The implementation of mastery learning concept and cognitive entry behavior to increase the students’ competency in accordance with IQF qualification

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Abstract. The objectives of this study are: (1) to describe the difference of the students’ competence between the students following mastery learning and conventional instruction, (2) to describe the difference of the students’ competence between the students have high cognitive entry behavior and low cognitive entry behavior, and (3) to analyze the interaction effect between instructional model and cognitive entry behavior to the achievement of students’ competence. Quasi experiment was conducted at accounting department of Politeknik Negeri Bali and research design is nonrandomized control group pretest-posttest. The variable in this study are: (1) students’ competence, (2) instructional model, and (3) cognitive entry behavior. The total samples are 168 students and each treatment decided 25 subjects as analysis unit, therefore the total of analysis unit are 100 subjects. The results of the study are: (1) there is a significant deference of the students’ competence between the students following mastery learning and conventional instruction (F=7.514; P<0.05), (2) there is a significant difference of the students’ competence between the students have high cognitive entry behavior and low cognitive entry behavior (F=8.035; P<0.05), (3) there is a significant interaction effect between instructional model and cognitive entry behavior to the achievement of students’ competence (F=8.392; P<0.05).

1. Introduction
Most of the learning process is still conventionally, the lecturer holds the authority of teaching and learning process. Apparently, this kind of learning tends to make the students passive and resigned. Various efforts have been made in order to improve the quality of learning, but the results out of expectations. In relation to accounting learning process, there are several problems such as: (1) the students’ understanding of the basic concepts in accounting learning has not been adequate, (2) students' creativity and learning activities are still low, and (3) lecturer is inconsiderate of students’ cognitive entry behavior.

Cognitive entry behavior is the most important factor that influences learning is what the learners already know. Man tries to understand his world by synthesizing new experiences into previously understood knowledge [1]. The current vision for K-12 science education is for students to build on their prior knowledge as they progressively deepen their understanding of the disciplinary core ideas, crosscutting concepts, and scientific and engineering practices [2].

Competitive learning atmosphere is very detrimental to students whose academic ability is low. Underprivileged learners, competitive atmosphere greatly reduces their learning motivation and always becomes their psychological torture. [3], educators should avoid the emergence of a competitive
atmosphere, but instead need to create a tolerant classroom atmosphere. One of the concept of learning
that has the aspect of collaboration is the packaging of learning that is set with mastery learning. This
correct concept can provide opportunities for students to be able to understand the scientific concept well and
thoroughly. Understanding a wrong concept tends to be consistent and very difficult to change. Such
conditions will greatly hinder the achievement of competence, and should be immediately sought the
solution. Based on this, then one of the strategies that can be taken for the achievement of students’
competence is to redesign of instructional from the usual learning method applied to the design in
accordance with the mastery learning.

The aim of implementation of mastery learning concept is to improve the quality of learning
programs so that learning objectives and competence of learners can be achieved. [4], the mastery
learning method divides subject matter into units that have predetermined objectives or unit
expectations. Students, alone or in groups, work through each unit in an organized fashion. When quality
education is being put into effect, mastery learning is of great realistic significance both in theory and
practice [5]. Conventional learning in this context is defined as learning in a classical context that has
been accustomed to do, its nature centered on educators, so the implementation is less attention to the
learning situation. Characteristics of this learning is, learning activities are dominated by teachers, while
learners are passive. In addition, the characteristic of conventional learning is, learning is not done in
groups and learning is not carried out through the activities of giving cases. Traditional instruction holds
time constant and allows mastery to vary while mastery learning or systematic instruction holds mastery
constant and allows time to vary [6]. Theoretically, conventional learning uses a behavioristic paradigm
that focuses on the transmission of knowledge as a learning base and behavioral change as an outcome
of the process [7]. It is assumed that knowledge can be transferred intact from the mind of the educator
to the minds of learners. The interaction between educators and learners is highly dependent on the
cognitive entry behavior of learners [8]. Cognitive entry behavior indicates the current status of learners' 
knowledge to get to the future status that the educator desires to be achieved by the learner. The
identification of cognitive entry behavior will determine how teaching should begin. Thus, teaching
takes place from the initial ability to terminal capability and it becomes the responsibility of the teacher.
[9], describes more specifically the importance of cognitive entry behavior, “cognitive entry behaviors
are a form of prelearning that is required in order to learn a specific learning unit”.

The cognitive entry behaviors will be used by learners for several things: (1) interpreting the ideas
learned, and (2) linking the learned ideas with what they already know and believe. Pre-learning that
has been owned by learners become a strategic variable in determining success in learning. Several
studies on the effects of pre-learning have been conducted [10], [11], [12]. At the time of the study,
showed that pre-learning is a key variable in determining the level of learning. Pre-learning gives a
positive influence on learning level of 95% [13]. Regarding the importance of cognitive entry behavior
variable, the researcher will conduct further research about the influence of cognitive entry behavior
toward the achievement of competence.

Competence is defined as the ability of a person who can be observed includes the knowledge, skills,
and work attitude in completing a job or task in accordance with established performance standards.
Competence is an accumulation of a person's ability to carry out a job description measured through a
structured assessment, including aspects of independence and individual responsibility in the field of
work. Competencies can be defined as the set of knowledge, skills, and experience necessary for
future, which manifests in activities [14]. Graduate competence is a qualification of graduate ability
that includes attitude, knowledge, and skill in accordance with national standard.

Thus, the mastery learning was chosen as an experimental study in the effort to achieve students’
competence according to the standard by observing the students’ cognitive entry behavior. This learning
method is expected to facilitate to improve their competence. The purposes of this study are as follows:
(1) to explain the difference of students' competence between the students following mastery learning
and conventional instruction; (2) to explain the difference of students’ competence between the student
have high cognitive entry behavior and low cognitive entry behavior; (3) to analyze the interaction effect
between instructional model and cognitive entry behavior to the achievement of students’ competence.
2. Methodology

2.1 Research design

Research method in this research is experimental research and research design is Nonrandomized Control Group Pretest-Posttest Design [15]. The research design is presented in Table 1. The design of this research analysis is 2×2 factorial design. The sorting factor is the cognitive entry behavior. Sorting is divided into two levels: high cognitive entry behavior and low cognitive entry behavior.

| Group     | Pretest | Treatment | Posttest |
|-----------|---------|-----------|----------|
| Experiment| Y₁      | ×         | Y₂       |
| Control   | Y₁      | -         | Y₂       |

2.2 Sample, data collection, instruments, and variables

Determination of sample in this research using probability sampling by using cluster sampling technique so that obtained class as experiment class and as control class. Data were collected through tests to obtain level of cognitive entry behavior and directly as a result of initial competence. Instruments used include: (1) instruments for measuring the moderator variable, namely the cognitive entry behavior test, and (2) the instrument to measure the dependent variable, i.e., the competence test. This study uses three instruments, namely two learning devices and one type of test. This research involves several variables, namely (1) competence, (2) cognitive entry behavior, and (3) instructional model. Cognitive entry behavior is measured by performing initial capability tests, and the data obtained are interval data. The number of tested questions is 100 items. Each correct answer is given a score of 1 and if wrong answer given score 0. So in this test the minimum score is 0, while the maximum score is 100.

2.3 Analysis technique

The analysis technique used descriptive analysis and 2×2 factorial variance analysis. 25 subjects were defined as the unit of analysis. Inferential statistical analysis using SPSS 20.00 for windows with decision analysis result at 5% significance level. The hypothesis in this study are classified into: (1) the main influence hypothesis by type group, (2) the main hypothesis according to the cognitive entry behavior group, and (3) the interactive influence between the type of learning and the cognitive entry behavior. The hypothesis of this research was tested by Analysis of Two Path Variance (Anava-AB) with F test at 5% significance level.

3. Results and discussion

3.1 Results

Description of the learners' competence either pretest or posttest base on criteria as presented in Table 2.

| Interval of mastery | Score Interval | Qualification |
|---------------------|---------------|--------------|
| 75.00 – 100.00      | 75.00 – 100.00| Competent    |
| 0.00 – 74.99        | 0.00 – 74.99  | Incompetent  |

The average score of pretest and posttest in each unit of analysis are presented in Table 3. Based on Table 3, the average scores of student from the pretest results in all analytical units (n=25; n=50) were in the range of a score of 0.00–74.99, the range of mastery under 75.00 with the category "Incompetent". Based on the table, it can also be explained that the average score of students' competence from the posttest result in each unit of analysis (n=25) is in the range of 75.00-100.00 scores, 75.00-100.00 mastery ranges, and category is "competent".
Based on the Table 3, it appears that the average score of competence, both in high cognitive entry behavior group and low cognitive entry behavior group is in the range of 75.00-100.00 scores, 75.00-100.00 mastery range, with "competent" category. Although being in the same category, when viewed from the average score, shows that high cognitive entry behavior is higher than the low cognitive entry behavior group. This indicates that the attainment of high cognitive entry behavior group is relatively higher when compared with low cognitive entry behavior group. Descriptively, the attainment of low cognitive entry behavior group is higher if given conventional learning compared with mastery learning. Based on comparison of competency achievement between two model groups, mean score of mastery learning group showed higher than conventional group.

3.2. Testing of hypothesis

A summary of the ANAVA is presented in Table 4.

| Source            | Type III Sum of Squares | df  | Mean Square | F     | Sig. |
|-------------------|-------------------------|-----|-------------|-------|------|
| Corrected Model   | 986.960a                | 3   | 328.987     | 7.980 | .000 |
| Intercept         | 732051.360              | 1   | 732051.360  | 17757.103 | .000 |
| CEB               | 331.240                 | 1   | 331.240     | 8.035 | .006 |
| MLC               | 309.760                 | 1   | 309.760     | 7.514 | .007 |
| CEB * MLC         | 345.960                 | 1   | 345.960     | 8.392 | .005 |
| Error             | 3957.680                | 96  | 41.226      |       |      |
| Total             | 736996.000              | 100 | 736996.000  |       |      |
| Corrected Total   | 4944.640                | 99  | 4944.640    |       |      |

Based on Table 4, it can be summarized as follows: (1) The cognitive entry behavior has significant influence on the competence (F=8.035; P<0.05); (2) instructional model has significant influence to competence (F=7.514; P<0.05), (3) there is interaction between cognitive entry behavior and instructional model in achievement of competence (F=8.392; P<0.05).

3.3 Mastery learning and conventional in achieving competency.

The results showed that between the mastery learning with the conventional differ significantly in the achievement of competence, F=7.514, a significance of 0.007.

Theoretically, mastery learning use a paradigm that focuses attention on the construction of the meaning of knowledge-based cognitive entry behavior. Operationally empirical, both models of learning
present the same supporting materials. The difference lies in the job-sheet used. The first model uses job-sheet oriented mastery learning, while the job-sheet on the conventional learning model only requires students to answer cases that exist on the job-sheet. Based on the theoretical and empirical comparisons of the two models of learning, it appears that mastery learning is more accommodating in achieving competence compared conventional model.

3.4 Cognitive entry behavior in competence achievement.

[7], suggests three related assumptions: (1) the cognitive entry behavior is a very important variable; (2) the degree of cognitive entry behavior must be known and measured in order to increase competence optimally, and (3) the learning process should be related to the degree of cognitive entry behavior. Measurement of cognitive entry behavior not only serves as an appropriate predictor of learning, but also provides a more useful basis for learning [7]. In mastery learning, meaningful learning can be realized by providing opportunities for students to conduct selection, organization, and integration of contextual facts into existing cognitive entry behaviors. This indicates that the cognitive entry behavior at least serves as a prior knowledge to achieve competence.

In line with the issue, this study has revealed that cognitive entry behavior as an indicator of prior knowledge of students has a significant effect on the achievement of competence. The results of this study were in line with the results of previous studies. [16], concluded that early knowledge contributed significantly to post-test scores. Students with high cognitive entry behavior more easily adjust and relate what they understand to what is learned as new knowledge compared to students with low cognitive entry behavior. The results of this study indicate that there is a significant difference between high and low cognitive entry behaviors in the achievement of competence with F=8.035 and significance 0.006.

3.5 Instructional model and cognitive entry behavior in competence achievement

The results showed that between the level of cognitive entry behavior and the type of learning has interaction, with F = 8.392 and significance of 0.005. It states that the cognitive entry behavior level and the type of learning show the interaction profile. Differences in the achievement of competence between the two groups of students (cognitive entry behavior high and low) because in the group of students who follow the mastery learning and have high cognitive entry behavior occurs the transform process completely and thoroughly. While in conventional learning occurs learning process with the transfer pattern, so that the concept comprehension is slower.

For students with low cognitive entry behavior, there is a significantly slower learning process, since this group of students is slower in its ability to accommodate concepts. If students who have low cognitive entry behavior follow the mastery learning and conventional, then the achievement of their competence will be different. The difference is due to the group of students who follow conventional learning and have low cognitive entry behavior occurs a complete understanding, namely through concept accommodation from the formal concept to concrete concepts. On the contrary, in the mastery learning and low cognitive entry behavior, there is still a complete transfer process, so the understanding of a concept is temporary.

4. Conclusion

The conclusions of this study are: (1) there is a significant deference of the students’ competence between the students following mastery learning and conventional instruction, (2) there is a significant difference of the students’ competence between the students have high cognitive entry behavior and low cognitive entry behavior, (3) there is a significant interaction effect between instructional model and cognitive entry behavior to the achievement of students’ competence. Mastery learning can be implemented as an alternative of accounting instructional especially for achieving competence. In its implementation, it should start with the exploration phase of cognitive entry behavior. In this study, the competency variable is considered to represent the achievement of competence. However, such representation is limited to the scope of the journal and ledger competence unit.
5. References

[1] Brooks, J G and Brooks, M G, 1993, In search of understanding: The case for constructivist classrooms, Virginia: Association for Supervision and Curriculum Development.

[2] National Research Council, 2012, *A Framework for K-12 science education: Practices, crosscutting concept, and core ideas.*, Washington DC: The National Academies Press.

[3] Slavin, R E, 1995, Cooperative Learning, Boston: Allyn and Bacon.

[4] Davis, D and Sorrell, J, 1995, Mastery learning in public schools, Valdosta State University, Valdosta, GA.

[5] Zhang, A B, 2010, The integration of Mastery Learning in English as a Second Language (ESL) instruction, *International Journal of Instructional Media*, vol 37 (1) p 91.

[6] Robinson, M, 1992, Mastery learning in public schools: Some areas of restructuring, *Education*, pp 121-6.

[7] Santyasa, I W, 2004, Pengaruh model dan seting pembelajaran terhadap remediasi miskonsepsi, pemahaman konsep, dan hasil belajar, Doktoral Disertasi Universitas Negeri Malang, Malang.

[8] Sudarwan, D, 2010, Perkembangan Peserta Didik, Bandung: Alfabeta.

[9] Muhittin, C, 2014, Effect of cognitive entry behaviors and affective entry characteristics on learning level," *Educational Sciences theory & practice*, vol 14 (5), p 1.

[10] Dochy, F J R C, Rijdt, D C and Dyck, W, 2002, Cognitive prerequisites and leaning: How far have we progressed since Bloom? Implications for educational practice and teaching, *Active Learning in Higher Education*, pp 265-84.

[11] Hailikari, T. Nevgi, A and Lindblom-Ylanne, S, 2007, Exploring alternative ways of assessing prior knowledge, its components and their relation to student achievement: A mathematics based case study, *Studies in Educational Evaluation*, pp 320-37.

[12] Thompson, R A and Zamboanga, B L, 2004, Academic aptitude and prior knowledge as predictors of student achievement in introduction to psychology, *Journal of Educational Psychology*, pp 778-84.

[13] Dochy, F J R C. Segers, M and Buehl, M, 1999, The relation between assessment practices and outcomes of studies: The case of research on prior knowledge, *Review of Educational Research*, pp 145-86.

[14] Kataane and Irene, 2006, Teacher competence and further education as priorities for sustainable development of rural school in Latvia, *Journal of Teacher Education and Training*, vol 6, pp 41-9.

[15] Tuckman, B, 1978, Conducting Educational Research, New York: Harcourt Brace Jovanovich.

[16] Dochy, F J R C, 1996, Prior knowledge and learning. Corte, E D and Weinert, F. (eds): International encyclopedia of developmental and instructional psychology, New York: Pergamon, pp 456-67.

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