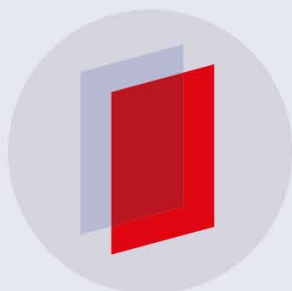**PAPER • OPEN ACCESS**

Developing instructional media integrated with learning style instrument for industrial electronics study programs of vocational high schools

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Developing instructional media integrated with learning style instrument for industrial electronics study programs of vocational high schools

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Abstract. The study was aimed at revealing (1) how the instructional media of industrial electronics integrated with learning style instrument was developed, (2) the feasibility of the instructional media of industrial electronics integrated with the learning style instruments, (3) the effect of the instructional media on learning achievement, and (4) the effect of the instructional media on learning satisfaction.
The study employed the Design and Development Research (DDR) model. The development procedure used the Specific Project Phases Cluster. The prototype of the product was tested by subject matter, software, and media experts related to the teaching media as a whole, and through a small group field test among a number of students. The data were collected through questionnaires in the form of Likert scale and were analyzed descriptively quantitatively.
The results of the study showed the instructional media was developed through the design and development research (DDR) model with the Design & Development Tools cluster which served as a part of the Product and Tool research main cluster, the instructional media was feasible to use without revision, there was a statistically significant difference in the learning achievement before and after the use of the instructional media, with the effect size of d=1.49 (d>0.8), so the effect of the media was categorized to have a large effect, and the instructional media could bring positive effects on the learning satisfaction.

1. Introduction

The problem in learning is the lack of teaching infrastructures. Related to facilities and infrastructures in vocational schools, Slamet has stated that "Vocational education should be more directed to the demand-driven rather than supply-driven, which is implemented through learning things more actual than the textual, more concrete than abstract, referring more to the reality than the artificial, more real than virtual, and these all demand proactively vocational education to be closer to the world of work." [1]. Thus, the facilities and infrastructures of learning, including the learning media should be as close as possible to the environment in the world of work. One of sixteen theorems by Prosser has revealed that vocational education will be efficient in proportion as the environment in which the learner is trained is a replica of the environment in which he must subsequently work, and effective vocational training

can only be given where the training jobs are carried on in the same way with the same operations, the same tools and the same machines as in the occupation itself [2].

To help vocational school students obtain the expected competence, the instructional media should have the following characteristics (1) Instructional media used should be suitable with the students' learning styles, (2) Instructional media used should be close to the work environment and constitute a replication of the tools used in industries. Of the industrial electronics instructional media mostly used in vocational schools already have those characteristics mentioned above except characteristic number one, namely the use of teaching learning media in line with the student's learning styles.

A learning style instrument is required to identify the learners' learning style [3]. The application of one or more learning styles instruments will provide them with extra information they can use in designing the lessons [4]. However, many teachers do not apply the learning style instrument as a tool to find out their students' learning styles. Nowadays most of the teachers in the higher education level adopt a teaching style that combines (1) the ways they prefer to learn and (2) approaches to teaching they see effective for their own learning in their higher education programs [4].

Models of assessing learning styles have been developed and today there are more than 70 schemes of learning style [4]. Those instruments have strengths and weaknesses. Mostly the learning style assessment is conducted by giving questionnaires in the form of hardcopy to the students though some are conducted online, or even only by observing what students like and dislike in the teaching.

The students' learning style in the teaching and learning process will influence the teachers' use of media because students learn more effectively when content drives the choice of modality [5]. The learning style that does not suit the demand of the field will affect the students' social adaptation to the educational institution [6]. The classical instructional media used by the teachers, such as a blackboard, slide projector, video, etc certainly cannot fulfill the criteria of "one size for all" because they have the nature of "One size doesn't fit for all" due to their partial characteristic, especially when, in using them, the teachers do not consider the students' learning style. Consequently, the media used are not in line with the students' learning styles. Regarding this, the instructional media used should be suitable with the students' learning styles.

In response to the fact, this study aims to integrate learning style instruments and instructional media. The integration between learning style instruments and instructional media is implemented in the form of computer-based instructional media.

In line with the above discussions, the research objectives are formulated as follows: (1) to reveal how the instructional media is developed. (2) to find out how feasible it is to use the instructional media of industrial electronics integrated with the learning style instrument in vocational schools. (3) to find out the effect of the instructional media to students' learning achievement. (4) to find out whether such an instructional media brings positive effects on the learning satisfaction.

1.1. Instructional media

In the classical view a teaching learning process is a communication process between a teacher as an information source and students as the information receiver through a communication medium. Communication media are all forms of communication channels which can deliver information. All of forms of communication channels used in the teaching process is called instructional media. Therefore, instructional media can be defined as everything that can be used to deliver information on the learning materials in the form of humans, equipment, or activities [7].

Reiser and Gagne (1983) state that the instructional media encompasses all the materials and physical means an instructor might use to implement instruction and facilitate students' achievement of instructional objectives [7] [8]. They include traditional materials such as chalkboards, handouts, charts, slides, overheads, real objects, and videotape or film, as well newer materials and methods such as computers, android phone cell Applications, the Internet, and interactive video conferencing. In general, using instructional media can facilitate learning or increase the understanding of material. Instructional media are commonly known as teaching and learning aids.

Instructional media should be directly used by teachers as a necessary procedure in the selection process. Therefore, the selection and use of media should be completely right to support the effectiveness, efficiency and appeal of learning so that the desired goal can be achieved.

Instructional media which used to be a single media was developed as instructional media integrated with other kinds of media which is later known as multimedia. The development of multimedia contradicts that of single media which usually only uses basic computer displays in the form of texts or paper print out, projector slides or products of other manual print out because multimedia is a combination of various forms of media contents consisting of texts, audio, still pictures, animation, interactive quiz, machine prototype, graphic art presented either off line or online.

1.2. Instructional media and technology

The implementation of technology in teaching is known as teaching aid instructional technology. It can be in the form of audio/video player, computer, mobile device, prototype of industrial machine, and another product of technology, used by a teacher to enhance classroom instruction. Seels & Richey (in [9]) has defined that Instructional Technology is the theory and practice of design, development, utilization, management and evaluation of processes and resources form learning.

The use of technology in teaching will bring great benefits to the world of education if the various products of technology at school can be used maximally by teachers in the class. Unfortunately, this expectation is still far from the reality as most of schools own teaching aids of sophisticated technology with a very limited classroom use. [10, p. 20]. The use of technology in teaching can overcome problems appearing in the teaching and learning process. For instance, technology can be an aid for teachers for efficiency and decrease the teacher's load, help manage the class, assist teachers in delivering the materials in the class become interface for the teaching and learning, administration, and system available in the school [10, p. 231]. Thus, the teachers physically function as models and mediators of the learning process as a whole in one period of teaching and learning to help students learn and grow, anticipates problems in learning and plans solutions to solve them, and guides and coaches students through the initial phases of learning to independent learning [11, p. 10].

1.3. Selecting instructional media.

After formulating the objectives, materials, and teaching methods, a teacher will then decide what instructional media to use. In general, the selection of instructional media is carried out by teachers by considering some factors related to the objectives and learning process. Kearsley (in Sihkabuden, 1985, p.46) proposes the following procedure of selecting media in the teaching and learning process: identifying the characteristics of media required based on the condition, identifying the characteristics of the learning environment related to the media used, identifying the practical considerations in deciding what media to use easily, and identifying the economic factors. Media selection becomes very important as instructional media is a part that cannot be separated from the learning activities. Gerlach dan Elly (1980) states that media selection in its capacity as media in an instruction is by using systematic approach, preceded with formulating instructional objectives, putting learning materials into details, test the students' prior ability. The result of the test is used to determine teaching strategies, manage and classify the students, allocate the time and place, and finally to determine the instructional media to use. All teaching activities end with evaluation to see the students' performance after the learning process. The results of the evaluation is used as feedback to revise the teaching design and process.

There is no media will replace the status and role of the teacher in the classroom one hundred percent. There is not any best media to achieve the learning objectives. Media have to be in line with the learning objectives. Media have to consider the suitability of the use and the teaching technique chosen. The choice of media should not depend on only a certain choice and use of media. The use of media has to be based on the good utilization and also be supported by the environment factor. Experiences, likes, interests, individual capability, and learning styles may influence the result of the media use.

1.4. "One size fits all" for instructional media

The statement "One Size Fits All" can be defined as something which is suitable for everyone or every purpose [12]. This term appears in some disciplines to define the use of one thing for many other things, or acceptable or used for a wide variety of purposes or circumstances; appealing or suitable to a variety of tastes [13]. In this dissertation, the phrase "One Size Fits All" is defined as "One teaching media for all types of students".

A common problem in the use of a single media is that students' preferences are not accomodated individually in the teaching process because it is impossible for teachers to deliver the learning materials by using different media for every single individual or group of students in one meeting. Besides the limited time, limited instructional media is also another obstacle in accomodating the students' learning preferences. The teaching strategy that can possibly accomodate the differences in the students' learning preferences is classifying the students into groups with the same learning styles. In this case, the grouping of the students' preferences is conducted through assessing the learning styles by using learning style instrument. With the assumption that the use of technology can bridge the different learning styles, technology in the form of a multimedia package will be able to cover those various learning styles.

The use of only one instructional media will accomodate just a number of students with a certain learning style, while the other students will have the feeling of being forced in the learning process.

With the "One Size Fits All" phrase it is expected that the development of instructional media are able to accomodate students' various learning styles. The use of technology and multimedia in learning enables teachers to implement the philosophy of "One Size Fits All".

1.5. Learning style

Studies on individual differences in learning have been conducted by the experts in psychology. Those studies resulted in the theories of learning, one of which is the theory of learning styles. The following are some definitions of learning styles. Pritchard (2009) in his book "Ways of Learning ...", has defined Learning style as a particular way in which an individual learns, a mode of learning an individual's preferred or best manner(s) in which to think, process information and demonstrate learning [14], is also defined as the ways people behave and feel while they learn [15], every individual has various ways of learning [16]. DePorter and Hernacki (2002) say that a learning style is a combination of absorbing, organizing, and processing information [17].

Based on the experts' statements, it can be concluded that learning styles can be characterized, ordered, and distinguished in a wide range of ways. For the most part, they are general examples of learning styles that give guidance to learning and educating. Learning style can also be described as a set of factors, behaviors, and attitudes that facilitate learning for an individual in a given situation. Although the various theories present differing views on how the learning styles should be defined and categorised. A common concept is that individuals differ in how they learn.

Some models of learning styles are based on the theories proposed by some experts. Coffield, in the book entitled "Learning styles and pedagogy in post-16 learning. A systematic and critical review" has identified 71 different models [4, p. 2]. Some of those models of learning styles also have different ways of assessing the learning styles. The assessment produces various learning styles based on the adopted theories.

1.6. Learning style awareness

Dourish and Bly (1992) say that awareness involves knowing who is "around", what activities are occurring, who is talking with whom; it provides a view of one another in the daily work environments [18].

Teachers' awareness of students' learning styles refers to the awareness of what activities teachers do before teaching related to their students' preferences in the learning process [3]. Learning styles as individual characteristics can only be identified through an assessment of the learning behaviours. As a reflection of teachers' awareness of the students' learning styles, teachers are required to have a good

understanding of how the learning materials will be delivered to them through the teaching method and media, which are appropriate for their preferences. To identify the learners' preferences in the teaching process, teachers can simply observe the learners' behaviours in the beginning of the teaching process. Unfortunately, such an observation will not bring accurate results. That is why the understanding of the concept of learning styles becomes important when teachers want the observation on the students' learning styles to be more detailed, effective, and efficient. In this way, teachers are able to use the available instruments of learning style assessment in the teaching and learning process.

After finding out the learners' preferences, teachers must have the awareness to use appropriate instructional media so that the teaching and learning process achieves the objectives as the students' learning styles in the teaching and learning process will influence the use of media by teachers, because students learn more effectively when content drives the choice of modality [5].

Geiser, W. F., et al. (2000) reveal that the students who applied learning-style-responsive strategies had significantly higher achievement and attitude scores in their subject matter than the students who applied traditional study strategies [19]. Thus, teachers' awareness of the students' learning styles can be characterized by the use of instructional media.

1.7. Design and Development Research (DDR)

The DDR model as a method in the instructional development is developed by Richey and Klein in 2000s. Richey and Klein (2014) state that the Design and Development Research is a type of inquiry unique to the instructional design and technology field dedicated to the creation of new knowledge and the validation of existing practice [20]. Richey and Klein (2014) state that the design and development research as "the systematic study of design, development and evaluation processes with the aim of establishing an empirical basis for the creation of instructional and non-instructional products and tools and new or enhanced models that govern their development" [21, p. 1]. The DDR model has a very wide range and classified into two clusters, namely (1) product and tool research, and (2) model research [21, p. 8]. Those two categories are very important in the research employing DDR.

Richey & Klein [20] state that today's research and development mostly focuses on the design and development of technology-based products and tools. Product and Tool Research emphasizes on the study of specific product or tool design and development projects with outcome lessons learned from developing specific products and analyzing the conditions which facilitate their use [21, p. 13]. The category of Product and Tool Research has three development groups: (1) Comprehensive Design and Development Projects, (2) Specific Project Phases, (3) Design & Development Tools [20, p. 142].

The development research using DDR has a very wide range; moreover, the cluster of product and tool is highly complicated. As a result, it takes a long time to conduct the research [21, p. 61] in addition to some other limitations. Based on those consideration, in this dissertation research, DDR model with the Design & Development Tools cluster which serves as a part of the product and tool research main cluster (see Figure 3). Therefore, this study focuses on computer based tools and some of this research is directed toward automating design and development, so this research can focus on the development and the efficacy of these tools.
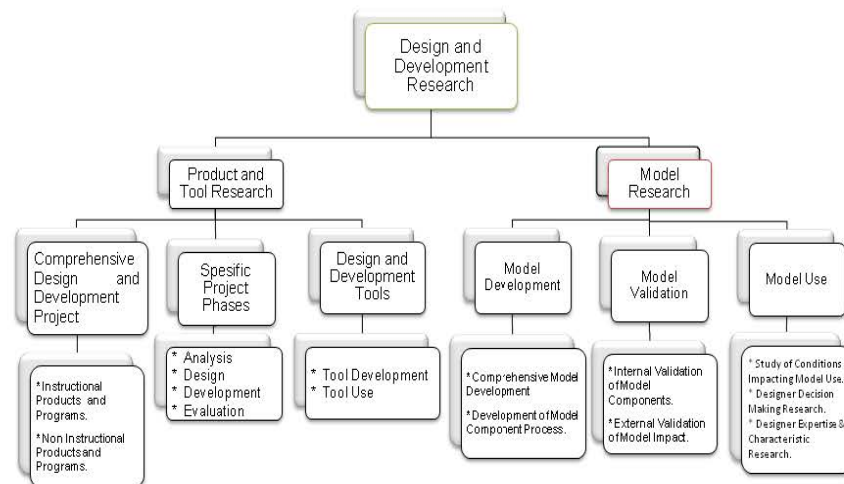
Figure 1. Diagram of Representatif Cluster of Design and
Development Research (The chart is illustrated based on [21, p. 8]).

The cluster product and tools research in the design and development research is divided into three clusters, each of which is an independent process which is not sequential in one procedure.

This research focuses on the use of tool, most of which are in the forms of computer programs. It seeks not only the tool's effectiveness, but also its practicality when using the tool.

This tool use study used a mixed methods design. In Phase 1 the method employed were survey research technics and content analysis. In Phase 2 the methods were in depth interview and content analysis. This study was primaly descriptive [20, p. 57].

1.8 Conceptual framework

The role of media in instruction is very crucial because media assist teachers to facilitate their students in learning. The development of technology has led to the increasing number of various media that can be used in the instruction. However, not many instructional media have been used by taking the students' learning preferences into account. Especially, when the teachers use only one kind of media in their instruction, all of the students' need of learning preferences cannot be fulfiled (One size does not fit all).

Theoretically, the students' learning preferences are called learning styles. Learning style is a variable which affects the students in the learning process. It is claimed to affect the learning process as it is related to "like" or "dislike" information/knowledge delivered to the students. If they "like" certain materials presented in such a way, they will enjoy learning and vice versa. One of the key successes in learning is when the students like the learning process. Therefore, in addition to the adjustment of the curriculum and learning materials, adjusting the instructional media and the students' learning styles is an essential thing the teaching and learning process.

The selection of instructional media should not only suit the students' learning styles, but also consider some aspects related to the level of the students' abstraction and principles of media selection (coherence, signaling, redundancy, contiguity, modality, segmenting, pertaining, multimedia, personalization, and interactivity.

Someone's learning style can be identified through an assessment carried out by using a learning style instrument. Various models of instrument to assess learning styles are available both online and in print. Unfortunately however, not all students as individual learners use them to identify their learning styles. Moreover, not all teachers assess their students' learning styles in designing their instruction. Based on the preliminary study, most of the teachers are familiar with the term of "learning style", and only a few of them implement the assessment in the classroom. It occurs due to their inadequate understanding of the instrument model to assess the learning styles and when the assessment should be

carried out. Although the teachers do not implement the assessment, they realize how important it is to identify the students' learning styles before teaching.

Based on the problem of the suitability of instructional media and learning styles, the conceptual framework to solve the problem of the research is by integrating the learning style instrument in a set of media in the form of instructional software.

Technically the learning style instrument is put in the beginning of the software's menu to serve the function of identifying the user's type of learning styles and the suitable media. It is assumed that when the instructional media is suitable with the students' learning styles, the suitability will bring positive impacts to the learning output. The selected learning style instrument to integrate in the instructional software is Barsch Learning Style Inventory (BLSI).

The instructional software is developed for the instructional functions and in this study the software of Visual Basic 6.0 is used. The programming in the Visual Basic as the instructional software contain menus to display the teaching activities in the form of visual, auditory, and kinaesthetic teaching. It also contains the menus for the teaching kits.

The design of teaching/learning model using the integration of the learning style instrument and instructional media is illustrated in Figure 2.
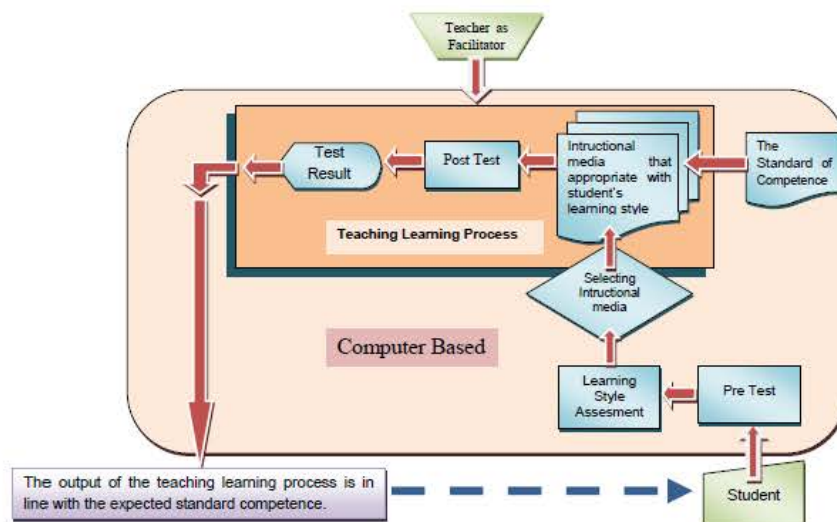

Figure 2. Conceptual Model of Teaching/Learning Using the Integration of the Learning Style Instrument and Instructional media.

2. Method

The development model employed in this research is Design and Development Research (DDR) Model. This model is used for the instructional development and also for the software development.

The development procedure conducted in the DDR model is consistent with the procedure used for the instructional development in the field in general [20]. This model is used for the instructional development and also serves as the procedure in developing the instructional media related to the subject matters in vocational schools.

The prototype of the product was tested by subject matter experts and media experts related to the Instructional media as a whole. The phase included the activities of revising and adjusting the product with the changes obtained from the testing or try-out.

The research employed one group pretest posttest design experiment in which a pretest was conducted before a treatment was given and a post-test was conducted after the treatment. These were carried out in only one group without another group as a comparison. The experiment was carried out by involving students of electronics/electrical study program taking the industrial electronics subject

matter as samples. Ten to twenty students of the electronics/electrics engineering of vocational schools were selected to represent the population.

The instruments used in this study were questionnaires with the Likert scale. The instruments were employed to find out whether the content of the media was easy to understand or not and also to stimulate feedbacks from the users for the revision.

The validity test measures whether an instrument precisely measures what it is supposed to measure. The instrument validity test employed construct validity test and content validity test. It was carried out by asking for the expert judgments to the experts, which was then continued by trying out the instruments to the sample [22]. The results of the instrument try out were analyzed by using item analysis test by correlating the score of each item with the total score.

The reliability test was conducted by testing and analyzing the item consistency in the instruments by using internal consistency technique [22]. The internal consistency reliability test was based on the score obtained one try out to the sample [23]. The internal consistency was calculated by using Alpha Cronbach Coefficient.

To analyze whether the Instructional media that integrated with learning style instruments was feasible or not to implement, the descriptive quantitative analysis was used. The results of the evaluation on the feasibility of product development were analyzed based on the number of mean and deviation standard scores obtained, which was then be categorized. The score can be obtained by using the following table:

Table 1. Categorization of The Result of The Study

Criteria	Category
$X \geq (\mu + 1.\sigma)$	Very Good/Very High
$(\mu + 1.\sigma) > X \geq \mu$	Good/High
$\mu > X \geq (\mu - 1.\sigma)$	Fair/Low
$X < (\mu - 1.\sigma)$	Poor/Very Low

The data of the pre-test and post-test results were then analyzed by using a paired sample t-test, the formula is as follows:

$$t = \frac{\sum D}{\sqrt{\frac{N \sum D^2 - (\sum D)^2}{N-1}}} \tag{1}$$

How large the effect of the difference before and after the use of the instructional media is on the learning achievement was measured based on the formula of cohen's d effect size. Effect size (ES) is a name given to a family of indices that measure the magnitude of a treatment effect [24]. The value of cohen's d is obtained by dividing the difference between the mean and deviation standard:

$$d = M1 - M2 / s, \tag{2}$$

The obtained value of cohen's d was matched in the cohan's categorization table as shown below.

Table 2. Cohen's d Standard [24]

Effect Size	Cohen's Standard
$0 < d < 0,2$	Small Effect
$0,2 < d < 0,8$	Medium Effect
$d > 0,8$	Large Effect

3. Results and discussion

This study is a development research implementing the DDR (Design and Development Research) development. It yields the products to accomodate the differences of students' learning styles. The following are the results of the development research.

3.1. The instructional media software integrated with learning style instruments

The learning style assessment used is Barsch Learning Style Inventory (BLSI). It is a learning style assessment consisting of 24 statements in the form of attitude scale, divided into three aspects of assessment of the students' attitudes of learning preferences. The first aspect looks at the preference of visual learners, the second one looks at the preference of auditory learners, and the third one looks at the preference of kinaesthetic learners. When the score of the two or three aspects of the three aspects which are assessed shows the same result, it is concluded that the user has a multimode learning style.
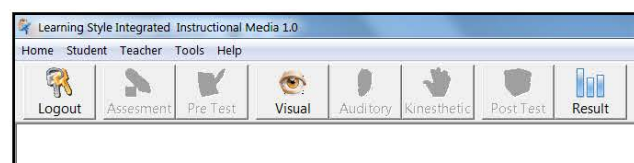

Figure 3. Appearance of button menu of the visual learning activated for the users with visual learning style (the button menu for other learning styles are not activated)
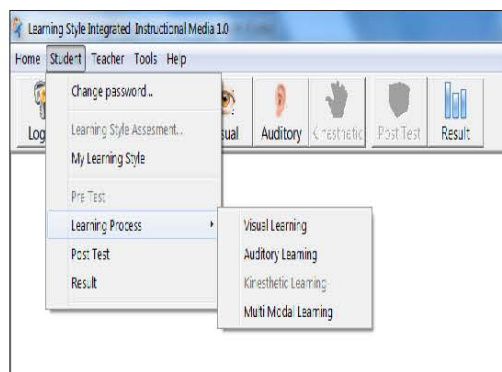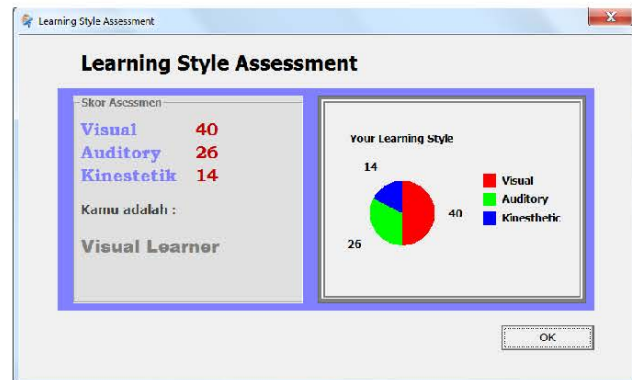

Figure 4. Menus users as students can run

Figure 5. The result of learning style assessment shown by the score and graph

The Learning Style Integrated Instructional Media (LS2iM) software as instructional media presents the learning materials suitable with the students' learning styles. The data of the students' learning styles saved in the database will lead the learning process to the materials suitable with the students' learning styles. The LS2iM software presents the materials packed visually for the students with the visual learning, the materials with the auditory package (narration) for the students with the auditory learning style, and the materials packed with instructions for the students with the kinaesthetic learning style. Besides, when the students are multimodal learners those with more than one learning style, the LS2iM software presents two or more modes of appearance that the students can choose. The LS2iM software disables the menu and button which are not suitable with the students' learning styles so that certain learning styles cannot access the learning materials for other learning styles.

The try out of the learning media as the research result was conducted through the validation stage by three experts of instructional media, three experts of learning materials, and three experts of software. Thus, totally nine experts were appointed as validators. Besides that, the media was also validated by students as users. The following is the result of validation by the experts.

3.2. The Result of validation by the instructional media experts

The validation was aimed at evaluating the instructional media as a whole according to the aspects of instructional media evaluation. The validation was aimed at evaluating the instructional media as a whole according to the aspects of instructional media evaluation. The following graph is the validation result by the instructional media experts.

Table 3. Result of the product validation by instructional media experts

		Freq.	Percent	Valid Percent	Cumulative Percent
Whole Aspect of Instructional Media	Good	1	33.3	33.3	33.3
	Very Good	2	66.7	66.7	100.0
	Total	3	100.0	100.0	

From the table above, it is shown that one instructional media expert categorizes the instructional media into very good (66.7%).

3.3. The Result of validation by subject matter experts

The materials were validated by two teachers of industrial electronics of vocational high schools and one lecturer of the same field. The aim of the validation is to evaluate whether the learning materials fulfilled some aspects in learning. The validation results are shown in the table 4 below.

Table 4. Result of the product validation by subject matter experts

		Freq.	Percent	Valid Percent	Cum. Percent
Whole aspect of Subject Matter	Very Good	3	100	100	100
	Total	3	100	100	100

Based on the tables of the result of the validation by subject matter experts above it can be concluded that overall the learning materials in the instructional media were categorized as very good.

3.4. The Result of validation by software experts

The validation of the software was conducted by three experts. The purpose is to evaluate the software from some criteria of instructional software. The result of the validation is presented in the following table.

Table 5. Interpretation of the result on the total aspect of software validation

	Category	Frequency	Percent	Valid Percent	Cumulative Percent
The Total aspect of Software	Very Good	3	100	100	100

It can be concluded from the table that overall the instructional software is categorized as "Very Good" from the validation by three experts.

3.5. Feasibility testing by experts

The validation by a number of experts was also conducted on the feasibility of the instructional media. The feasibility test was conducted by demonstrating the instructional media in front of the experts. After the experts had completed the validation instruments according to their expertises, they answered the questions on the feasibility of the instructional media.

Overall the results of the feasibility testing on all aspects of the instructional media by all experts are shown in the table and figure below.

Table 6. Feasibilty testing of instructional media by all experts

		Freq.	Percent	Valid Percent	Cum. Percent
Feasibility Testing By All Experts	Feasible with Revision	4	44.4	44.4	44.4
	Feasible to Use	5	55.6	55.6	100.0
	Total	9	100.0	100.0	

The table above show that of all media experts, four of them (44.4%) state that the media is feasible to use with revision and five of them (55.6) state that the media is feasible to use without revision.

Based on the overall result of the feasibility testing by the experts, it can be concluded that the instructional media is considered to be feasible to use without revision; however, when each aspect of the testing is considered, it seems that the revision is still necessary to improve the instructional media by accommodating the suggestions from the experts.

3.6. The result of validation by students

The validation of the instructional media were also carried out by 38 students of the Electronics Study Program of vocational high schools in the Province of Yogyakarta Special Region. The try out was conducted in SMK Muda Patria Kalasan Yogyakarta and Balai Pendidikan Teknik (BLPT) or Centre for Engineering Education of Yogyakarta. Table 7 below shows the results of the try out.

Table 7. Frequency distribution for whole aspects of the students' evaluation on the instructional media

		Freq.	Perct	Valid Perct	Cumulative Percent
Whole Aspects of Instructional Media	Fair	9	23.7	23.7	23.7
	Good	29	76.3	76.3	100.0
	Total	38	100.0	100.0	

For the whole score total of all aspects the respondents consider that the learning media is good (76.3%)

The results of the data interpretation show that the respondents consider that in the aspect of material the learning software was categorized into good (81.6%), the aspect of presentation was categorized into good (76.3%), they consider that the aspect of ease and satisfaction in using the learning software was also good (65.8% and 57.9%) and the learning media as a whole was categorized into good (76.3%).

There is a different learning achievement value before and after the use of the instructional media. The study shows the difference between the mean (μ=-33.4996) of pre-test (μpre=31.5341) and that of the post-test (μpos=65.0336), with the standard deviation of σ=22.4487. The Sig. (2-tailed) value is 0.000 (ρ<0.01) so Ho = μ1 = μ2 meaning that "There is no different learning achievement value before and after the use of the instructional media" is rejected, and the hypothesis Ha = μ1 $\neq$ μ2 meaning that "There is a different learning achievement value before and after the use of the instructional media" is accepted. Thus, it can be concluded that there is a difference in the learning achievement before and after the use of the instructional media, with the effect size of d=1.49 (d>0.8), so the effect of the media was categorized to have a large effect.

4. Conclusion

Based on the data obtained and the analysis it can be concluded that:

The instructional media of industrial electronics that is integrated with learning style instrument was developed through the design and development research (DDR) model with the Design & Development Tools cluster which served as a part of the product and tool research main cluster.

The instructional media of industrial electronics integrated with the learning style instrument in vocational schools was feasible to use without revision; however, when each aspect of the testing is considered, it seems that the revision is still necessary to improve the instructional media by accommodating the suggestions from the experts.

The instructional media could bring positive effects on the learning satisfaction. It is shown that the respondents consider that in the aspect of material the learning software was categorized into good, the aspect of presentation was categorized into good, they consider that the aspect of ease and satisfaction in using the learning software was good too and the learning media as a whole was categorized into good.

5. References

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