Relevance of Multimedia Expertise Competency in Vocational Schools toward the needs of Business/Industrial World

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ABSTRACT

This study aims to determine the relevance of vocational school curriculum with the needs of business/industrial world, based on competency profile in the structure of 2013 curriculum after revision. The method used is a survey with quantitative descriptive approach, and data analysis techniques use descriptive statistics. The findings of the study reveals that there are 13 basic competencies of competency profiles needed by the business/industrial world in printing graphic design subject; in 2D and 3D animation subject, there are 19 basic competencies needed; and on audio and video processing engineering subject, all of the basic competencies as many as 18 items are needed by the business /industrial world. In general, all the basic competencies of those three subjects, in terms of percentage, are in the very relevant category. This means that this 2013 curriculum after revision is truly needed and has been relevant to the world f work needs, so that if it's applied in vocational schools, competency of the graduates of multimedia expertise competency already able to fulfill the competencies of the business/ industrial world.

Keywords: competency; curriculum; multimedia; relevance; vocational.

INTRODUCTION

Vocational education is one of educational program that is expected to be able to give contribution to the development of human resources, especially for youth to get better job opportunities. Vocational education is education that prepares students to become professional and competent workers. As said by (Pavlova, 2009) that vocational education has objective to prepare workers. Based on those objectives, to equip students or prospective workers is done by providing provisions in the form of competencies that can support their work readiness.

Vocational school or better known as SMK is one of formal education level in Indonesia.

SMK which is a secondary school that prepares its graduates to be ready to work is given learning material in theory as well as practice to support its students to own competency. That competency will be used in the world of work.

The world of work is the ultimate goal that will be achieved or will be undertaken by someone, whether in the industry, business, or government agencies and professions. The world of work requires SMK graduates/ prospective workers to have a professional attitude and good competency. Based on (Presiden Republik Indonesia, 2013) PP.No.32 of 2013 about National Education Standards explains that competency is a set of attitudes, knowledge and skills that must be possessed, internalized, and

mastered by students after learning a learning content, completing a program or completing a particular educational unit. This is corresponding with (Burke., 2005) that competency is the knowledge, skills, and attitudes possessed by each individual to be able to do work in a professional manner in accordance with the profession they have. Thus, students must be equipped with good attitudes, knowledge and skills that can be used to become professionals. To prepare graduates with attitude, knowledge and skill competencies that can be accepted by the business/industrial world, then it's not separated from curriculum.

The curriculum used in Vocational Schools is a curriculum which is compiled and developed by the government through National Education Standards Agency (BSNP). Curriculum has structure which includes subjects along with core competencies (KI) and basic competencies (KD) for each subject in the 2017-revised version of the 2013 curriculum. On its structure, subjects and basic competencies have been compiled comprehensively, so that the subjects and competencies are interrelated, support and complement, without overlapping one another. The implementation of the curriculum in Vocational Schools must go through adjustment by concerning the condition of the school, students, regional potential, scientific and technological progress, and environmental needs, especially the needs of the working world.

The competency of multi-media expertise is currently one of the competencies needed by the working world, as it relates to animation, media and others. As said by the chief of literacy development center and profession of human resources communication, Prof.Dr.Gati Gayatri, that along with the rapid growth of the world of advertising, public relations, broadcasting and content distribution via social media, the need for labor in the field of information and communication technology (ICT) is experiencing a significant increase each year. He further said that based on data released by Data Fast 50, the demand for human resources in the content industry globally continued to increase to 63%, especially in the field of multimedia, editing, and graphics, research library center (litprof, 2017). Therefore the applicable curriculum constantly adjusted, which on the after revision version, the subject become less and more adjustable with the development of technology and business/industrial world needs nowadays. This adjustment

mainly has to pay attention to the development of science and technology, in order to develop curriculum that can keep up with the development of business/industrial world needs that much faster to keep up with science and technology development, where it slowly changing and developing from manual head to computerization.

Vocational school as a formal education institution that produce ready-to-use resources in the working world need to make adjustment on expertise competency by paying attention to the relevance of competency on the curriculum toward business/industrial world needs. The curriculum needs to be adjusted with working world needs, in terms of relevance. Relevance according to Indonesia Dictionary (KBBI) is relation, bond. Principle of relevance consists of two types, which are external relevance and internal relevance. External relevance indicates the relevance between curriculum with students' living environment and society and the development of life nowadays and future. Internal relevance indicates the relevance between the curriculum components itself, (Widiaty, 2013). That adjustment is continuously made, however in reality that happen in education world, there is an incompatibility between programs held by education units and the business/industrial world. Among these incompatibilities, not all subjects along with their competence required by the business/ industrial world, the competencies contained in curriculum structure do not immediately build and train student skills that can be used or adjusted to the needs of the business world/industrial world so that SMK graduates is often underestimated. As well as the competencies that should keep up with the development of science and technology through curriculum development can't anticipate the rapid development of science and technology, in addition the competencies (KI and KD) that have started to be specific but evidently are not needed by the business/industrial world. In line with previous problems, (Deworoto, 2017) states that there is basic competency taught in vocational schools, yet not relevant to the needs of the business/ industrial world.

Different things is found by (Puruasdi, 2016) that the relevance of competency on manufacturing image engineering subject at SMKN 2 Pengasih toward the competency of industrial needs is 87,05% and classified in highly relevant category, there are some competencies that are not needed by industry.

(Ramdani, Hamdani, & Suhayat, 2017) reveals that mechanical drawing material at SMKN 2 Bandung with SKKNI overall has compatibility level by percentage 80, 09% on relevant category. Besides the relevance of competency toward working world needs, according to (Haylusi, 2015) that the relevance level of productive subject competencies on apprenticeship program is 91% (highly relevant) with details of the basic relevance of vocational competency with work is 96% (highly relevant), and the relevance of vocational competency is 87% (highly relevant). According to (Ramadhan, 2013) the competency of SMK graduates at building engineering study program on TGB expertise competency is relevant with competency required in working world. In line with that, (Suwarsono, 2013) write that the relevance between curriculum of architectural drawing expertise competency SMKN 3 Yogyakarta with industrial needs in highly relevant category. (Yoga, 2017) summarize that out of 18 basic competencies which covers 83 sub-basic competencies of audio video, there are 16 basic competencies (88%) which classified in relevant category with competency needs in industry, and 2other competencies are less relevant. And out of 83 sub-basic competencies, there is 64, 5% sub-competency that relevant with competency needs in industry, while the remaining 35, 5% sub-competency are not needed by the industry in Bandar Lampung.

The findings of those studies show the lack of education world to offset the rapid progress of the world of work that has an impact on the ability of graduates who are less able to handle and operate the latest technology. This inability makes the unemployment rate of vocational high school graduates in the city of Makassar included in high category, according to the South Sulawesi provincial statistics center (Stistik, 2018), the open unemployment rate in South Sulawesi is 5.95%, which is mostly come from working age with the latest education high school/equivalent. That shows the low level of absorption of high school/equivalent graduates, which includes vocational schools in the world of work, especially business/industrial world.

To achieve the development and implementation of curriculum with competencies that are indeed needed by the business /industrial world, this can be done by perfecting and harmonizing the curriculum with competencies according to the needs of graduate, which is the business/industrial world (link and match). In addition, can be done by increasing cooperation with institution, government and the business/industrial world itself, as well as by providing competent educators and education personnel in their respective fields. Study conducted by (Westerlund, 2015) reveals that there is a need of recommended curriculum that must be considered so that IT graduates keep relevant, this is done by compile a curriculum that corresponding with future needs. (Widiyanto, 2010) summarize that the school needs to identify competency needs of DUDI; second, DUDI's mechanism in developing the competency needs is a strategy that can be used by SMK to develop curriculum with competency as expected by DUDI. The findings of the study by (Okedeyi, Oginni, Adegorite, & Saibu, 2015) reveals that the acquisition of relevant skills in Multi Media will improve teaching and learning of scientific concepts in secondary schools. Based on the findings, recommendations were proffered to inculcate knowledge of multimedia skills in improving teaching of science.

Based on the problems above, researchers are interested to know the relevance of vocational schools curriculum to the needs of the business/industrial world, which are reviewed from the competency profile in the structure of 2013 curriculum after the revision.

METHOD

The method used in this study is survey. This study uses quantitative descriptive approach. The objective of this research is to quantitatively describe the profile of competency needs of the world of work that comes from KIKD 2013 curriculum as stipulated in the structure of the 2013curriculum after revision. The KIKD in 2013 curriculums after revision are printing graphic design, 2D and 3D animation, and audio and video processing engineering. The samples of this study are the leaders and HRD of business /industrial world of PT.TVRI Makassar, PT. Media AD, CV. Liga Vision, CV. Fadel Digital Printing. Technique of collecting data is using questionnaires, data analysis techniques using descriptive statistics.

Instrument used in this study is questionnaire. The type of questionnaire used is a closed questionnaire, in which the statement and answers are already available in it to be selected as an alternative choice; with a rating scale. The statement in the questionnaire was guided by

KIKD in the 2013 curriculum after revision. Respondents can choose alternative answers that considered most suitable with their needs by giving a sign (√). The following is an overview of the questionnaire construction:

1) Number of questionnaire items

The number of questionnaire items used for instrument of the competency of the business/industrial world needs as many as 56 items.

2) Questionnaire form

The form of questionnaire is a statement with choices, which can be selected by giving a sign (√), to one of the 4 answer choices provided. This questionnaire uses Likert scale, which has previously been validated by an expert validator. The questionnaire uses Likert scale to simplify the classification of the level of basic competency needs by business/industrial world.

Table 1 Likert Scale

No.	Scale	Score
1	Very needed	4
2	Needed	3
3	Less Needed	2
4	Not needed	1

To find out the level of compatibility or relevance of the research, used table of relevance category as follows

Table 2 Category of Relevance Level

Percentage Level	Category
76% - 100%	Highly Relevant
56% - 75%	Relevant
40% - 55%	Less Relevant
<40%	Not Relevant

RESULTS AND DISCUSSION

Results

The findings for each basic competency on each subject with the needs and relevance to the business/industrial world as follows:

a. Basic competency needs on printing graphic design subject

Printing graphic design subjects, learn about graphic design, typography and photography. Graphic design subjects have basic competencies as below, and from the results of the survey reveals that the needs of business/industrial world competencies based on the 2013 curriculum guidelines after revision in the form of basic

competencies, as follows:

Table 3 Basic Competency Needs of Printing Graphic Design Du/Di

No.	Basic Competency	Frequency
1	Make a design by applying the basics of graphic design and naming	14
2	Make designs using the right typography	14
3	Draw sketches and illustrations	13
4	Draw shapes and perspectives	13
5	Combining vector-based images and text	13
6	Designing effects on vector images	11
7	Combining bitmap-based images and text	12
8	Design effects on bitmap images	13
9	Make a review of Bitmap and Vector based designs	13
10	Developing images reference according to Photography science	13
11	Operate types of cameras and photography aids	11
12	Operate digital cameras and maintenance of photographic equipment	10
13	Take pictures according to the field of view and point of view,	13
14	Adjust lighting in shooting	13
15	Take pictures with zooming and panning techniques	12
16	Take pictures with blurring techniques	11
17	Take pictures based on image composition in photography	12
18	Make digital photography artwork	11
19	Making a Photography Report	11

On printing graphic design subject, out of 19 basic competencies, there are 13 basic competencies required based on the frequency tabulation result. As for 13 basic competencies needed are : 1) create a design by applying the basics of graphic design and naming; 2) make designs using the right typography;3) drawing sketches and illustrations;4) drawing shapes and perspectives;5) combine vector-based images and text;6) combining bitmap-based images and text;7) designing effects on bitmap images;8) make a review of Bitmap and Vector based Design;9) develop reference images according to Photography science;10) take pictures according to the field of view and point of view;11) regulating lighting in shooting;12) taking pictures with zooming and panning techniques;13) take pictures based on image composition in photography.

b. Basic competencies in 2D and 3D animation subjects

2D and 3D animation subject learn about making vector-shaped animations with various techniques, making 3D animation in the form of motion graphics to create products and product reports. Based on the survey findings, the needs of business/industrial world competencies based on the 2013 curriculum guidelines after revision in the form of basic competencies, as follows:

Table 4. Basic Competency Needs for 2D and 3D Animations Du/Di

No	Basic Competency	Frequency
1	Conveying the basic principles of making 2D (vector) animations	12
2	Make simple object images using 2D animation applications	12
3	Create 2D animation using tweening techniques	14
4	Make simple characters using 2D animation applications	13
5	Make puppeteer digital image elements in 2D animation	13
6	Make puppeteer digital motion in 2D animation	13
7	Make a background image	14
8	Applying animation principles in animation production	14
9	Create 2D animation products	13
10	Make a review of 2D animation products	13
11	Sketching design 3D objects	13
12	Creating a Simple Model based on 3D Hard surface	13
13	Processing simple object modeling based on 3D Hard surface	13
14	Apply Material to Simple 3D objects	13
15	Place the right camera position in a 3 dimensional application	14
16	Make non character digital motion in 3D applications	13
17	Apply Rendering techniques to 3D objects	14
18	Creating 3D animation products using simple objects (Motion Graphics)	13
19	Make a report of working process of 3D animation products	13

On 2D and 3D animation subjects, out of 19 basic competencies, all basic competencies are needed, based on frequency tabulation result. The basic competencies are: 1) conveying the basic principles of making 2D animation (vector);2) create simple object images using 2D animation applications;3) make 2D animation using tweening techniques;4)create simple characters using 2D animation applications;5) create puppeteer digital image elements in 2D animation;6) make thepuppeter move in 2D animation;7) make a background image;8) applying the principles of animation in the production of animation;9) making 2D animation products;10) make a review of 2D animation products;11) sketching 3D object designs;12) Creating a Simple Model based on 3D Hardsurface;13) processing simple object modeling based on 3D Hardsurface;14) apply Material to 3D Simple objects;15) put the right camera position in a 3-dimensional application;16) make digital motion non character in 3D applications;17) applying Rendering techniques to 3D objects;18) making 3D animation products using simple Motion Graphics;19) make a report of the process of 3D animation products.

Basic Competencies In Audio and Video Processing Engineering

Audio and video processing engineering Subject learn about the production process of multimedia, image taking /shooting procedure, the use of video processing software, combines audio and video, to packaging products. Based on the survey findings, the needs of business/industrial world competencies based on the 2013 curriculum guidelines after revision in the form of basic competencies, as follows:

Table 5. Basic Competency Needs for Audio and Video Processing Engineering

No.	Basic Competency	Frequency
1	Create a multimedia production process flow	12
2	Operate video cameras according to procedures	14
3	Able to apply camera movement techniques based on size (framing) and camera angle	14
4	Adjust lighting in moving images (video recording)	14
5	Editing videos using video processing software	13
6	Manipulate videos using the video processing software effects feature	15
7	Manipulating audio using digital audio software features, 8) integrating audio and video according to the demands of the script	13
8	Combining audio and video according to the demands of the script	14
9	Review audio visual products	14
10	Create a short video process flow (profile videos, features and other short videos)	15
11	Record moving images (video) using the camera	13
12	Combining audio and video according to the demands of the script	14
13	Improve the quality of audio data	14
14	Combine text to combine with videos	13
15	Make special effects by using special effects software features	14
16	Make videos according to the scenario	15
17	Make video production packaging	13
18	Make short video production reports	15

Competency on audio and video processing engineering subject, there are 18 basic competencies which is required entirely by the business/industry, based on frequency tabulation result, as follows:1) create a multimedia production process flow;2)operating a video camera in accordance with procedures;3) able to apply camera movement techniques based on the size (framing) and camera viewing angle;4) regulate lighting in taking moving images (video recording);5) editing videos using video processing software;6) manipulate videos using the video processing software effect features;7) manipulating audio using digital audio software features;8) integrating audio and video according to the demands of the script;9) integrating audio and video according to the demands of the text; 10) reviewing audio visual products;11) create a short video process flow (profile video, features and other short videos);

12) record moving images (video) using a camera;13) integrating audio and video according to the demands of the script;14) improve the quality of audio data;15) combine text to be combined with video; 16) create special effects using special effects software features;17) make videos according to scenario;18) making video production packaging;19) make short video production reports.

The relevance of Basic Competency based on Curriculum Documents with the Competency Needs of Business/Industrial World

The following is the percentage relevance of basic competencies of the three subjects, which are printing graphic design, 2D and 3D animation, and audio and video processing engineering based on the 2013 curriculum document after revision to the needs of the business/industrial world/, which is obtained

from the total score of the questionnaire of business /industrial world needs

Table 6. The Relevance of the Competency of World of Work Needs

No.	Subjects	Percentage	Category
1	Printing Graphic Design	63.15	Relevant
2	2D and 3D animations	82.23	Highly relevant
3	Audio and Video Processing Techniques	86.45	Highly relevant
	Average	77.27	Highly relevant

The Relevance of expertise competency in percentage form are printing graphic design on 63.15% included in the relevant category, 2D and 3D animation 82.23% in the category of highly relevant, audio and video processing techniques is 86.45%, and the average of all competencies in these three subjects is 77.27% classified in the highly relevant category. This means that this 2013 curriculum after revision is indeed needed and has been relevant to the needs of the world of work, so that if it is applied in vocational schools, then the competence of graduates of multi-media expertise competencies can fulfill the competencies of the business /industrial world.

Discussion

Based on the findings of this study, it was found that most of the basic competencies in each subject on Multi Media expertise competency are needed by the business/industrial world (DUDI). While the relevance level of expertise competency with DUDI is at the relevant and highly relevant level.

The review of this study findings illustrate that the contribution of basic competencies in the 2013 curriculum document revised 2017 of SMK on Multi Media expertise competency has been able to fulfill DUDI's needs in the Multi Media field competency.

It is supported by the research of (Dumo, 2018), which stated that the relevance level of competency between SMK and Du/Di is on the relevance level 100% where all competency items are needed by Du/Di. So is the research of (Prasetyani, 2017) which stated that the relevance of SMK graduate competency that needed by DUDI classified into "relevant" category, however there are still several DUDI that classified into "less relevant" category. In line with Prasetyani, (Setiawan, 2017) found that the relevance of the competency standards of audio

video engineering students in Bantul district with the needs of the industrial world reach 84% with relevant category.

CONCLUSIONS AND SUGGESTIONS

This study aims to determine the relevance of vocational curriculum with the needs of the business world / industry, based on competency profiles in the 2013 curriculum structure after revision. Based on the point of the research findings and discussion above, it can be concluded that, the basic competencies in 2013 curriculum after revision are needed by the business /industrial world, as seen from the percentage of relevance on multimedia expertise competency on the basic competencies possessed by its three subject, printing graphic design, 2D and 3D animation, and audio and video processing engineering that in the relevant and very relevant category.

Level of working world needs toward basic competency based on curriculum after revision can be used as basis in the development of curriculum in multimedia expertise competency.

Based on this research, relevance level between basic competencies that implemented in SMK with basic competency that is needed by the working world can be stated in relevant category. This can be a matter of reflection or evaluation, that basic competency which is programmed in SMK can be maintained with continuous revision on some aspects that not relevant based on this research, to increase the compatibility of students' competency on multimedia expertise package. So that the competencies implemented on the learning process in Vocational Schools are the competencies which are really needed by DUDI in the field of multi-media.

To complete the research findings, there are several suggestions stated by the researcher, as follows: vocational school should be agreed upon or carried out an MOU in planning and implementing a curriculum that has been made by the government, so that the curriculum that contains competencies which is taught to the

students can be in line with the needs of the business/industrial world. Vocational schools and the business/industrial world need to conduct more in-depth and periodic assessments regarding the competency content of curriculum, due to the extremely rapid technological developments that result in work competencies which is needed by the business/industrial world can change any time. To the next researcher, be desirable to review and analyze the curriculum, especially the competencies taught in the future, as well as the work competencies of the business/industrial world, because curriculum is greatly influences the realization of good quality education.

REFERENCE

Burke., J. (2005). *Competency Based Education and Training*. USA: UK The Flamer Press, Taylor & Francis Inc., 1900 Frost Road, Suite 101, Bristol, PA 19007.

Deworoto, S. (2017). *Relevansi Isi Kurikulum 2013 SMK/MAK Paket Keahlian Teknik Komputer dan Jaringan (TKJ) terhadap Kebutuhan Dunia Usaha/Industri (DU/DI) Studi Kasus Pada SMK Negeri 1 Sentani Kabupaten Jayapura*. *Tesis*. Yogyakarta: Universitas Negeri Yogyakarta.

Dumo, M. R. R. (2018). *Relevansi Kompetensi Yang Dibutuhkan Dunia Usaha dan Dunia Industri (Du/Di) Bidang Multimedia Dengan Kompetensi Keahlian Multimedia SMK Di Kabupaen Poso*. *Tesis*. Yogyakarta: Universitas Negeri Yogyakarta.

Haylusi, N. (2015). Relevance Between Competency Productive Course With The Job In Implementation Work Practice In Industry Of Learning Technical Enginering SMK N Migas Cepu Lessons Years 2014 / 2015. *Jurnal Taman Vokasi*, *3*(32), 532–542.

Okedeyi, A. S., Oginni, A. M., Adegorite, O. S., & Saibu, S. O. (2015). The Relevance Of Multi Media Skills In Teaching And Learning Of Scientific Concepts In Secondary Schools In Lagos State, Nigeria. *Journal of Education and Practice*, *6*(15), 150–154.

Pavlova, M. (2009). *Technology and Vocational Education for Sustainable Development*. Springer Science +Business Media B.V. https://doi.org/10.1007/978-1-4020-5279-8

Prasetyani, H. (2017). *Relevansi Kompetensi Lulusan SMK Kompetensi Keahlian Multiedia Terhadap Kebutuhan Dunia Usaha dan Dunia Industri (DUDI) ditinjau dari Kurikulum Di Kabupaten Pati*. *Tesis*. Yogyakarta: Universitas Negeri Yogyakarta.

Presiden Republik Indonesia. (2013). Peraturan Pemerintah Republik Indonesia No 32 Tahun 2013 Tentang Standar Nasional Pendidikan.

Puruasdi, R. J. (2016). Relevansi Mata Pelajaran Teknik Gambar Manufaktur Di SMK. *Jurnal Pendidikan Vokasional Teknik Mesin*, *4*, 535–540.

Ramadhan, M. A. (2013). Relevansi Kompetensi Lulusan SMK Khususnya Kompetensi Keahlian Teknik Gambar Bangunan Dengan Kompetensi Yang Dibutuhkan di Dunia Kerja. *Jurnal PenSil Jurusan Teknik Sipil FT UNJ*, *2*(1), 1–10.

Ramdani, M. V, Hamdani, A., & Suhayat, D. (2017). Studi relevansi mata pelajaran produktif paket keahlian teknik gambar mesin dengan standar kompetensi kerja nasional indonesia di smk. *Journal of Mechanical Engineering Education*, *4*(2), 198–205.

Setiawan, A. (2017). *Relevansi Kompetensi Siswa SMK Program Keahlian Teknik Audio Video dengan Kompetensi yang dibutuhkan Industri di Kabupaten Bantul*. *Tesis*. Yogyakarta: Universitas Negeri Yogyakarta.

Stistik, B. P. (2018). Keadaan Angkatan Kerja. Makassar: Badan Pusat Statistik Provinsi Sulawesi Selatan.

Suwarsono, S. (2013). Relevansi Kurikulum Teknik Gambar Bangunan Smkn 3 Yogyakarta Dengan Kebutuhan Dunia Industri. *Jurnal Pendidikan Vokasi*, *3*, 359–372.

Westerlund, M. (2015). Designing a Modern IT Curriculum : Including Information Analytics as a Core Knowledge Area. In *Proceedings of the 17th Australian Computing Education Conference (ACE 2015)* (Vol. 160, pp. 27–30). Sydney: CRPIT.

Widiaty, I. (2013). Relevansi Kurikulum Smk Berbasis Industri Kreatif Dengan Metode Extrapolation and the Econometric Approach. *Innovation of Vocational Technology Education*, *9*, 29–42. https://doi.org/10.17509/invotec.v9i1.4882

Widiyanto. (2010). Strategi Pengembangan Kurikulum Berbasis Kompetensi Dudi Untuk Smk. *Jurnal Pendidikan Ekonomi Dinamika Pendidikan*, *V*(2), 103–116. Retrieved from https://media.neliti.com/media/publications/60056-ID-strategi-pengembangan-kurikulum-berbasis.pdf

Yoga, M. R. (2017). Relevansi Penerapan Kurikulum Kompetensi Keahlian Audio Video SMK Negeri 2 Dengan Kebutuhan Industri. *Jurnal Elektronik Penddikan Teknik*, 37–42.