teaching Resources vs. Normalization

Teaching Resources before Normalization	
FTE career faculty members	22.0
Estimated sabbatical leaves*	2.6
Teaching Resources after Normalization	
Residual FTE career faculty members	19.4
Residual total FTE: (19.4 FTE CFM** + 5.5 FTE PTI**) - 3.7 FTEs	21.2
Verification of Teaching Potential	
Teaching credit potential: 21.2 FTEs X 12 (average teaching load)	254
Normalized course credits: 181 (undergraduate) + 51 (graduate)***	232
Course credits taught (1980-81): 225 (undergraduate) + 51 (graduate)***	276
Section credits taught (1980-81): 236 (undergraduate) + 51 (graduate)***	287

*One out of seven tenured faculty members is estimated to be on leave every year.
**CFM = career faculty member; PTI = part-time instructor.
***Graduate credits were all protected.

Although strong arguments can be put forth to defend the merits of this approach, the results must be analyzed in a more comprehensive planning perspective. To this end, we have performed two types of analysis. In the first, we examined how the parameters used in the reduction formula related to one another and to other variables describing departmental teaching activities and how the level of proposed reduction related to these indicators of activities and resources. In the second, we analyzed the reduction pattern to determine whether a substantial reorganization of teaching resources had been taking place among units and across disciplinary lines and whether newer and smaller programs had been more affected by the reductions than larger and longer established ones.

Results of the Analysis

The evaluation of the relative influence of the reduction formula variables and of other related variables was undertaken through correlation analyses. Pearson product-moment correlation coefficients were used to measure the strength of the relationships between different variables describing the activities and resources of the 38 academic departments. These variables included program structure (measured by the number of compulsory, optional, and elective courses contained in each department's undergraduate programs), average section size, course credit offerings, faculty size and composition, and teaching productivity (measured by the ratio of student credit hours to teaching resources). Next, partial correlation coefficients provided a measure of association between pairs of variables of the analysis while controlling the effect of one or more related variables. This second analysis was particularly useful in characterizing the relationships between the reduction levels calculated by the application of the formula and the variables of activity and resources described above.

Results from the Pearson correlation analysis (Table 4a) show that the reduction proposals were significantly but weakly linked to average section size (-.45), to undergraduate course credits taught (.32), and to teach productivity (-.36). Furthermore, the relationships between the variable productivity and other variables of the analysis—such as section size, teaching resources, and course credit offerings—show that the overall level of activity and resources of departments was a determining factor in the proposed level of reduction. However, there were no significant relationships between reduction levels and faculty composition or between the structure of course offerings and the proportion of optional courses relative to the total program structure of the department.

The partial correlation analysis which was performed on different combinations of variables with the level of reduction as a dependent variable also showed the variable productivity and its correlates to be significant controlling factors in the analysis (Table 4b).

The correlation analyses have conclusively established that the greater the level of teaching activity and, indirectly, teaching resources a department had, the less reduction in activity and resources it had to assume. The use of a multiplication factor based on "section size" to determine the optional credit offerings for optional courses can, thus, be said to have indirectly introduced into the

Table 4a
Correlation of Selected Variables of Teaching Activities and Resources

		1	2	3	4	5	6	7	8
1.	Optional course credit offerings	1.000 P=	.699 .001	.530 .001	.526 .001	.099 .277	.706 .001	.314 .027	-.048 .386
2.	Optional credit/all credit offered (%)	.699 P=.001	1.000	.077 .321	.024 .441	-.111 .253	.107 .260	.047 .388	-.160 .167
3.	FTE-career faculty members (CFM)	.530 P=.001	.077 .321	1.000	.944 .001	.450 .002	.672 .001	.447 .002	.134 .211
4.	FTE (CFM + part-time instructors)	.526 P=.001	.024 .441	.944 .001	1.000	.377 .010	.711 .001	.420 .004	-.045 .393
5.	Average section size	.099 P=.277	-.111 .253	.450 .002	.377 .010	1.000	.138 .203	.832 .001	-.045 .002
6.	Undergraduate credits taught	.706 P=.001	.107 .260	.672 .001	.711 .001	.138 .203	1.000	.370 .011	.320 .025
7.	SCHs/FTE	.314 P=.027	.047 .388	.447 .002	.420 .004	.832 .001	.370 .011	1.000	-.369 .011
8.	Credit reduction proposals	-.048 P=.386	-.160 .167	-.134 .211	-.045 .393	-.452 .002	.320 .025	-.369 .011	1.000

Table 4b
Partial Correlation between Credit Reductions and Selected Variables*

First-order partials		Second-order partials		Third-order partials
Credit Reduction with Average Class Size by		Credit Reduction with Average Class Size by		Credit Reduction with Average Class Size by
VAR 1		VAR 1 and VAR 3		VAR 1 and VAR 2 and VAR 3
VAR 2		VAR 2 and VAR 3		
VAR 3		VAR 1 and VAR 2		
-.281	P=.045	-.133	P=.219	-.001 P=.496
-.470	P=.002	-.437	P=.004	
-.529	P=.001	-.291	P=.042	

*VAR 1 = SCHs/Total FTE teaching staff; VAR 2 = Total FTE teaching staff; VAR 3 = Undergraduate credits taught

reduction procedure the criteria of performance and attraction programs. Furthermore, the findings did not confirm the main criticism which some department heads had voiced against the methodology—that the larger the proportion of optional course credits in a department's program structure, the smaller the reduction this department would have to support.

The second analysis, aimed at evaluating the distributional impact of the reduction methodology, used the Spearman rank-correlation coefficient. The 38 departments were rank ordered according to their levels of teaching resources before and after the reduction procedure was applied (Table 5). The results of the correlation analysis ($r_s = .983$, $p < .01$) show that the relative distribution of departments was not significantly affected by the application of the methodology and that a significant realignment of resources would not take place. An analysis of percentage point differences in FTE teaching resources showed reductions ranging from 0 to 30.6% from previous levels. The disciplinary areas most affected by reductions were languages and, to a lesser extent, some pure and applied sciences such as physics, chemistry, mathematics, and geology. The explanation may be that section size was related to laboratory activities embedded

Table 5
Relative Ranking of Instructional Units and Percentage Change in FTE Resources from Past Levels

Instructional Unit	Before the Reduction Rank	Before the Reduction FTE	After the Reduction Rank	After the Reduction FTE	% Change in FTE
Psychology	1	77.1	1	76.8	0.4
Law	2	76.8	2	74.7	2.7
Mathematics	3	46.0	3	41.3	10.2
Physical education	4	36.6	4	34.1	6.8
French studies	5	35.0	6	32.0	8.6
Biology	6	33.9	5	31.1	2.4
Theology	7	31.8	7	30.0	5.7
Economics	8	28.9	8	27.6	4.5
Translation	9	28.0	9	27.5	1.8
History	10	27.7	18	24.0	13.4
Art history	11	27.6	11	26.3	4.7
Physics	12	27.5	13	25.6	6.9
Educational psychology	13	27.3	12	26.3	3.7
Chemistry	14	27.2	16	24.7	9.2
Pharmacy	15	26.7	10	26.7	0.0
Computer science	16	26.6	15	24.9	6.4
Sociology	17	25.6	17	24.4	4.7
Criminology	18	25.5	14	25.0	2.0
Linguistics	19	22.1	20	21.2	4.1
Rehabilitation	20	21.5	21	21.0	2.3
Political science	21	21.5	19	21.3	0.9
Industrial relations	22	20.9	22	20.2	3.3
Geography	23	20.2	23	19.9	1.5
English studies	24	19.5	25	18.5	5.1
Philosophy	25	19.1	24	19.1	0.0
German studies	26	19.0	30	14.0	26.3
Social work	27	18.6	26	17.9	3.8
Nutrition	28	18.5	27	17.2	7.0
Hispanic studies	29	17.5	29	14.2	18.9
Anthropology	30	17.1	28	16.1	5.8
Communication science	31	14.0	31	13.7	2.0
Speech & hearing therapy	32	12.5	32	12.0	4.0
Geology	33	12.2	33	10.5	13.9
Library science	34	11.5	35	9.6	16.5
Russian studies	35	10.8	37	7.0	16.9
Health administration	36	10.2	34	10.2	0.0
Italian studies	37	9.8	38	6.8	30.6
Demography	38	8.1	36	7.8	3.7

in the program structure of these departments and that this type of activity was overlooked by the methodology, with the result that resource reductions were unrelated to the requirements of these programs. A second explanation is also plausible: that the very low levels of student enrolment and, consequently, of teaching productivity that had been observed in these programs in recent years, especially in the areas of languages, physics, and geology, were responsible. These two factors (the mix of teaching activities and low productivity) may have worked together to target these units for major reductions.

The more traditional and longer established departments such as sociology, philosophy, economics, psychology, and others in the arts and humanities have been assured of resource reductions of 5% or less from past levels because of their program structures, high levels of teaching productivity, and large average section sizes. Some of the newer programs, those in the field of language, for example, have been hit very hard. Others of the same size communication science, demography, and library science have fared well. Again, teaching productivity seems to have been a determining factor in discriminating among older and newer programs.

Conclusion

In recent years, program review has been associated very closely with retrenchment and program discontinuance. The review process itself has become a long and cumbersome operation in which questions of authority, definition of institutional priorities, and search for consensus rarely have been resolved to the satisfaction of everyone involved. Other considerations often overlooked by the initiators of the review have been the time lags necessary to complete a wide range of studies and the human and financial costs that have been generated by comprehensive and multidimensional review operations.

While there is a need for continued study of program review procedures in which quantitative and qualitative indicators can be assembled and appraised by appropriate bodies, most institutions have neither the time nor the resources to perform university-wide evaluations. Under these conditions, methodologies such as the one developed for the Université de Montréal can become valuable planning tools by providing the first directions for program evaluation, for allocation of resources and, most importantly, for reexamination of institutional priorities.

The program review formula implemented at the Université de Montréal has, in effect, proven to be useful in more than one respect. Despite its limited scope, the implemented formula has allowed for the introduction of criteria such as needs, institutional priorities, and general performance. For instance, when reductions in teaching resources were being considered, the nature of the teaching resources at stake was independently evaluated with respect to professional and tenure status, research productivity, and complementarity to other departmental resources this in addition to the verification in teaching capacity performed within the methodology itself.

Another important result of this operation has been the insight that the methodology has provided on two long-standing issues of program evaluation: the appropriate size of optional course offerings and the match between instructional activities and the teaching resources required to sustain them. With respect to the first point, the methodology suggests linking optional course offerings to student attendance, group partitioning, and productivity. The criteria of need and efficiency are thus considered for the definition of the appropriate threshold level. As for matching instructional activities to teaching resources, the calculated course offerings baseline can be used to indicate the most desirable level of resources which can be equated to the unit level of activity.

A final and not less significant impact of the review process has been to create a situation whereby units are beginning to question their own modes of operation, their use of faculty resources, and their instructional activities. Efficiency, performance, and quality criteria are thus progressively considered as important departmental priorities. There is hope that self-evaluation will lead to self-imposed reallocation of resources and to the necessary changes in departmental organization.

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The AIR Professional File is published by the Association for Institutional Research, 314 Stone Building, Florida State University, Tallahassee, FL 32306 up to four times per year. The *Professional File* is intended as a presentation of papers which synthesize and interpret issues, operations, and research of interest in the field of institutional research. Authors are responsible for material presented.

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