

The Synthesis of Blended Instruction Procedures for Enhanced Problem Solving Skills

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Abstract—Globalization has currently caused rapid changing in technology and innovations. New graduates risk the lack of practical skills to perform in actual work. The solution called ‘Heuristic Problem Solving’ comes in play. This education model suggests “problem solving skills” as a target. Students must study task-problems. Once each task problem is eliminated, students shall create a formula or solution process. The created principles or rules can then be used as comparable references to solve problems in the same or similar circumstances. The objectives of this research are: 1) analysis and synthesis of blended instruction procedures to enhance problem solving skills 2) evaluation of the proposed instruction procedures by experts. This study was a documentation research. It was carried out by means of *-Literature Studies*: From books and web sites, theories and researches related to blended instruction procedures to enhance problem solving skills were collected; and, various design principles for course-work instruction were studied and integrated. *Study of Current Situation and Needs*: Current situations, needs and functional expectations had been studied. The collected data were analyzed and synthesized, to construct this blended instruction procedures. *Assessment*: The proposed instruction procedures was examined and assessed by experts. The overall result was highly satisfactory. It indicated that this blended instruction procedures can be implemented further.

Keywords—Blended instruction procedures, Blended instruction, Blended learning, Problem solving skill

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I. INTRODUCTION

CURRENTLY, globalization has great impact on the rapid turnovers of technology and innovations. Some graduates may lack essential knowledge and skills to adapt and perform at actual workplaces. Particularly in fields of Science and Technology, the students are challenged with keeping themselves updated with these speedy changes. As a result, enterprises are confronted with constant shortage of capable workforce to perform the jobs. In some cases, the job training before operations may take too long in a process, and become incompatible with the newer technology or innovations.

‘Problem Solving’ is the learning method through exposure to experiences in finding solutions to the problems. The solutions are usually associated with the selection and combination of various principles or rules. In addition, problem solving is in concern with the application of recommended principles in a specific task called “Heuristic Problem Solving”. Yet, this is not a fixed solution. The study should start from the problem solving objectives. When each task problem has been eliminated, students construct or impose a formula or problem-solving process. The principles or rules for this solved situation then used as a guide for solving the same or similar situation [1] [2]. Bruner, Vygotsky, and Piaget referred to the philosophy of human learning process as being done through the interaction between them. Students who pass through online lessons often feel isolated. Lack of social interaction, direction, and technical skills can

eventually resulted in students' declining motivation. Working in a collaborative integrated learning ambience as a group work in real life will increase achievement and skill of students. Blended courses have the average achievement higher than teaching in the classroom only or online learning alone [3].

The purposes of this study were:-

- 1) To develop a blended instruction procedures enhancing students' problem solving skills
- 2) To have this blended instruction procedures evaluated by experts.

II. LITERATURE REVIEWS

Application of information and communications technology to support teaching and learning is to increase learning achievement at different levels through the use of information technology to support teaching and learning in the classroom. Blended Learning facilitates classroom instruction with online learning activities. The researches of [4], [5] assigned the proportion of teaching and learning in the classroom together with online learning by 50:50 ratio, while [6] assigned to 45:55.

By observing the self-regulation learning method applied to high school students, [5] recognized that the students had insufficient responsibility for their assignments. Hence, teachers still needed to direct and give them advices. In relevant to the study of [7], the researches demonstrated that learners with external self-regulation (SERL) performed an average of higher learning achievement than those with self-regulation (SRL); and that learners applying self-regulation along with external-regulation (ERL) performed significant learning achievement by the difference of .05.

It suggested that online learning could provide backup and fulfill the learning contents in the classroom. Voluntary activities proved to provide additional learning resources to deliver a positive impact on learning achievement which is a critical success factor of the learners. The design of learning environments should involve communication in two ways:-

1) Interpersonal communication. This means designing a learning environment which facilitates the communication and interaction between learners, between learners and teachers, and between learners and others than those mentioned.

2) Communication between learners and the knowledge. That means learning environment which encourages learners to interact with the essence of knowledge and contents. In addition to achieving skills in various fields, exposure to practical experiences and enhancement of problem-solving ability, the cognitive load is reduced. Meanwhile, new knowledge, transfer and dissemination of knowledge are created. The successful knowledge transfer should be in two-way communication.

III. RESEARCH METHODOLOGY

This study is a documentation research. The purposes of the study were to analyze and synthesize the blended instruction procedures to enhance problem solving skills. The research was conducted as follows.

At the initial step, studies from previous literatures were carried out - - as of from text books, information theories and researches related to blended instruction procedures to enhance the problems solving skills, and instruction design principles. Then, a survey of the current situation and needs was executed. All collected data were analyzed and synthesized. And finally, construction of a blended instruction procedures to enhance problem solving skills was conducted.

IV. PROCESS OF INSTRUCTION PROCEDURES OF BLENDED LEARNING FOR ENHANCE PROBLEM-SOLVING SKILLS

The blended instruction procedures to enhance problem solving skills has shown in fig. 1. The results of the study are as follows.

A. Inputs

From an analysis of the proposed instruction procedures, the input of the learning process can be divided into four components as the followings:-

- 1) The learning objectives
To achieve the learning objectives of the individual learner and the study groups, learners learn from case studies and practical work, thus parallel-master knowledge acquisition from the rules and principles. Learners will be engaged in knowledge pulling, analysis, synthesis, class discussion to consider the most appropriate application of the rules and principles for each problem solving task. When each problem is successfully solved, the knowledge from such problem solving task is captured and generalized. For more effective result, learners are assigned to identify the strategies, teaching techniques, and learning activities in order to develop their skills.
- 2) Learner
Learner is an important element of the inputs. Learners are prepared to adapt to the instruction process and to collaborate with groups. In order to develop problem solving skills of the learners via instruction with a blended learning, the teacher must have knowledge, skills and experiences required to link with existing knowledge of the learners group - - which are not significantly different from one another, such as the students in the same level or field of study, with an average of the same learning achievement.
- 3) Teacher
Teacher is the facilitator or a recommender rather than a lecturer. Teachers have to learn and understand the existing students' basic knowledge and skills. Their role is to ignite the creation of activities to achieve the learning objectives. Subsequently, the strategy for

searching information and conscience should always be involved to bring about extended knowledge and knowledge transfer from the existing knowledge and skills. Also, teachers coach their students how to reach the learning resources to support each learning unit.

4) Contents

Contents are an import input. The teacher will be involved to take it into the process of teaching and learning - - from analysis of learning objectives, and course outline, to bring into the knowledge processes. The content has to be relevantly associated with the basic knowledge and skills of the learners, and must be meaningful and appropriate to the learners.

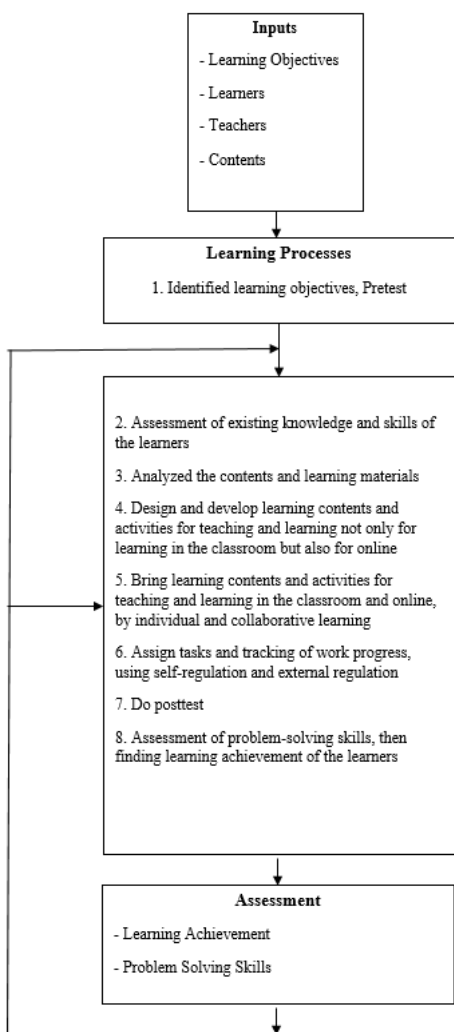


Fig. 1 Blended instruction procedures for enhance problem solving skills

B. Teaching and Learning Processes

Teaching and learning processes are as follows.

- 1) Clearly identify the learning objectives, teaching and

learning activities, scope, and assignments. Promote interest and motivation. Then, do pretest before starting the class.

- 2) Assess the existing knowledge and skills of the learners. Next, conduct reviewing prior knowledge.
- 3) Analyze the learners, the contents and the learning materials. Identify concern of different situations or contexts. Select appropriate learning materials or resources by various formats.
- 4) Design and develop learning contents and activities for teaching and learning equally for classroom instruction and for online, in compliance with learners' existing knowledge and skills, and by order of increasing degree of difficulty. Challenge self-learning and collaborative learning using 'think aloud' techniques to build their knowledge associated with the practical work. While learners are engaged in solving the problems, teacher assists as a coach.
- 5) Present learning contents and activities for classroom instruction and online, by individual and collaborative learning via social media.
- 6) Assign tasks and tracking of work progress, using self-regulation and external regulation. Practice of problem-solving for novice will lead to an expertise further.
- 7) Do post-test, summary and review to construct problem schema, and store the knowledge for later reference.
- 8) Execute an assessment of problem solving skills by evaluating learning achievement of the learners. And lastly, process feedback of teaching and learning process [1].

C. Assessment

Conduct the learning assessment as follows.

- 1) Learning Achievement. The average scores of the posttest must be higher than the pretest. In addition, an average test score must be of at least 75 percent.
- 2) Problem Solving Skills. The psychomotor domain, students can work on their own without guidance, and try to find the correct operation, then develop their own procedures.

V. EVALUATION OF BLENDED INSTRUCTION PROCEDURES

The questionnaires were distributed to 5 experts for evaluation, 3 out of 5 questionnaires were returned. Results of the evaluation of blended instruction procedures to enhance problem solving skills by experts are shown in table I.

TABLE I
RESULTS OF THE EVALUATION OF INSTRUCTION PROCEDURES

Description	Mean	Standard Deviation	Level of satisfaction
Inputs	4.50	0.75	high
Learning Processes	4.38	0.49	high
Assessment	3.89	1.05	high
<i>Overall</i>	<i>4.25</i>	<i>0.72</i>	<i>high</i>

Evaluation of inputs, learning processes, and processing are at a high level. Finally, overall evaluation of blended instruction procedures is highly satisfactory. It is indicated that, the proposed blended instruction procedures are appropriate and can be implemented further.

VI. CONCLUSIONS AND RECOMMENDATIONS

The blended instruction procedures to enhance problem solving skills consists of three main parts: the inputs, the learning processes, and the assessment. Results of the evaluation of the proposed instruction procedures are proved appropriate and can be implemented further.

For further development of the blended instruction procedures, it can be deployed to develop instruction procedures for more specific skills such as data communication and network management skills, skills in management information systems. In addition, the appropriate proportion of blended learning and instruction procedures with learner self-regulation and external self-regulation, in different contexts.

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