

An Academic Development Model of Mechanical Engineering Professional Teachers Using the ON-IN-ON-IN System in Vocational High Schools

Gede Widayana^{†*}, Djoko Kustono[‡], Tuwoso[‡], Muladi[‡]

[†] Students of the vocational education doctoral program at Malang State University

[‡] Faculty of Engineering, State University of Malang

* Corresponding author e-mail: gede.widayana@undiksha.ac.id

ABSTRACT

Teachers can be said to be the key to education. Teachers develop themselves by reading a lot of books, journals, references, writing scientific papers, attending seminars or training. Teachers must be able to master the curriculum and translate it into a more operational educational program in the form of lesson plans. This research is focused on designing normative teacher learning models to be educated to become productive teachers. The purpose of this study was to develop the design of a dual skill teacher education learning model in SMK. This research is the development of a learning model to design a learning model for dual skill teachers in SMK. By using the R & D method, teacher education learning designs are designed. From the assessment of the aspects of objectivity, curricular content, learning activities, educational resources and evaluation strategies, the results are 'very good', which means that the design of this model can be used in multi-skill teacher learning. The results of the validation state that this design is suitable for use in non-productive teacher education programs to become productive teachers.

KEYWORDS

Development Model, dual skill teacher, vocational high school.

INTRODUCTION

The main key to student success in learning is strongly influenced by the teaching professionalism of a teacher [1]. Teachers play a key role in education. The main tasks of a teacher are to educate, teach, guide, train, direct, assess and evaluate the students [2]. Teachers are expected to constantly improve their qualities so that their competencies will be developed over the course of times. Moreover, instilling the basic values of students' character development in their lives is likewise the teacher's job [3]. Teachers are expected to be professional in caretaking education to provide high quality education. The development of information technology must be utilized by the professional teachers for the sake of teaching and learning process development [4]. A professional teacher is a teacher who competently build a good learning process so as to provide a high quality education. There are three criteria of professional teachers [5], which they should be able to meet the professional competencies for educators, build a good collegueship and develop social-awareness. The professional development of teachers through career development programs is to improve teachers' competencies [6]. The mapping of teachers' competencies can be obtained by Teacher Competency Test (UKG) for pedagogical and professional competencies [7-9]. The outcome can be seen by the strengths and weaknesses of teacher competencies on knowledge acquisition which later was manifested in the form of teacher training. The teachers competency development program is carried out through face-to-face method, online method and can likewise be a mixture of face-to-face method and online method [10].

Self-development becomes the main thing of the teachers' profession [11, 12]. Teachers are expected to constantly develop themselves by reading books, journals, references, writing scientific papers, attending seminars or training course [13-15]. Conducting continuing professional development activities is mandatory for the teachers so that their competencies development and career success can be carried out as needed, constantly

and sustainably [16]. It will improve teachers' teaching skills, so the teaching and learning process will be interesting, innovative and total. Moreover, self-development evokes professional self-awareness of the teachers to further improve their knowledges and skills for their students' academic development. Moreover, entering the industrial revolution 4.0, teachers are expected to constantly develop themselves and master specific field of their expertise [17]. Career development as one of the strategies, ensures the teachers to continuously maintain, improve and develop their competencies based on the established standards.

The strategic role of professional teachers in Vocational High School, where the existing quantities and qualities of proficient professional teachers, will synergistically impact the embodiment of learning in Vocational High Schools. Competency Standards for Teachers include four main competencies [18], namely pedagogical competence, personal, social and professional competence [19]. In addition, teacher's status as a professional staff serves to improve the dignity of the teachers and their role as an agent of learning to improve the quality of vocational education. The shortage of productive teachers and the amount of normative teachers in Vocational High School [20] demands the schools to provide Vocational Training Programs for normative teachers. The aim is transforming the normative teachers to be the productive ones by enhancing teachers' expertises commonly referred as professional teacher [21]. The form of the training is Teachers' Professional Education (abbreviated as PPG) with the initial purpose of teachers mastering their competencies based on the established standards [21]. The success of teachers' professional development is largely determined by the environment formed during the learning implementation. Conducive learning environment maintains students success in learning participation and the achievement of the desired goals and competencies.

Teachers need to be able to master and interpret the curriculum [22] into more practical academic planning in the form of annual, semester, monthly, weekly and daily plans, commonly addressed as lesson plans (abbreviated as RPP) [23], which will be presented in front of the class. Learning curriculum needs to be well-studied and maturely understood in the teaching and learning process to achieve good learning outcomes for the students. The curriculum is one of the elements that contributes to the development process of the students' potential. Therefore, the development of the competency-based curriculum [24] is much-needed as a directing instrument for the students to be civilized human beings, who are able to answer the challenges of the era that constantly developing, educated, faithful, noble, healthy, creative, independent and responsible [25,26]. In improving the professional teacher according to [60], there is an increase in the teaching ability of teachers after joining a community that provides many benefits in developing the teacher profession. This study focuses on designing a learning model of normative teachers to be educated and developed into productive teachers in Vocational High Schools. The aim is to develop the professionalism of normative teachers by providing professional education suited to their interests and talents. The instructional design model of professional teachers includes methodologies, skills and training to develop effective mastery in the area of expertise. It will provide the added value to the teacher's professionalism, so that it can be applied in learning process.

RELEVANT LITERATURE

Instructional design

Instructional design refers to a learning development [27] applied in ensuring quality of learning where the learning plans are arranged in accordance to the applied concepts and curriculum. There are some who stated that instructional design is a practice for preparing communication media between teachers and students to achieve the learning objectives [28]. Wherein there are students' comprehensive plan in terms of cognitive, mental, physical aspects, furthermore the formulation of learning objectives and planing the learning material to help the process of knowledge transfer from teachers to students, and likewise the evaluation plan. There are many experts opinion describing the definition of instructional design. Reigeluth (1983) stated that instructional design is the process of formulating goals, strategies, techniques and medias. This opinion was likewise reinforced by Reiser [30] & Richey, Dennis C. Fields, Foxon [31]. In contrast to Sharif & Cho [32] who stated the instructional design as people's learning process which included several stages, both short-term and long-term stage.

Another opinion by Isman [34] stated that instructional design is an analysis and the answer of the students' needs in learning. Basically, all the experts opinions above are valid where any of those lead to the main

objective of instructional design that is achieving more effective and efficient learning [35]. The opinions are likewise reflecting what is the role of instructional design is (developing effective and efficient learning systems, increasing teachers' skills, solving learning problems, predicting learning success, producing learning resources and as a measuring tool for learning outcomes) [36,37]. Several components needs to be considered in preparing the instructional design are students's skill and potential [2] [38], formulation of learning objectives [39], teaching materials [40], analysis of learning activities, development of learning materials [41] [28], learning methods [42], learning resources and evaluation as the competency measurement tool [43]. The characteristics of the instructional design as described above, including:

1. Student-oriented [38], where each individual has different physical, mental, moral, and emotional.
2. Systematic mindset, where each component has a specific role in achieving the formulated goals [44].
3. Empirical and repetitive, where each model is inevitably empirical and can be developed [45].

Broadly speaking, the steps need to be considered in preparing the instructional design are as follows:

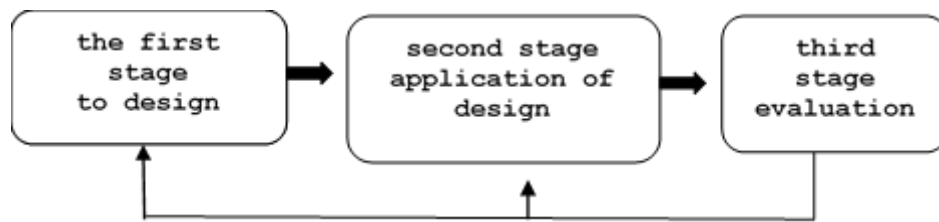


Figure 1. Learning Activity Cycle

Instructional design models

Instructional design includes the needs, the systems and the objectives of learning. It is likewise including development, learning activities, implementation, assessment and evaluation. Below are four instructional design models cited by some experts using various design principles:

The Dick and Carey Model

[46] All ten steps are connected in this model, some influence others indirectly while some may influence others directly. The system is concise, compact and clear from one step to the next. This model is suitable for the beginners as a basis for preparing instructional design models. In this model, it is mandatory to analyze and determine students' skills before formulating the objectives. The ten steps of the Dick and Carey model are (1) Identify Instructional Goals and Objectives (2) Conduct Instructional Analysis (3) Identify Entry Behaviors and Learning Characteristics (4) Write Performance Objectives (5) Develop Criterion-Referenced Test items (6) Develop Instructional Strategy (7) Develop and Select Instructional Materials (8) Develop and Conduct Formative Evaluation (10) Develop and Conduct Summative Evaluation.

ASSURE Model

This model includes the stages in preparing Instructional Design from Analyze learners, State standards and objectives, Select strategy, technology and materials, Utilize technology, media and materials, Require learner participation and Evaluated and revised [47]. This model was developed by Sharon E. Smaldino, James D. Russell, Robert Heinich and Michael Molenda [48] to plan the learning implementation systematically using technology and media.

ADDIE Models

This model emerged in the 1990s, developed by Reiser and Mollenda This model is a guideline in building the training program equipment and infrastructure. There are five stages of development in this model, including Analysis, Design, Development, Implementation and Evaluation [49].

Model J. E. Kemp

This model is considered as the cyclic circular model [49]. In this model, the design of learning system consists of several components, developed as needed. The components are (a) determining competency standards (b)

analyzing student characteristics (c) determining basic competencies (d) determining subject matters (e) pre-test (f) determining learning strategies (g) coordinating supporting facilities (h) conducting an evaluation.

RESEARCH METHODS

Research Design

This study is the development of instructional design models refer to the Borg and Gall version of the research and development model [50] to design an instructional model of professional teachers education in Vocational High School. According to Borg, research on educational development is a process conducted to develop and validate educational products. This study refers to the stages of the research process based on Gall, Meredith D. , Borg, Joyce P [50] modified into five stages: (1) needs analysis stage; (2) design development stage; (3) expert validation and revision stage; (4) trial stage; and (5) implementation stage. This study emphasizes is two stages of Borg & Gal’s research process, to be specific the development stage and the validation stage. At the development stage, the design model of the professional teachers is a model for vocational teachers to be trained and educated.

Teachers professional development model is referred from literature review, design simulations and data results obtained in the teaching-learning process. The targets to be achieved from the development of this education are teachers in vocational high schools in Indonesia who still teach normative subjects or productive teachers who want to improve their teaching skills in the classroom. The expert validation stage is conducted on the design model requested by the validator. The intention of conducting validation by involving the experts related to the product research is to figure out whether the product research is fully prepared for the field testing or not. The validators are the education experts and practitioners, as well as the selected design model experts. The validators’ feedback (either results or suggestions) is the input to revise and develop the model, so that it will be suitable to be applied in learning.

Year											
Jan	Feb	Mar	Apr	May	Jun	Jul	August	Sept		Oct until Dec	
ON 1			IN 1		ON 2			IN 2			
Teach initial subjects			Training		An apprentice teaching productive packages in class			Training		Industrial work apprenticeship	the activities
Basic introduction to vocational competencies			Preparation of learning tools		Field Industrial practice			Strengthening of materials	Sharpening competency skills and competency tests	Teacher professional education and training	
Learn to be independent			Strengthening of materials		Learn to be independent						

Procedure

The instructional design of vocational teachers education to professional teachers refers to the implementation of the professional learning programs by Kementerian Pendidikan dan Kebudayaan tahun 2017 [51].

Figure 2. Design Model of Professional Program in Vocational Schools (adapted from the Educator Certification Program and Vocational Teacher Certification Program, Ministry of Education and Culture Directorate General of Teachers and Education Personnel in 2017 [51]).

The steps of implementing Professional Program as shown in figure 1, including the activities of: 1) Guided Independent Learning (GIL) conducted at the teachers’ own Vocational High School or another Vocational High Schools as an apprentice (On-Service Training), 2) Education and Training Course (In-Service Training), 3) Business and Industrial Apprenticeship, and 4) Expertise Certification by the Professional Certification Institute (LSP) and Teaching Certification by Teachers’ Professional Education and Training (PLPG). Professional Design using a Sandwich System O n - In - On – In [52].

The Implementation Stage of In-Service Training 1 (IN-1) can be explained as follows.

1. The duration of IN-1 is eight weeks with a total of 476 Lesson Times.
2. There are four teaching and learning modules to be studied.
3. At the beginning of the IN-1 activity, a final test is conducted on three teaching and learning modules that have been studied in ON-1.
4. Participants participate in the education and training course of the productive material exploration, either theoretical and practical.
5. The study materials, which are included in the teaching and learning modules, consist of professional and pedagogical materials in the fourth modules up to seventh modules.
6. Participants are expected to prepare learning materials.
7. Participants conduct an industrial visit.
8. During IN-1 activity, participants are guided and assessed by the instructors, teachers, lecturers or experts from industrial sector based on their competencies.
9. At the end of the IN-1 activity, a final test is conducted on four learning and teaching modules studied at IN-1.

The learning methods applied in the IN-1 activity are as follows.

1. Applying the Adult Learning Approach (Andragogy) suited to the practical needs and self-development of the participants, interactive communication between participants and facilitators and between fellow participants, likewise, a dynamic and pleasant learning environment;
2. Applying a Scientific Mindset in the training course, where the learning strategies applied including Discovery Learning, Inquiry Learning, Problem Based Learning, Project Based Learning, and Design Based Learning;
3. The number of participants per group for professional competencies is between 10-20 people or adjusted to the characteristic of each skill package.

MATERIAL DESCRIPTION

- a. The policy of Teachers' Training and Career Development. This section discusses the guidance and career development of the teachers, particularly related to the policy of the Expertise Certification and Educator Certification Program for Vocational Teachers.
- b. Sustainable Professional Development Program. This section discusses Sustainable Professional Development as a form of sustainable learning to maintain and improve the whole competency standards, including specific fields related to the teaching profession.
- c. Reflection and in-depth study of three ON-1 modules. In this activity, participants present one of the three project assignments undertaken on ON-1 along with the in-depth study and modules comprehension studied during ON-1.
- d. In-depth study of Module Materials. Participants learn about four teaching and learning modules, either theoretical or practical, and work on the worksheets (assignments) given by the facilitators.
- e. Preparation of ON-2 Learning Materials. Participants prepare learning materials of Vocational productive lesson based on their chosen competencies or skill packages and do the peer teaching during IN-1. The learning materials will be presented by the participants for the teaching practice during ON-2.
- f. Industrial Visit. Participants conduct an industrial visit to learn about the process of organization, planning and production, likewise, the products and services marketing based on the competency skill at the Business World (DU) and Industrial World (DI).

- g. ON-1 Evaluation. Participants take the final test for three teaching and learning modules studied in ON-1. The final test is conducted at the beginning of the IN-1 online activity.
- h. IN-1 Evaluation. Participants take the final test for four teaching and learning modules studied in IN-1. The final test is conducted at the end of the IN-1 online activity.

Table 1. The structure of the IN-1 program

No	Theory	Lesson hour
1	Teacher Career Development and Development Policy	4
2	Sustainable Professional Development Program	4
3	Reflection and deepening of 3 ON-1 modules	30
4	Deepening of 4 th Module Material	94
5	Deepening of 5 th Module Material	94
6	Deepening of 6 th Module Material	94
7	Deepening of 7 th Module Material	94
8	Arrangement of Learning Devices (ON-2)	35
9	Industry Visit	20
10	ON-1 Evaluation (1st Module to 3)	3
11	ON-1 Evaluation (4th Module to 7)	4
	TOTAL	476

The implementation stage of In-Service Training 2 (IN-2)

The Implementation stage of In-Service Training 2 (IN-2) can be explained as follows.

1. The duration of IN-2 is 4 weeks with a total of 238 Lesson Times.
2. The is one module to be studied.
3. At the beginning of the IN-2 activity, a final test is conducted on two teaching and learning modules that have been studied in ON-2.
4. The study materials, which are included in the teaching and learning modules, consist of professional and pedagogical materials.
5. A study material of the competency skill corroboration is provided as a preparation for the competency assessment test.
6. The competency assessment test is conducted by Professional Certification Institute .
7. At the end of the IN-2 activity, a final test is conducted on one teaching and learning module studied in IN-2.

The learning methods applied in the IN-1 activity are as follows.

1. Applying the Adult Learning Approach (Andragogy) suited to the practical needs and self-development of the participants, interactive communication between participants and facilitators and between fellow participants, likewise, a dynamic and pleasant learning environment;
2. Applying a Scientific Mindset in the training course, where the learning strategies applied including Discovery Learning, Inquiry Learning, Problem Based Learning, Project Based Learning, and Design Based Learning;
3. The number of participants per group for professional competencies is between 10-20 people or adjusted to the characteristic of each skill package.

Program Structure and Material Description

1. Program Structure. The structure of the IN-2 program as shown in the following table 2.

Table 2. Structure of the In-Service Training 2 (IN-2)

No	Theory	Lh
1	Reflection and deepening of 2 ON-2 modules	20
2	10th Material Module Deepening	94
3	Strengthening Competency of Expertise	90
4	Expertise Competency Certification	30
5	ON-2 Evaluation (Modules 8 and 9)	2
6	IN-1 Evaluation (10th Module)	1
7	Comprehensive Assessment	1
	TOTAL	238

MATERIAL DESCRIPTION

- a. Reflection and in-depth study of two ON-2 modules. In this activity, participants present one of the two project assignments undertaken on ON-2 along with the in-depth study and modules comprehension studied during ON-2.
- b. In-depth study of Module Materials. Participants study on one teaching and learning module, either theoretical or practical, and work on the worksheets (assignments) given by the facilitators.
- c. A study material of the competency skill corroboration is provided as a preparation for the competency assessment test.
- d. The competency assessment test is conducted by Professional Certification Institute based on the chosen skill package.
- e. ON-2 Evaluation. Participants take the final test for two teaching and learning modules studied in ON-2. The final test is conducted at the beginning of the IN-2 activity.
- f. IN-2 Evaluation. Participants take the final test for one teaching and learning module studied in IN-2. The final test is conducted at the end of the IN-2 activity.
- g. Participants' Comprehensive Assessment refer to professional's comprehensive assessment in general, including the assessment of the facilitators and training evaluation.

Product Validation

Product validation by involving the experts related to the product research is to figure out whether the product research is fully prepared for the field testing or not. The experts are both the instructional design model experts and practitioners, selected based on their relevant competencies to the research.

Instruments

The instrument of the study was the questionnaire type with both open-ended and closed-ended questions. Open-ended questions are intended for the competent experts of the instructional design model, where the provided information will be in the form of suggestions or opinions about the instructional design model. Whereas, the closed-ended questions are compiled based on the instructional design model developed by Tania Moreira and Julia Espinoza [53] using 5 point Likert scale (as shown in Table 3).

Table 3. Operational matrix for the measurement tools used for instructional design

Dimensions	Indicators
Objectives	Degree of development for the procedural, cognitive and attitudinal objectives.

	Degree of satisfaction for the student's needs and expectations.
Curricular content	Level of congruence with the course objectives
	Compliance level based on the quality criteria
Learning Activities	Level of congruence with the course objectives
	Compliance level based on the quality criteria
Educational resources	Level of congruence with the course objectives and activities resources
	Compliance level based on the quality criteria
Evaluation strategies	Level of congruence with the course objectives and content
	Compliance level based on the quality criteria.

Data Analysis

This study uses both qualitative and quantitative datas. Qualitative datas were obtained from the questionnaires given to the experts and practitioners of instructional design model. The obtained datas can be used as the input to improve the design model. Meanwhile, Quantitative data were obtained from the validation testing in the form of a score on each instrument. Furthermore, the scores obtained are summed, averaged and converted into scores using a criterion-referenced table of scale 5 test adapted from Sugiyono [54].

Table 4. Conversion of Scores to Scores on a Scale of Five

Category	Score Range	Calculation
Very good	$X_p \geq M_i + 1.5SD_i$	$X_p \geq 4,21$
Well	$M_i + 1.5SD_i > X_p \geq M_i + 0.5SD_i$	$3,4 > X_p \geq 4,21$
Pretty good	$M_i + 0.5SD_i > X_p \geq M_i - 0.5SD_i$	$2,6 > X_p \geq 3,4$
Not good	$M_i - 0.5SD_i > X_p \geq M_i - 1.5SD_i$	$1,79 > X_p \geq 2,6$
Very bad	$M_i - 1.5SD_i > X_p$	$1,79 > X_p$

Where : X_p = actual score

$$M_i = \frac{1}{2} (\text{ideal maximum score} + \text{ideal minimum score ideal})$$

$$SD_i = \frac{1}{6} (\text{ideal maximum score} - \text{ideal minimum score})$$

Maximum score = 5

Minimum score = 1

$$M_i = 1/2 (5 + 1) = 3$$

$$SD_i = 1/6 (5 - 1) = 0,67$$

To locate the average score (mean score) of an assessment of the product that has been developed, the following formula is used:

$$\text{Where: } \bar{X}_l = \frac{\sum x}{n}$$

\bar{X}_l = Mean score

$\sum x$ = Total score

n = Number of respondents/validators

In this study, the feasibility of a minimum set value of "Very good", as the result of a good assessment by experts and practitioners of instructional design. If the results of the final assessment (overall) at least got an "Very good" by experts and practitioners, the instructional design of the development is already considered feasible in learning.

RESULTS

The Final Results of the Design Model of Learning Implementation in Preparing Professional Vocational Teachers

Goal : The teacher can have knowledge and skills in the area of expertise taught in learning						
Learning						
	ON 1	IN 1	ON 2	IN 2		
Activity	Teach initial subjects (C1,C2)	Training (C3)	Teaching Internships in Classroom and in Industry (C3,C4)	Training (C3,C5)	Industrial work apprenticeship (C1,C2,C3,C4,C5,C6)	
	Introduction to basic Vocational competencies (C1)	Arrangement of Learning Devices (C3, C4)	Industrial Work Practices (C3, C4)	Strengthening of Material (Modules) (C4, C5)	Teacher Professional Education and Training (PLPG)	
	Self Study (Module) (C2)	Strengthening of Material (Modules)(C2,C3,C4)	Self Study (Module) (C1,C2,C3,C4)	Sharpening Competency Expertise and Competency Test (C1, C2, C3, C4, C5, C6)		
Lesson Hours	350	470	350	238		

Figure 3. The Final Results of the Design Model of Learning Implementation

The Matrix of Learning Implementation for professional teachers illustrates the elements of learning and training based on Revised Bloom's learning objectives taxonomy. (C1 = remember, C2 = understand, C3 = apply, C4 = analysis, C5 = evaluation, C6 = create).

Validation Results

The assessments, suggestions and input provided by the experts and practitioners on the design development of instructional design for professional teachers are presented in the table below. The assessment provides a positive input for the perfection of the design model. Some advices given by the experts and practitioners can be a good input for the design model development of professional teachers. The design model of professional teachers have been well-prepared, however it needs to be developed to encourage teachers' teaching motivation and evoke their self-confidence.

Table 5. Results of Validation of learning design experts and practitioners

Dimensions	Indicators	value			Average	Catagory
		V-1	V-2	V-3		
Objectives	Degree of development for the procedural, cognitive and attitudinal objectives.	5	5	5	5	Very Good
	Degree of satisfaction for the student's needs and expectations.	4	5	5	4.67	Very Good
Curricular content	Level of congruence with the course objectives	5	4	5	4.67	Very Good
	Compliance level based on the quality creteria	5	5	5	5	Very Good

Learning Activities	Level of congruence with the course objectives	5	5	4	4.67	Very Good
	Compliance level based on the quality criteria	4	5	5	4.67	Very Good
Educational resources	Level of congruence with the course objectives and activities resources	5	5	5	5	Very Good
	Compliance level based on the quality criteria	5	5	4	4.67	Very Good
Evaluation strategies	Level of congruence with the course objectives and content	5	5	5	5	Very Good
	Compliance level based on the quality criteria.	4	5	5	4.67	Very Good

From the table, it can be seen that the assessment scores of all the instruments provided by the experts and practitioners already categorized as very good, which means that the developed designs have met the requirements to be applied in the training of professional teachers.

DISCUSSION

The design development of the instructional design models for professional teachers is divided into several stages in 1 following year. The undertaken stages are divided into four parts, namely the on-1, in-1, on-2 and in-2 stages, which are all taken during 1414 lesson times or 9 months [51]. During the learning process, several obstacles encountered can be resolved properly without reducing the initial objectives. The instructional design model for professional teachers integrate indoor and outdoor education as well as the applications which further be used in the industrial world. The cooperation among the graduates gains new practical experiences for the teachers which further can be delivered to their students. This cooperation not only improve teachers' teaching profession but also improve their effectiveness in caretaking the education systems of the schools. Six management principles conceived by Robbins & Coulter [55] including 1) Based on the market needs, 2) Skill training accesses for the students 3) Professional development for the teachers, 4) Standardization, 5) Soft skills, 6) Sustainable implementation. Most of the six principles have met as expected by the cooperation of schools and industrial corporation.

The advantage of the instructional design model for professional teachers by the industrial involvement is providing the real experience for the teacher in implementing their knowledges and skills gained from the training. Likewise, enriching teachers' insight and evoking their professionalism and self-confidence in delivering their knowledge to the students. The self-confidence and knowledge/skill experiences possessed by the teachers are very important in developing the professional teachers [56]. Furthermore, the teacher's readiness in preparing themselves before teaching, either knowledge or attitudes aspects, will conduct a successful teaching and learning process. Students who have been taught by professional teachers will possess competencies and skills as the provision to enter the workforce. Teachers professionalism are very important to guarantee the quality of education suited to the era of development and the Industrial Revolution 4.0 nowadays.

The instructional design model helps the teachers improving their professionalism, where they will be able to produce superior graduates and compete in the workforce. Teachers with only one skill are able to improve their competencies by attending training course for their personal development by using this design models. Teacher Education and Development Program can also be applied not only in Vocational High Schools but also in Junior High Schools, Senior High Schools or Instructor Training Courses. This design model emphasizes the competencies and skills needed to be developed in Vocational High Schools. The industrial involvement will strengthen and convince teachers' skills during the learning process. Later, the teachers will implement their real-life knowledges. This is very much in accordance to the teaching theory conveyed by Dickenson (2016) who stated that the teacher's knowledges, beliefs and goals affect the learning process in the classroom. This research is also reinforced by Olusegun (2015). Likewise, the industrial involvement can be conducted by the schools to improve their students's skill and graduates' competencies. The importance of the cooperation greatly

helps learning development in the respective schools. Furthermore, it will encourage the implementation of Human Resources (HR) Development, so that it will reduce the absorption of recent graduates in the workforce or the misallocation of human resources.

The learning modules provided for professional teachers is a reference in developing further teaching materials. Teachers' knowledges enrichment before compiling more interesting teaching materials will produce beneficial classroom activities for the teachers and the students [56]. The good delivery of the interesting teaching materials, will ease the students to grasp and comprehend what is conveyed by the teachers. The instructional design model for professional teachers will motivate the teachers to enrich their insight and deepen their cognitive skill through on-service training. Likewise, it will improve their psychomotor competency and affective skill in industrial training through IN-service training. There are many beneficial aspects of the design model, namely a) The teachers will be assisted by the experienced mentors and instructors b) The teachers not only study the educational theories in the classroom but also implement their skills through industrial training c) The development of teachers professionalism theoretically and practically in industrial training d) Flexible learning periods based on the developed skills.

CONCLUSIONS

The main key to students success in learning is strongly influenced by the teachers professionalism. Teachers are expected to be professional in caretaking education to provide high quality education. Self-development becomes the main thing of the teachers profession. Conducting continuing professional development activities is mandatory for the teachers so that their competencies development and career success can be carried out as needed, constantly and sustainably. The instructional design model for professional teachers is a learning development model to educate teachers to have one specific area of expertise. This design development has been conducted through various needs analysis, human resources, teacher's professional development, evaluation and validation by the experts practitioners in education and learning. The outcome of the assessment in such aspects as objectivity, curricular content, learning activities, educational resources and evaluation strategies show 'very good' result, which means that the design model is able to used in learning implementian of professional teachers. This research can still be developed by improving the learning development model and focusing more on improving skills and expertise that are tailored to the needs and technological developments to face the era of the industrial revolution 4.0. In this study, the learning development model is limited to one model, so it needs to be added with other models as consideration for perfecting the results/targets that are only to be achieved.

ACKNOWLEDGEMENT

This study was supported by BUDIDN (Flagship scholarship for Indonesian - Domestic Lecturers) scholarship is a synergy between Kemristekdikti and the Education Fund Management Institute (LPDP) Indonesia.

REFERENCES

- [1] C. Girvan, C. Conneely, and B. Tangney, "Extending experiential learning in teacher professional development," *Teach. Teach. Educ.*, vol. 58, pp. 129–139, 2016.
- [2] I. Noguera, "A model for aligning assessment with competences and learning activities in online courses," *Internet High. Educ.*, vol. 38, no. April 2017, pp. 36–46, 2018.
- [3] N. Tal and O. Shapira, "Ethical dilemmas among teachers with disabilities : A multifaceted approach," *Teach. Teach. Educ.*, vol. 86, p. 102881, 2019.
- [4] S. A. Parsons, A. C. Hutchison, L. A. Hall, A. Ward, S. T. Ives, and A. Bruyning, "U . S . teachers ' perceptions of online professional development," *Teach. Teach. Educ.*, vol. 82, pp. 33–42, 2019.
- [5] F. Rodrigues and M. J. Mogarro, "SC," *Educ. Res. Rev.*, p. 100286, 2019.
- [6] A. Rosser and M. Fahmi, "The political economy of teacher management reform in Indonesia," *Int. J. Educ. Dev.*, vol. 61, no. June 2017, pp. 72–81, 2018.
- [7] R. Bakar, "Kasetsart Journal of Social Sciences The in fl uence of professional teachers on Padang vocational school students ' achievement," *Kasetsart J. Soc. Sci.*, vol. 39, no. 1, pp. 67–72, 2018.

- [8] G. Mulongo and Z. Amod, "Participation in cross-national learning assessments and impact on capacity development : Programmes , practice , structures and teacher competency . Case study of Kenya , Tanzania and South Africa," *Eval. Program Plann.*, vol. 65, no. February, pp. 94–105, 2017.
- [9] L. Peculea, "Curricular openings in developing the learning to learn competency : an intervention program for 11th graders with learning difficulties," *Procedia - Soc. Behav. Sci.*, vol. 209, no. July, pp. 370–377, 2015.
- [10] U. Matzat, "Computers & Education Do blended virtual learning communities enhance teachers ' professional development more than purely virtual ones ? A large scale empirical comparison," *Comput. Educ.*, vol. 60, no. 1, pp. 40–51, 2013.
- [11] J. Lindvall and A. Ryve, "Coherence and the positioning of teachers in professional development programs . A systematic review," *Educ. Res. Rev.*, vol. 27, no. March, pp. 140–154, 2019.
- [12] M. Ceylan and E. Turhan, "Student-teachers ' opinions about education and teaching profession example of Anadolu University," *Procedia Soc. Behav. Sci.*, vol. 2, no. 2, pp. 2287–2299, 2010.
- [13] A. A. Terry, "Continuing Edication in the Scholarly Continuum : Back To School with Publishers, Librarians, And Vendors," vol. 27, pp. 62–78, 2001.
- [14] P. J. A. C. Van Der Zanden, E. Denessen, A. H. N. Cillessen, and P. C. Meijer, "Domains and predictors of fi rst-year student success : A systematic review," *Educ. Res. Rev.*, vol. 23, no. December 2016, pp. 57–77, 2018.
- [15] L. Airton and A. Koecher, "How to hit a moving target : 35 years of gender and sexual diversity in teacher education," *Teach. Teach. Educ.*, vol. 80, pp. 190–204, 2019.
- [16] E. Fischer and M. Hänze, "Back from ' guide on the side ' to ' sage on the stage ' ? E ff ects of teacher-guided and student-activating teaching methods on student learning in higher education," *Int. J. Educ. Res.*, vol. 95, no. March 2019, pp. 26–35, 2020.
- [17] Y. Liu, J. Visone, M. B. Mongillo, and P. Lisi, "Studies in Educational Evaluation What matters to teachers if evaluation is meant to help them improve ?," *Stud. Educ. Eval.*, vol. 61, no. January, pp. 41–54, 2019.
- [18] S. Jiraro, S. Sujiva, and S. Wongwanich, "An Application of Action Research for Teacher Empowerment to Develop Teachers' Test Construction Competency Development Models," *Procedia - Soc. Behav. Sci.*, vol. 116, pp. 1263–1267, 2014.
- [19] K. M. Salleh, N. H. Khalid, N. L. Sulaiman, M. M. Mohamad, and L. C. Sern, "Competency of Adult Learners in Learning: Application of the Iceberg Competency Model," *Procedia - Soc. Behav. Sci.*, vol. 204, no. November 2014, pp. 326–334, 2015.
- [20] M. Helms-Lorenz, W. van de Grift, E. Canrinus, R. Maulana, and K. van Veen, "Evaluation of the behavioral and affective outcomes of novice teachers working in professional development schools versus non-professional development schools," *Stud. Educ. Eval.*, vol. 56, no. June 2017, pp. 8–20, 2018.
- [21] E. Soslau, "Opportunities to develop adaptive teaching expertise during supervisory conferences," *Teach. Teach. Educ.*, vol. 28, no. 5, pp. 768–779, 2012.
- [22] S. F. Shawer, "Teacher-driven curriculum development at the classroom level: Implications for curriculum, pedagogy and teacher training," *Teach. Teach. Educ.*, vol. 63, pp. 296–313, 2017.
- [23] L. M. Brevik, A. E. Gunnulfsen, and J. S. Renzulli, "Student teachers' practice and experience with differentiated instruction for students with higher learning potential," *Teach. Teach. Educ.*, vol. 71, pp. 34–45, 2018.
- [24] E. Soare, "Perspectives on Designing the Competence Based Curriculum," *Procedia - Soc. Behav. Sci.*, vol. 180, no. November 2014, pp. 972–977, 2015.

- [25] P. Siriwongs, "Developing Students' Learning Ability by Dint of Self-Directed Learning," *Procedia - Soc. Behav. Sci.*, vol. 197, no. February, pp. 2074–2079, 2015.
- [26] A. Orîndaru, "Changing Perspectives on Students in Higher Education," *Procedia Econ. Financ.*, vol. 27, no. 15, pp. 682–691, 2015.
- [27] M. B. Triyono, "The Indicators of Instructional Design for E- learning in Indonesian Vocational High Schools," *Procedia - Soc. Behav. Sci.*, vol. 204, no. November 2014, pp. 54–61, 2015.
- [28] I. K. Suartama, P. Setyosari, Sulthoni, and S. Ulfa, "Development of an Instructional Design Model for Mobile Blended Learning in Higher Education," *Int. J. Emerg. Technol. Learn.*, vol. 14, no. 16, pp. 4–22, 2019.
- [29] C. M. Reigeluth, *Instructional-design theories and models*. Lawrence Erlbaum Associates, 1983.
- [30] R. A. Reiser, "A history of instructional design and technology: Part II: A history of instructional design," *Educ. Technol. Res. Dev.*, vol. 49, no. 2, pp. 57–67, 2001.
- [31] by R. C. Richey, Dennis C. Fields, and M. Foxon, *Instructional design competencies : the standards*. Eric Clearinghouse on Information & Technology, 2001.
- [32] A. Sharif and S. Cho, "Bridging the Perceptual Gaps between Identity, Practice, Impact and Professional Development," *RUSC. Univ. Knowl. Soc. J.*, vol. 12, no. 3, pp. 72–85, 2015.
- [33] B. L, G. K, and T. M, "Instructional design in education," *J. Instr. Des. Educ.*, vol. 3, no. 2, pp. 6–19, 2017.
- [34] A. Syamsuyurnita, Mhd. Isman, Indra Prasetia, "The Design of Management System through Using Total Quality Education Service at Some Schools in Medan," *IOSR J. Res. Method Educ.*, vol. 7, pp. 75–84, 2017.
- [35] J. Zambrano R., F. Kirschner, J. Sweller, and P. A. Kirschner, "Effects of prior knowledge on collaborative and individual learning," *Learn. Instr.*, vol. 63, no. August 2018, p. 101214, 2019.
- [36] J. W. Pellegrino, "Assessment as a positive influence on 21st century teaching and learning: A systems approach to progress," *Psicol. Educ.*, vol. 20, no. 2, pp. 65–77, 2014.
- [37] B. Eilouti, "Reinventing the wheel: A tool for design quality evaluation in architecture," *Front. Archit. Res.*, no. xxxx, 2019.
- [38] G. Falloon, "Using simulations to teach young students science concepts: An Experiential Learning theoretical analysis," *Comput. Educ.*, vol. 135, no. October 2018, pp. 138–159, 2019.
- [39] D. C. D. van Alten, C. Phielix, J. Janssen, and L. Kester, "Effects of flipping the classroom on learning outcomes and satisfaction: A meta-analysis," *Educ. Res. Rev.*, vol. 28, no. May, pp. 1–18, 2019.
- [40] H. Castañeda-peña, D. I. Calderón, M. Borja, S. P. Quitián, and A. Y. Suárez, "Pre-service teachers ' appreciations of teacher-educators ' strategies when learning about narratives," *Int. J. Educ. Res.*, vol. 94, no. March 2018, pp. 90–99, 2019.
- [41] D. A. Schmidt, E. Baran, D. Ann, P. Mishra, and M. J. Koehler, "Journal of Research on Technology in Education Technological Pedagogical Content Knowledge (TPACK)," no. November 2014, pp. 37–41, 2009.
- [42] A. Badia and L. Chumpitaz-campos, "Studies in Educational Evaluation Teachers learn about student learning assessment through a teacher education process," *Stud. Educ. Eval.*, vol. 58, no. December 2017, pp. 1–7, 2018.
- [43] T. Nielsen and S. Kreiner, "Studies in Educational Evaluation Course evaluation for the purpose of development : What can learning styles contribute ?," *Stud. Educ. Eval.*, 2016.
- [44] M. Lynch, "Technological Forecasting & Social Change Combining technology and entrepreneurial education through design thinking : Students ' reflections on the learning process," *Technol. Forecast. Soc. Chang.*, no. June, p. 119689, 2019.

- [45] E. Hepple et al., "Developing intercultural learning in Australian pre-service teachers through participating in a short term mobility program in Malaysia," *Teach. Teach. Educ.*, vol. 66, pp. 273–281, 2017.
- [46] J. O. C. W. Dick, L. Carey, *Systematic Design of Instruction*, 7th ed. New York: Kevin M. Davis, 2008.
- [47] L. J. Briggs, K. L. Gustafson, and M. Tillman, *Instructional design: principles and applications*. Englewood Cliffs, NJ: Educational Technology Publications, 1991.
- [48] R. Heinich, M. Molenda, J. D. Russell, and S. E. Smaldino, *Instructional Media and Technologies for Learning*, 7th ed. New Jersey: Prentice Hall, 2001.
- [49] H. Molenda, "In Search of the Elusive ADDIE Model," *Int. Soc. Perform. Improv.*, vol. 42, no. June, pp. 34–36, 2003.
- [50] W. R. Gall, Meredith D. , Borg, Joyce P., "Educational Research: An Introduction." Allyn and Bacon, Boston, p. 656, 2003.
- [51] K. Team, *Program Sertifikasi Pendidik Dan Sertifikasi Keahlian Bagi Guru Smk/Sma (Keahlian Ganda)*, vol. 1. Jakarta: Direktorat Jenderal Guru dan Tenaga Kependidikan, 2017.
- [52] G. Widayana and A. Mukhadis, "Development of Vocational Education as Demands Revitalization of Vocational High School in Dual Skills Program State University of Malang , Indonesia," *Int. J. Res. Eng.*, vol. 04, no. 12, pp. 278–282, 2017.
- [53] T. Moreira-mora and J. Espinoza-guzmán, "Initial evidence to validate an instructional design-derived evaluation scale in higher education programs," *Int. J. Educ. Technol. High. Educ.*, 2016.
- [54] Sugiyono, *Metode Penelitian Kuantitatif Kualitatif dan R&D*, 25th ed. Bandung: Alfabeta, 2017.
- [55] S. P. Robbins and M. K. Coulter, *Management*, 14th ed. United Kingdom: Pearson, 2017.
- [56] T. A. Yarkova, I. I. Cherkasova, A. M. Timofeeva, V. V Cherkasov, and V. G. Yarkov, "Preparing Teachers to Use New Media Visual Communications in Education," *Int. J. Emerg. Technol. Learn.*, vol. 12, no. 2, pp. 4–15, 2017.
- [57] P. Dickenson, "Redesigning Teacher Education Programs to Meet the Needs of Today's Second Career Pre-Service Teache," in *Teacher Education: Concepts, Methodologies, Tools, and Applications*, I. S. Reference, Ed. IGI Global, 2016.
- [58] S. Olusegun, "Constructivism Learning Theory : A Paradigm for Teaching and Learning," vol. 5, no. 6, pp. 66–70, 2015.
- [60] U. Matzat, "Do blended virtual learning communities enhance teachers' professional development more than purely virtual ones? A large scale empirical comparison", *Computers & Education* 60 pp. 40–5, 2013.