

A Consideration on MIPP from the Viewpoint of Educational Technology

by

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SUMMARY

MIPP¹⁾ means Mass Instruction system by Personal computer connecting with video Projector.

This paper deals with a consideration on MIPP from the viewpoint of educational technology and practices.

The concrete contents are :

- (1) To give consideration to education and to compare MIPP with the other educational equipment concerning instructional aids, materials and methods.
- (2) To discuss the difference with stand alone type CAI by personal computer.
- (3) To make a report on the teaching-learning process when MIPP is used.

As a result, it is recognized that this system has many good characteristics compared with other conventional equipment for teaching, and is useful for instructional equipment in the case of mass instruction.

I INTRODUCTION

Recently, personal computers have been much less expensive and much more functional in their ability. As a result, wider application of them for instruction has been observed (Hosoda, 1985). Several instructional facilities, such as over-head-projectors, video-tape-recorders and response analyzers have been widely used in classrooms in Japan.

Now personal computers are about to be added to them. But the way of their application to education is the CAI type through stand alone personal computers. Each learner uses a personal computer for learning as a kind of tool. On the other hand, the general teaching form in schools in Japan is a mass education to many students at a time. Consequently, personal computers must be utilized as a tool for instructors for mass instruction so that they may be used widely and effectively in a school room. MIPP presents a large picture on a wide screen through a projector by transferring the results obtained from a personal computer. By this device, the use of personal computers which have been mostly applied to personal study, can be applied to mass education.

The ability of the former typed system, which is called MIPP-I, is limited as to focusability on the screen and disposal ability of personal computer. Therefore, MIPP-I is an underdeveloped system (Nakatsu, et al., 1984, 1985a). The latest one is greatly renewed and improved with regard to

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the presenting of Kanji characters, focusability on the screen, the capacity of memory and the speed of management of the computer. Owing to these improvements, MIPP-II becomes a really practical system.

The hardware of MIPP-II is shown in Fig. 1 and the disposition of one in the CAI room is presented in Fig. 2 (Nakatsu, et al., 1985b).

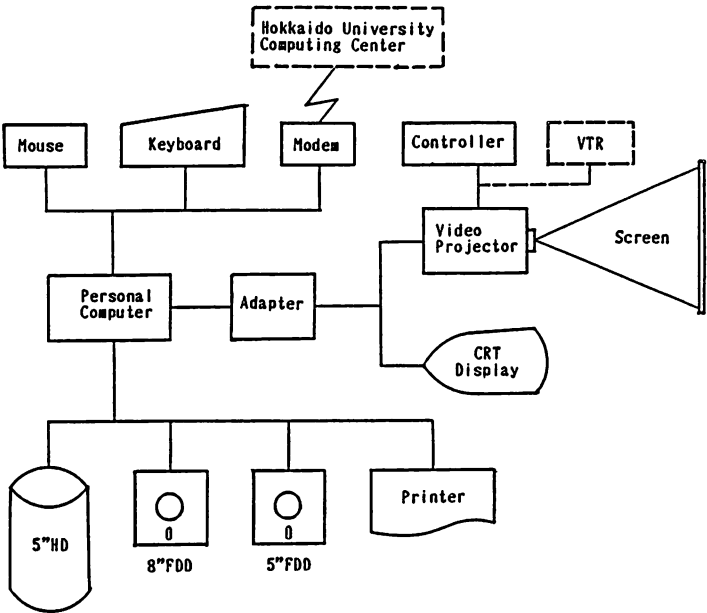


Fig. 1. Hardware of MIPP-II

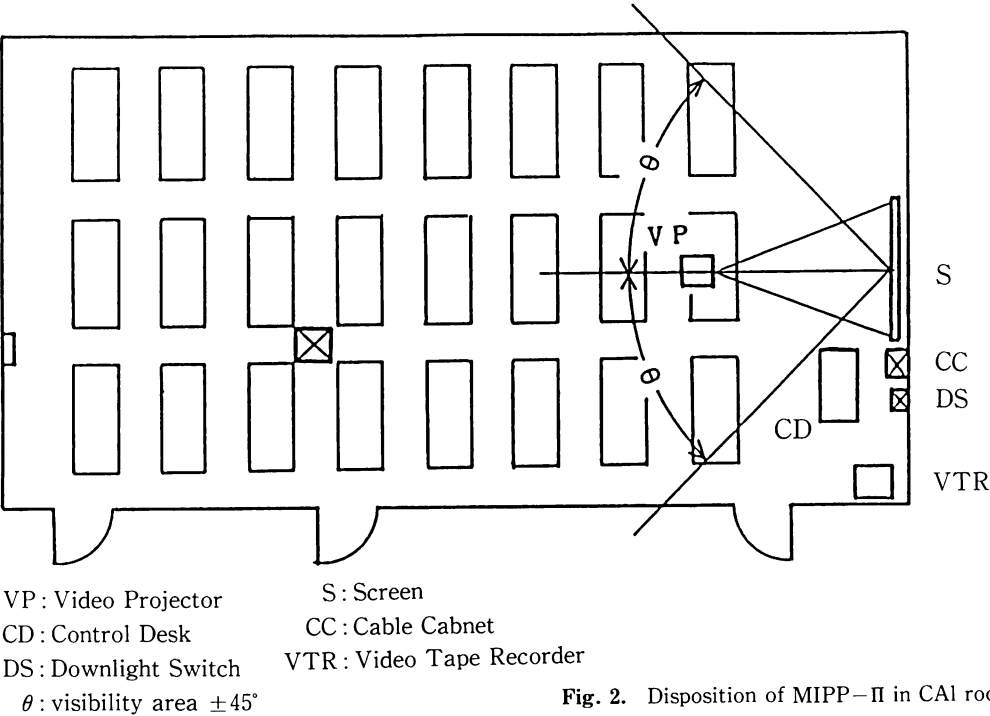


Fig. 2. Disposition of MIPP-II in CAI room

This system is also used for devising materials for instruction, so it becomes very complicated and large in scale. But with respect to basic construction, MIPP is a simple system which consists of a personal computer and a video projector which can be found in any school.

MIPP has not only the ability of presenting a large picture on the screen, but the ability that an instructor chooses the teaching materials according to the study level of students. Therefore, when this system is applied for mass instruction, various kinds of instructional methods can be found through this system. Accordingly, it is necessary to give consideration to the good use of MIPP from the viewpoint of educational technology.

In this report, MIPP is compared with other educational equipment and consideration on MIPP is given to its ability from the viewpoint of educational technology. It is hoped that this report will be the first step towards further research.

II COMPARISON WITH THE OTHER EDUCATIONAL EQUIPMENT

A comparison was made between MIPP and other educational equipment, such as blackboard, OHP, slide projectors, movies (including 8m/m, 16m/m) and VTR (combined with video projector). Each educational equipment has its own function for its purpose, so it has both strong and weak points. Therefore, it cannot be compared on the same basis, much less be declared better or worse.

The following tables show a cue to thinking of the best use of MIPP for teaching purposes, taking account of the merit of MIPP (Suetake, 1970). Instructional aids, materials and methods are originally one means for their purpose, so it's impossible to divide them. In spite of that, these are separated into three kinds for convenience' sake, so that comparison and research about them can be made.

2-1 Instructional aids

Table 1 shows the result of comparison between MIPP and instructional aids. On the whole, MIPP seems to have the same characteristics as VTR regarding the preparation, operation repeating, etc. Though the blackboard has a lots of demerits, it is used widely even now. Because of simple preparation and operation. It is easy for the instructor to use methods such as VTR.

It is necessary to darken the room to some extent, when using a video projector, since, a sharp focused picture cannot be obtained in daylight. The picture is visible under controlled light, but not

Table 1. Comparison with instructional Aids

Items	Black board	OHP	Slides	Movies (8m/m)	VTR	MIPP
(1) Simple preparation	⊙	○	○	△	○	○
(2) Available in daylight	⊙	○	×	×	△	△
(3) Simple operation	⊙	○	○	△	○	○
(4) Focusability on the screen	○	⊙	⊙	○	○	○
(5) Ability of presenting a large picture	×	⊙	⊙	⊙	⊙	⊙
(6) Repetition of instructional materials	×	⊙	⊙	⊙	⊙	⊙
(7) Harmful for health	×	○	○	○	○	○
(8) Expense of equipment	×	○	○	△	△	△
(9) Running cost and charges of instructional materials	⊙	○	○	△	△	○
(10) Possibility of growth and improvement	×	△	△	△	○	⊙

notes: ⊙ {fine simple easy} ○ {fair possible} △ {occasionally possible} × {difficult impossible}

so darkened as to be unable to take notes. One of the problems of MIPP is this regulation of light. It is necessary to improve this regulation.

The necessary equipment is very expensive as shown in Fig 1. But as stated above, the chief mechanism is not so expensive, and can be built easily by using stock articles.

The running cost is very small, and the required charges of instructional materials are reasonable if the materials are domestic make. Since they are devised for the student only, the programs for CAI on the market are difficult to apply to this system. Therefore, the authors don't adopt them.

The main merits of MIPP are their possibility of growth and improvement. Even at present much finer focused pictures can be presented if expense is not considered. Moreover, personal computers are being greatly improved day by day. It is possible to connect this system with other equipment such as VTR or response analyzer. In our school, MIPP is connected with VTR so as to be able to practice audio visual instruction. In addition, when MIPP is combined with the personal computers of the students for inter-communication, the function of this MIPP is greatly enlarged and sophisticated.

Moreover, since laser disks or video disks are easily added to this system, it can be expected that the use of MIPP will be greatly widened and deepened with respect to teaching effects.

2 - 2 Instructional material

Judging from Table 2, MIPP has almost the same characteristics as VTR and movie films in many respects, but MIPP is vastly different from the blackboard, OHP and the slide projector in its function. The reason is that MIPP can present both dynamic and static pictures on the screen. However, there are some weak points in MIPP at present. Firstly, to deal with MIPP, requires knowledge about the computer and the technical skill of the practices. Another problem is that it takes much time to make a software program in accordance with the teaching plan. In this respect, there is a favorable prospect. Personal computers, as is generally known, are permeating into every home, and so are radio and television sets. Owing to this circumstance, computer materials are rapidly increasing in number. Under this condition, most parts of the problem will be solved.

Table 2. Comparison with instructional materials

Items	Black board	OHP	Slides	Movies (8m/m)	VTR	MIPP
(1) Easy for making instructional materials	⊙	○	○	×	△	△
(2) Anybody can make the instructional materials	⊙	⊙	○	△	○	△
(3) Dynamic expression	×	△	×	⊙	⊙	⊙
(4) Colourful expression	△	△	△	⊙	⊙	⊙
(5) Effective sound	×	×	△	⊙	⊙	○
(6) Repeating patterns	×	△	△	△	○	⊙
(7) Graphic indication	×	○	○	△	△	⊙
(8) Overlapping diagrams	×	○	×	×	×	⊙
(9) Expression by letters	○	○	○	○	○	⊙
(10) Expression by pictures	×	○	○	⊙	⊙	○
(11) Searching speed for instructional materials	○	○	○	△	△	⊙
(12) Limitation of subjects	×	○	○	○	○	⊙
(13) Keeping and arranging instructional materials	×	○	○	○	○	⊙

notes : ⊙ {fine
simple
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Moreover, a great number of the software problems have been researched and developed in order to have good teaching material (Okamoto. 1983).

Effective sounds are supposed to be impressive for the students, though these cannot be produced in this software program. In the report of Otani : (1982) they are found, so the authors give a circle signal to them in Table 1. The main differences between MIPP and VTR or movie films are that MIPP is able to report the same pattern easily to overlap diagrams and to present three-dimensional graphs. Moreover, MIPP also has the ability of presenting static pictures, such as statements, diagrams and flowcharts—an ability which belonged to OHP and the slide projector. Taking account of these conditions, MIPP can deal with any instructional materials and make innumerable kinds of programs for various subjects. Changes, additions and program corrections can be done easily by using the disk for an auxiliary memory.

2-3 Instructional methods

MIPP has its own characteristics regarding instructional methods. Table 3 shows the difference from the foregoing two tables. MIPP has the same character as the blackboard, OHP and slide projector, unlike VTR and movie films. VTR and movie films show pictures moving continuously,

Table 3. Comparison with instructional methods

Items	Black board	OHP	Slides	Movies (8m/m)	VTR	MIPP
(1) Flexibility of courseware	◎	○	○	×	×	◎
(2) Participation with students in instruction	◎	◎	◎	×	×	◎
(3) Able to take notes by learners	○	○	○	×	×	○
(4) Corresponding with various circumstances	◎	○	○	×	△	◎
(5) Teacher's initiative in instruction	◎	◎	◎	×	×	◎
(6) To give an affective KR	○	○	○	×	×	○
(7) To give an affective Cue	○	○	○	△	△	○
(8) Impression of learners	△	○	○	○	○	◎
(9) To collect and manage educational information	×	×	×	×	×	○
(10) Presentation of letters, graphs, tables, and diagrams in lecture	△	◎	○	△	△	◎
(11) Simplicity in demonstration and simulation	△	○	○	○	○	◎
(12) To be available for exercise	○	○	×	×	×	◎

notes : ◎ {fine simple easy} ○ {fair possible} △ {occasionally possible} × {difficult impossible}

but MIPP shows discontinuous pictures. So the instructor can stop, and start and transfer the movement as desired.

In the real scene of instructional practices, the movement is not one way. Sometimes, the same lesson is repeated several times, or sometimes, the lesson goes back to the past, for example. Using MIPP, the instructor can freely choose a proper item among many prepared for the process of instruction. In short, MIPP is quite flexible for its courseware.

Intellectual KR (knowledge of result) can be given by instructional systems and affective KR can be given only by the teacher. When a movie film or VTR is used in instruction, the direction of knowledge becomes one way, so the educational equipment cannot give the students affective KR in accordance with the response of the students. when the response of the student is shown, the instructor can give him affective KR instantly, such as encouragement, confirmations, acceptances and impressions. This is extremely important for teaching by this system. These instructor's replies are accompanied by some talk, gestures and facial expressions. In the same way, the instructor can give affective cues in the form of jokes, or other indications. Moreover, the instructor can give

intellectual cues in the form of games, quizzes and some demonstrations by using MIPP. As a result, the student can receive the information not only from the screen but also from the instructor. The effectiveness of this form of instruction is very dramatic. The merit of MIPP, which cannot be found in other instructional equipment, is that it is available for various developments in the teaching process. Above all, in the case of practices, various problems can be distributed to each student through MIPP- something that has been impossible in the past. One problem was shown on the blackboard or by OHP and the students were forced to do the same problem each time. Now, MIPP judges the answers from the students instantly and gives each student proper indications as an intellectual KR, which enables the efficiency of the exercise to rise greatly.

III CAI AND MIPP

In Table 4, MIPP is compared with stand-alone type CAI. MIPP is supposed to be a kind of CAI. The usual type of CAI is used for an individual study and exercise as a tool of the student, on the other

Table 4. Comparison with CAI

	CAI	MIPP
Learning forms	An individual learning	Mass and Conventional instruction
Users	To be used by students for learning	To be used by teacher for instructing
A purpose of use	Drill and Exercise	Not only Drill and Exercise, but Simulation, Illustration and Demonstration
Confirmation of courseware	To set up a courseware in program	Unnecessary to set up a courseware of details
Flexibility of courseware	To be fixed at program	Can be changed when the teacher wants
Drawing up materials	Difficult	Simple and Prospective
Affective and Intellectual KR	It is difficult to insert the affective KR into the instructional material	Affective Cue is given by teacher and the Intellectual one is given by MIPP
Affective and Intellectual Cue	It is difficult to insert the affective Cue into the instructional material	Affective Cue is given by teacher and the Intellectual one is given by MIPP
The effect of learning	Dependent on learner's will and the program	Dependent on teacher's will and the program

hand, MIPP is used for mass instruction each time as a tool of the instructor. Since the instructor takes the initiative through MIPP in teaching, she can add the effect of cues and KR for the students.

As a further detailed comparison with the programs of each material will be expanded and distributed in another report, there is no mention about it here.

In using CAI, the individual information for study can be stocked and utilized for its purpose, on the other hand, by using MIPP, the instructor can connect her computer with the student inter-relatedly, and also can connect a response analyzer. Owing to that, the instructor can collect the learning information and utilize it. The authors are pursuing research in this field.

IV TEACHING-LEARNING PROCESS

It is generally said that the objects of education are not achieved until the teaching-learning process has consisted of the three communications between the instructor and the students.

The first one of the three is to present the instructor's information, such as explanations,

demonstrations and asking questions, from the instructor to the students.

The second one is to respond to the information in the form of the student's answer or question or putting something on paper. The instructor can evaluate and check the process of teaching from these student's reactions.

The last one is to deliver the instructor's evaluation and diagnosis to the students in the form of intellectual or affective KR. In other words, this "Go-Return and Go" achieves the objectives of education.

Instruction should be developed without disturbing the current of information. Though some

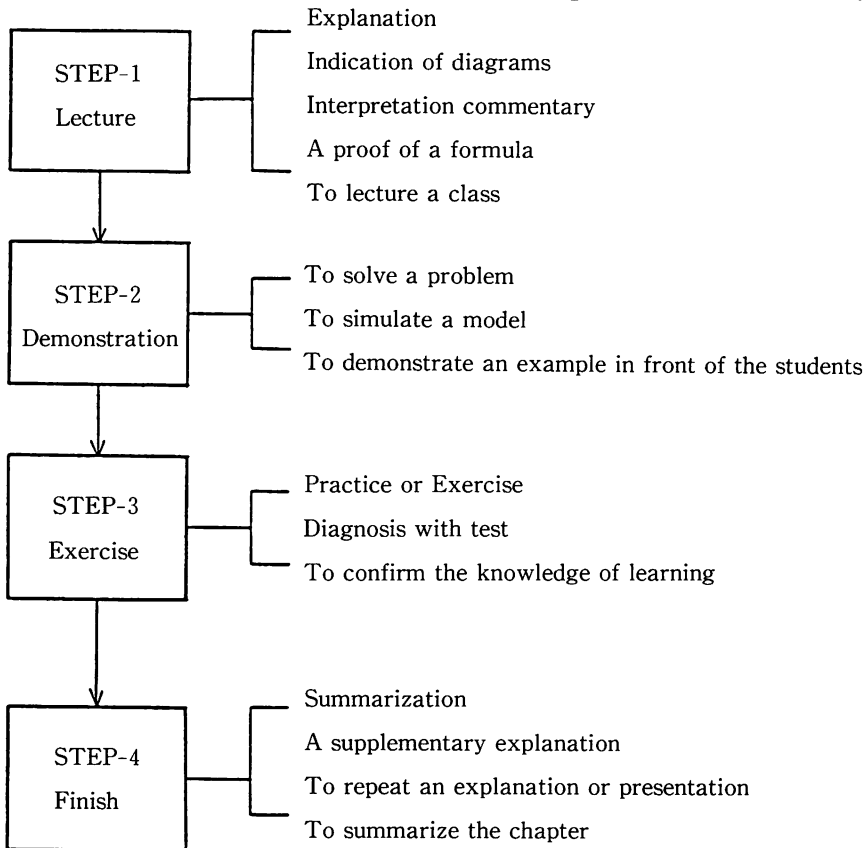


Fig. 3. Development of instruction

differences are found in each subject, the ordinary form of instruction is practised through four steps as shown in Fig. 3.

The first step is the stage of lecture through explanations, interpretations, comments, a proof of a formula and indications of diagrams.

The second step is the stage of the instructor's demonstrations, such as solving problems, presenting examples and simulating a model in front of the students.

The third step is the stage for practice to confirm the knowledge in student's memory by a test.

The last step is for summarization. At this stage, the chapter on a unit has been summarized.

Through these steps, instructions are completed, and the objectives of education are achieved. Table 5 indicates examples of MIPP and how MIPP is used through MIPP in the teaching-learning process. The number of (1), (2) and (3) in the table shows the flow of communication. The example shows the materials which are in the instruction of Quality control (Fig. 4, Fig. 5).

It is devised by the authors. Judging from Table 5, MIPP is effectively available for each stage in the development of instruction, without disturbing the flow of teaching. It can be confirmed easily that the three communications, so called, “Go-Return and Go”, are carried out effectively with the aid of MIPP.

Table 5. Teaching-learning process in the case of using MIPP

Instructional development	Teaching-learning process (An example of an instruction in Quality Control)	
STEP-1	(1) Statistic (continious data, enumerated data)	(M) (Fig. 4)
	Kinds of control chart	(M)
	Process of making control chart	(M)
	Explanation of control limit	
	(2) Let students write letters	
Lecture	Response for the teacher's asking	
	(3) To give the KR	
	Another explanation	(M)
STEP-2	(1) Presentation of control chart	(M)
	Solving the problem and Showing examples	(M)
	(2) Receiving questions from students	
	(3) Searching for a proper material and Presenting in front of students	(M)
	(1) Giving an individual problem to each student	(M)
STEP-3	(2) Student solves the problem and presents the result to the teacher	(M)
	(3) Giving the affective KR to students	
	Giving the intellectual KR to students	(M)
STEP-4	(1) Finish and Summarization	
	A supplementary explanation (How to read control chart)	(M) (Fig. 5)
	(2) Receiving questions	
Finish	(3) Another explanation	(M)

notes: (1): The flow of communication from instructor to students
(2): The flow of communication from students to instructor
(3): The flow of communication from instructor to students
(M): Using MIPP

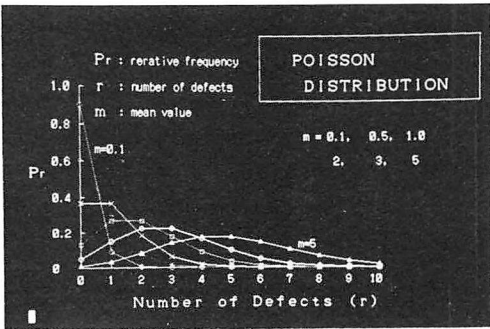


Fig. 4. Learning of statistic (Poisson distribution)

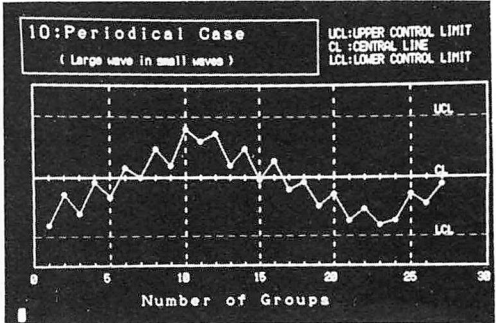


Fig. 5. How to read control chart

V CONCLUSION

The outline of the consideration on MIPP is as follows.

- (1) MIPP is not only a simple system which consists of equipment near at hand, but also a prospective system which can grow in the future. In addition, the method of use is easy.
- (2) It can display three dimensional graphs, dynamic and colourful pictures, superposition of diagrams and so on, on the screen.

(3) The function of MIPP is very flexible. MIPP can correspond with various circumstances in any subject of instruction. For example, in instructor's repeating of explanations, in receiving questions, in teaching by demonstrations, MIPP is most effective.

(4) When it is used in exercises, MIPP is greatly effective in the form of individual study.

(5) It is quite useful as instructional equipment in the case of mass instruction in accordance with each step of the process.

Finally, the authors hope that MIPP will be used widely to the best advantage in any scene of instruction, from kindergartens or primary schools to universities or social education schools.

Notes 1) The systems like MIPP were given lots of names until now, such as "Learning system assisted personal computer by way of showing examples", or "Teaching system using personal computer combined with video projector", or "Presentation system by personal computer connecting with video projector". When the improved system was made, it was given the name "Mass Instruction system by Personal computer connecting with video Projector". The authors began to call the system MIPP in July, 1985, when this contribution was planned.

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