INTRODUCING MASTERY LEARNING STRATEGIES INTO THE HUNGARIAN HIGHER EDUCATION

Benő Csapó

Department of Education, Attila József University
Szeged, Hungary

Abstract

One of the most extensive experiments in the Hungarian higher education was carried out between 1980-86 in the agricultural colleges and universities. The experiment was based on the principles of Bloom's Mastery Learning and Keller's Personalized System of Instruction. In the experiment, the dominance of traditional lectures and seminars was changed and systematic feedback mechanisms were introduced, the instruction focused on facilitating students' active learning. During the five years of the experiment, 1596 students took part in the experimental instruction. Data on 73 courses were collected and analyzed. This paper presents the main results of the experiments and draws its conclusions for the present reforms of higher education. It discusses how teachers and students can be involved in the reform process, how traditional and new methods can be combined in the instruction and how the instructional culture of higher education can step by step be changed.

Introduction

Since the first European universities were established around 700 years ago, very few changes have taken place in the teaching methods of higher education. Lectures have been the main vehicles of transmitting knowledge and during the main phase of instruction, students' role has not been more than the passive reception of knowledge. The problems have been known for centuries, too, however remedies have not been found or were impossible to apply. A quote from Loránd Eötvös, one of the most prominent scientists of the last century, illustrates this ongoing problem. He wrote in 1887:

Benő Csapó

A tanár a fönnálló rendszer mellett nem képes meggyőződni arról, bírják-e követni hallgatói, s ha látja is az üresedő padokon, hogy a tanulók érdekeltsége csökken, nincsen módjában e bajon segíteni. Szomorú dolog az, amikor a tanár a tanulóért többet nem tehet, mint hogy indexét a félév elején és végén aláírja, s azután a vizsgálaton kihallgatja anélkül, hogy tanulmányainak menetére tényleg befolyást gyakorolt volna.

Within the existing system, a professor cannot be sure if his students are able to follow him, and when he sees in the emptying lecture hall that students' interest is declining, he is not in the position of helping them. It is a sad thing, when a teacher cannot do more for the students than signing their cards at the beginning and at the end of the semester and then listen to them at the examination without having a real influence on the process of their study.

By the end of the 1970s, this problem became evident in some Hungarian higher education institutions. The situation was especially crucial in the agricultural colleges and universities. Because of the decreasing number of the students applying to these institutions, the entrance criteria were lowered and the poor initial knowledge of the students resulted in a large proportion of failure during the first semesters.

Addressing this problem, between 1980-86 a large-scale experiment was carried out in the agricultural colleges and universities to examine the effectiveness of mastery learning strategies in higher education. The objectives of the experiment were (1) to develop optimal versions of instructional strategies, (2) to devise the necessary evaluation methods and tools, and (3) to measure the effectiveness of these strategies.

The project was initiated and financed by the Ministry of Agriculture and the present author was asked to be the director of the project. Although the project aimed at solving practical problems, the whole experiment was designed, administered and documented according to the standards of educational research. The results of the project were published in several technical reports and papers and the comprehensive evaluation of the experiment appeared in a book format (Csapó, 1988). This paper summarizes the main results presented in this book.

Theoretical Framework

In the 1960s, *Mastery Learning* was one of the most influential ideas in the field of educational innovations. The idea, elaborated by Benjamin Bloom (1968), was based on Carroll's (1963) proposition that instead of teaching students uniformly, the level students have to reach should be defined and the ways of teaching should be adapted to the individual needs of students to help them to reach the pre-determined mastery criterion. Bloom applied Carroll's model to the mainstream classroom instruction and initiated a wave of experiments both inside the USA and in other countries as well (Block, 1971, 1974). Another similar innovation was Keller's *Personalized System of Instruction* that was mostly applied in the American higher education (Keller, 1968; Sherman, 1974).

These conceptions and practical developments concerning Mastery Learning were intensively reviewed in Hungary as well (Csapó, 1977, 1978, 1980) and by the end of the 1970s,

they became broadly known among the Hungarian educators. The possibilities of the application of these strategies were often proposed and later began experimentation with these strategies (Csapó, 1983; Nagy, 1982).
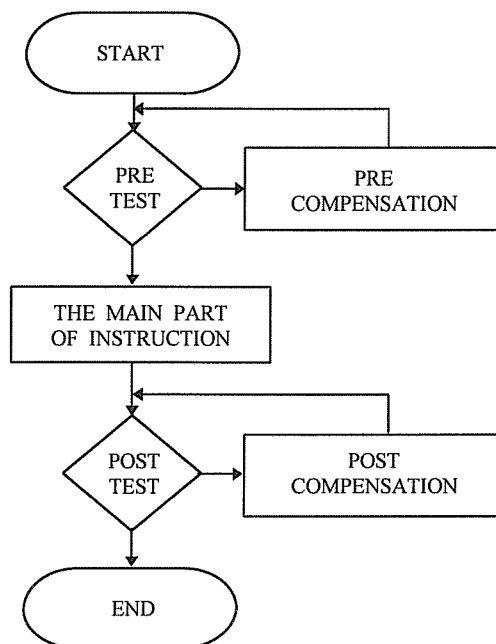

Figure 1
The general scheme of learning units

Bloom's Mastery Learning and Keller's Personalized System of Instruction, were integrated into a model, using the cybernetic and system-theoretical approach to the instruction. The generalized model has some well-defined elements and parameters (see Figure 1).

The elements of mastery learning, as they were applied in the experiment, are as follows:
1) The semesters were divided into smaller learning units, learning tasks.
2) Each unit started with a formative pre-test to assess if students possess the prerequisite knowledge required for understanding and successful mastering the learning material of the unit.
3) Students not reaching the criterion on the pre-test attended pre-compensation.
4) The main part of the instruction was not changed significantly. In this phase the instruction was continued in the usual ways (lectures, seminars, etc.). The modification was that this phase was shortened to accommodate the other elements of a mastery strategy.

71

5) The main part of the instruction was followed by a post-test to assess how well the students mastered the new materials.

6) Students not reaching the criterion on the post-test attended post-compensation.

A large number of concrete variations of the model were used in the experiment. The actual implementations differed in the way of combination of these elements and the values of the parameters. For example, several types of pre- and post-tests were used from short self-evaluated formative tests to more comprehensive and detailed achievement tests. The compensatory methods were adapted to the specificity of the course. If a large number of students failed on the pre-test, the prerequisite knowledge was formally taught through a variety of strategies. These included large group instruction, peer tutoring, individual and group tutoring by the teachers, individual assignments and homework, individual and group projects, specific exercises, computer programs.

The one-semester-long courses were divided into several units and the number of learning units per semester varied usually from three to ten, so the length of learning task typically varied from one week to two months. The number of possible repetitions of failed tests and the criterion of mastery also varied from course to course, usually test retakes were between two and four. The criterion of mastery ranged from 60 to 90%.

Methods and Techniques

The experiment was conducted in four agricultural colleges and universities. Nineteen different courses were involved from the disciplines of mathematics, computer-science, physics, chemistry and industrial drawing and design. The basic block of the experiment was the one-semester course and these semesters as whole were documented. Between 1981 and 1986 the experimental instruction in a given course was repeated three to five times, so that altogether data exists on 73 different semesters. These semesters together involved 344 learning units, each ending with a post-test. The results from these 344 post-testing periods were documented, and data on the results of ca. 40,000 tests administered to the participating students were processed. During the five years, 1596 students took part in the experimental instruction.

Taking into account the aims, complexity and extent of the experiment, no control groups were applied. However, since several testings took place in the experimental semesters, several ways to estimate the yields and additional benefits of the methods used during the experiment can be applied.

The experimental courses were documented in a uniform way and the results of all tests were entered into a computer for statistical analyses. The basic element of the data-base was the outcome of a single test. Each test-result was represented as the percentage of the maximum score. The data base allowed a large number different analyses. Several aggregations were computed and different comparisons were possible between the frequency distributions of the test achievements, depending on the discipline and the different parameters of the strategies (see Csapó, 1988). In this paper only representative examples of the particular learning units and some comprehensive results will be presented. The frequency distribu-

72

tions of the results of the learning units were computed as follows: (1) the frequency distributions of the post-tests, (2) those after the first repetition of testing, and (3) those after the final repetition of testing.

Results and Discussion

Increased performances

Some example from the experiment demonstrate the results of the investigation. The effectiveness of mastery strategies can best be shown through the students' achievement measured at the end of the learning units. When comparing the achievements of the post-tests and the repeated post-tests after the compensation, the benefits of the compensation are obvious.

Out of the 344 learning units analyzed in a uniform way, two will be presented here. Figure 2 and Figure 3 depict the results in learning units of two different courses. Both figures represent the results of the first learning unit of the particular course. The initial level of the students' knowledge can be observed here.
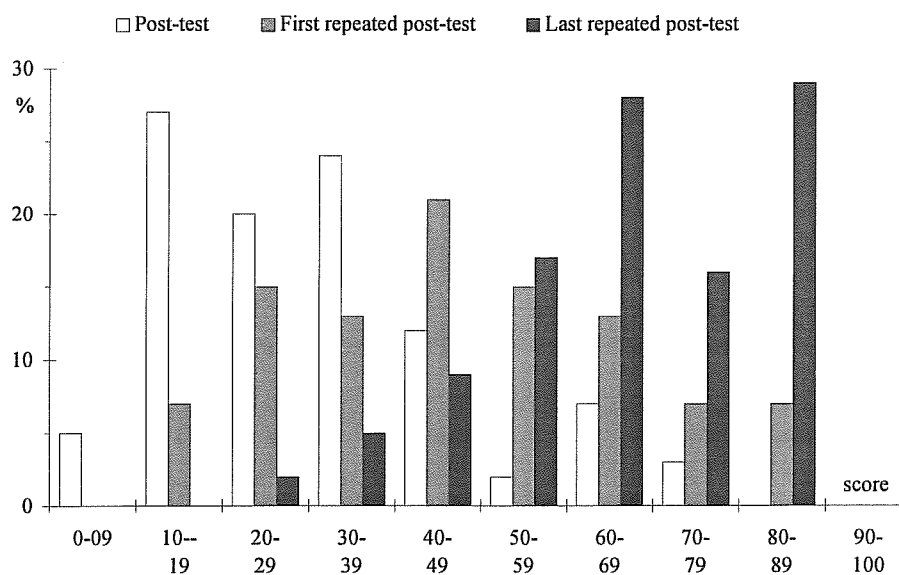

Figure 2
The results of the first learning unit in a mathematics course (Csapó, 1988. p. 27.)
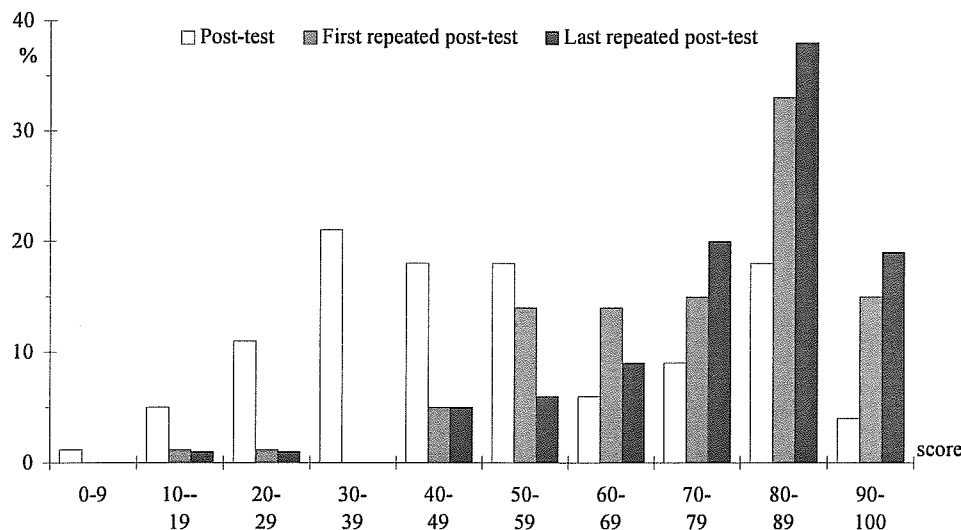
Figure 3
The results of the first learning unit in a physics course (Csapó, 1988. p. 28.)

The figures show frequency distributions of the students' achievements at the end of the learning units. Three achievement are depicted at each figures: (1) the post-test results, (2) the results after the first compensation and (3) the final results after the last compensation cycle.

1) At first, the post-test results were analyzed. These results indicate the achievement level without the compensation. Since no control groups were applied, it is not possible to tell what would be the achievement in the same course in the traditional instruction. The students in the experiment went through the pre-compensation phases. So they understood more from the instruction and, therefore, their achievements on the post-tests were probably better than they would have been without the pre-compensation. However, the achievements in this first assessment can be considered as a point of reference to estimate the additional benefits of the mastery methods, and at least to measure the effects of the compensation.

2) Next, the results of the testing after the first compensation period are indicated. Those students who did not achieve the mastery criterion in the post-test, participated in the compensation sessions. These sessions which dealt only with the material students failed to master, were facilitated a large number of different ways. Then students were tested again with tests (usually a parallel, equivalent version of the original post-test) that covered the whole learning material again. Therefore their achievements can be compared with the post-test results. At this phase, the achievements of the whole group are considered again. Data for those students who reached the mastery level on the first testing and did not take the second test, are involved in the statistical analysis. Thus, this part of the figure demonstates the level of mastery of the whole group of the students after the first compensation period.

74

Comparing the two frequency distributions shows how much students benefited from one single compensation cycle.

3) Depending on the actual implementation of the mastery strategy, those who failed the repeated post-test (not reaching the mastery level again) attended one or more further compensation periods and testing cycles. The figures also present the results of testing after the last compensation period, showing the knowledge level students finally reached before proceeding to the next unit.

Turning to the interpretation of the concrete learning units presented here significant effects of compensation can be observed in both cases. In mathematics, as it was well known before the experiment, the achievement of the students was very low. As the white columns indicate, the majority of the students achieved under 30% on the post-test and only very few were above the 40% level. Those students, who studied in the agricultural colleges, came to these institutions with very poor mathematical knowledge, and a lot of them failed and dropped out in the first semester. However, mathematics is an essential discipline in these institutions. Mathematics knowledge students are supposed to learn will later be applied in several other courses. Learning just 20-30% of the content of math curriculum makes success impossible later in the other courses. Actually, this phenomenon was one of the factors that motivated the search for more intensive teaching methods and the introduction of the mastery learning strategies. Thus, after diagnosing students' weaknesses came the remedy: in this case re-teaching the critical parts of the material and intensive tutoring of the poor achieving students by the instructors. As the gray columns indicate, the first compensation cycle already helped a large number of students to master at least half of the material. Then another attempt was made to help those who needed additional help by providing this smaller group of failing students more intense assistance. This compensatory period increased the knowledge of students significantly again. The black columns indicate students' final knowledge in this learning unit. As the figure indicates, even in this way, not every student reached the 60% mastery criterion. However, taking into account the very poor initial level, and comparing the first and last testing (the distribution depicted by the white and black columns), it can be concluded that the improvement is massive, anyway.

The learning unit from the physics course is an example for a different situation. The students' initial knowledge was very heterogeneous (Figure 3). The white columns indicate a bimodal distribution of achievements. Although the majority of the students remain under the 50% level, a significant number of students achieved above the mastery criterion of 70%. In this case, high achieving students were involved in the compensation process by tutoring their low achieving class-mates. As the gray columns indicate, already after the first compensation cycle the large mass of very low achieving students disappeared and then, after the second compensation period almost 80% of the students achieved above 70%.

Achieving well in the first learning units was especially important and had long-lasting effects. When a firm knowledge base was established, less time was needed for the pre-compensation, and also more students passed the mastery criterion on the first post-test. So, by the end of the semester, the system worked more smoothly and the extra time invested in the first learning units could be regained.

As the semesters advanced, several positive by-effects were also observed. Since several rewards were offered for the high achieving students (e.g. they could skip some otherwise mandatory activities, during the compensation periods they had free time, high test perform-

75

ances were taken into account in the final exams) and some measures or sanctions were taken against the notorious low achievers (e.g. several compulsory extra activities), students attitudes changed. They learned the new rules, and those who just wanted to pass the exams with minimal efforts realized that high performances were expected and they could not escape, so it was in their best interest to meet or exceed the mastery criterion as soon as possible.

To evaluate the results of the whole experimental project, the test performances of the learning units were aggregated in several ways. Test scores were added up for whole semesters and figures similar to the above ones were compiled. Similarly, data characterizing a whole institution were also computed.

When the data for whole academic years were computed, the experimental years could also be compared. For example, researchers found that, as the faculty became more experienced in running the new system, students' performances improved year by year. (For the details, see Csapó, 1988.)

Data were also added for the same disciplines across the institutions and experimental years. For example, the proportions of the students who finally achieved above the 80% level and those who achieved above 70% (incl. the previous group) after the last compensation cycle, are presented in Table 1.

Table 1. The proportions of students who reached the 70% and 80% achievement level

Discipline	Students above 70%	Students above 80%
Chemistry	88.5%	56.1%
Mathematics and computer-science	71.9%	43.0%
Industrial drawing and design	63.8%	53.3%
Physics	39.6%	28.0%

As the data show, the mastery strategies worked quite well in chemistry and mathematics, but the final results still were low in physics. The poor results in physics can be explained by the fact, that it was not considered an essential discipline in the agricultural colleges, so less effort was invested to improve the efficiency of physics courses. These figures also indicate, that high performances can be achieved even in the most problematic field: mathematics. Furthermore, 70% seems a more realistic mastery criterion than the 80%.

Since the number of students who participated in the experimental instruction varied broadly by disciplines, and only a few students attended physics, the overall results of the entire experiment are better than Table 1 suggests. *Taking into account all 73 semesters of the experimental courses, 70.3% of the students were over the 70% achievement level, and among them 48.4% passed even the 80% level.* Thus, finally almost half of the participating students performed at this very high level.

The results of the entire experimental instruction can be also summarized on a chart. The aggregated results of 344 learning units that were documented during the five years are displayed in Figure 4. These aggregations involve all experimental semesters, the test data for

76

every learning units, including the results of those semesters, where the principles of the mastery learning strategies were not followed precisely.
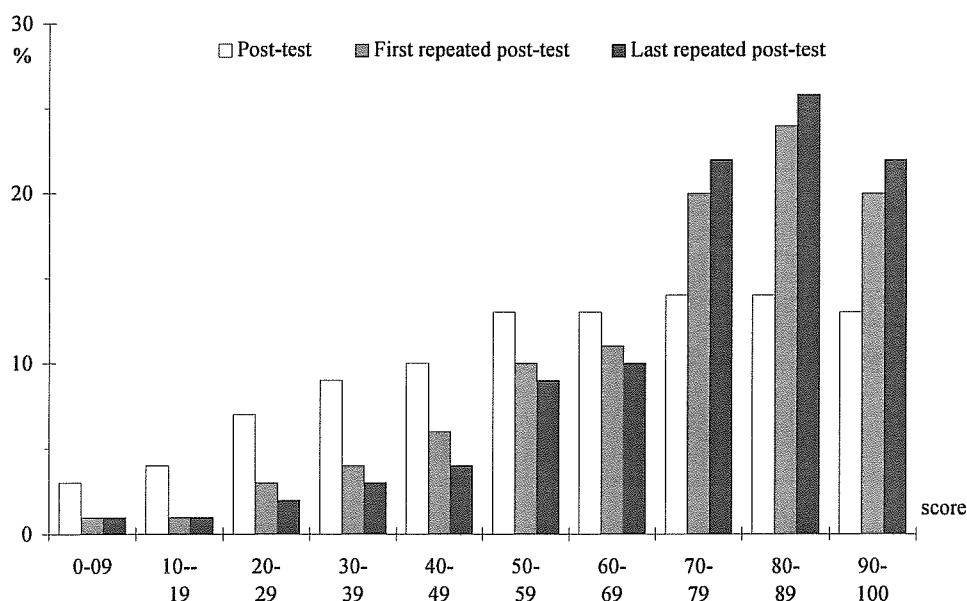

Figure 4
The aggregated results of the entire project (Csapó, 1988. p. 63.)

In this figure, the distribution of the post-test results is more balanced then it was on the first learning units of a course (see Figure. 2. and 3.). Here, there is not a peak in the low achievement range. This is due to the fact, discussed earlier, that in the last learning units a larger proportion of students passed the mastery criterion for the first time. However, a significant improvement can be observed after the first compensation cycle, while the second compensation cycle resulted in more modest improvement in general. So, based on the experiences of the project, a good strategy appears to be to allow students to participate in more compensation cycles (four or even five if needed) at the beginning of the course, to set the rules and establish high standards and less compensation cycles (three or even just one, if it is enough) need by the end of the course.

As the overall results of the project indicate, the mastery strategies did not work with a hundred percent accuracy. Even though extra efforts were taken to „teach everything to everyone", some students failed and dropped out. However, if the very poor initial knowledge of students are also considered and the final results are compared to the efficiency of the traditional instruction, the differences are impressive anyway.

Benő Csapó

Factors influencing the success of mastery strategies

If characterizing the semesters by several quantitative features (variables) and considering the 73 semesters as the elements of a statistical sample, further advanced analyses can be carried out. In a multiple regression analysis the variables were as follows:

1) The proportion of students who reached at least the 70% achievement level on the last repetition of testing. This variable characterizes the effectiveness of the strategies and is the dependent variable in the multiple regression.

2) The year in which the experiment took place. It may be presumed that as experience accumulates year after year during the period of the experimental process, the results improve.

3) The number of learning units in a semester. The bigger the number, the shorter the length of the units. It may be presumed that shorter learning units prevent the accumulation of problems and more frequent compensation is more efficient.

4) The number of possible repetitions of testing.

5) The mastery criterion in the strategy. In the experimental courses 50%, 60%, 67%, 70%, 80% were used as the passing level. A higher criterion is expected to result in higher final knowledge.

6) Rewards offered for the high achievers of faster learners.

7) Use of sanctions against the students who did not reach the mastery criterion.

8) The number of students in the group.

9) The volume of the tests used in the semester.

10) The results of the compensatory activity (difference between the results after and before the repetition of testing).

In this case, the proportion of students who finally reached the 70% achievement level was the variable that is used to characterize the efficiency of the instruction of the course., How the other variables influence this variable is examined. The results of the multiple regression are summarized in Table 2.

All variables were entered in one single step. When r (the correlation between the independent variable and the dependent variable) is multiplied with β (the regression coefficient), the $r\beta$ gives the proportion of dependent variable explained by the respective independent variable.

As the data in the Table show, the characteristics which play significant roles in the effectiveness of the strategies are as follows in the order of the importance (the proportion of the explained variance in percent in the parentheses).

1) The compensatory activity (31.53%), plays the most important roles. Obviously, this is the heart of the mastery learning strategies, this is, the ramidation added to the traditional instruction that makes these methods effective.

2) The advantages given to the fast learners (10.59%), are also important. As it is well known from the psychology of learning, immediate rewards maintain motivation and punishments are less effective.

3) The accumulation of experience in the methods of mastery learning (5.38%) had also significant contribution. This is understandable: by the later experimental years not only the

teachers gained some practice, but a new culture of instruction was also established and better and better accepted both by the students and by the whole faculty.

Table 2. The impact of characteristics of experimental instruction on the results of semesters

Dependent variable: Proportion of students reaching 70%					
Independent variables	r	β	rβ	t	sign.
Experimental years	0.232	0.2321	0.0538	2.74	0.01
Number of units	0.189	0.2809	0.0531	2.52	0.05
Number of repetitions of post-tests	0.131	0.0744	0.0097	0.95	-
Mastery criterion	0.106	0.1597	0.0169	2.00	-
Rewards for fast learners	0.449	0.2358	0.1059	2.32	0.05
Sanctions for slow learners	0.374	0.1035	0.0387	0.94	-
Number of students	0.097	0.2309	0.0224	2.01	0.05
Volume of tests	0.401	0.0982	0.0394	1.03	-
Compensation	0.636	0.4957	0.3153	5.52	0.001
Rate of variance explained:			65.5%		

4) The number of learning units in the semester (5.31%) had a significant role too. However, more (and so shorter) learning units require more tests and other materials for the compensation. So, during the experiment some courses evolved in a way, that a number of new test items and other materials were prepared and the courses were divided into more and more units.

5) The number of students in the group (2.24%) has small, but significant contributions to the effectiveness of mastery learning. Obviously, if the number of students in the experimental groups varied between 20 and 110, the attention that a student individually could receive, also varied.

Thus, in this model a total of 65% percent of the source of variance of the success rate can be identified. This offers enough information for finding the optimal implementation and improvements of these strategies.

Students' attitudes

The mastery learning strategies require more work not only from the teachers, but more systematic and disciplined learning from the students as well. Students' acceptance and positive attitude were crucial in the successful implementation of these strategies. To assess

students' attitudes, a survey was administered in the last experimental year. This question-naire covering every relevant aspect of the project was administered to the participating stu-dents.

Most of the students had quite negative opinion about the efficiency of the traditional ways of the instruction. Altogether 89.8% of them answered that their instruction needed improvement.

In Table 3, students' opinions about the main principles of the mastery learning strate-gies they experienced are summarized. They were asked if they found the particular princi-ple was a proper one to reflect their needs in improving the instruction (yes/no) and if the principle was properly implemented in their own instruction (yes/no). The Table shows the percentage of students answering „yes" for the actual question.

Table 3. Students' opinion about the main principles of mastery learning and their imple-mentation in the experiment

Principle	Is it a proper principle?	Was it properly implemented?
Diagnosing and compensating prerequisite knowledge	89.2	77.8
Using test for reliable assessment of knowledge	51.3	71.5
Compensating students' knowledge	71.5	87.3
Setting high standards	82.9	58.2
Rewarding fast learners	51.3	41.4

Consistently with cognitive-psychological considerations, students found the role of pre-requisite knowledge the most important. Many of them considered setting high standards also a good principle, but less students thought that this principle was realized in their own instruction. As the regression analysis showed compensation as the most important contri-bution to the good results, so believed students as well. According to their answers, com-pensation was the best implemented element of experimental instruction.

As for the other questions, students evaluated the experimental instruction positively. They were also asked to estimate the increase of the knowledge that they mastered due to the methods used in the experiment. The average of their estimation was 38%.

On the question that, as an overall judgment, asked if they recommended the broader application of the methods used in the experiment, 91.1% of them suggested that the mas-tery learning strategies should be introduced into the regular system of instruction in higher education.

Teachers' attitudes

No systematic assessments of teachers' attitudes were carried out during the experimen-tal period. However, the documents of the experiment indicates that most of the participat-

ing teachers become committed proponents of the mastery learning strategies. None of the teachers were educational researchers by training and before this project they did not participate in any similar experiments. At the beginning they were rather skeptical, and it was their own success that gradually changed their opinion. At the beginning, educational experimentation was not their aim, but they published their result in 18 papers and book chapters, and finally four doctoral dissertations in education grew out of the experimental work.

During the five academic years of the study eleven volumes of textbooks were published that were designed for the use of the mastery learning strategies. The teachers who took part in the experiment become professional test developers. They learned how to write test items and how to run test analysis programs. They produced altogether 1546 pages of tests for the pre- and post-testing sessions. Several other instructional materials were also prepared mostly for the compensation sessions (e.g. computer programs, ca. 1600 pages of specific exercises, over 250 slides, more than 200 sample drawings, several models and demonstration materials).

Costs and benefits of mastery learning

The analysis of the financial background of the mastery learning was not the aim of the experiment. The total expenditure of the project was known, and a quite precise estimation of the minimal additional gain in students' knowledge could also be given. However, it was very difficult to estimate reliably how much the real cost of the traditional instruction was.

Taking these difficulties into account, and using the highest costs and the lowest gains as a basis of the estimation, some simple calculations were carried out anyway. The result of a draft cost-effectiveness estimation showed that the introduction of the mastery strategies into the most important disciplines required no more than a 2% increase of the total costs of the training, and resulted in at least a 10% increase in the knowledge of the students.

Epilogue

The experiment presented here was just one of the many innovations in the Hungarian higher education. However at that time in its form and dimensions, it was quite unique. It introduced methods already proven successful in some western countries. In required not minor changes, but an entirely different view of teaching in higher education. It aimed to change the entire culture of instruction. Therefore, the success of the mastery learning was rather surprising.

After finishing the experimental phase, the methods used then still survived at least several years. The reform movements in the participating institutions gained an impetus that also lasted for years. The materials prepared at that time are still in use. The teachers also continue to apply the methods and techniques that they learned then. Following the good examples, several other teachers began to experiment with the mastery learning on their own. However, that strong institutional support never appeared again. Since no systematic

81

Benő Csapó

follow up took place, it would be hard to tell precisely the present status of the mastery learning methods.

Looking back on experimental years from a decade distance, one may still wonder what is needed for the success of a major innovation in higher education. The following conditions seem necessary:

1) A critical, crisis-like situation, when the system is close to collapsing and there is little choice other than changing something.

2) A deep awareness of the problems and a desperate search for the solution.

3) Strong institutional support and expectations concerning quality teaching.

4) Extra resources allocated for the implementation of the new methods.

5) Providing motivation for the participating teachers both in moral and materialistic terms as well.

6) One lonely reformer can do little. A „critical mass", a group of colleagues supporting each other is needed to make a real break-through.

A new wave of reforms began in 1989. Since than, university faculties have been learning new concepts concerning their work, like „accountability", „accreditation", „quality control" „quality assessment", and „quality assurance". Economic realities forced higher education to take several measures to improve efficiency. In the past seven years a great deal of changes took place and there are more to come. A renaissance of mastery learning would fit well into this series of changes.

References

Block, J. H. (ed.1971). *Mastery Learning: Theory and practice.* New York: Holt, Reinhart and Winston.

Block, J. H. (ed. 1974). *Schools, society and Mastery Learning.* New York: Holt, Reinhart and Winston.

Bloom, B. S. (1968). *Learning for Mastery. Evaluation Comment,* 1, 2.

Carroll, J. B. (1963). A model of school learning. *Teachers College Record,* 64, 223-233.

Csapó, B. (1977). A mastery learning fogalma. In: *A XI. Szegedi Pedagógiai Nyári Egyetem Előadásai,* Szeged. 49-74.

Csapó, B. (1978). A mastery learning elmélete és gyakorlata [The theory and practice of mastery learning]. *Magyar Pedagógia,* 78 (*1*),. 60-73.

Csapó, B. (1980). Az eredményre orientáló iskola [The achievement-oriented school]. *Köznevelés,* (*29*), 11-12.

Csapó, B. (1983). A perszonalizált oktatás [The personalized instruction]. *Felsőoktatási Szemle,* 32, 513-576.

Csapó, B. (1988). *A megtanító stratégiák hatékonysága a felsőoktatásban* [The efficiency of mastery learning strategies in higher education]. Budapest, MÉM.

Keller, F. S. (1968). „Good by teacher ..." *Journal of Applied Behavioral Analysis.* 1, 78-79.

Nagy, J. (ed. 1982). *A megtanítás stratégiája* [The strategy of mastery teaching]. Budapest: Tankönyvkiadó.

Sherman, J. G. (ed. 1974). *Personalized System of Instruction.* Menlo Park, CA.: W. A. Benjamin Inc.