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Acceptability of Teacher-Made Modules in Production Management

Lucell Larawan
Associate Professor/College of Business and Accountancy
Central Philippine University
Iloilo City, Philippines
lucelllarawan@gmail.com

Abstract: *Learning interventions in business management education should not just promise vague outcomes. In this study, the researcher determines the acceptability of teacher-designed programmed modules in Production Management for classroom learning using the evaluations of expert jurors and student-users. The modules use the critical elements of mastery learning and proven effective teaching practices. After the researcher has developed them, students are given an orientation about the learning intervention which they have evaluated after using. The jurors who are known experts in the field also assessed the modules using quantitative and qualitative inputs. The findings show that the modules are generally very satisfactory in terms of physical aspects, objectives, instructions, learning, and evaluative instrument using separate and combined evaluations of the two groups of evaluators. This points out that they are acceptable as a learning intervention. The evaluation paves the way to develop a self-learning kit suited to the idiosyncrasies of unique learners*

Keywords: Modules, Teacher-made, Acceptability, Production Management.

1. INTRODUCTION

As business educators are inundated with new instructional interventions, all promising to improve learning, it is difficult for school leaders to prove these claims. Under pressure to make an upward trend, many schools simply proceed with implementation, hoping against all odds that the promised results will be convincing (Guskey, 2010; Barry, T. and Thompson, R., 1997). Fortunately, many innovations include elements of more established strategies for which evidence of positive effects does exist. Business management education institutions that apply kaizen, which means ―continuous improvement,‖ can greatly improve their performance if they adopt these strategies in their pursuit of more effective, efficient and maximized student-centered learning. Among the proven strategies is the use of teacher-designed modular instruction, a product of established learning principles.

A module is defined as a set of learning opportunities systematically organized around a well-defined topic which contains the elements of instruction-specific objectives, teaching activities and evaluation using criterion-reference measures (Cruces, 1993). In this study, this refers to teacher-made modules in Production Management subject (Mgt32a) intended for business students at Central Philippine University (CPU). Among others, this programmed instruction is not only a type of teaching technique with four basic practices: a) lessons are in frames or steps, b) response to each segment of the material is required, c) there is immediate knowledge of the results, d) it permits the students to respond at his own pace (Schoen, 1976). The modules are designed based on effective teaching practices that conforms the ideas of Brophy (1978), Good and Brophy (1982) and Hawley (1984) which are: a) optimizing academic learning time, b) rewarding achievement in appropriate ways, c) utilizing interactive teaching practices, d) holding and communicating high expectations for student performance, and e) selecting the appropriate unit of instruction. More than a teaching strategy, the modular approach also follows the mastery

learning model developed by educator Benjamin S. Bloom (Guskey, 2010). It incorporates feedback, the corrective process, and congruence among learning components.

This study anchors on the thrust of improving the current educational system of the Philippines which is not yet consistent with international standards. Senator Edgardo Angara lamented on the country's education sector: "Since our educational system is not comparable with the more developed countries, our graduates are sometimes unable to become competitive. We must therefore strive to improve this system so that we may overcome these obstacles to national development" (Sy, 2010).

The use of teacher-made modules for classroom instruction is significant in the light of maintaining the students' motivation in spite of their poor ability in grasping ideas and processes from a highly verbal lecture (Guskey, 2010; Carroll, 1963). The modularized learning could allow the students to evaluate their own progress and utilize their spare time to read the lesson as many times as his ability to master requires.

Moreover, with the use of modularized instruction, more time could be used for the teacher's explanation instead of note-taking. With this, time is maximized for learning by spending it more on students' facilitated interaction, topical role play, buzz sessions and other strategies instead of spending more time on the delivery of core lessons.

The actual use of the teacher-made modules in classroom instruction has been much desired by educators (Cruces, 1993). It could be an answer to the need to enhance the quality of business education in the university.

If this strategy of using the teacher-made modules in Production Management is proven to be effective in helping the students attain mastery, this can be a signal for other teachers to follow. It can be an answer to make a difficult subject more interesting.

Studies support teacher-made modules for instruction. Among them, one of the most powerful is mastery learning, a major element of the learning instrument (Guskey, 2010). Smith (1977) recognized the advantages of using the approach when he mentioned the modules in Physics, a relatively difficult subject. A panelist discussion on modular instruction came up with points of agreement about this classroom method such as reducing classroom management effort (Technology Teacher, 1996).

An experimental study by Tullis and Benjamin (2011) gave evidence on the effectiveness of self-paced learning which the modules also incorporate. The study investigates the consequences of allowing learners to self-pace study of a list of words on later recognition, and show that learners with control of study-time allocation significantly outperformed subjects with no control, even when the total study time was equated between groups (Experiments 1 and 2). Self-pacing can improve memory performance, but only when appropriate allocation strategies are used. In "A Meta-analysis of Research Findings on Individualized Instruction in Mathematics," a subject which Production Management has an element, several studies prove the effectiveness of the approach (Horak, 1981).

There seems to be scant researches—if not totally absent—on how mastery learning and self-paced learning combining the teaching practices of Brophy (1978), Good and Brophy (1982), and Hawley (1984) and the ideas of teaching quantitative subjects (Rustagi, 1997) can be useful in business management subjects. Thus, this study was done to determine the acceptability of the teacher-made production management modules, as perceived by the expert jurors and student-users. The focus of this paper was on answering the two questions: Based on the expert jurors' perception, how acceptable are the modules in general and in terms of physical aspects, objectives, instruction, learning activities, and evaluation procedure? Based on the student evaluators' perception, how acceptable are the modules in general in terms of physical aspects and instruction?

2. THEORETICAL EMBEDDEDNESS OF THE STUDY

2.1 Concepts Involved

Much of the underlying concepts governing the use of modules are influenced by Skinner (1968). The principle is based on the experiment which shows that for any given subject, the pigeon's (or human) brain being deliberately left out of account acts effectively if certain precautions are given. In addition to this, the law of reward reinforcement for the expected actions applies. Such law asserts that action is not caused by anything to be repeated several times in order to fix it in an individual; rather, it is caused by repeated rewards given for the action. This leads to a new law which incorporates the above mentioned theory that a correct response when followed by a reward will be repeated. The response (reaction) is established by the recompense (stimulus) given. It operates retrospectively, reinforcing an action already performed. In this way reinforcement is said to have a feedback effect on the response. The change in the frequency with which the pigeon raises its head constitutes a process of operant conditioning.

This psychological law of operant conditioning is utilized in the making of programmed modules which considers the following areas: 1) step-by-step principle that divides the information to be communicated into small units or doses where each dose is an activity sanctioned by reinforcers; 2) activity that provides sets of exercises on each unit for the students to accomplish in order to assimilate the information; 3) avoidance of errors and failures which are obstacles to successful learning; 4) immediate verification that feeds back results of action taken, whether successful or not, as Bloom (1981) emphasizes a vantage of mastery learning using systematic feedback procedures to reveal errors in learning shortly after they occur; 5) logical progress of learning centered on what is to be taught to avoid any element which may distract students' attention and which gradually increases in difficulty; 6) principle of individual pacing that allows students to proceed at their own pace (SEAMEO, 1991).

The specific criteria considered to zero-in at a state-of-the-art modules are given by Querubin (1996) as follows: First, modules should be self contained; the content should be prepared to allow students to work independently by themselves and if there is a need for some teacher's assistance, such help will be at its minimum. Second, it should be self-pacing within the time frame provided, thus students in the class achieve different levels of the task; some can finish ahead of the others, some fairly catching up, while others are trailing behind.

Third, its topic or subject matter should be short enough and well-defined, making every module take up only one particular concept or topic at a time to allow more in-depth study on one given subject matter. Fourth, modules should be so designed to enable students to achieve successfully the objective explicitly stated in a module; certain encouraging statements appear in it and at the same time direct him to proceed to the next module, or if not advice him to do some remedial work all by himself. Fifth, modules should provide opportunities for interaction with the learner, thus when a student reads a module it would seem as though it were talking to him/her in a conversational friendly manner. Such informal approach encourages him to proceed through the different parts of the module. Sixth, the objectives and activities of the modules should be properly sequenced into a logical arrangement which follows the inductive pattern of learning. Seventh, it should be written in clear and correct language suitable to the level of the target learner because any module becomes useless if its target learner cannot grasp it in terms of its situations, and irrelevant obscure example. Eight, the knowledge presented in the module should be correct and up-to-date. There should not be any room for misleading and obsolete information; therefore, facts and figures should be checked for accuracy in this regard. Ninth, contents in the module should bear no wrong implications or conflict with other subject matters of values. As much as possible, the knowledge contained in the module must have universal meaning that it becomes not only acceptable to one field but also to other academic areas. Tenth, it should utilize every opportunity to achieve affective outcomes of learning. It is the ultimate objective of learning to be concerned with the development of the proper attitudes, appreciation and values in the individual students. Eleventh, modules should contain all the necessary components of an effectively prepared program. Twelfth, components of a module should be highly supportive of one another. For instance, such parts as objectives, learner's activities and evaluation should be interrelated with one another. The suggested activities are used to achieve the predetermined objectives and likewise evaluation is used to find out the extent of the realization of the objectives.

According to Querubin (1996) and SEAMEO-INNOTECH (1991), a module must have the following components: 1) the instructions which explain the structure of the module and the procedure employed in working through it, giving emphasis to what the learner is expected to do during all phases of study; 2) purpose and aims for whom to module is intended and where it fits a programme and a course within the programme; 3) list of pre-requisite in knowing and defining the actual needs in achieving the objectives of a module; 4) list of instructional objectives in behavioral terms which is a critical part of the module; 5) list of equipment and other resources such as tools, video-tapes, and film strips, necessary to supplement the module; 6) a sequenced instructional activities which form the core of the module and set out the input-processing output or input-practice task-feedback sequences for each activity in turn; and 7) mastery post-test that should correspond to one-to-one with the specific objectives of the modules.

2.2 Roles of Modules

Modules, while initially costly to produce, will be economical in the long run because of the convenience they give while they are used and reused. Educational objectives would be the same ensuring uniformity of standards. Because they encourage mastery of concepts and skills rather than partial learning, a satisfactory standard of achievements would be guaranteed. Modules could be used by the business management educators to improve their own standards of teaching. The programmed learning material can readily provide resources for remedial and enrichment work ensuring a general upgrading of standards. Furthermore, these instructional materials provide maximum flexibility enabling rapid changes to occur in response to changing needs (SEAMEO, 1991).

According to Suwanawongse (1991) modular instruction meets all conditions for effective learning whereas the other methods of study meet only very few. All elements are brought together in time and space. Individual differences are catered to and the objectives are achieved because students work on them at their own pace. They have built-in statements of objectives informing students about what they should be able to learn after instruction. The modules have the information sequenced in logical steps. Then testing is undertaken to make sure that students can follow the steps. Modules also utilize unlimited scope for a wide variety of media and methods. Only modules can combine various types of students' participation into one learning sequence. Furthermore, they guarantee immediate comments on the rate of student's progress which information is built in at virtually every step. Lastly, they can build in genuinely interactive group work as part of the learning experience.

In learning situations, the learner has to take an active part in maximizing learning. The steps which a learner takes when he/she uses a programmed module are the following (SEAMEO – INNOTECH, 1991): He/she looks at the objectives to know what he/she is trying to accomplish. Then the learner works through the activity units which consist of frames. Frames are small units of information which are presented to the learner. Priming frame helps the students make the first response in the program. It is written very simply to make sure that the first response the student makes is the correct one. The Teaching Frame also leads the learner from the priming frame to the test frame. The programmer uses a variety of clues or prompts in the teaching frames. Finally, the learner finishes the test frame, the final part purposely made to measure whether or not the student has mastered the objectives of the program. If the student displays mastery, he/she continues with another program; if not, he takes a remedial assistance.

3. METHODOLOGY

3.1 Research Design and Respondents

A descriptive design was used to evaluate the instructional modules developed by the researcher, a production management mentor.

There were two groups who evaluated the general acceptability of the instructional modules in Production Management. The first group consists of three expert jurors: one expert in modular instruction and graduate of a doctorate degree specializing in curriculum, instruction and design; and two professors from the University of the Philippines in the Visayas –satellite of the country's

premier university--who have specialized in teaching Production Management subject for more than ten years.

The other group comprised 140 students of Production Management (Mgt 32a) coming from three sections. They were chosen on the basis of practicability wherein only the researcher have had the know-how on implementing the modular instruction strategy in business education. The students' characteristics were almost the same having been part of business courses that do not screen learners.

3.2 Materials and Instruments

3.2.1 The Module

Fourteen (14) instructional modules in Production Management comprising 70% of the course content that a semester can cover were prepared to introduce and develop competencies in the selected topics covered in the subject. The reason for not covering all topics in the subject is that the mentor needs to combine other strategies in teaching available to give variety and avoid monotony. The contents of these modules were upgraded and updated by using recent books in the subject and the textbook "Production/Operations Management" authored by William Stevenson (2010). Filipino-authored books were also used to tailor some topics to the local needs. The preparation of the modules was based on careful application of the identified critical elements in mastery learning program (Anderson, 1980) which are the following: a) clearly-defined instructional activities; b) small learning units organized around related sets of objectives; c) highly valid, relatively short tests used primarily for diagnostic and prospective purposes; d) preset standards on the tests, which when attained, indicate mastery; e) clear communication with the student concerning what is to be learned; f) provision of corrective loops for students who fail to achieve preset performance standards; and g) monitoring the attainment of the standard.

A user's guide was prepared to give students and jurors information about the instructional modules and to explain their use. It contains the objectives and the procedure in using the modules.

3.2.2 Evaluation Form

The expert jurors evaluated each of the fourteen modules on the following aspects: a) physical aspects; b) objectives; c) instructions; d) learning activities; and e) evaluative instrument (Ticao, 1986). For the student evaluators, the same instrument by Ticao was used but partially modified to exclude objectives, learning activities and evaluative instrument.

The results of the evaluation of the instructional materials are the bases for determining the acceptability or unacceptability of the materials. Their qualitative remarks based on Yin's procedure (1984) were used to improve the final revision of the modules.

Instructional modules with average ratings of "very satisfactory" are considered acceptable, while those with an average rating of "satisfactory" or below are revised.

The evaluators were asked to write their remarks about their own personal perceptions on the module. They were asked to indicate their appraisal of the modules by checking the appropriate columns in the checklist for evaluation. Each column is assigned a value. Column 1 for excellent is given a weight of 5; column 2 for very satisfactory, a weight of 4; and so on.

The following scale was utilized:

Scale:	Description:
4.15 – 5.00	Excellent (All aspects of instruction and work are very adequately covered and the quality is superior.)
3.35 – 4.14	Very Satisfactory (The major aspects of instruction or work are covered with above average standards.)
2.55 – 3.34	Satisfactory (The major aspects of instruction or work are hardly covered with minimum acceptability.)
1.74 – 2.54	Fair (The major aspects of instruction or work are covered

	with minimum acceptability.)
1.00 – 1.74	Poor (The major aspects of work are very inadequately covered and of unacceptable quality.)

In administering the evaluation forms, a non-teaching staff was employed to accomplish the task. This ensures that the researcher's influence is minimized.

3.3 The Classroom Procedure

With the user's manual as guide, the classroom teacher starts with the orientation with the class, making the students acquainted with the requirements and the procedure of the class work during the modular instruction in the classroom. Modular instruction starts immediately the following day. Answers to questions in the module are done in the module itself. The students were asked to evaluate the fourteen (14) modules at the end of the semester.

After reading the module, the student could inquire from the teacher for clarification, interact among classmates in the discussion of the lesson, but must complete all the test frames and the post-test in the module and submit the work at least five minutes before the end of the period. The cut-off score is 80% correct answers for the student to go to the next module. Those who got below 80% were asked to read the module again and take another post-test.

3.4 Procedure in Designing and Production of the Modules

The steps in preparing a module presented in this study are not hard-fixed rules but are just one of all other methods that can be applied. In this method the review of the previous lesson related to the lesson to be introduced is written in the "Priming Frame". Then the series of questions asked to verify whether important information is assimilated by the students in written in the "Test Frame," in which case, the expected answer are written in the "Feedback." The succeeding activities are then a series of "Teaching Frame," "Test Frame," and "Feedback". At the end of the lesson, the achievement test is written in the "Post-Test" of the module.

Mc Crimmon (1984) recommends that the first to be done is organizing for the job of writing. It is primarily a thinking, list-making, and idea-gathering process, during which the writer needs to choose category, pick points, and collect necessary details. In choosing the category, one decides what to write wherein he thinks a little bit ahead to zero-in at the objective of whatever purpose it is to be written, leading to the focus, namely the requirements and the format of the finished product. In the selection of the subject, the writer's knowledge about the subject in terms of depth, the need to learn more about it and the availability of sources are important considerations. Also to be considered is the focus of the subject which should be restricted to a smaller, more specific, and more detailed one. The writer should identify significant points about the subject which include the issues of general importance and fresh insights the writer contribute to the readers. He or she must have an honest feeling about the subject and a genuine motive in it which can attract the reader's interest. Lastly, the writer decides the particular form to follow and the magnitude of complexity or simplicity that he and his readers can manage.

After picking the information is the collection of details needed at any particular moment of writing. The only way to do so is to skillfully venture with the three identified skills. First is the ability to anticipate the details needed and to collect them efficiently, in which case, such anticipation grows dramatically as the writer moves along in his work and becomes familiar and comfortable with the writing process. Skill must be energetic which means devoting much effort to collect the needed materials. Skill ought to be coupled with imagination. It is the job of the writer to go beyond the obvious detail and to think of new ones that will enlighten the reader. One must be able to synthesize new ways to describe will known details which enlighten the reader, and more importantly, hold his interest, effectively guiding one to the direction set by the writer.

Having done the organization of materials, the writer proceeds to the turning out of the first draft. Unlike doing a speech which often seems to flow spontaneously, writing needs time, thought, and many conscious choices to move from conceptions to documentation. Writing can be extremely

frustrating to one who tries to turn vague ideas into full statement that will mean what one wants it to mean to the reader. Turning out the first draft is, so far, the most decisive part of the writing because writing is a demanding art and requires complex competence. Even if the writer has acquired the skills that go into writing from the mechanism of spelling and the formal rules of grammar to the strategic use of examples and the logical organization of the entire paper, it is quite difficult to keep them all in mind simultaneously while one is trying to write. If one full attention to all the skills at once, that effort would leave one very little mental room to devote to the actual subject of writing. Devoting one's mind to each of these tasks, one at a time, the more likely one can discover a good solution to each. Writing develops most efficiently if one limits himself to one problem at each stage, starting with the basic issues of developing ideas and working through to the final task of neat typing.

The steps involved in writing the first draft are primarily a focusing, sketching-out and construction process, during which the writer needs to figure out the theme, make the outline, and write the draft.

There are three purposes for making an outline; 1) check on what one has done, 2) suggests the shape and size of the product-to-be, and 3) make a skeleton for the draft itself. As writer proceeds to the first draft, one section of the outline should be expanded at a time. The writer should treat each section as though it were a separate entity, giving time and effort as needed in each section and doing the best one can with each section. After this, one can go on to the next section.

Finally, having organized the material and finished the draft, the writer polishes the product. The objective here is to enhance, sharpen and focus the draft to give it power and credibility. After all, the piece of writing is successful only when it does what the writer intends to do. To be successful, a piece of writing must earn the reader's respect through its internal power and credibility.

The steps that the teacher-programmer takes when writing a program module are as follows (SEAMEO-INNOTECH, 1991): 1) The objectives of the program are established. The objectives must be stated in behavioral form. 2) The post-test is prepared. 3) After writing or identifying the objectives, the post-test for the program is written. Usually, the post-test is a criterion-referenced test, the purpose of which is to determine whether the program taught what is tries to teach. 4) The writer prepares the activity units which consist of a test frame used to test the mastery of a very small unit of learning; a priming frame which is a brief review of related lessons in the past to prepare the learner for the lesson in the teaching frame; and a teaching frame which presents the students with information and asks him to make a response in order to ensure he has learned the given information.

The production of the output modules was done through the College of Business and Accountancy that got a funding from the UBCHEA (United Board for Higher Education in Asia). The researcher was tasked to implement the project being assigned by the College to specialize in teaching Production Management.

3.5 Data Analysis

Mean ratings of the students' and jurors' evaluation of the module was used to describe the aspects mentioned earlier. Also, weighted means of the two evaluators was employed which set 80% weight for expert jurors and 20% for student-users. Textual interpretation was also used in reporting the supporting qualitative data.

4. RESULTS

4.1 Jurors' Evaluation

Evaluation on the physical aspects was based on the clarity of the layout and handiness of the material. Generally, the physical aspects of the modules got "very satisfactory" acceptability level with an overall composite M of 3.99 as rated by the jurors. Thirteen (13) modules were rated 4.0 except Module No. 6 (Process Selection and Capacity Planning) which got an M of 3.83.

The instructions were evaluated based on how they were worded to facilitate easy understanding by the target learners. The acceptability level of this aspect was "excellent" with an overall composite M of 4.26. Twelve (12) of the modules got a rating of "excellent" (M = 4.33). Only Module No. 5 (Setting TQM Standards) and Module No. 9 (Forecasting 2) got "very satisfactory" rating with Ms of 4.00 and 3.67 respectively.

Learning activities provided in the learning instruments was evaluated on the following items: relevance of subject matter to course content; potential to carry out the objectives; variety and sequence of drills, illustrations and exercises; adequacy of the materials; ease and speed in the performance of activities; provisions for immediate feedback; and adequacy of the coverage of content. The acceptability level of the learning activities based on the jurors' evaluation was "very satisfactory" (M = 3.89).

For the objectives, the evaluation is based on how the objectives are stated whether they are achievable through the content and illustrative examples provided, and on whether these objectives would develop skills on analyzing and solving related problems among the students. Only the expert jurors are asked to evaluate the objectives since they are the only ones who are competent to evaluate this aspect. The overall composite M for the objectives is 4.29 which is "excellent" acceptability level.

In evaluative measures, the jurors have evaluated whether post-test items are suitable measures of the skills they are intended to measure; whether specific objectives are adequately measured in the post-test; and whether the post-test is parallel to the work done in the class. As a whole, the fourteen modules got 3.86 which is "very satisfactory". Only Module No. 9 (Forecasting 2) is "satisfactory" with M of 3.22.

Taken together, the jurors gave a "very satisfactory" composite mean of 4.06 to the five aspects measured. Data on the jurors' evaluation is shown in Table 1.

4.2 Students' Evaluation

Students also have evaluated the layout and handiness of the modules. They have given an overall composite M of 3.75 for all the modules which means "very satisfactory" acceptability level.

The criteria used for students' evaluation on the quality of instructions provided by the modules are whether or not instruction is clearly worded, easily understood by the target learners, the presentation of the lesson is sequenced logically, there are more advantages in taking the lesson with the modules than in having the traditional method without the modules, and whether or not time is maximized for learning when the module is used. As a whole, the students have given "very satisfactory" (M=3.45) acceptability level for the instructions aspect which is lower than the jurors' rating. Thirteen (13) modules are rated "very satisfactory" with Ms ranging from 3.41 to 3.54. Only Module No. 12 (Linear Programming) got a "satisfactory" rating (M = 3.33).

For the student-evaluators, learning activities are measured in the following measures: drill materials that are varied; learning activities that are suited to target learners; and learning activities that can be executed with relative ease and speed. In the learning activities, the students have given an overall rating of "very satisfactory" but with a lower M of 3.42 compared to the jurors' rating. Eleven modules are "very satisfactory" with Ms ranging from 3.36 to 3.55. Module No. 5 (Setting TQM Standards), Module No. 7 (Process Selection and Capacity Planning), and Module No. 12 (Linear Programming) only got a "satisfactory" rating of 3.32, 3.33 and 3.31 respectively.

As a whole, students rated the physical aspects, instruction, and learning activities of the learning instrument with "very satisfactory" having a composite mean of 3.54. The students' evaluation is presented in Table 2.

Combining the physical aspects, objectives, instructions, learning activities and evaluative measures; the jurors and the students have given the fourteen modules got 3.95 overall composite mean described as "very satisfactory". All the modules, as perceived by both evaluators, had the same descriptions. However, among the modules, Module No. 11 (Just-in-time Systems), Module No. 3

Table 1. *Acceptability of Modules Based on the Jurors' Evaluation*

Module No.	Title	Physical Aspects		Instruction		Learning Activities		Objectives		Evaluative Measures		All Aspects	
		M	**D**	**M**	**D**	**M**	**D**	**M**	**D**	**M**	**D**	**M**	**D**
1	Introduction to Production Management	4.00	VS	4.33	E	3.74	VS	4.33	E	3.67	VS	4.00	VS
2	Decision-making	4.00	VS	4.33	E	3.89	VS	4.22	E	3.78	VS	4.04	VS
3	Quality Management	4.00	VS	4.33	E	3.96	VS	4.33	E	4.00	VS	4.12	VS
4	Nature of Total Quality Management	4.00	VS	4.33	E	3.93	VS	4.22	E	4.00	VS	4.10	VS
5	Setting TQM Standards	4.00	VS	4.00	VS	3.82	VS	4.33	E	3.89	VS	4.01	VS
6	Product and Service Design	3.83	VS	4.33	E	3.48	VS	4.22	E	3.78	VS	3.93	VS
7	Process Selection and Capacity Planning	4.00	VS	4.33	E	3.96	VS	4.33	E	4.00	VS	4.12	VS
8	Forecasting 1	4.00	VS	4.33	E	3.93	VS	4.22	E	3.78	VS	4.05	VS
9	Forecasting 2	4.00	VS	3.67	VS	3.96	VS	4.22	E	3.22	S	3.81	VS
10	Inventory Management	4.00	VS	4.33	E	4.00	VS	4.33	E	4.00	VS	4.13	VS
11	Just-in-time Systems	4.00	VS	4.33	E	4.00	VS	4.33	E	4.00	VS	4.13	VS
12	Linear Programming	4.00	VS	4.33	E	3.89	VS	4.33	E	3.89	VS	4.09	VS
13	Scheduling 1	4.00	VS	4.33	E	3.89	VS	4.33	E	4.00	VS	4.11	VS
14	Scheduling 2	4.00	VS	4.33	E	4.00	VS	4.33	E	4.00	VS	4.13	VS
Overall Composite Mean		3.99	VS	4.26	E	3.89	VS	4.29	E	3.86	VS	4.06	VS

M = Composite Mean
D = Description

(Quality Management) and Module No. 10 (Inventory Management) were the highest rated and Module No. 9 (Forecasting 2) was the lowest rated.

The overall composite means of the jurors' and the students' evaluations are both "very satisfactory" though the jurors have given 4.06 which is higher than the students' 3.54 rating. The acceptability of the modules as a whole incorporating the two groups of evaluators is presented in Table 3.

Table 2. *Acceptability of Modules Based on the Students' Evaluation*

Module No.	Title	Physical Aspects		Instruction		Learning Activities		Overall Evaluation	
		M	D	M	D	M	D	M	D
1	Introduction to Production Management	3.68	VS	3.53	VS	3.37	VS	3.53	VS
2	Decision-making	3.70	VS	3.46	VS	3.39	VS	3.52	VS
3	Quality Management	3.80	VS	3.45	VS	3.43	VS	3.56	VS
4	Nature of Total Quality Management	3.78	VS	3.45	VS	3.55	VS	3.59	VS
5	Setting TQM Standards	3.82	VS	3.41	VS	3.32	S	3.52	VS
6	Product and Service Design	3.88	VS	3.54	VS	3.50	VS	3.64	VS
7	Process Selection and Capacity Planning	3.70	VS	3.44	VS	3.33	S	3.49	VS
8	Forecasting 1	3.76	VS	3.54	VS	3.51	VS	3.60	VS
9	Forecasting 2	3.71	VS	3.47	VS	3.39	VS	3.52	VS
10	Inventory Management	3.80	VS	3.43	VS	3.43	VS	3.55	VS
11	Just-in-time Systems	3.74	VS	3.46	VS	3.53	VS	3.58	VS
12	Linear Programming	3.68	VS	3.33	S	3.31	S	3.44	VS
13	Scheduling 1	3.72	VS	3.41	VS	3.36	VS	3.50	VS
14	Scheduling 2	3.67	VS	3.42	VS	3.39	VS	3.49	VS
Overall Composite Mean		3.75	VS	3.45	VS	3.42	VS	3.54	VS

M = composite mean
D = description

4.3 Qualitative Remarks on the Modules

When three or more jurors made converging remarks about the same point of view regarding the modules, their remarks were considered evidence and as such were included in the qualitative evaluation of the material (Yin, 1984).

Generally, the modules, according to the jurors, contain the essential elements to cover each topic presented; however, the modules could still be improved by presenting the "feedback" of the "test frames" on the next page to avoid easy access while students are performing the test. Some lessons that need to be expounded further are to be changed for more comprehension, while those that are too large are to be split into two frames. Furthermore, adding at least four topics could maximize students' learning, the jurors believed. The graphics of some cover pages should also be changed to be more appropriate. In some parts, particular words are to be written to clarify explanation.

As to the physical aspects, the modules are found handy and the frames are neither too large nor too small but were just enough to maintain interest and enthusiasm. Layout changes are needed for better presentation. The objectives were considered thoroughly behavioral and measurable; while instructions are simply worded for students to understand. The learning activities are easy

for students to follow; and finally, the evaluative measures are strictly on the basis of the objectives.

Table 3. *Acceptability of the Modules as a Whole Based on the Jurors' and Students' Evaluation*

Module No.	Title	Jurors' Evaluation		Students' Evaluation		Combined Evaluation	
		M	**D**	**M**	**D**	**M**	**D**
1	Introduction to Production Management	4.01	VS	3.53	VS	3.91*	VS
2	Decision-making	4.04	VS	3.52	VS	3.94*	VS
3	Quality Management	4.12	VS	3.56	VS	4.01*	VS
4	Nature of Total Quality Management	4.10	VS	3.59	VS	4.00*	VS
5	Setting TQM Standards	4.01	VS	3.52	VS	3.91*	VS
6	Product and Service Design	3.93	VS	3.64	VS	3.87*	VS
7	Process Selection and Capacity Planning	4.12	VS	3.49	VS	3.99*	VS
8	Forecasting 1	4.05	VS	3.60	VS	3.96*	VS
9	Forecasting 2	3.81	VS	3.52	VS	3.75*	VS
10	Inventory Management	4.13	VS	3.55	VS	4.01*	VS
11	Just-in-time Systems	4.13	VS	3.58	VS	4.02*	VS
12	Linear Programming	4.09	VS	3.44	S	3.96*	VS
13	Scheduling 1	4.11	VS	3.50	VS	3.99*	VS
14	Scheduling 2	4.13	VS	3.49	VS	4.00*	VS
Overall Composite Mean		4.06	VS	3.54	VS	3.95*	VS

- computed using 80% weight for jurors' evaluation and 20% weight for students' evaluation
  M = composite mean
  D = description

The students taking the subject are also asked to evaluate the modules, being the user of the learning material. Although not as competent as the jurors, their inputs are also valuable on the basis of the "language of affection" element of measuring the quality of a product (Stevenson, 2010).

Similar findings are given regarding the physical aspect, instruction and learning activities which are evaluated by the students. Generally, they believed that the modules bring more knowledge and are easier to understand than a usual textbook. Changes, however, should be made such as perforating the post-tests, avoiding watermark, emphasizing on important terms, having a single binding for all modules, giving more concrete examples and illustrations and simplifying further some explanations.

5. IMPLICATIONS FOR THEORY AND PRACTICE

The findings of this study brought about implications for both theory and practice regarding the usefulness of modules in classroom instruction and the teacher devising the modules.

The findings of the study have shown the usefulness of the seven critical elements in mastery learning programs as identified by Anderson (1980). They are guides in designing the modules:

clearly defined instructional activities; small learning units organized around related sets of objectives; highly valid, relatively short tests used primarily for diagnostic; preset standards on the tests; clear communication with the student concerning what is to be learned; and monitoring the attainment of the standard.

The SEAMEO-INNOTECH (1991) presents some qualities of instruction to promote leaning, the effectiveness of which is realized in this study. Instruction must have the following qualities: a) students must actively respond; b) knowledge of results of their endeavor must always be available to them; d) lessons must be presented in small meaningful units; and e) the output brings about program effectiveness.

Bloom's idea on systematic feedback in order to reveal errors in learning immediately after they occur suggests that feedback should be placed immediately after the test frame.

Even before the dawn of formal education, there were theories on how learning takes place. Since then, man has never stopped the search for the most efficient way to learn. All the findings of their endeavors have been available to teachers. These theories must not be put into waste but tried out. Teachers must be aware of these theories, and that their methods of teaching must not be wanting of the theories developed by great teachers before them.

Putting theory into practice can be implemented very efficiently if a lecture is to be written in a modular form which can be revised several times in order to have the most appropriate theory fit the right group of people in the most relevant lesson planned and sequenced in the most effective way. What has been written can be remodeled to perfection. The effort exerted becomes very worthwhile. In practice, modules are very important because students can read the lesson as many times as needed to attain mastery.

6. CONCLUSION

On the basis of the findings, the 14 modules designed for Production Management students in CPU are acceptable using the expert jurors' and student-users' separate assessments. The instructional modules, subjected to the combined evaluations, are acceptable.

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