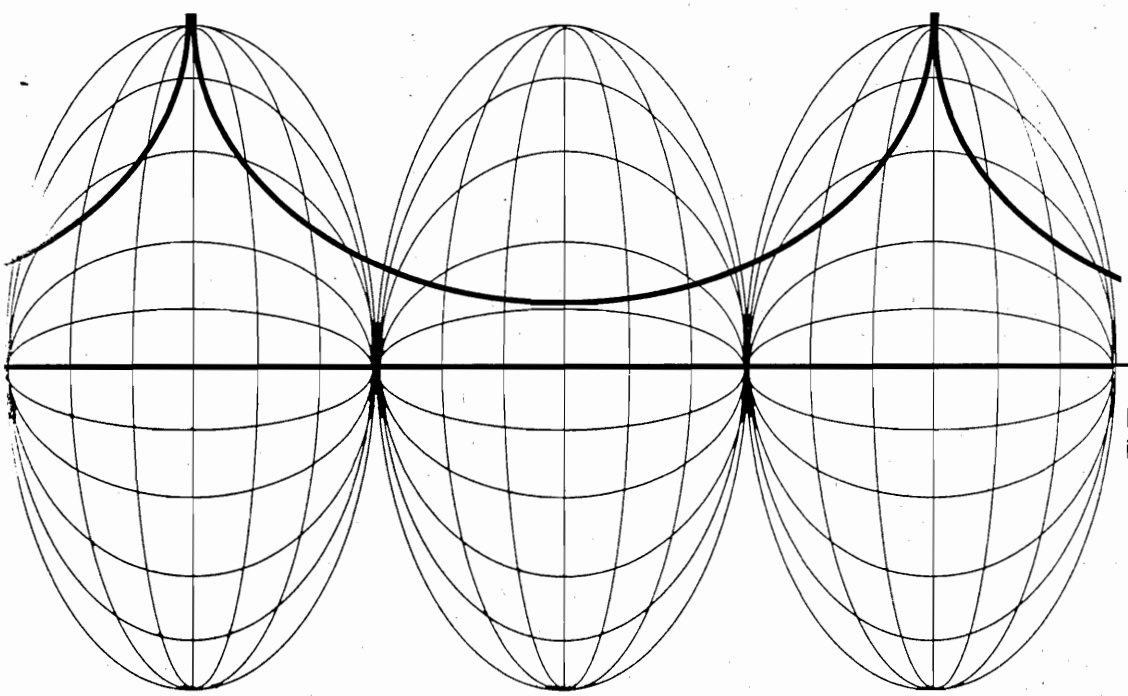

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Basic Research and Implementation
in DevelopinG Education Systems

CASUAL PAPERS

October 1990

The Cost-Effectiveness of Distance and Conventional Approaches to Teacher Education in Indonesia

by

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EXECUTIVE SUMMARY AND RECOMMENDATIONS

Background

During the past few years junior secondary school teachers in Indonesia have been trained at the Diploma II (or D-II) level either through attending a two year pre-service course at IKIPs or FKIPs or through an in-service program for underqualified teachers provided by the Indonesian Open University. The pre-service course receives candidates who have graduated from upper secondary school and provides for them training in both subject matter and teaching methods. The Open University receives candidates who have received a D-I diploma (one year post secondary) and who have had at least two years teaching in a secondary school. Since they are assumed to have teaching experience already, their program at the D-II level emphasizes subject matter mastery and theoretical concepts related to teaching. The program uses distance education since it is relatively economical, does not remove the teacher from the classroom, maintains uniform standards throughout the country, and allows trainees to continue earning an income while they study.

These programs are both expected to increase the teacher's or prospective teacher's mastery of the subject matter they teach and strengthen teaching skills. Up until now there have been no studies to show whether they have been effective in doing so and what the relative strengths and weaknesses of the two kinds of teacher training approaches have been. Beyond that, there have been no clear assessments of the relative costs of the training programs and how these costs relate to their effectiveness. Clear assessments of these will allow teacher educators in Indonesia to determine the extent to which their current programs are operating cost-effectively and alert them to problems in efficiency which they can improve through changes in policies and programs.

This study was supported financially by the U.S. Agency for International Development through Project BRIDGES, under the coordination of the Harvard University Institute for International Development, with technical assistance from the Institute for International Research, Inc., Arlington, VA. The full report is in the Indonesian Language.

Objectives

This research was mounted for the purpose of determining the costs, effectiveness and efficiency (cost-effectiveness) of alternative approaches to D-II level certification for SMP teachers. In do so, it addressed the following research questions:

a) What are the similarities and differences between the different approaches/programs in terms of the objectives, curriculum, learning materials, delivery systems, educational technology, teaching staff and trainee characteristics?

b) What are the costs (institutional and private) of the different programs?

c) How effective are the different programs in terms of creating or improving teacher competence, as determined by mastery of subject matter, understanding of appropriate teaching practices, and the acquisition of teaching skills and professional attitudes?

d) How efficient are the different programs in terms of their costs per unit increase in teacher competence?

Methods

This study employed a cross-sectional research design, in which groups of trainees at the beginning of their program (entry level) were compared with groups of trainees at the end of their program (exit level). Of the many fields of study offered at the D-II level, two basic fields in which the demand for qualified teachers is relatively high, Mathematics and Language (Bahasa Indonesia), were selected for special attention. Sampling was from four different provinces where both pre-service and in-service training were offered to significant numbers of candidates, three on Java and one on Sumatra (Palembang). One hundred trainees were to be selected at random in each field and level (entry and exit). A 20% subsample of trainees was also selected at random for observation of teachings skills.

In actuality, the achieved sample was as follows (the figure to the right of the / is the subsample):

PROGRAM	MATH		LANGUAGE	
	Entry	Exit	Entry	Exit
Pre-service	126/17	121/22	99/19	91/19
In-service	43/21	95/17	42/21	87/17

The shortfalls for the entry level in the in-service program were caused by the unexpected fall in the enrollment for that program during the year of data collection.

Collection of cost data for institutions was done through interviews and examination of institutional records. Capital costs were annualized using prevailing interest rates. Student or private costs (including opportunity costs) were collected through questionnaire from the exit-level students. Concerning effectiveness, **subject matter mastery** was assessed using standardized achievement tests having two levels of content, that to be mastered by SMP students, and that expected of D-II graduates. **Teaching skills** were conceived to have two dimensions: understanding of appropriate teacher behaviors (based on the Ministry of Education's 10 basic teaching competencies); and the actual use of effective skills in a classroom setting. In order to assess the first, a written test of understanding was used; assessing the second was through the observation of a micro-teaching lessons. **Teacher professional attitudes** were assessed through the use of an attitude scale developed by a group of Indonesian experts and validated with a group of 50 teachers. The groups of trainees (entry and exit) were compared on background and ability and, when they were not matched, differences were controlled through statistical means (analysis of covariance).

Findings

Costs. Table 1 shows the results of the costs analysis, the pre-service (IKIP/FKIP) programs being compared on cost per credit hour with the in-service (UT) program, for both Math (part a) and Language (part b). Overall it is clear that the pre-service programs, both Math and Language, are the more expensive than their pre-service counterparts. This is in large part because of their substantially higher institutional costs. Of the institutional costs, it is the recurrent costs (e.g., instructors' salaries) that distinguish the two program. Capital costs are not so divergent. In the case of private costs (those born by the trainees), those for in-service are actually higher than those for pre-service. The student cost burden for the Open University (direct plus opportunity costs) is between 2/3 and 3/4 of total overall costs, whereas for the IKIPs/FKIPs it is about 1/3. Differences between the Math and Language programs are almost nil in the case of the in-service program; in the case of the pre-service program, the Language Program is generally more expensive, particularly in recurrent institutional and private costs.

Subject Matter Mastery. Table 2 reveals the results of the analysis of subject matter mastery in both Math and Language. In this table, the results for the **entry level** groups are compared

with the results for the **exit level** groups. Part "a" is for the pre-service program; Part "b" is for the in-service program. The two subsections of the tests are reported separately, that covering items at the lower secondary school (SMP) level and that covering items at the higher education (PT) level. A composite of the two levels is shown on the right side of the table, both for Math and Language. In Part "a" it is clear that in all cases the exit level groups have higher scores than the entry level groups, a good indicator of program effectiveness. The difference between exit and entry is especially pronounced in the case of the Math course. Initial scores in the SMP Math subsection, around 50%, rise to over 60% at exit; those in PT Math, no better than guessing (25%) at entry, rise to over 35% at exit. The fact that the overall (composite) score on the Math items at exit is lower than 50% is a matter of concern. In the case of the Language tests, modest differences between entry and exit were found overall, with most of the difference being attributed to the SMP items. Exit level was above 60% in this subject, higher than for Math, but still not as high a desirable.

Part "b" of Table 2 shows the results for the in-service (UT) program. They reflect adjustments which have been made to control for teaching experience and academic ability. Overall, there appears to be almost no difference between entry and exit for the Math items, and a modest but significant difference for the Language items. In the case of the SMP items, the entry level is already quite high, a reflection of the fact that the trainees teach this content in school. Although mastery at exit is near 70%, the difference between entry and exit is not significant. In the case of the PT items, both entry and exit show virtually no mastery. The combination of PT and SMP items shows an overall mastery level which is somewhat less than 50%, a finding similar to that for the pre-service program. In the case of Language mastery, the exit level group show a modest but significant improvement over the entry level group in both SMP and PT level items. In both cases the movement is from just over 50% to slightly under 60%.

Teaching Skills: Understanding of Appropriate Practices. Table 3 presents the results of the test of understanding of appropriate teaching practices for the pre-service program, Part "a" for the Math course and Part "b" for the Language. The dimensions on the X axis of the table are **administer teaching learning programs, manage the class, use of media resources, manage teaching-learning interactions, evaluate student achievement, understand and implement guidance and counselling.** Part "a", that for Math, shows clearly that the exit level is above the entry level on all dimensions, particularly on **administer teaching learning programs** and **evaluate student achievement.** In the case of the Language course (Part "b"), exit level is above entry in all dimensions but **manage the class** and **use of media.** In overall

terms, the mastery level of the teaching concepts for the Math trainees is at 60% at entry and moves to near 70% at exit; for those in the Language course it is already near 70% at entry and moves to precisely that figure at exit.

Table 4 shows the results on the test for those in the in-service program. For those in the Math course (Part a) there is very little difference between the entry and exit groups, once teaching experience and academic ability have been controlled. The slightly higher levels of the exit level group on some dimensions are compensated for by the slightly lower levels on others. The average across all dimensions (at a 65% mastery) shows no difference at all. The findings for those in the Language course are more positive: in all but one dimension (**use of media**) the exit group is higher than the entry group. Overall mastery at exit is about 65%, compared to around 60% at entry. Thus, in in-service training, program effects on mastery of teaching concepts seem apparent for the Language course but not for the Math.

Teaching Skills: Micro-Teaching. Skill in delivering a micro-teaching lesson is reflected in Tables 5 (pre-service) and 6 (in-service). For those in the pre-service program, it is apparent that on most dimensions behavior at exit is more highly rated than that at entry. Some exceptions are the **use of visual aids**, **active involvement**, **seat work**, and **checking comprehension** for those in the Math course; and **lesson planning**, use of **clear objectives** and **use of visual aids** for those in the Language course. The Overall Micro-teaching INDEX reveals significant differences between exit and entry for both courses. Those in the Language program at exit reached the same level as experienced teachers (i.e., trainees in the in-service program); those in the Math program, although they increased ten points on the average, were still about ten points below the level of trained teachers.

For those in the in-service program the findings are less encouraging, once the teaching experience and academic ability are taken into consideration. On most dimensions performance in micro-teaching at exit was judged to be about the same (or even lower) than that at entry. Exceptions to that are use of **clear objectives** and **seat work** for the Math course trainees, and student **attentiveness** (where the rating reached 100 on the 100-point scale) and **checking comprehension** for those in the Language course. On the overall INDEX, exit level is virtually the same as entry in both courses. It should be noted, however, that entry level students in this program already performed at the level of 80 on the overall INDEX. This is a reflection of their experience as teachers. The fact that the exit level group was rated not significantly higher reflects both a ceiling effect on the observation instrument AND THE FACT THAT CLASSROOM TEACHING METHODS WERE NOT EMPHASIZED in the in-service training program.

Teaching skills in micro-teaching was also rated using a second instrument, one which used locally validated, low-inference measures (specific behaviors which could be counted) that were based on the literature on effective teaching . In neither of the programs on this instrument were there significant differences between the exit-level and entry-level groups. Consistent with the above findings, the exit-level scores for those in the pre-service program were virtually the same as the entry-level scores for those in the in-service training program.

Teacher Professional Attitudes. Developing valid items to assess teacher professional attitudes was a difficult task. Of the 120 items which were originally created, only 12 were validated on a group of 50 Jakarta teachers. The results of the analysis of these items were are follows:

AVERAGE MEAN SCORES ON 12 PROFESSIONAL ATTITUDE ITEMS
(Range 1-7)

	PRE-SERVICE		IN-SERVICE	
PROGRAM	Entry	Exit	Entry	Exit
Mathematics	4.5	4.6	4.8	4.5
Language	4.7	4.7	4.7	4.5

It is obvious from the above that there is very little difference between the exit and entry-level groups on professional attitudes. The only trend that is apparent is that in the in-service program of being slightly more negative in attitudes at exit that at entry. Detailed analysis show some interesting scattered findings: for example, in the pre-service program, Math trainees at exit are significantly different from those at entry in their **non**-endorsement of the following statements: "Any person who masters subject matter can be a good teacher"; "Teaching programs should be standardized for all students." For the in-service training program, trainees at exit were more likely that those at entry to endorse the statement that "Teaching programs should be standardized for all students"; they also showed less tendency to endorse idealistic statements such as "Correcting student homework until the middle of the night is the obligation of any teacher" and "Teacher should create their own reading

materials based on the general course outline." Such findings provide some evidence that the two groups are having different kinds of professional socialization. Nevertheless, the dominant finding in the study is that the programs are having very little influence on the acquisition of professional attitudes and values.

Cost-effectiveness. The final table in the series, Table 7, provides a view of the cost-effectiveness of the two kinds of training programs. In column "a" of the table is the difference between the exit and entry-level groups on a composite of outcome variables (all of the above except the **professional attitudes** variable where the results were either nil or contrary to that of the other variables). Difference between exit and entry is higher for the pre-service Math and lowest for in-service Math; in the middle are both pre- and in-service Language, which were about the same. Column "b" shows the cost per cycle of the various programs/ courses. This is the total cost per student, both institutional and private (including opportunity costs), over the length of the course. It is highest for the pre-service Language course, slightly lower for the pre-service Math course, and significantly lower for the two in-service courses. The last column is a ratio between the first two, essentially showing the cost per unit difference in the composite measures. Shown in this fashion, the in-service Language course, is shown to be the most cost-effective (i.e., having the lowest cost per unit difference in effectiveness); the pre-service Math course is next in terms of cost-effectiveness. After that is the in-service Math course and finally the pre-service language course. Viewed from the other direction, the most yield per unit expenditure is the in in-service Language course, followed by the pre-service Math course. The other programs appear to be relatively inefficient. It is interesting to note that training through distance education is relatively efficient in the field of Language but not in the field of Mathematics. On the contrary, training for prospective teachers on campus is relatively efficient in the field of Math, but not in the field of Language. Such comparative advantages suggests ways of organizing teacher training in the future.

Recommendations for Policy and Practice

This research was conducted as a means of determining the strengths and weaknesses of the various approaches to SMP teacher training to be used as an input into the process of policy making and program improvement in this field. The research outcomes have, in fact, provided some clear signals as to what can be done in order to improve the quality of SMP teachers and teacher training in the future. The following is a set of recommendations covering the two kinds of programs in general as well as each of the programs in particular.

THE D-II PROGRAMS IN GENERAL

1. Both the pre-service and in-service programs seem to be pursuing legitimate and unique (non-redundant) objectives. For the foreseeable future it seems reasonable to retain a dual system of pre-service and in-service teacher certification at the diploma level. Also, conventional IKIPs/FKIPs appear to be the logical institutions for the pre-service training as does UT for the in-service program.

2. The government needs to clarify its policy concerning the minimum qualifications of SMP teachers. When this research was launched SMP teachers were expected to obtain at least D-II certification. Recently it has been decreed that primary school (SD) teachers should be upgraded to this level. The government will need to determine whether SMP and SD teachers should be qualified at the same level (one possible way of operationalizing the integration of SD and SMP) or whether it would like to reset the qualifications of SMP teachers at a higher level, namely at least at the D-III level.

3. The mastery level of SMP-level materials by both in-service and pre-service trainees need to be improved. The mastery level by the two groups (69% Mat; 57% Lang for UT; 64% and 67% for IKIPs/FKIPs.) is well below that hoped for given the fact that the trainees will be expected to teach this content to students. The first step in accomplishing this task is to determine the extent to which the training curriculum focuses on the subject matter of the SMP curriculum. To the extent that it doesn't, the teacher training curriculum should be changed.

4. Neither the pre-service nor the in-service programs investigated in this study made any positive impact on the professional attitude of their trainees. It may be too much to expect large changes in attitudes; on the other hand, it is apparent that little was done in both courses with the explicit goal of influencing teacher attitudes. Experience shows that little will be gained by the explicit teaching of attitudes; instead the following are recommended:

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For the pre-service program:

a) More effort should be given to the development of the "informal curriculum"--namely the organization of forums, symposia, speeches, student activities and professional/student associations all geared towards giving more status and glamour to the teaching profession;

b) Efforts should be made to create interesting and rewarding experiences during the student teaching (PPL) and student service (KKN) programs, e.g., by assuring that the schools chosen for PPL have a supportive and stimulating environment and that the supervising teacher is positive and supportive, and the KKN is constructive and relevant to professional growth;

c) Efforts should by IKIP/FKIP program administrators and DIKTI to recognize excellent student work and to disseminate it nationally and regionally through journals and other publications/mass-media;

d) Career development and growth paths for teachers must be clear to teacher trainees as they prepared to enter the profession. The real benefits to the teachers of the new credit system should be investigated.

For the in-service program:

a) Teachers in the diploma courses need to have socialization experiences (for example those which are available in a small working group setting) and the satisfaction and reinforcement that comes from professional growth and positive experiences in the school, classroom and study group. (See BRIDGES research in Sri Lanka for an example of how pre-service through distance education can positively affect teacher attitudes.)

b) Professional support, such as that provided by Headmasters, supervisors, peer groups (Musyawarah Guru Mata Pelajaran (MGMP)) and other professional organizations (PGRI) should operate in ways that complement and support the in-service diploma program;

c) Better incentive systems should be established for SMP teachers which reward extra professional effort and increases in competence (see section below concerning teacher incentives).

5. Efforts should be made to increase the interrelationship between the in-service and the pre-service training programs. Our research shows that the two programs are complementary in many ways: the pre-service program is relatively effective but expensive, while the in-service program is quite inexpensive but relatively ineffective; the pre-service program is quite efficient in training in Mathematics, while the in-service is so in Language;

the pre-service program can help trainees improve their teaching skills, while the in-service program finds teachers already skilled in certain areas. Despite these complementarities, there is virtually no interrelationship between the two programs at present. Since demands on the training budget continue to expand at a rapid rate there are urgent reasons for considering ways of integrating them. The simplest form of integration is the sharing of materials and textbooks. For example, self-instructional modules from the in-service program can be used as resources in the pre-services courses. Beyond that there could be some form of program integration. Some countries (Zimbabwe, Papua New Guinea) have done so by making the pre-service (campus-based) and in-service (distance education) programs into a single training system. In such a hybrid system each subsystem does what it is most efficient at. Thus, pre-service training provides training in skills and socialization experiences, while in-service (distance education) provides training in theories, concepts and content mastery. Such a hybrid system has been used in Indonesia during the past few years at Sebelas Maret University in Solo. It is recommended that the costs and effectiveness of this hybrid system be studied in order to determine its potential as a model for the rest of the country.

THE UT IN-SERVICE D-II PROGRAM

1. Better incentives for SMP teacher upgrading will need to be adopted. Of the more than 200,000 SMP teachers who are not yet qualified at the D-II level only about 5,000 are currently involved in upgrading through the Open University. In order not be surpassed in status, salary level, and professional competence by SD teachers in the near future, mechanisms will need to be found which will attract SMP teachers into upgrading programs at the D-II or D-III levels. This will involve adjustments of at least two kinds; namely, reducing the student cost-burden of upgrading courses, and enhancing the relationship between the upgrading and programs of career development and advancement (e.g., through the Civil Service credit system (SK MENPAN).

a. **Reduce the student cost-burden**. The student cost-burden for the D-II in-service training program needs to be reduced. UT students pay a much higher proportion of the costs of their training than do pre-service trainees at the regular IKIPs/FKIPs. If opportunity costs are included they even pay a higher price in absolute terms (Rp 25,000 per credit hour vs Rp 19,000). Moreover, if SD teachers are to be provided the D-II course without charge for tuition and course modules the SMP teachers will find themselves in a relatively disadvantaged financial position. This research suggests the following ways of reducing student costs:

1. To cut down on student transportation costs to the UT study center, local study centers, closer to the trainees' work places, should be established. Study centers could be set up at existing SANGGAR PKG or at the same places as the new D-II course for SD teachers, perhaps using some of the same tutors).

2. To cut down on the cost of learning materials (modules and reference books), a library of D-II and any future D-III course materials and references should be set up in the local study centers mentioned above. Trainees could study their lessons using these materials at such a library. Alternately, if trainees want to purchase their own materials, organizers of the UT study center should facilitate their purchase of used modules.

3. Scholarships should be made available for D-II/SMP participants, especially those who have heavy family obligations and/or no sources of extra income (either by themselves or through other members of their families).

4. Policy makers and program managers should be made aware of the relatively high opportunity costs experienced by many UT students and develop ways or helping them cope with these costs by:

-Allowing them to take a lower course load than normal, at prorated student fees;

-providing them classes and counselling on personal time management and efficient study habits.

5. Concerted efforts should be made to increase enrollment in the in-service diploma courses for SMP teachers. The potential for this is great, since, as mentioned above, **the number of SMP teachers with qualifications below D-II is well over 200,000**! In addition, new SMP teachers will be needed in response to the decision to include SMP schooling in the basic cycle of education. The pay-offs of increased enrollments should also be great: given the fact that the fixed costs at UT are relatively high, increases in the enrollment can lead to economies of scale that actually reduce per student costs. If these reductions are passed on to the trainee in the form of reduced fees and/or materials costs, new incentives for student enrollment will be introduced, leading to additional economies of scale and a new round of cost-cutting and student incentives.

b. **Improve career advancement possibilities.** Clear linkages between the diplomas and career advancement systems need to be developed. This requires the following kinds of actions:

1. Research should be undertaken to determine the extent to which the cumulative credits available for the acquisition of the D-II and D-III are perceived as and are acting as incentives for such upgrading;

2. The mechanisms of the MENPAN credit system should be worked out such that students receive credit for activities in tutorials and other D-II/III learning activities;

3. The acquisition of such credits should be made one of the criteria in annual teacher evaluations (DP3).

4. The curriculum of the Diploma courses (especially D-III if that becomes required for SMP teachers) should be revised in order to provide the teachers with the research, writing and other skills they need in order to gain credits through research and curriculum development efforts.

2. Simultaneous efforts should be made to increase the effectiveness of UT courses. The UT trainees studied, especially those in the Mathematics Program, gain relatively little in terms of improved mastery of subject matter and teaching skills. Experiences in other countries (e.g., Sri Lanka) show that distance education programs can have a large influence on both <u>if there is a considerable amount of tutorial support and feedback on student assignments</u>. For UT this implies that the D-II course should:

a. Provide more in the way of small group tutoring (of the sort that is already planned for the D-II in-service training program for primary school teachers), especially in areas that require the acquisition of quantitative and analytical skills, such as science and math;

b. Provide more in the way of exercises and assignments which are required throughout the course and for which feedback is provided;

c. Reexamine the difficulty and pass level of the course exams (current exams are quite difficult and the pass level is only marginally above that for guessing; as such students could attain that level after two or three attempts at the exam without even studying a module!);

d. Pay more attention to the development of teaching skills, once again though the use of small group processes where trainees can help one another in modelling and trying-out (through simulation, micro-teaching or live classroom teaching) new teaching techniques in particular subjects. This could also be done the forging links with the in-service training activities being conducted by the SANGGAR PKG. Under appropriate conditions, work within the SPKG could be submitted for academic credit within the D-II or D-III program.

THE PRE-SERVICE D-II PROGRAM CONDUCTED BY IKIPS/FKIPS

1. Changes need to be made in the candidate selection process so that more able trainees enter the pre-service training program. Our findings reveal that trainees at entry level have low levels of content mastery, especially in mathematics (30-40%). Efforts should be made to find ways of attracting more able candidates, perhaps by allowing those who have applied for university places in math or science to opt for teaching as a second choice.

2. Attention needs to be focussed on increasing the effectiveness of the pre-service Language Programs. Our results show Language Program operational costs to be higher than those for the Mathematics Program, apparently a result of lower student-teacher ratios. This implies that Language programs could handle a higher number of students with the same number of staff members. On the other side of the equation, the improvement in student test scores is not as high for Language as for Math. Efforts should be made to discover the reasons for this and to improve the effectiveness of the programs.

3. Although pre-service trainee costs are relatively low compared to institutional costs, they are still higher than expected. Efforts should be made, through the organization of cooperatives and student services, to assist students in finding low-cost housing, transportation and used books and study materials.

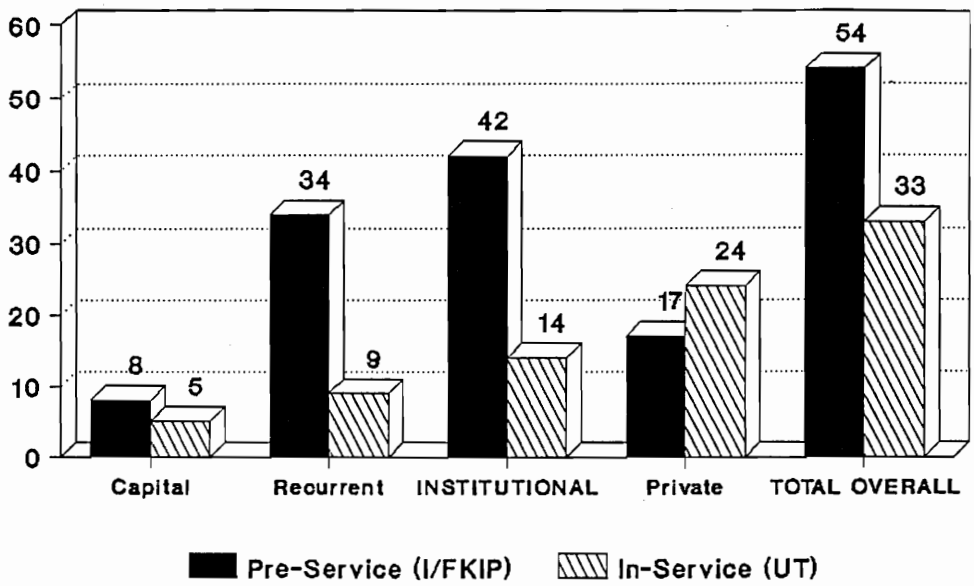
4. More attention needs to be given to the mastery of teaching skills in the pre-service training program, especially those which research has shown to have a strong effect on pupil learning outcomes. This implies devoting much more time than now available to teacher practice and practice teacher (PPL). Practice teaching needs to be supervised and observed by teacher training specialists from the IKIPs/FKIPs as well as by the school-based supervising teacher. Linkages should also be made between the pre-service diploma programs and the activities of the SANGGAR PKG's, on occasion allowing the activities of the SPKG's and MGMP's to be used as a contexts for field training of D-II/D-III candidates In addition, pre-service trainees could be given a chance to get involved with any local in-service tutorial groups which might be set up in the future, a measure which would also contribute to the integration of pre- and in-service training.

5. In order to enhance the trainees' understanding of classroom processes and problems, they should be required to undertake classroom research at the SMP level. This should be especially emphasized if SMP teachers are to be trained at the D-III level in the future. The insights gained from such research will be valuable in and of themselves, but in addition such research, if accompanied by adequate research training and supervision, will provide the prospective teachers with some of the tools they need in order to acquire professional credits through the production of research in the future.

Table 1

(a)

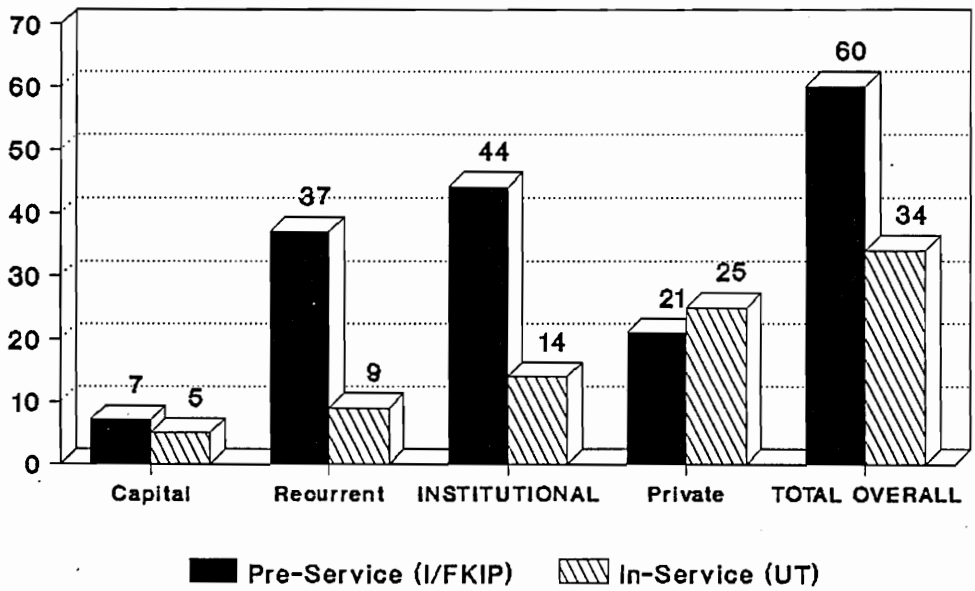
COSTS PER CREDIT HOUR: MATH
Pre-Service and In-Service



In Thousands of Indonesian Rupiah.

(b)

COSTS PER CREDIT HOUR: LANGUAGE
Pre-Service and In-Service

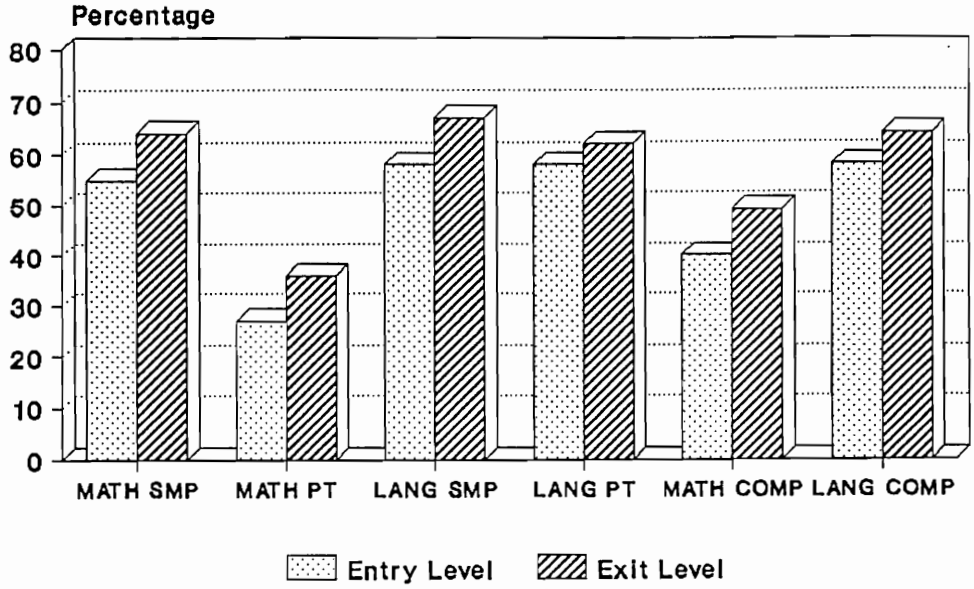


In Thousands of Indonesian Rupiah.

Table 2

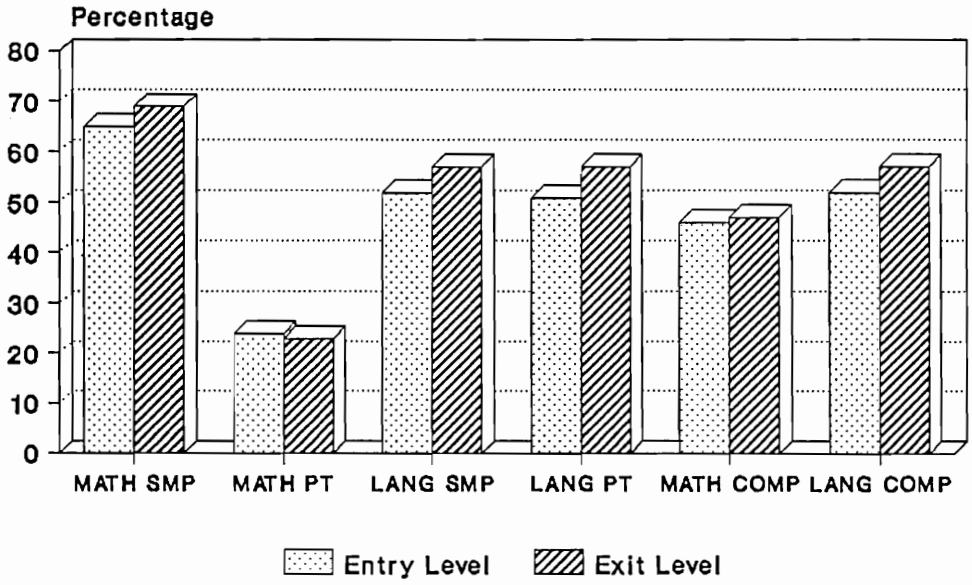
(a)

TRAINEE SUBJECT MATTER MASTERY
Pre-Service



(b)

TRAINEE SUBJECT MATTER MASTERY
In-Service



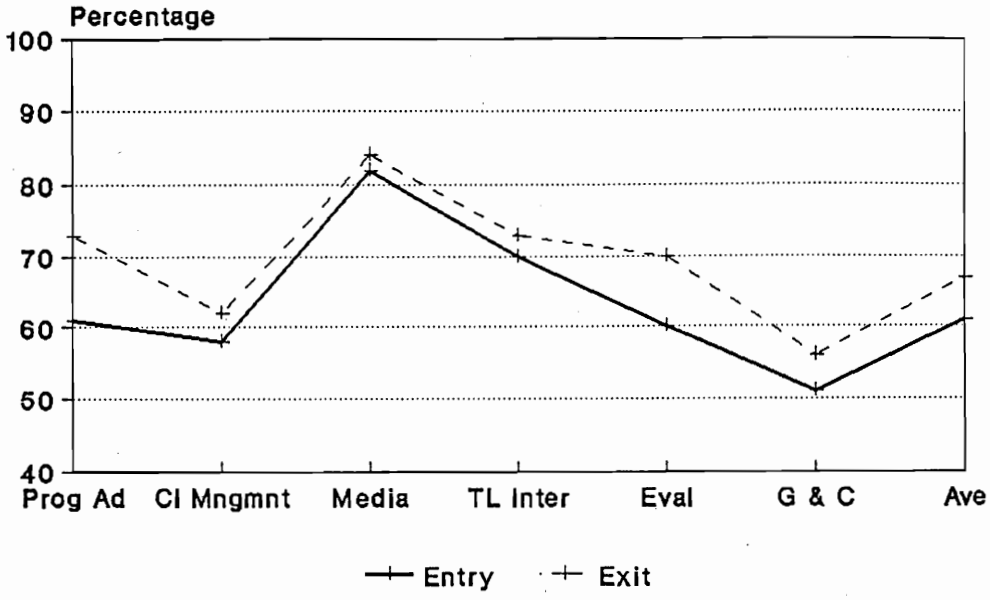
Controlling for teaching experience and academic ability.

Table 3

(a)

TEACHING SKILLS: UNDERSTANDING

Pre-Service Mathematics



(b)

TEACHING SKILLS: UNDERSTANDING

Pre-Service Language

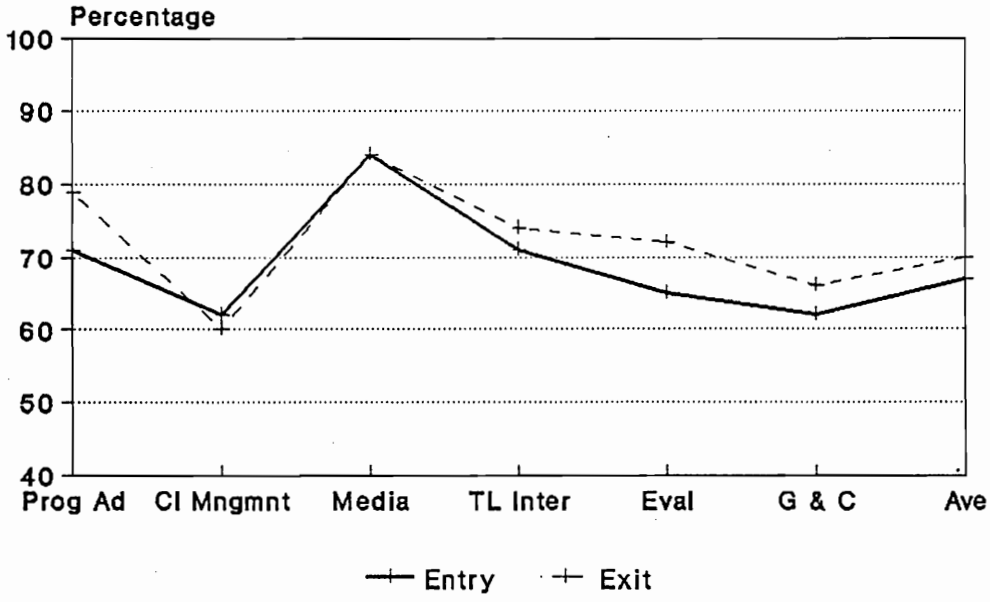
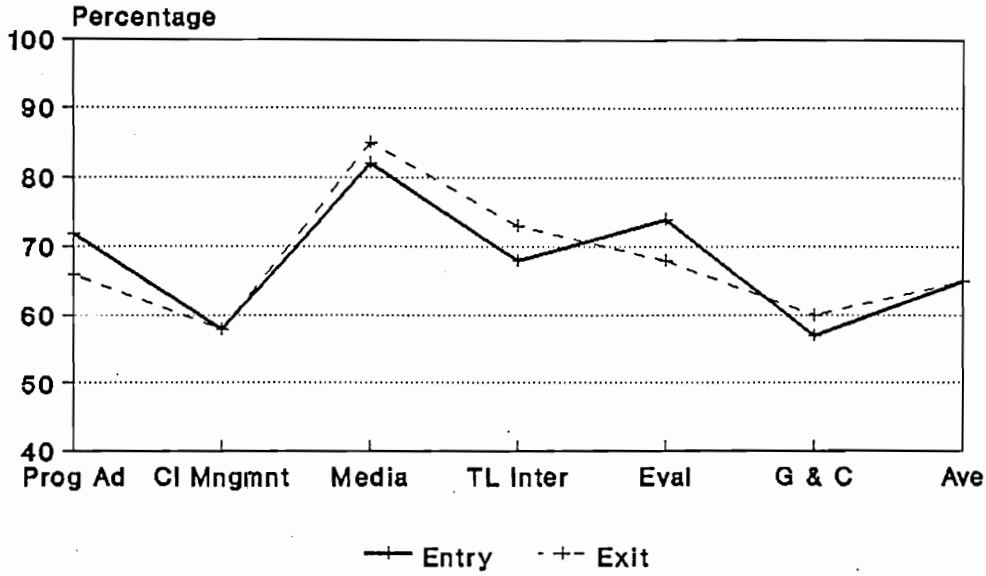


Table 7

(a)

TEACHING SKILLS: UNDERSTANDING

In-Service Mathematics

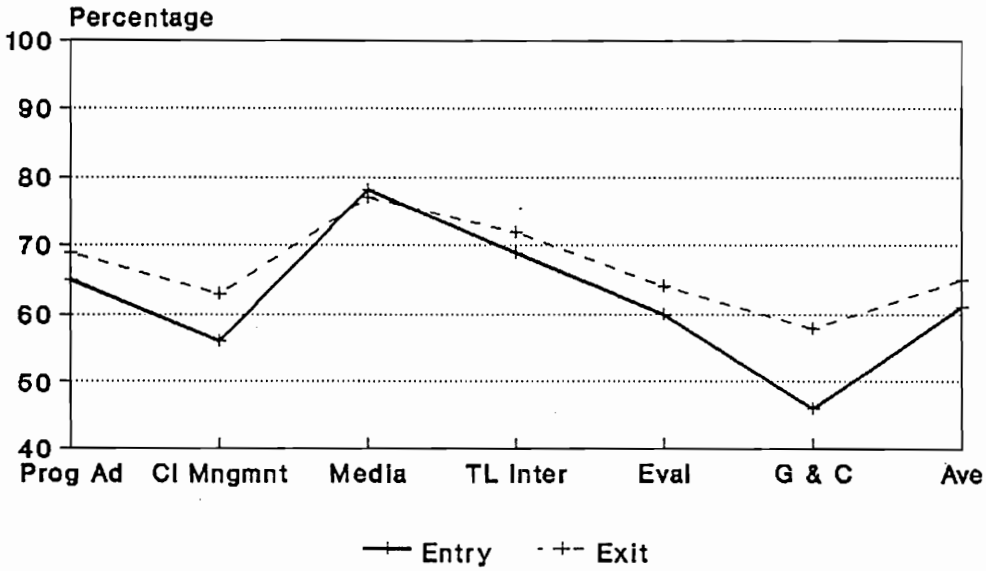


Controlling for teaching experience and academic ability

(b)

TEACHING SKILLS: UNDERSTANDING

In-Service Language



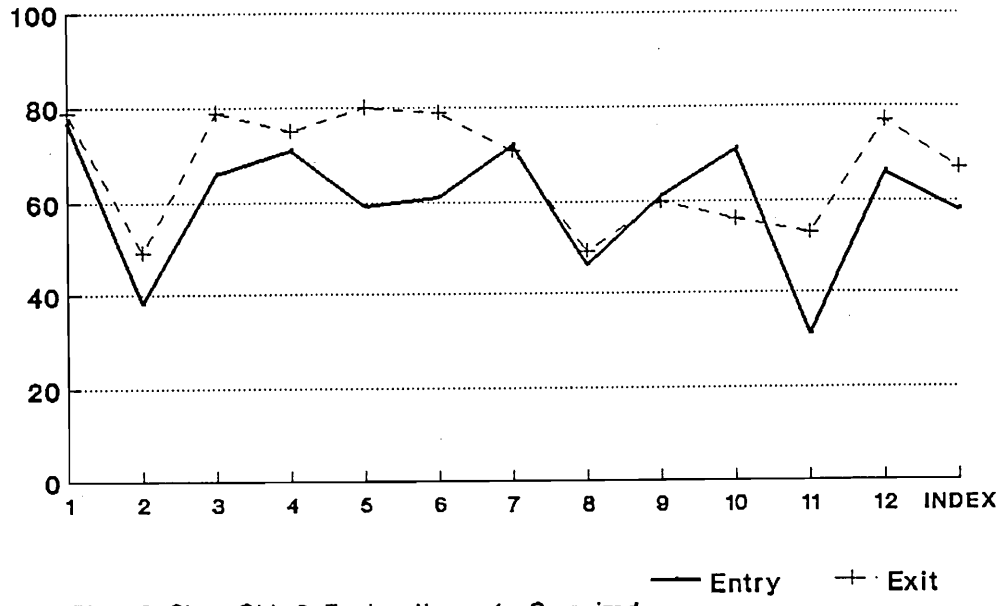
Controlling for teaching experience and and academic ability

Table 5

(a)

TEACHING SKILLS: MICRO-TEACHING

Pre-Service Mathematics

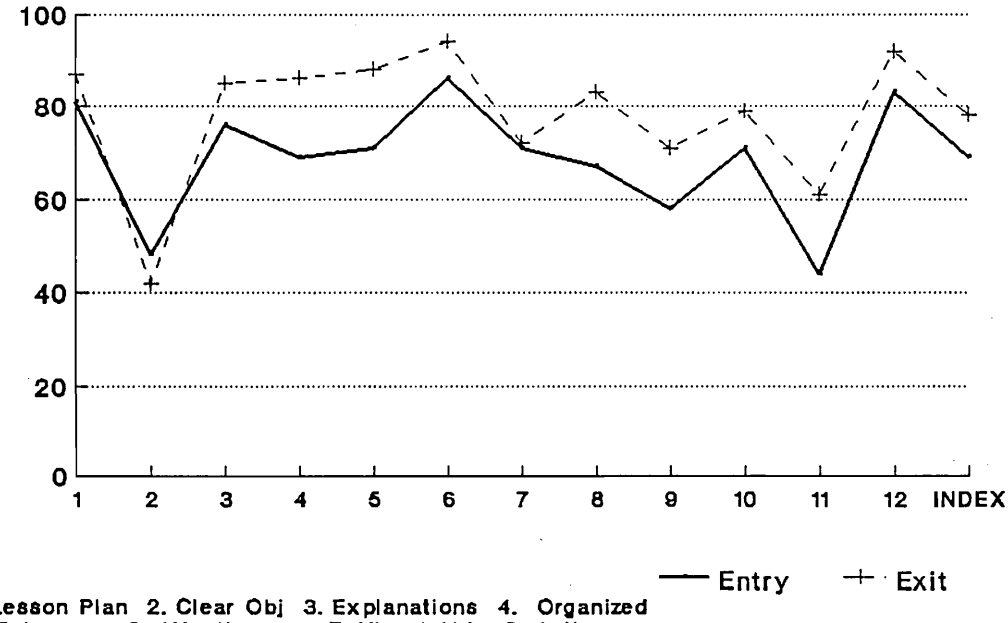


1. Lesson Plan 2. Clear Obj 3. Explanations 4. Organized
5. Relevance 6. Attentiveness 7. Visual Aids 8. Active
9. Seat Work 10. Checking Comp 11. Summary 12 Enthusiasm

(b)

TEACHING SKILLS: MICRO-TEACHING

Pre-Service Language



1. Lesson Plan 2. Clear Obj 3. Explanations 4. Organized
5. Relevance 6. Attentiveness 7. Visual Aids 8. Active
9. Seat Work 10. Checking Comp 11. Summary 12 Enthusiasm

Table 6

(a)

TEACHING SKILLS: MICRO-TEACHING

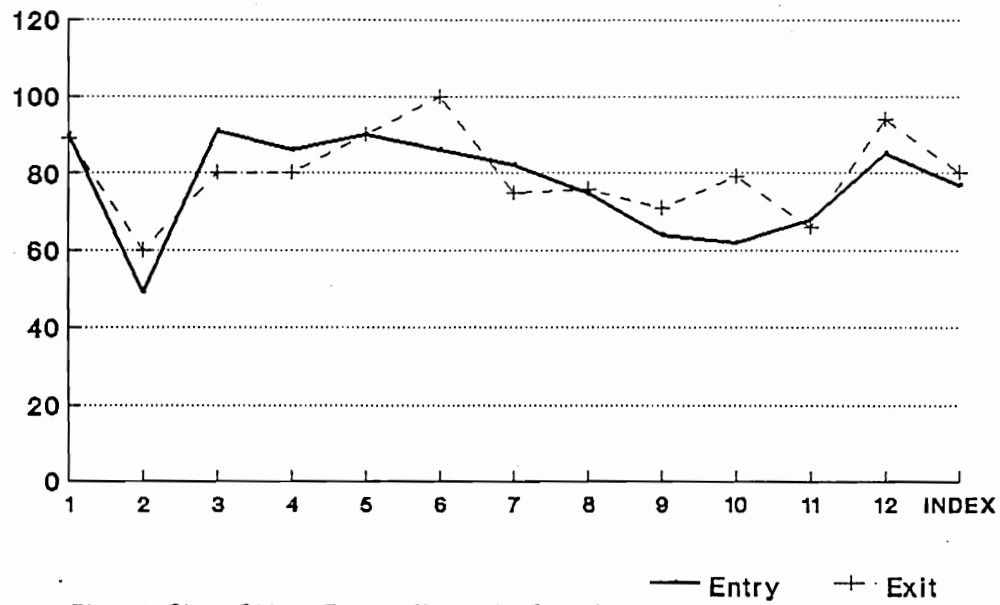
In-Service Mathematics

1. Lesson Plan 2. Clear Obj 3. Explanations 4. Organized
5. Relevance 6. Attentiveness 7. Visual Aids 8. Active
9. Seat Work 10. Checking Comp 11. Summary 12 Enthusiasm

(b)

TEACHING SKILLS: MICRO-TEACHING

In-Service Language



1. Lesson Plan 2. Clear Obj 3. Explanations 4. Organized
5. Relevance 6. Attentiveness 7. Visual Aids 8. Active
9. Seat Work 10. Checking Comp 11. Summary 12 Enthusiasm

TABLE 7
COST-EFFECTIVENESS OF THE DIFFERENT TEACHER EDUCATION PROGRAMS
(EXCLUDING PROFESSIONAL ATTITUDES)

PROGRAM	DIFFERENCE IN COMPOSITE INDEX (Exit - Entry) (a)	TOTAL COST PER CYCLE (b)	COST PER UNIT DIFFERENCE (b/a)
PRE-SERVICE			
Mathematics	22	4330	197
Language	13	4806	370
IN-SERVICE			
Mathematics	5	1332	266
Language	12	1349	112