E-ISSN : 2774-8472
P-ISSN: 2774-8480

Jurnal Hurriah: Jurnal Evaluasi Pendidikan dan Penelitian
Vol. 2, No. 3, Sep 2021, hal. 89-97

ASSESSING THE VOCATIONAL TAXONOMY HIERARCHY

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Abstract

Taxonomy recently defined as the naming or classification of an idea or name, in terms of one discipline. However, there is a lack of regulation in the concept of vocational education. Based on Bloom, the taxonomy is built to determine the level of cognitive, affective, and psychomotor ability. Higher Vocational education (SMK) cannot fully use Bloom's Taxonomy. Vocational Taxonomy is dependent on the psychomotor theory which emphasizes aspects of physical movement. However, the purpose of this research is to determine the Vocational Taxonomy hierarchical structure for SMK N 1 Jeunib. The design of this research is a qualitative research which using the interview method to assess the perception of the Vocational teacher in terms of determining the Vocational Taxonomy. The sample chosen was SMKN 1 Jeunib, Bireun, Aceh, which selected 54 teachers from all departments. From the data, the respondents presented that they believed the Vocational Taxonomy is important in terms of learning and teaching. Then, the taxonomic function is very important and assisting in teaching and learning, aiding the curriculum preparation, and contributing the practical activities. However, the taxonomy function is important in the measurement and assessment of psychomotor activities. It was recommended that Vocational Taxonomy was important to apply. The research also stated that there was a need for a link between cognitive and psychomotor aspects.

Keywords: *Taxonomy, Vocational, Hierarchy*

Abstrak

Taksonomi diartikan sebagai penamaan atau klasifikasi suatu gagasan atau nama, dalam satu disiplin ilmu. Berdasarkan Bloom, taksonomi dibangun untuk mengetahui tingkat kemampuan kognitif, afektif, dan psikomotorik. Pendidikan Tinggi Kejuruan (SMK) tidak dapat sepenuhnya menggunakan Taksonomi Bloom. Taksonomi Vokasi bergantung pada teori psikomotorik yang menekankan pada aspek gerak fisik. Adapun, tujuan dari penelitian ini adalah untuk mengetahui struktur hierarki Taksonomi Kejuruan SMK N 1 Jeunib. Desain penelitian ini adalah penelitian kuantitatif dengan metode survey untuk menilai persepsi guru SMK dalam menentukan Taksonomi SMK. Sampel yang dipilih adalah SMKN 1 Jeunib, Bireun, Aceh yang memilih 54 guru dari semua jurusan. Dari data tersebut, responden menyatakan bahwa mereka percaya Taksonomi Kejuruan penting dalam hal belajar dan mengajar. Kemudian, fungsi taksonomi sangat penting dan membantu dalam proses belajar mengajar, membantu penyusunan kurikulum, dan menyumbangkan kegiatan praktis. Fungsi taksonomi penting dalam pengukuran dan penilaian aktivitas psikomotorik. Direkomendasikan bahwa Taksonomi Kejuruan penting untuk diterapkan. Penelitian tersebut juga menyatakan bahwa perlu adanya keterkaitan antara aspek kognitif dan psikomotorik.

Kata Kunci: *Taksonomi, Kejuruan, Hirarki*

INTRODUCTION

Currently, facing the 21st century millennial era, the government stated that the future generation must have the competencies needed such as communication, collaboration, creative thinking skills, technological skills, interpersonal skills, and problem solving skills. To support the functions of educational institutions, especially in terms of vocational education, the Government seeks to compile

the curriculum that accordance with the educational goals and objectives. The vocational education curriculum must meet the demands of the users (industry or company). However, in implementing the curriculum of vocational, the problems are encountered, both for teachers, students or the school management itself. In addition, vocational education having problems which related to scientific issues that are closely related to the world of work and industry. These issues are summarized in a module or taxonomy that currently used by the global education world.

Taxonomy can be defined as the naming or classification of an idea or name, according to one discipline. Etymologically, the term taxonomy comes from the Greek language, namely taxon which means collection or unit and nomos which means laws or rules that function to place one business in a particular taxon (Partha & Kholia, 2010). Taxonomy can be defined as the grouping of things based on a certain hierarchy (level) (Wikipedia.org, 2019) or which means systematic, arrangement and division (Enghoff, 2009). Bloom's Taxonomy is a taxonomy that is widely used in the world of education and learning. Basically, Bloom's taxonomy was published in the 1950s, in a meeting of the American Psychological Association by Benjamin Bloom. Bloom's Taxonomy covers three domains, namely the Cognitive Domain, the Affective Domain, and the Psychomotor Domain. However, according to Jackie Greatorex and Irenka Suto (2016), there is no perfect taxonomy that is appropriate with education. Among many taxonomies, according to those who approach and overshadow complex domains are Marzano and Kendall's Taxonomy (2007) and Hutchins et al. (2013).

In its implementation, Bloom's taxonomy does not cover the vocational education discipline. There is a lack of regulation in the concept of vocational education. Bloom's Taxonomy places more emphasis on cognitive aspects. Vocational education (SMK) cannot fully use Bloom's Taxonomy. Vocational Taxonomy is centered on psychomotor theory which emphasizes aspects of physical movement. However, vocational education is not entirely on the physical aspect, it still requires cognitive aspects. Thus, it’s important to build the Vocational Taxonomy which is prepared with combining the cognitive and psychomotor aspects. However, in its implementation, the percentage of cognitive aspects is greater than psychomotor. Thus, the graduates from vocational education do not master complex competencies because of demands for more theoretical mastery.

There needs to review the Vocational School curriculum by integrating academic science with vocational fields. Realizing that vocational education graduates will not only master technical skills but also other abilities such as literacy, creative thinking, critical thinking, and problem solving ability (Ramlee et al., 2003). Psychomotor is the basis of vocational education. SMK students have a learning style that focuses on what the teacher transforms rather than just reading or listening. Psychomotor can be defined as gross and fine motor skills that are interrelated with other technical abilities (Mimi et al., 2014). According to Reynolds (1965) in Norhazizi and Ramlee (2019), mentions that psychomotor learning involves a lot of physical (motor) and mental (psycho) activities.

Psychomotor abilities are determined by the existence of habits or practice exercises routinely. This means that there is “learning by doing” activity which is a concept of Dewey's theory. The field of vocational education requires a learning concept "learning by doing" and a "experiential learning" concept that combines practice and experience. This activity is an important motor ability to be arranged in a taxonomy. So it is necessary to have in-depth research on a vocational taxonomy that is fulfill the vocational education needs. An important aspect in the formation of Vocational Taxonomy, is the number of learning styles of SMK students. According to Ramlee (2012), there are at least three learning styles for vocational education students, namely cognitive, affective and manipulative (the suitability of the body and brain in carrying out physical activities).

It be concluded that taxonomy is required a specific knowledge classification regarding vocational education. In Indonesia, the vocational education curriculum does not respond to the needs of the Industry and affects the quality of competence of students. The ILO (International Labor Organization, 2013) states that there needs to be a policy from the state to overcome the miss-match curriculum problem and correct the wrong one. However, the purpose of this research is to determine the appropriate Vocational Taxonomy hierarchical structure for SMK N 1 Jeunib.

METHOD

This research aims to assess the teachers’ perception of Vocational Taxonomy domain. The qualitative research was chosen by using open-ended question method to assess the teachers’ opinion of the Vocational Taxonomy. The school used was SMKN 1 Jeunib, Bireun, Aceh. The School has A and B accreditation in several field of expertise. The areas of expertise include agribusiness, agricultural product processing, boutique clothing, fishery, automotive engineering, fishing vessel Nautica, fishing vessel engineering, and hospitality. However, the respondents involved were teachers of SMKN 1 Jeunib which selected 54 teachers from all departments. In this study, the instrument used was a set of open-question. There are five questions asked to them. The question was asked about teacher’s agreement of vocational taxonomy, vocational taxonomy’s importance, teachers’ approval of the taxonomic hierarchy, teachers' suggestions for taxonomy and last question was teachers’ recommendations for vocational taxonomy.

RESULT

The result presented the teachers’ statement about the vocational taxonomy for the vocational school (SMK) in Aceh. From the Table 1, the teachers believed that Vocational Taxonomy is important for SMK learning and teaching (item 1).

Table 1. *Teachers' Agreement of Vocational Taxonomy*

Item	Frekuensi (%)
1. Do you agree that Vocational Taxonomy is important for the SMK teachers?	
a. Yes	54 (100%)
b. No	-

Furthermore, the teachers were asked to state the level of importance of the taxonomic function in vocational education. In Table 2, the taxonomic function is very important and assisting in teaching and learning, aiding the curriculum preparation and contributing the practical activities (item 2). In addition, the taxonomy function is important in measurement and assessment. However, one teacher of the SMKN 1 Jeunib stated that taxonomy is not important for its function in learning and teaching, curriculum preparation, practical activities and measurement and assessment. Generally, it can be concluded that taxonomy was a key role in succeed the teaching and learning process of SMKN 1 Jeunib. Finally, it is necessary to revise on the correct and precise of the taxonomic arrangement.

Table 2. *Analysis of Taxonomic Importance in Vocational School Education*

Item	Very Important	Important	Less Important	Not Important
2. If you agree that vocational taxonomy is important, please choose its importance according to the taxonomic function in vocational education.				
a. Teaching and learning	33	17	-	1
b. Curriculum Development	29	22	-	1
c. Practice Activities	29	21	-	1
d. Measurement and Assessment	21	27	-	1

Furthermore, teachers are asked their agreement in terms of the vocational taxonomy that has been compiled by the taxonomist. The suggestions of taxonomists are as follows:

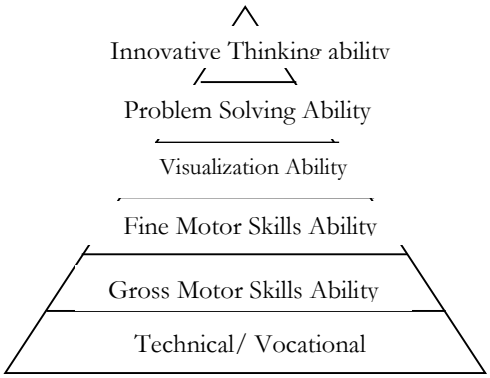

Figure 1. Proposed Vocational Taxonomy Hierarchy

Further, the teachers were requested to give their agreement of the proposed Vocational Taxonomy by the taxonomist (item 3). Table 3 presented the teachers perception of those hierarchy. There are 98% of teachers agreed with the taxonomic hierarchy proposal designed by taxonomists. Meanwhile, one teacher (2%) disagreed and made the proposed taxonomy according to personal knowledge.

Table 3. *Teacher Approval of the Taxonomic Hierarchy*

Item	Frequency (%)
3. Do you agree with the order of the taxonomic hierarchy?	
a. Yes	53 (98 %)
b. No	1 (2 %)

The next item question was asked about teachers' suggestions for designing the vocational taxonomy (item 4). There were several suggestions that noted in this research. Majority of them suggest that vocational taxonomy is acceptable to be implemented in SMK, but it need to develop. Other suggestion was the application of vocational taxonomy in SMK can help entrepreneurship-based learning. Teachers also suggested to align the Vocational Taxonomy in the SMK curriculum. Another suggestion would presented on the Table 4.

Table 4. *Teachers' Suggestions on the Taxonomic Hierarchy*

No	Suggestion
1.	This vocational taxonomy is acceptable to be implemented in SMK, but its development needs to follow-up.
2.	Hopefully, the application of vocational taxonomy in SMK can help entrepreneurship-based learning
3.	This Vocational Taxonomy needs alignment in the application of the curriculum. Thus, it would achieved the aim of thinking and practicum ability.
4.	Improve motivation in learning and vocational taxonomy learning model.
5.	The vocational taxonomy will provide benefits for vocational teachers. Further, it would create a comprehensive learning process and assessment of the vocational domain.
6.	The Vocational taxonomy is important for learning in SMK because it deals with cognitive, technique, theory and practice in the laboratory
7.	Vocational taxonomy needs to be implemented for vocational students in the field of expertise. It could affect the ability to think and practice which corresponds for the business and industrial world.

Final question was asking about their recommendations about the Vocational Taxonomy (item 5). The numbering of recommendations followed the teacher's majority answers. Most of the respondent recommend that there should hold scientific research related about vocational taxonomy. The teachers also recommended that the implementation of vocational taxonomy would increase the balance of

thinking and practicum that needed in the 21st century skills. Another recommendations have showed on Table 5 as below.

Table 5. *Teachers' Recommendation on the Taxonomic Hierarchy*

	Recommendation
1.	In terms of Vocational knowledge application, the practice learning is higher (60%) than theory learning (40%). It might affect the taxonomy level. Hopefully, there will be a further research related about this.
2.	The vocational taxonomy is important in vocational schools. It would increase the balance of thinking and practicum that needed in the 21st century skills.
3.	Vocational taxonomy is appropriate for compiling the SMK curriculum
4.	It is necessary to continue the similar research by increasing the number of sampling school for the research that would represented the result.
5.	It is important to socialize about vocational taxonomy for vocational teachers as the main subject in the learning-teaching process.

Based on the data, it can concluded that the vocational taxonomy hierarchy for SMK N 1 Jeunib as preview below (figure 3). Generally, the teachers of SMK N 1 Jeunib agreed with the proposed hierarchy of vocational taxonomy suggested by taxonomists. It can believed that the most basic level is Technical Knowledge, the second level is Gross Motor Ability, the third is Fine Motor Ability, the fourth is Visualization Ability, the fifth is the Ability to Solve Problems and the last is the Thinking Innovation Ability. It would benefit to facilitate the learning-teaching process, compile the vocational curriculum, guide the practicum activities and assist the assessment and measurement process.

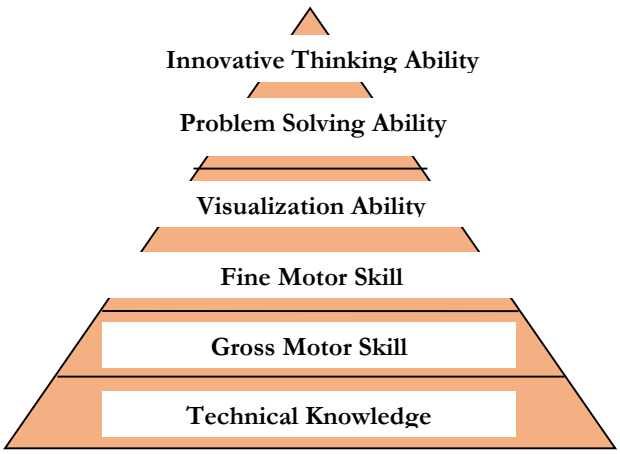

Figure 2. Vocational Taxonomy Hierarchy

The results indicated that the respondents were strongly agreed with the proposed Taxonomy domain. The results of the empirical data presented that the function of Vocational Taxonomy is very important for teaching and learning in SMK. The importance of the taxonomy in terms of curriculum, specifically in terms of practical activities. Vocational taxonomy is important for aspects of

measurement and assessment. Based on the research data, the respondents suggested that innovative, creative and active learning were important aspect in SMK. However, the appropriate learning methods for vocational education including demonstrations, simulations and project-based learning (Norhazizi & Ramlee, 2019). Related to the taxonomy domain and according to the teachers' perception, the gross motor skills, fine motor skills and visualization abilities are appropriate to the interests of learning and teaching. This ability correspond to the concept of Simulation and Demonstration learning method. Then, the PBL model is intended to the problem solving ability and innovative thinking domain. In terms of the curriculum development, the important aspect needed in SMK are practical or hands-on activities. It was necessary to develop students' knowledge and psychomotor skills (Abigail, 2016). The taxonomy domains that appropriate with this importance are Fine Motor Abilities and Gross Motor Skills. According to Norhazizi and Ramlee (2019), to improve their practical ability, students need to remediate their psychomotor competence. According to respondents, Vocational Taxonomy is important in practical activities that involve gross motor skills and fine motor skills.

For the purposes of measurement and assessment, vocational taxonomy is important. There are at least three educational assessment functions related to the vocational education, namely, improving the quality of vocational learning and teaching, (ii) determining the competence of education participants and (iii) determining the success of a program (US Congress, Office of Technology Assessment, 1992). The context of Vocational Taxonomy which aims to measure and assess technical knowledge are gross motor and fine motor skills domain. The assessment of practical activities included measurement of speed, accuracy and implementation steps. Meanwhile, the visualization stage of the assessment involved graphic communication skills which related to the design ability. Finally, the assessment at the problem-solving and innovation aspects are the ability to generate and realize new ideas (Norhazizi & Ramlee, 2019). Basically, the Vocational Taxonomy is hierarchy format which means that learning at the top level depends on the knowledge and abilities in the lower step before. Thus, the taxonomy structure in the form of a hierarchy, made the teachers understand the level of ability that students must learn from the low to the high level.

CONCLUSION

Based on the result, in can concluded that Vocational Taxonomy was important in the teaching and learning process of SMK, curriculum preparation, practical activities and assessment and measurement processing. Basically, the Taxonomy is arranged according to Simpson, Harrow and Dave's psychomotor theory. From the data, it is stated that Vocational Taxonomy is designed with six domains, namely (1) domain of technical knowledge, (2) domain of gross motor skills, (3) domain of fine motor skills, (4) domain of visualization, (5) domain of problem solving and (6) innovative thinking domain. The respondent strongly agreed with the suggestion Vocational Taxonomy which designed by taxonomist. The teachers also stated that there was a need for a link between cognitive and psychomotor

aspects. Hopefully, the students compiled mastered not only the aspects of knowledge but also skills.

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