DEVELOPING INSTRUCTIONAL MATERIALS FOR INFERENTIAL STATISTICS BASED ON CORPORATE REAL PROBLEM TO IMPROVE MANAGERIAL ABILITY FOR THE STUDENTS OF MANAGEMENT DEPARTMENT

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Abstract

This reserarch connducted because there was wweaknesses in the implementation of inferential statistics learning subject is the unavailability of teaching materials which respond to the needs of students, especially in facing the real world in the company. The study aims to develop teaching materials subject inferential statistics which raised problems of real companies so that students can have practical managerial abilities through structured and practical learning process. Teaching materials development was validated by subject matter experts and expert teaching materials and tested on a limited class and Stata University of Malang S1 FE Management Department, State University of Surabaya. Teaching materials produced inferential statistics has met the criteria very valid and worthy after the holding of expert validation material to the level of 91.81% validation, validation of teaching materials with 84.44%-level validation, and testing is limited to the 91% level of validation.

INTRODUCTION

Instructional materials is meant to be a set of tools or learning tool containing learning materials, methods, limitations, and how to evaluate which systematically designed and attractive in order to achieve the expected goals of achieving competence or sub-competence in all its complexity (Belawati, Tian, et al. 2003). Another meaning of the teaching materials is as all kinds of materials that are arranged systematically which allows learners to be able to study according to the designed applicable curriculum (Lestari, 2013: 1). Instructional materials should be designed and written by the basic competence, competence purpose cause it will be used by teachers/educators in supporting the learning process. In addition to helping teachers/educators, teaching materials designed and systematically arranged according to the characteristics of learners that will also assist students in learning when used either individually or as a group.

Teaching materials do not only contain materials about knowledge but also contains the skills and attitudes that need to be studied learners to achieve basic competence. Inclusiveness of teaching materials in addition to good teaching materials containing cognitive, affective and psychomotor which a must include the goal of competence, guidelines for the use of teaching materials for students, conclusions / summary of the material, evaluation (exercises), and a glossary (DePorter, Bobbi: 2009). Scope of teaching materials is quite broad that need to be considered in view of the teaching materials that have a variety of benefits/functions in terms of those who use them (Prastowo, 2013: 24-26) such as:
1) The function of teaching materials for teachers/educators are:
a). Saving time for teachers/educators in teaching.
b). Changing the role of teacher/educator as a teacher to be a facilitator.
c). Enhancing the learning process to be more effective and interactive.
d). As a guideline for teachers/educators who will direct all of their activities in the learning process and the substance of competencies that should be taught to students.
e). As an evaluation tool of achievement or mastery of learning outcomes.
2) The function of teaching materials for students are;
a)   Learners can learn without a teacher / educator or other learning friends.
b)   The students can learn anytime and anywhere they wants.
c)   Learners can learn according to their own speed.
d)   Learners can learn according to the order of their own choosing.
e)   To help potential learners to become independent.
f)   As a guideline for learners who will direct all of its activities in the learning process and the substance of competencies that should be learned or mastered.

If it is associated with the demands of the content of instructional materials, then one of the subjects that are deemed to be inadequate of its material is inferential statistics. Weaknesses in the implementation of inferential statistics learning subject is the unavailability of teaching materials which respond to the needs of students, especially in facing the real world in the company. Inferential statistics is a science that provides the techniques of data analysis for the purpose of making conclusions (Hair, 2010). Inferential statistics is the science which contains data analysis techniques used to resolve cases in the world of business and management in the company (Mendenhall, 2004). By using Inferential Statistics many business decisions can be made with the least possible level of risk (Bradley, 2016). Business statistics is the science of

good decision making in the face of uncertainty and is used in many disciplines such as financial analysis, econometrics, auditing, production and operations including services improvement, and marketing research (Willoughby, Dawn, 2015). The business statistics and analysis specialization is designed to equip you with a basic understanding of business data analisys tools and techniques (Freed, 2015). We will master essential spreadsheet functions, build descriptive business data measures, and develop your aptitude for data modeling. We will also explore basic probability concept, including measuring and modeling uncertainty and you'll use various data distributions, along with the Linier Regression Model, to analyze and inform business decisions (Pardoe, 2012). Many large companies are applying statistics in solving management problems so that company performance can improve (Hoerl, 2012).

Competence Course for inferential statistics is skilled in understanding and modeling, selection and use of techniques of data analysis to draw conclusions as parametric and nonparametric within the scope of management.
In accordance with the objectives of this course, the management student should be given a vivid description of the problems in the company that is the decision to use the techniques of analysis in inferential statistics.
Inferential statistics course has 3 credits and weighs 3 learning hours. The presented material is: (1) The Role of Statistics in Decision Making; (2) sampling (3) Type and Data Scale (4) hypotheses testing; (5) the introduction of statistical computer program packages; (6) one-sample t-test; (7) independent t-test; (8) dependent t-test; (9) the correlation analysis; and (10) the multiple regression analysis.

Based on the results of preliminary surveys and interviews among a team of researchers and students and lecturer of the course inferential statistics on the management department of the Faculty of Economics at various universities show that there are some problems in the implementation of the course inferential statistics that are: (1) the lecturer of the course still use conventional methods and not in context; (2) there is no adequate learning tools within the meaning cannot give a real picture of statistics on the application of the concept of managerial fields in the company; (3) lack of knowledge of students and teachers about the problems the company is reflected from the subject matter in the thesis that still monotonous and not actual; and (4) lack of managerial skills of the student alumni of the college management because they are rarely given examples of problematic cases companies (based on the results of tracer studies on students majoring in management).
The phenomenon of the students who take a course in inferential statistics assume that this course is a difficult subject, because only about the calculation of figures and full formula. Mindset of the students is what ultimately makes the students think that this course does not have a close relevance to the world of work. Therefore, the motivation of students to learn and follow this course is low. Thus, it is the preparation of teaching materials for inferential statistics need to look at the various components. According to Mulyasa (2006), there are six (6) components that are associated with the creation of teaching materials that are:

1. Learning Guide
The first component includes instructions for teachers/educators/lecturers and learners/students. In the study guide will explain about how the teacher/ educator/lecturer should teach the material to the learners/students and how well learners/students should learn the material in the teaching materials.
2. Competencies to be achieved
The second component of this competence is to be achieved by learners. As a teacher/educator/lecturer, we must explain and place into teaching materials which we arrange it with the basic competencies, as well as indicators of achievement should be mastered learners/students. Thus, it is clear goals to be achieved by learners/students.
3. Supporting Information
Supporting information is a lot of additional information that can supplement teaching materials, so that the learners/students will be easier to master the knowledge they would earn. In addition, the knowledge gained learners/ students will be more comprehensive.
4. Exercises
The fourth component is a form task given to learners/students to practice their skills after learning teaching materials. Thus, the ability they will learn to be more refined and possessed it well.
5. Working Guidance or Worksheet
Work instructions or worksheet is a single sheet or several sheets of paper containing a number of procedural steps for the implementation of specific activities or activities that must be performed by learners/students associated with the practice in certain subjects.
6. Evaluation
This last component is one part of the assessment process. This is due to the evaluation component contained a number of questions addressed to students to measure how far the successful mastery of competencies that they control after the learning process. Thus, we can determine the effectiveness of teaching materials that we make or the learning process that we hold in general. If then considered still many learners/students who have not mastered, it may be necessary to improve and perfect the learning activities.
The following are the topics that are often to be the case in the real problems of companies that can be solved with the use of inferential statistics which is shown in Table 1.1 are (Black, 2012):

Table 1: The Topics of the Company's Managerial Problems

Department	Topic
Production/Operational	- Short-term Forecasting (up to 1 year) - Long term forecasting (more than 1 year) - Field study of the factory and warehouses - Production Planning - Integrated Quality Management (total quality management) - Quality Control - Inventory Planning
Finance	- Forecasting for bank rate tendency - Prediction of the exchange rate, lending, and commodity prices - Alternative capital formation - Study for mergers and acquisitions - Review the trade-off between risks and benefits - Impact of tax - Analysis portfolio - Study on expected rate-of-return - Model determination of the value of capital - Credit risk - Cost Analysis
Human Resource	- Morale and job satisfaction - Leadership style - Productivity of labor - The effectiveness of the organization - Review the organizational structure - The level of employee absenteeism and exit-entry clerks - Organizational climate - Communication in organizations - Study of time and movement - Study of the physical environment of workers - logistics management learning
Marketing	- Market potential - Analysis of market share - Study of market segmentation - Analysis of sales - Establishment of a sales quota - Study of distribution channels - Testing of new product concepts - Study of market testing - Advertising - Buyer behavior - Study of customer satisfaction

Based on the above background, the study aims to develop teaching materials subject inferential statistics which raised problems of real companies so that students can have practical managerial abilities through structured and practical learning process.This study is designed in the form of research development. In the first year of research (I) was developed to handle textbook that contains faculty and students about the concept of data analysis techniques and examples of managerial application cases, test validation, and testing on a limited circle.

METHOD
This study is designed in the form of research development. Research Development (RD) is a set of strategic, proactive, catalytic, and capacity-building activities designed to facilitate individual faculty members, teams of researchers, and central research administrations in attracting extramural research funding, creating relationships and developing and implementing...." (Torraco, 2010). Development model that is referred by the researcher is a C-ID (Constructivist Instructional Design) model. According to Willis in Mustaji (2009) C-ID is a constructivist development model approach to learning with R2D2 (Reflective, Recursive, Design and Development) work patterns. The structure of the C-ID model consists of five stages: (1) define, (2) design, (3) development, (4) try out, (5) dissemination.

In the first year of research (I) there was developed to handle textbook that contains faculty and students about the concept of data analysis techniques and examples of managerial application cases, test validation, and testing on a limited circle that results material becomes feasible/valid to be used. Test validation is performed by a specialist/expert inferential statistics that one of the professors that administer inferential statistics courses at the State University of Surabaya, Dr. Lukman Hakim, S. Pd, M.Pd. and experts/specialists Subjects Dr. Norida Canda Sakti, M.Si.

This research took place at some universities in Malang and Surabaya. While the study subjects were college students majoring in Management. Given the number of universities in Malang and Surabaya is quite a lot, the chosen college was done through purposive sampling. The sample selection criteria are as follows:
1. Having a department or Management study program
2. Having adequate IT-based learning facilities
3. Stakeholders have a strong commitment to improve the quality of learning inferential statistics in the department or study program.

Therefore, the product of research is the development of such materials, then prior to the development of products applied to a wider audience, it will be tested its feasibility and tested beforehand on a limited number of products to be revised. The instrument used for product validation test are as follows:

Table 2: Research Instrument

No.	Dimension	Indicator	Source of Data	Instruments
1.	The completeness of learning components	• Product identity • User's guidance • Learning aims • Core material • Real case • Exercises • Glosarium • Reference	Validator for instructional material	instructional material sheet
2.	ppropriateness of the used instructional material	• Accuracy of grammar • Accuracy punctuation • Accuracy of the term	Validator of the instructional material	Validation sheet for instructional material
3.	Design feasibility of the instructional material	• Placement of chapter's sections • Systematics contents • Writing formula Presentation of the tables, images, and graphics • Grammar Accuracy	Validator of the instructional material	Instructional learning validation sheet
4.	Completeness of the Inferensial Statistics instructional material	• Compliance with the learning goal Completeness of analytical techniques • Completeness of managerial Cases • Completeness of the exercises	Validator of the instructional material	Instructional learning validation sheet
5.	Feasibility of the inferential statistics material presentation	• Orderly of the material presentation • Illustration presentation (table, image, graphic, etc)	Validator of the instructional material	Instructional learning validation sheet
6.	Thoroughness of the inferential statistics material	Linkage material with the competency suitability of material with the students' needs Linkage material to the case of managerial • Linkage material with exercises	Validator of the instructional material	Instructional learning validation sheet
7.	Easiness for the users	Ease of understanding of the concept Ease of understanding of	Students	Instructional learning users' sheet

		he use of statistical software • Ease of understanding • Ease of completing exercises		
8.	Usefulness for the users	• Increased motivation Knowledge of the material pplications in the real world • Interest in the material • The emergence of new ideas	Students	Instructional learning users' sheet

Technical analysis is used to process the test results in this study is the analysis of the validity to determine the validity of a prototype product development.

Validity Analysis

According to Sireci, validation theory and apllications, validation of the learning materials is the material covers procedures for checking the accuracy checking message content (learning material) by expert instructional materials, subject matter experts. Validation is the process of discovering whether a program / teaching materials can be used to achieve the learning objectives as planned. In this study, a validation test is done with the material covers procedures for checking the accuracy checking message content (learning material) by subject matter experts and design teaching materials by experts writing of teaching materials.

The aim of testing the validity of the prototype product development are: (a) to determine the quality of products made, (b) to determine whether the product can achieve the desired objectives, (c) to revise the product before it is used for public or manufactured, (d) to test whether the product is really valid and suitable as a means of learning.

In accordance with the above purposes, the data results of the assessment of the experts and the subject of the trial will be analyzed using validity. Before analyzed, the data result of the respondents' assessment disaggregated quantitative and qualitative data. Qualitative data analysis is done by grouping the data according to the type of component questions in the questionnaire. While quantitative data analysis used the formula as described by the following percentages:

$$P = \frac{(nx1) + (nx2) + (nx3) + (nx4)}{N \ x \ 4} \ x \ 100\%$$

Description:

P	=	answer percentage
n	=	number of multiple choices
N	=	total choices
1,2,3,4	=	grading given value on the answer

In order to give a meaning on the decision to do revision for the learning material, it used the qualification level with the following criteria (Setyosari, P: 2012):

Table 3: The Criteria in Deciding to Revise the Instructional Media

Score	Assessment Scale	Qualification
4	80% - 100%	Excellent
3	66% - 79%	Good
2	56% - 65%	Bad
1	0% - 55%	Very bad

This analysis is then used as the basis to enhance the components of teaching materials developed. Then, a product that has been improved is used again in field trials.

RESEARCH FINDINGS

A. Data Presentation of the Validation Test

The data presentation of teaching materials validation for inferential statistics Based On Company's Real Problems as KKNI Curriculum Implementation was performed by Dr. Lukman Hakim, S. Pd, M.Pd as an inferential statistics lecturer in Faculty of Economics UNESA. While the material's writing validation was performed by Dr. Norida Canda Sakti, M.Si, as lecturers in FE UNESA. Implementation of validation is performed in Faculty of Economics UNESA on September 28 to 29, 2016.

1. Validation Results by Expert Content Validator

Data obtained from the results of expert validation of material in the form of an assessment of the contents of teaching materials developed by researchers by using a scale of 1 - 4. Rating is based on the assertion that there is the validation

questionnaire that has been filled by the validator. In addition to the assessment criteria, the validator also provide an assessment in the form of comments and suggestions regarding the teaching materials that have been developed by researchers. Validator material gives a score of 4 and 5 on virtually any of the questions. There are some items that are given a score of 3. This shows that the assessment of the material is good validator. Criticisms and suggestions from validator matter, Mr. Dr. Lukman Hakim, S.Pd, M.SA are as follows:

1) Material Completeness:
a)   It should include learning objectives so that the presented material can certainly refer to the learning objectives.
b)   Some editorial and writing formulas should be seen again in order not to cause doubt or error.
c)   Text staining should be adjusted based on the needs.

2)   Presentation of the Materials Eligibility:
a)   Presentation of the image needs to be enlarged so that writing can be read more clearly.
b)   References (excerpt) need to be included.

3)   Material's Deepness:
a)   The depth of the material is adjusted to the need of the expected competencies achieved.
b)   Exercises need to be added to the material about the cases that occur in the field.

2. Validation Results by Subjects Validator
Data obtained from the results of expert validation of teaching materials in the form of an assessment of the teaching materials developed by researchers using a scale of 1 - 4. Rating is based on the assertion that there is the validation questionnaire that has been filled by the validator. In addition to the assessment criteria, the validator also provide an assessment in the form of comments and suggestions regarding the teaching materials have been developed by researchers. Teaching materials validator give a score of 4 and 5 on most of the questions, but there are some of the questions are rated with a score of 3 and 2. This indicates that the validator vote against the teaching materials is good. Criticisms and suggestions from the validator of teaching materials, Mr. Dr. Norida Canda Sakti, M.Si are as follows:

1)   Eligibility of the Material Component:
a)   Completed with the instructions for using the teaching materials.
b)   Completed with the learning objectives.
c)   Added with the practice questions at the end of each chapter.
d)   Add to the list of libraries that use the latest books published.
2)   Eligibility / Compliance of the Spoken Language:
a)   The language used has been appropriate.
b)   Please note the constancy in writing.
2)   Feasibility Design Subjects:
a)   The text shouldn't be colorful (black only), except for the images.
b)   The fonts should be consistent.
c)   Should not use the mark ●, →, ».
d)   It should be noted the use of the word in bold and italics.

B. Revised Product
The average score is the subject matter expert validation results by 4.59 (= 101: 22). With the validity of the percentage of 91.81%. With a very valid predicate. Very valid predicate given by subject matter expert validator does not mean teaching materials that have been validated been perfect, but there are some items that are suggested to be revised. Revisions made reference to their criticisms and suggestions that have been given by subject matter experts. While the average score of the results of expert validation teaching materials amounted to 4.22 (= 114: 27). With a percentage of 84.44% validity. With a very valid predicate. Very valid predicate given by expert validator does not mean teaching materials teaching materials that have been validated been perfect, but there are some items that are suggested to be revised. Revisions made reference to their criticisms and suggestions that have been given by expert instructional materials. Based on the data analysis of the results of validation by subject matter experts and expert teaching materials, the overall teaching materials developed are good, but there are still some points that need to be improved so that teaching materials developed for perfection. This revision is done based on the criticism and advice provided by subject matter experts and expert teaching materials. Some of the improvements made are as follows:

a)   Researchers should add teaching materials with the purpose of learning, so that the material presented can certainly refer to the learning objectives.
b)   Researchers should make improvements to the text coloring, match the needs, namely on the parts that need emphasis.
c)   Researchers make improvements on the size of the image presentation.
d)   Researchers add exercises at the end of each chapter.
e)   Researchers complement the products with the instructions for use of teaching materials.
f)   Researchers enrich the bibliography with the newer references.

g) Researchers make improvements to the use of fonts and font sizes consistently.

C. Try Out of the Products

After the revision of teaching materials products inferential statistics, researchers tested teaching materials to the undergraduate students of Management Department, State University of Surabaya as many as 10 students. Implementation of the trials carried out on October 4, 2016. Here are the results of a limited class of product trials.

Table 4: Results From Pilot Data Products in Limited Class

No.	Aspect	Σx	Mean
er's Easiness			
	The material is presented systematically / coherently	46	4,6
	The material presented is easy to be understood by the students	46	4,6
	The material presented is not only the introduction of inferential statistical formulas but guided students in completing a case	50	5,0
	There are exercises in the form of real cases in all departments within the company	39	3,9
	Every explanation of material is always accompanied by examples of real cases in courts making it easier for students to understand	50	5,0
	There are examples of exercises in the form of real cases in the marketing department	50	5,0
	here are examples of exercises in the form of real cases in the production department	50	5,0
	There are examples of exercises in the form of real cases in the HR department	50	5,0
	There are examples of questions in the form of real cases in the finance department	50	5,0
.	The language used is communicative	38	3,8
.	ere is provided teaching materials manuals for the user and instruction in completing exercises in real cases in the company that help students very much	36	3,6
.	resentation of the material presented and exercises more real cases on the application	48	4,8
e Use for the Users			
.	The format of the presentation is interesting	43	4,3
.	Presentation material can add insight knowledge	43	4,3
.	Presentation of the questions in the form of real cases in all departments in the mpany can encourage and motivate students to practice making managerial decisions	48	4,8
.	resentation materials and exercises can give you an idea of students find new ideas in the thesis	41	4,1
.	Presentation materials and exercises real cases in all departments support the achievement of learning goals	39	3,9
.	udents feel comfortable in learning, incorporating inferential statistical exercises real cases in the field in all departments	48	4,8
.	reading and studying these materials, students do not only know and must memorize formulas for inferential statistics but can apply existing formulas	45	4,5
.	Presentation materials and exercises in the form of real cases in companies attract students to learn	49	4,9

Based on the Table 2, it shows that the average score of the test limited class teaching material users performed on S1 student of Management Faculty of Economics, University of Surabaya totaling 10 students giving an average score of 4.55 (= 90.9: 20) the teaching materials developed by researchers. This shows that the developed teaching materials can be received by users with a percentage of 91%. The results of development in this study are in line with research conducted by Polonco (2004) where the process of teaching materials based on problem solving can improve learning outcomes. In addition, the findings of this study support the research of Visser, Y.L (2002), and Yeung, E (2003) where the teaching materials based on problem solving affect the performance, problem solving strategies, and attitudes of students. The results of this study also support the research conducted by Rahayu, W. P (2010) on Entrepreneurship Module Development which states that the ready-to-use entrepreneurship module is a feasible module and has been tested by expert validation and has been piloted on the right users. Modules are part of the form of teaching materials whose compilation must follow the existing systematics.

Conclusion

Based on the results of research and development was concluded as follows:

1) The results of this research is the development in the form of inferential statistics Textbook Based On Company's Real Problems as KKNI Curriculum Implementation for Improving Managerial Capabilities of Management Students.

2) Teaching materials development was validated by subject matter experts and expert teaching materials and tested on a limited class of 10 students S1 FE Management Department, State University of Surabaya.

3) Teaching materials produced inferential statistics has met the criteria very valid and worthy after the holding of expert validation material to the level of 91.81% validation, validation of teaching materials with 84.44%-level validation, and testing is limited to the 91% level of validation.

C. Suggestions

Suggestions are given input of researchers associated with the products, to be used optimally in the learning process. Some suggestions related to the development of inferential statistics Textbook Based On Company's Real Problems as Curriculum Implementation KKNI, are as follows:

1) Utilization Suggestion

Students in using this teaching materials should be enriched with other references or other learning resources (statistical inferential textbooks, books marketing management, production management, human resource management, financial management, and information managerial from the Internet) so that the use of teaching materials this can be maximized. Students can use this textbook for teaching material independently on campus or at home. This textbook will be optimally used if students have good skills in using SPSS statistical software, so students can immediately practice to resolve cases in a managerial supplied teaching materials / textbooks this.

2) Dissemination Suggestion

After going through the validation and testing, these materials had been categorized as fit for use. Utilization of these materials can be further optimized by extending the use at other universities. For instance, professors can disseminate the teaching materials that have been validated through: Seminar collegiality; Associations / Management Forum Indonesia, so that other universities can utilize these materials as a source of learning for students majoring in management.

3) Suggestions for Future Product Developers

The future developer is expected to develop inferential statistics teaching materials in accordance with the development of management science and latest technology. Besides, further development is also expected to develop teaching materials with different material in terms of using analysis techniques to decision making through inferential statistics and provide managerial case applications in the enterprise which are more varied.

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