THE DEVELOPMENT OF TELECOMMUNICATION ENGINEERING GRADUATE COMPETENCY AT POLYTECHNIC VOCATIONAL EDUCATION (STUDY: PADANG STATE POLYTECHNIC)

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Doctorate Student (S3) Faculty of Education, State University of Padang (UNP)

ABSTRACT: The study of graduate competency standard which can increase the graduates competency with work competency in industry world for Padang State Polytechnic (PNP) can be established by identifying the competency which involves lecture, industry, practioners, alumni, and students. It can be formulated as follow: (1) Assessing the Learning Outcomes (LO), (2) Deciding the designed model on the development of graduate competency standard, (3) the relevance level on graduate competency of PNP with work competency at the industry world based on Vocational Stream of the Indonesian Qualification Framework (KKNI). This research has generated the designed model on the development of graduate competency which is held by PNP. The purpose is to increase the relevance of graduate competency with work competency at the industry world based on Vocational Stream of the Indonesian Qualification Framework (KKNI) by applying R&D method. This method is considered relevant with the demand on the working world. Structurally, the procedure of this research can be concluded into four stages, they are: (1) Preliminary study, (2) Designing and developing the model validation, (3) Model test-drive, and (4) Revision and finalisation on the mode. Lecturer, student, alumni, industry and practioner are the five components that have significant role in the development of relevance on the graduate competency with the working world. The development of competency and curriculum should have been followed as well by the development of lecturer competency, student and alumni as the learning party. Their participation can strengthen the competence mastery in the industry world as the users of required competency in the working world which is considered significant.

Key word : extremely important, important, unimportant

I. INTRODUCTION

The education in Polytechnic provides its graduates with skills which are supported with sufficient theoretical knowledge and discipline character. By having those points, it is expected that the alumni of this Polytechnic Vocational Education can be vocational human resource in fulfilling the needs of professional work force in supervision level within the industries, particularly in Engineering and Commerce. The pattern of this vocational education sets intensive system in their lecturing time which is applied in small classes with 24 to 26 students per each class. To add, all students in the same semester and study program will follow the same lecturing. The education and lecturing system in Polytechnic takes the hour package system which is in accordance with semester credit system (SKS). The load unit is named semester credit unit (sk).
raising the quality of human resources (SDM) of all people in this country.

The concept of this polytechnic vocational education is based on the needs of work force in industrial world where the planning of the work force cannot be separated from the education level which is included high education. The needs of work force market and educational level should be designed integrally by paying attention to the purpose and the target of industry. The difference in education level has to be capable in differentiating the level/type of task description, function, and competence which are required by relevant structure of work field. The Professional Education Line at the high education level develops a system where the alumni can implement and transform technology becoming an economical product, which fulfills the requirement standard neither national or international one. This line consists of Diploma I level to Diploma IV. The percentage of its knowledge, experience, and training in this kind of education can be seen in Picture 1 (Bambang Budiono, 2001: 15).

![Picture 1](image1.png)

**Picture 1. The percentage of knowledge, experience, and training at vocational education (Bambang Budiono, 2001: 15)**

Meanwhile in the future model of vocational education as explained in Picture 2., the vocational education has received attention from community taken from the the side of the user on the result process of this education, and from the side of the students to be in the community. Here, the users are from the industry or from other businesses that have realized on the needs of the skilled work force and experts which are produced by the vocational education organizer. (Putu Sudira et al, 2009)

![Picture 2](image2.png)

**Picture 2. The future education model, Explanation**

F = Fantasy M = Knowing K = Career T = Evaluating, Deciding P = Developing, T = Implementing

Referred to the stated purpose, thus they have to work effectively and efficiently, to develop the skills and the expertise, to have a good stamina and master their own skill and basic knowledge and technology, to have high work ethic and to be capable in communicating based on the needs of their work, and to have the ability in empowering themselves. In order to achieve these purposes, the polytechnic vocational education has designed a curriculum which covers critical thinking dimension (cognitive), feeling, attitude and norms
(effective), and the ability to conduct something (psychomotoric). The cognitive aspect encompasses several fields such as: (1) Technical Sciences; (2) Basic Sciences, Mathematics; and (3) Social Sciences. Where the Aspective Aspect encompasses the fields on: (1) Technical Specialties; (2) Communication Skills; and (3) Humanities. Furthermore, the Psychomotoric Aspect can be classified into (1) Technical Electives; (2) Computer Competencies; (3) Cooperative Educations; and (4) Remedial Works (Bambang Budiono, 2001 :4). The curriculum structure of this kind of education has been set up referred to the Ministry Decree No. 056/U/1994. According to its characteristic, the lecturing process, the education material has several processes, they are: (1) learn to know; (2) learn to do; (3) learn to learn; (4) learn to behave; and (5) learn to live together.

The curriculum which is applied by Polytechnic Vocational Education is in the consideration of theory 60% and practice 40% (SKS). Therefore, this education can produce graduates which are relevant to the characteristic of Padang State Polytechnic (PNP). Majority, the graduates of this institution have to have a good competence in conducting their work, empowering themselves either vertically or horizontally, and having ability to run their life in a good way. Through this point of view, the substance and the content of the curriculum which is implemented by PNP is chosen and compiled based on the competency-based curriculum, broad-based curriculum, and life skills approach.

Competency-based curriculum is meant to confirm that the curriculum does consists of lecturings which are needed in order to achieve the competencies which are required by the work field. Likewise it is also from planning the lecture as well. By implementing competency-based training which has been designed modularly, it is expected that the students will receive learning experience which can develop their own potential in mastery the learning competencies level by level. This learning experience should have been conducted without any burden of unrelated competencies mastery. Even conceptually, this curriculum is designed in order to be performed in the form of working directly through production process as production-based training.

Based on the explanation above, it can be said that the discussion about the graduates competency of Polytechnic Vocational Education, particularly on the study program of Telecommunication Engineering (PSTT) in order to raise the relevance of lectured competencies with required competencies. The preliminary step in the process of that discussion has been done through identifying which competencies are needed of the work field by Polytechnic Vocational Education, particularly the study program of Telecommunication Engineering (PSTT) which is based on Vocational Stream of the Indonesian Qualification Framework (KKNI). The identification can be done through a research that involves lecturer, students, alumni, industry and practitioners in telecommunication field.

II. METHODOLOGY

This study aims to create a developmental designed model of graduates’ standard competency which has been conducted by Telecommunication Study Program – State Polytechnic of Padang to increase relevance between the competence of its graduates and the industrial competence based on National Qualification of Main Competence (KKNI). This study applies the Research & Development method as Borg dan Gall describe (1979:624),"education research and development is a process used to develop and validate education product". This method has high relevance to develop standard competence of graduates based on National Qualification of Main Competence (KKNI, and it is considered as relevant program that accommodate requirement of job qualification.

Post Graduate Program at Padang State University (2014:36) describes three models of Research & Development, they can be seen as (1) procedural model, (2) conceptual model, and (3) theoretical model. The Conceptual model as one of these models is analytical which includes product components, detailed analytical
components, correlation among developed components, menunjukkan hubungan antar komponen yang akan dikembangkan). The Research & Development which is recommended by Borg & Gall (1989) in developing a model with flowing scheme as mentioned by Sugiyono (2007:409) can be seen as follows:

![Picture 3 The scheme of Research and Development Method](image)

This study applies quantitative data analysis by using statistic correlation and regression technique (Arikunto, 2009:247) for testifying hypotheses, then the discussion of this statistic analysis result can be identified as the next process. This discussion is used to define analysis result which has been conducted in this study, the steps can be described as follows:

a. The achievement level of responders on each variable can be calculated by using the following formula (Sudjana, 1982)

\[
\text{Achievement Level} = \frac{\text{Average Score}}{\text{Maximum Ideal Score}} \times 100\%
\]

b. Homogeny test

This test is used to observe whether the data has homogeny variation or not. This homogeny test applies Barlett Test (Sudjana, 1996).

c. Linear Test

Linear test of regression line with simple regression technique and double regression can indicate the linear regression line.

### III. RESULT

**The Summary of Research Questionnaire Score Interpretation**

<table>
<thead>
<tr>
<th>No</th>
<th>Indicator</th>
<th>Lecturer</th>
<th>Students</th>
<th>Alumni</th>
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</tr>
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<td>85.31%</td>
<td>87.51%</td>
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<td>80.15%</td>
<td>86.53%</td>
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</tr>
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<td>81.38%</td>
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<td>74.89%</td>
<td>76.39%</td>
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Avarage 81.41% Good

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<tr>
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<td>23</td>
<td>Good</td>
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<td>3</td>
<td>Radio Communication Network</td>
<td>28</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>Antenn and Propagation</td>
<td>9</td>
<td>Good</td>
</tr>
<tr>
<td>5</td>
<td>Signal, Image and Video Processing</td>
<td>9</td>
<td>Good</td>
</tr>
<tr>
<td>6</td>
<td>Radar and Navigation</td>
<td>12</td>
<td>Good</td>
</tr>
</tbody>
</table>

**IV. CONCLUSION**

Based on the table above, it can be concluded that:

1. From the subject of Telecommunication and computer network with 26 units of total competence, with the good level of achievement to finish the job.
2. From the subject of Telecommunication Transmission with 23 units of total competence, the level of achievement to finish the job is good.

3. From the subject of Radio Communication Network with 28 units of total competence, the level of achievement to finish the job is good.

4. From the subject of Antenna and Propagation with 9 units of total competence, the level of achievement to finish the job is good.

5. From the subject of Signal, Image and Video Processing with 9 units of total competence, the level of achievement to finish the job is good.

6. From the subject of Radar dan Navigasi with 12 units of total competence, the level of achievement to finish the job is good.

REFERENCES


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The development of Polytechnic Vocational Education requires the joint cooperation policy, support and full participation from organizations in the government and non-government. It also needs full participation from business and industry world (dudi), and the community who uses the vocational education. As an additional, this Vocational Education has a great role in planning and creating professional and productive human resources (SDM). Its presence becomes significant in development time, as it can produce a skillful human in bridging the community and the state interest. It is hoped that this education can be an instrument in enriching the quality of people in Indonesia. As the country is still facing the economic crisis and the limitation of fund in accelerating and creating highly educated people, therefore by having this kind of education can be one of best alternatives in
raising the quality of human resources (SDM) of all people in this country.

The concept of this polytechnic vocational education is based on the needs of work force in industrial world where the planning of the work force cannot be separated from the education level which is included high education. The needs of work force market and educational level should be designed integrally by paying attention to the purpose and the target of industry. The difference in education level has to be capable in differentiating the level/type of task description, function, and competence which are required by relevant structure of work field. The Professional Education Line at the high education level develops a system where the alumni can implement and transform technology becoming an economical product, which fulfills the requirement standard neither national or international one. This line consists of Diploma I level to Diploma IV. The percentage of its knowledge, experience, and training in this kind of education can be seen in Picture 1 (Bambang Budiono, 2001: 15). 100 %

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![Diagram](image)

**Figure 3** The scheme of Research and Development Method

The Research and Development method has three primary phases which can be identified as (1) pre-development phase, (2) development phase, dan (3) and modelled implementation phase. Firstly, the pre-development phase includes initial study such as theoretical analysis, literature e, and relevant research findings as well as field observations. Then, the development phase includes several activities such as determining and creating developmental designed model of graduates’ competence which can be applied by Telecommunication Engineering Study Program at State Polytechnic of Padang to improve relevant competence of its graduates with industrial requirements based on National Qualification Framework of Main Competence (KKNI) implementation. The designed model also includes its manual guidance and implementing instructions. Finally, the implementation phase of graduates’ competence model consists of some activities such as validating, testing, evaluating and revising as well as presenting a final model.

**III. RESULT**

**The Summary of Research Questionnaire Score Interpretation**

<table>
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<th>Indicator</th>
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<th>Students</th>
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**Average** 81.41% **Good**

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4. From the subject of Antenna and Propagation with 9 units of total competence, the level of achievement to finish the jobs good
5. From the subject of Signal, Image and Video Processing with 9 units of total competence, the level of achievement to finish the jobs good
6. From the subject of Radar dan Navigasi with 12 units of total competence, the level of achievement to finish the jobs good.

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LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : PROSIDING

Judul Karya Ilmiah : The Development of Telecommunication Engineering Graduate Competency at Polytechnic Vocational Education (Study : Padang State Polytechnic)

Jumlah Penulis : 1 Orang : Nasrul
Status Pengusul : Penulis ke 1

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d. Penerbit/organiser : Universitas Negeri Padang
e. alamat repository PT/Web prosiding :
f. Terindeks di (jika ada) : ..................................................

Kategori Publikasi Makalah : ☐ Prosiding Forum Ilmiah Internasional .................
(beri ✓ pada kategori yang tepat) ☐ Prosiding Forum Ilmiah Nasional .......

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<tr>
<td>b. Ruang lingkup dan kedalaman pembahasan (30%)</td>
<td>4/5</td>
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<td>c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)</td>
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<tr>
<td>d. Kelengkapan unsur dan kualitas terbitan/prosiding (30%)</td>
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<td>Total = (100%)</td>
<td>14,9</td>
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Nilai Pengusul =

Catatan penilaian paper oleh reviewer : Artikel Baik sekali

** coret yang tidak perlu

29 Agustus 2018
Reviewer

Dr. Nazrie Nazruddin ST. M.Si
NIP 19700527 198501 1001
Unit Kerja : Elektro
# LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : PROSIDING

Judul Karya Ilmiah : The Development of Telecommunication Engineering Graduate Competency at Polytechnic Vocational Education (Study : Padang State Polytechnic)

Jumlah Penulis : 1 Orang : Nasrul
Status Pengusul : Penulis ke 1

Identitas Prosiding :
- a. Judul prosiding : 3rd International Conference on Technical and Vocational Education and Training (TVET)
- b. ISBN/ISSN : 978-602-1178-11-9
- c. Tahun terbit/tempat pelaksanaan : 2015, Bukittinggi
- d. Penerbit/organiser : Universitas Negeri Padang
- e. alamat repository PT/Web prosiding :
- f. Terindeks di (jika ada) :

Kategori Publikasi Makalah :
- Prosiding Forum Ilmiah Internasional ....................
- Prosiding Forum Ilmiah Nasional ...........

Hasil Penilaian Peer Review :

<table>
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<th>Internasional</th>
<th>Nasional</th>
<th>Nilai Akhir Yang Diperoleh</th>
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<tr>
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<td>a. Kelengkapan unsur isi paper (10%)</td>
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<td>b. Ruang lingkup dan kedalaman pembahasan (30%)</td>
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Catatan penilaian paper oleh reviewer :

Prosiding Baik

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Padang, 21 Agustus 2018
Reviewer

[Signature]

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NIP 196507291990031021
Unit Kerja : Fotografi Teknik Elektro