

# Self-regulated Learning Student Through Teaching Materials Statistik Based on Minitab Software

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**Abstract.** This study aims to develop self-regulated learning of Industrial Engineering students through Minitab software-based teaching materials. This is done because there is no Minitab software-based instructional material to develop student self-regulated learning. The importance of self-regulated learning in students has developed instructional materials for instructional materials that are able to develop student self-regulated learning. The products of this study produce instructional materials in the form of student worksheets. The research method uses 4D development, namely: 1) Define, develop problem analysis and potential, 2) Design, make the initial product (prototype) product design tailored to existing needs and potential, 3) Development, in two stages: expert appraisal and developmental testing, 4) Disseminate, do validation testing. After expert trials, instructional materials were in the decent category (80%) and could be used as teaching materials for supporting lectures.

## 1. INTRODUCTION

Education is a measure of the success of a country. A good educational process is also supported by good learning tools. Implementation of good learning activities, supported by the availability of appropriate teaching materials. Appropriate teaching material is teaching material whose content and context are tailored to the needs of students. Adjustment of teaching materials for students because during the learning process takes place, will create a learning community. The importance of teaching materials has a role in the process of learning. The available material is arranged in the form of teaching materials aimed at optimizing the learning done. Fundamental factors in the development of scientific and technological advances are findings from research results [1]. Explains teaching materials in the form of hand out aimed at helping students learn in a directed manner [2].

Appropriate teaching materials make it easier for students to learn the material and make students reduce the dependency of the tutor. Because self-directed learning is certainly not a new educational goal, but seems to get more attention again in many countries [3]. So that self regulated learning will be formed properly, good self regulated learning makes students able to make decisions without the influence of other individuals. Independent individuals can exhibit explorative behavior, be able to make decisions, be confident and be



creative. Developing a process-oriented approach in teaching presents a major challenge for teachers as well as for schools [4].

Explained that well-structured teaching materials must refer to the existing curriculum [5]. Argue that teaching materials are devices that contain learning material or content that is "designed" to achieve learning objectives [6]. Teaching materials are materials and learning materials that are arranged systematically and used by educators and students in learning activities.

A simple example of using statistics to predict production results and sales and customer satisfaction with a product. Of course, in studying statistics, it needs to be supported by mastering statistical software. Statistical software is a learning resource that is packaged in the form of teaching materials.

Statistical software including, SPSS, minitab, lisrel, etc. Each software certainly has advantages and disadvantages. Minitab software is a system of statistical calculation tools. Where statistical calculations are very many and complicated can be facilitated through minitab. But this software is only a tool for statistical calculations. This software is Pennsylvania State University and the first version is Omnitab.

According to Perry and colleagues, important features of a powerful learning environment (and accordingly of high-SRL classroom practices) provide students opportunities to: (1) engage in complex, meaningful activities that extend over multiple lessons; (2) make choices about what to work on, where, and with whom; (3) control challenges by deciding, for example, how much to write, at what pace, and with what level of support; and (4) be involved in setting evaluation criteria and reviewing and reflection on their learning [7].

The use of software as a learning resource must look at the need to use the software. The design of Minitab software-based statistical teaching materials, of course, pays attention to the needs and development of technological progress. The development of Minitab software-based statistical teaching materials is expected to form positive student self-regulated learning. Good self-regulated learning has a positive impact on students' attitudes after the recovery is over. Based on the description that has been explained, the researcher made the problem statement "how to design statistical teaching materials based on Minitab software for self regulated learning of industrial engineering students"

## 2. METHODS

This research method is a research and development method. Research and development methods aim to produce products in the form of teaching materials. Ruseffendi (2005) explains the research and development method is a research development that aims to produce educational products such as materials, media, tools, learning strategies, evaluations etc., the aim is to provide solutions to educational problems.

The development of the 4D model in the study was developed by Thiagarajan, who had the stages of defining, design, develop and disseminate. In the define stage, the researcher analyzes the potential of the problems that arise. Design designs according to potential and existing problems. At this stage the researcher made a prototype of the Minitab software-based statistical teaching material for statistical courses. Develop at the develop stage is divided into two stages, namely: appraisal and developmental testing. The expert appraisal stage of teaching material products that have been designed and made validated by experts. In the developmental testing phase of the design of teaching material products that have been made, limited testing is carried out on the subject. Disseminate researchers do the last stage, the researchers conduct validation testing.

Validation is carried out by material experts, education experts and media experts. A small-scale test was conducted on five students. Every expert's measurement uses a Likert scale. With very good criteria, good, enough, less, and very less. The results of the assessment by experts are calculated using the following table 1.

**Table 1.** The final percentage score criteria

Criteria	Classification
$0 < P \leq 20$	Very weak
$20 < P \leq 40$	Weak
$40 < P \leq 60$	Enough
$60 < P \leq 80$	Strong
$80 < P \leq 100$	Very strong

### 3. RESULT AND DISCUSSION

The initial stage in this study is to design teaching materials consisting of ten parts: the first part of statistical introduction, the second part of the population mean test, the third part, analysis of variance, the fourth part of the correlation test, the fifth part of the regression test, the sixth part of the sign test, part to seven Wilcoxon tests, part eight mann-whitney test, part nine kruskalwallis test, tenth part friedman test.

**Figure 1.** Display Cover

The purpose of the cover is made interesting to attract students' interest in learning the contents of this book. So students have the desire within themselves to learn the material presented.

**Uji Analisis Variansi (Anova)**

**One Way ANOVA**

Uji Anova atau yang sering disebut dengan uji analisis variat. Uji anova dilakukan untuk menyelidiki rata-rata perbedaan antar grup, sehingga seringkali di sebut sebagai *analysis of variance*. Uji Anova merupakan pedasaan dari uji-t sehingga beberapa asumsi serta logika penujian mirip dengan uji-t. Pada penujian anova yang di bandingkan adalah rasio variansi di dalam grup dengan variansi antar grup ( $F_{hitung}$  dengan ( $F_{tabel}$ ). Sehingga dalam penujian dengan menggunakan uji anova, ingin melihat apakah terdapat perbedaan yang bermakna dari setiap grup. Hipotesis nol pada penujian anova akan sama dengan variabel yang akan dikaji (dengan k adalah jumlah grup atau populasi yang akan dibandingkan). Formulas hipotesis nol sebagai berikut:

$$H_{0: \mu_1 = \mu_2 = \dots = \mu_k}$$

Sementara itu untuk pemulisan hipotesis penelitian, peneliti harus menyebutkan sekurang-kurangnya (at least) satu dari populasi atau grup tersebut berbeda. Formulas hipotesis penelitian sebagai berikut:

$H_{1:}$  Paling sedikit satu dari  $\mu$  populasi atau antar grup-gup berbeda.

Penujian Anova dengan bantuan software Minitab akan terasa lebih mudah. Data yang telah diperoleh selanjutnya di input pada software Minitab.

Figure 2. Display Section Figure

**Tugas Mandiri**

- Seorang departemen menguji hipotesis. Apakah rata-rata tinggi badan pegawai pria sebesar 155 cm, dengan sampel acak sebanyak 35 orang pegawai pria. Dengan simpangan baku 7,3 cm. Buktikanlah apakah dugaan tersebut benar ? (gunakan taraf signifikansi 15%).
- Suatu percobaan dilakukan untuk melihat daya tahan suatu baterai dengan 5 jenis baterai. Sehingga dibagi kedalam 5 jenis kelompok. Dengan data sebagai berikut:

Jenis Baterai				
A	B	C	D	E
50	90	30	80	70
90	70	90	80	60
30	50	70	20	90
20	30	40	90	40
70	60	70	40	70

Berdasarkan data tersebut, buktikanlah apakah rata-rata lamanya daya tahan ketiga jenis baterai sama ? ( $\alpha = 0,05$ )

- Perusahaan yang memproduksi pelék ban mobil dengan diameter berdistribusi normal dengan rata-rata 35 cm. Kepala *quality control* menduga bahwa mesin tersebut kini rata-rata pelék ban mobil yang dihasilkan mesin tersebut berubah. Maka diambilah sampel sebanyak 15 unit untuk membuktikan kecurigaan tersebut.

Sampel Ke-	Diameter Pelék Ban Mobil
1	35,4
2	30
3	32,4
4	35

Figure 3. Independent Tasks

In Figure 2 and figure3 the material and independent assignments are made as attractive as possible, aiming at students easily learning the material and working on the practice questions.

**Refleksi Pemahaman**

Pada kolom ini tuliskanlah pengalaman saudara sebelum dan sesudah mempelajari materi pada bab ini.

Figure 4. Reflection column

The reflection column is given to assist students in conducting self-reflection after and before learning begins. This goal is in line with Chen (2011) who explains that in the process of learning independence students need to make, organize, choose, heat and evaluate learning outcomes. The next step is to evaluate the experts: material experts, educationalists and media experts.

**Tabel 2.** Expert Evaluation

Expert evaluation	Percentage	Classification
Material expert	83%	Very strong
Educationist	80%	Very strong
Media experts	76%	Strong

Material experts give an assessment of 83% with a very strong classification. Improvements from material experts, given a detailed explanation related to the material from each chapter. The aim is to facilitate students in learning the material.

Educationist give an assessment of 80% with a very strong classification. The input given is that the formula in the manual calculation is also given. The goal is that students are not only good at using software, but also smart at doing calculations manually.

Media experts gave an assessment of 76% with a strong classification. The advice given is that the material to be made more colorful and attractive. The goal is that students do not feel bored in studying the material.

After repairs are made, validation is carried out again by material experts, education experts and media experts. So that all suggestions given are fixed. Furthermore, a small-scale test was conducted by five students. The test results give 80% results with a very strong classification. In small-scale testing students give input there are several tables and columns that are truncated. So some improvements are made to perfect the module.

#### 4. Conclusion and Suggestions

Teaching material produced through this research, aims to develop student learning independence in industrial statistics courses. It is hoped that students will not only be good at using Minitab software, but students can independently study the material for each chapter.

After a process of testing by material experts, educationalists and media experts. With 83% rating by material experts, 80% by educationalists and 76% by media experts. Small-scale testing by students also provided an 80% rating with very strong classification. So based on these results the teaching materials developed in this research on industry statistics materials, are worth using.

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