Learning Model Products: Is It Valid? (Study on Geometry Learning Model)

Indah Setyo Wardhani *
* Faculty of Education, Universitas Trunojoyo Madura, Jawa Timur, Indonesia

Indahsetyo.wardani@trunojoyo.ac.id , 0000-0003-3821-7478

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Abstract

The learning model was developed to answer the issue of solving learning problems. At elementary school level, one of the models that has been developed is a geometry learning model, such as a spatial imaginative learning model with learning syntax in the form of introduction, demonstration of spatial concepts, facilitation of spatial activities and closing. The learning model syntax will work well if it is equipped with learning model products such as model books, teaching modules, student worksheets, teacher books, etc. To obtain validity and answer whether the product model has valid criteria or not, a validation sheet needs to be developed. The aim of this research is to develop a validation sheet for the learning model product. This research is development research using the Plomp model. The development stages of Plomp are: initial investigation, prototype development, and assessment. The results of the research are in the form of a learning model product validation sheet format. The implication of the research results is the applicability of the learning model product validation sheet format as a tool for obtaining the validity of the learning model product.

Keywords – Learning Model Validation; Spatial Imaginative Learning; Plomp Development Model.

1. Introduction

A learning model is a conceptual framework that describes systematic procedures for organizing learning activities to achieve certain goals (Subanji, 2013). The learning model has characteristics in the form of five model components, namely: syntax, social system, reaction principle, support system, and learning impact. Each component of the learning model is supported by a strong theoretical rationale and foundation for thinking about what and how students learn. This is so that one learning model is different from another learning model (Wardhani., et al. 2023).

Descriptions of learning models have been provided by several researchers. Arends (2004) describes the learning model as broader than approaches, strategies and methods because it includes: (1) the theoretical framework supporting the learning model; (2) the basis for student learning; (3) teacher and student behavior designed so that the learning model can work; and (4) a learning environment that supports learning goals. Learning models direct us in designing learning to achieve learning goals (Joyce, et al., 2015). The author concludes that a learning model is a conceptual framework that includes steps in organizing learning experiences to achieve certain goals. In order to apply the conceptual framework in problem situations, learning model products need to be developed (Wardhani, 2023). This learning product becomes a tool for implementing the learning model in the classroom. Examples include model books, lesson plans, worksheets, teacher's books, etc.

The results of the study of several geometry learning models that have been produced by researchers are in the form of model syntax and learning model products. Ihksan (2015) has produced a geometry learning model based on Van Hiele theory with stages: 1) learning orientation, 2) group discussion, 3) class discussion, 4) integration, 5) evaluation. Nur'aeni, et al., (2020) have produced the SPADE learning model based on the traditional Kampung Naga game with stages: 1) singing, 2) playing, 3) analyzing, 4) discussing, 5) evaluating. Alim, et al., (2020) produced a realistic learning model assisted by multimedia with stages, 1)

realistic problem orientation 1, 2) understanding and solving problems horizontally mathematically, 3) guiding and providing stimulation, 4) presenting work results, 5) orientation realistic problems 2, 6) understanding and solving vertical mathematical problems, 7) confirmation of interactive media, 8) concept application, 9) evaluation. The three learning models produced are equipped with learning model products in the form of model books, worksheets and lesson plans.

A model for learning geometry through spatial activities has also been developed by several researchers (Howse & Howse, 2015; Wulandari, 2020, Wardhani, 2023). Howse & Howse (2015) have obtained instructions for learning activities to improve the spatial reasoning of pre-school children through the use of attribute blocks with stages: 1) information, 2) directed orientation, 3) explication, 4) free orientation, 5) integration. Wulandari, (2020) obtained a valid, practical and effective geometry learning model to improve the spatial abilities of junior high school students with stages: 1) information acquisition, 2) facilitation of spatial ability activities, 3) information strengthening, 4) integration. Wardhani (2023) produced a spatial imaginative model with preliminary stages, demonstration of spatial concepts, facilitation of spatial activities, and closing. The three learning models produced are equipped with learning products in the form of teaching modules (RPP), worksheets and teacher's books.

A valid learning model product is one whose validity is measurable. The validity of a product is the suitability (accuracy) of a product with the specified criteria. According to Nieveen, et al., (1999), a product has validity if it is assessed as valid by experts. Expert assessments have a big influence on product quality. The assessment of experts greatly influences the depth of knowledge and breadth of knowledge of the selected expert. Therefore, it can be said that a product has validity if it is based on strong theoretical rationale. To obtain data validity from model products, a validation sheet needs to be developed.

This research will develop a validation sheet to obtain the validity of data for a model product. The validation sheets that will be developed are: 1) learning

model book validation sheet, 2) teaching module validation sheet, 3) teacher book validation sheet, and 4) Student Worksheet (LKS) validation sheet. Parta (2009) and Wulandari (2020) have developed product development model validation sheets, but there is a need to adjust aspects in the validation sheet items. This research will modify or adopt concepts from Parta (2009) and Wulandari (2020) to obtain a new validation sheet. Therefore, the focus of the research is what is the process and results in obtaining a learning model product validation sheet that has valid criteria?.

2. Method

The aim of this research is to develop a validation sheet for a learning model product with valid criteria. Therefore, this research is categorized as development research. The product development validation sheets in this research are: model book validation sheet, teaching module validation sheet, LKS validation sheet, and teacher book validation sheet. The research stages include: initial investigation, prototype development, and assessment. The research stages are described as Figure 1.

The resulting learning model validation sheet was then validated by two validators. The selected validator has qualifications for a doctoral degree in Indonesian language education and a doctoral degree. According to Johnson & Christensen, (2004), product validity criteria are determined based on measurement values on an ordinal scale 1-4, with divisions of 25%, 50% and 75% from the range 1-4, namely: valid criteria, if $(V\_T)\bar{}\geq 3$; quite valid, if $2\leq(V\_T)\bar{}<3$; invalid, if $(V\_T)\bar{}<2$. If the validation sheet is valid enough, then a small part is revised. If the data is invalid, it needs total revision. Whether revisions are necessary or not also depends on the validator's suggestions.

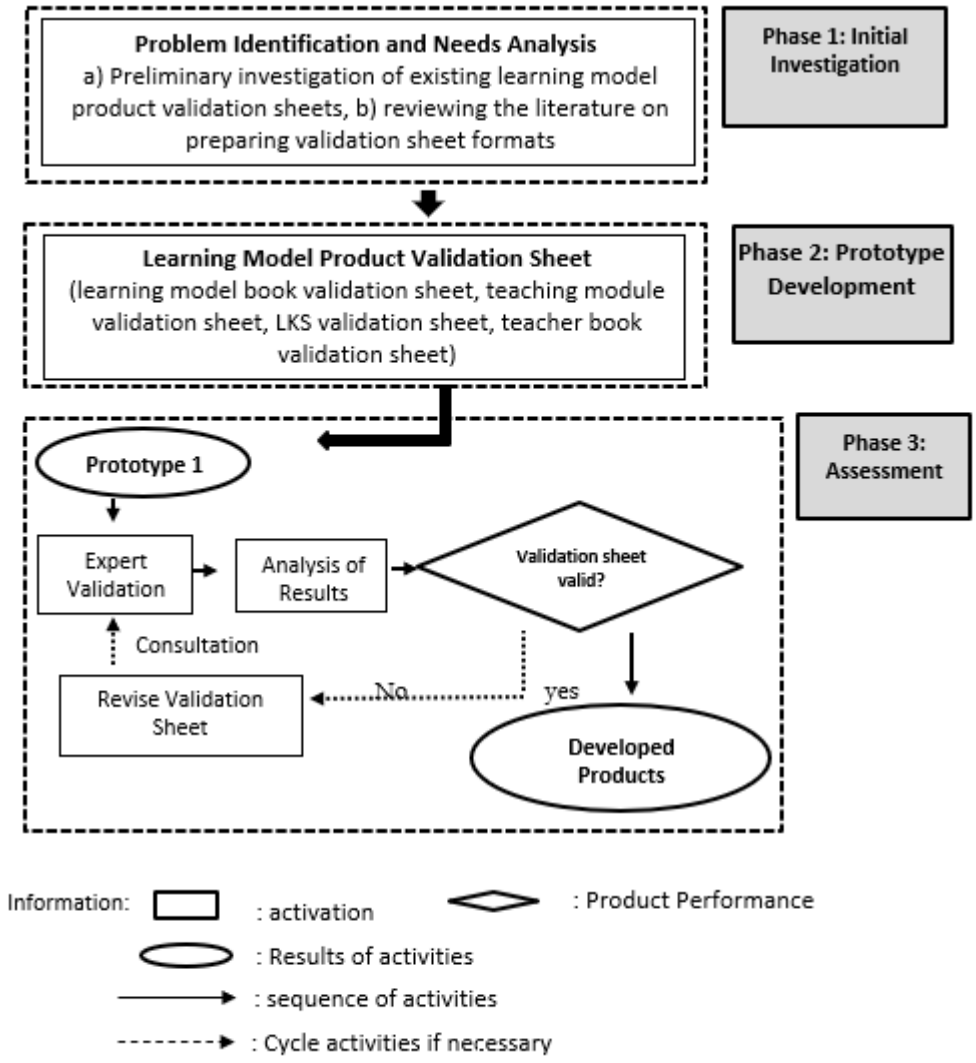

Figure 1. Flow of Adapted Product Development Activities from Plomp

3. Result and Discussion

Learning Model validation sheet

The learning model validation sheet is used to obtain the validity of the learning model. This sheet contains 4 aspects of assessment, namely: (1) rational model development used to assess the need for model development, (2) theoretical basis used to assess the theoretical basis of model development, (3) model components used to assess model components, (4) instructions for implementing the model used to assess implementation and instructions for

preparing the use of the model. The statement items in each aspect of the assessment modify or adopt concepts from Parta (2009) and Wulandari (2020).

Modifications to the concept from Wulandari (2020) were carried out in the rational aspects of model development and instructions for implementing the model. Modifications to aspects of model development were carried out in statement items (1), (2), and (3) which were modified into one statement item and statement items (4) and (5) which were modified by changing terms due to the different aspects being considered. Modifications to aspects of the model implementation instructions were made to statements (1) and (2) with editorial changes.

Modifications and adoption of concepts from Parta (2009) were carried out in aspects of the theoretical basis and model components. Modifications to aspects of the theoretical basis were carried out in statements (1), (2), (3), (4), and (5) by changing terms due to different aspects being considered in the form of: model development targets, suitability of development theory and development steps, linkages one theory and another, and the adequacy of the theory underlying development. Adoption of aspects of the theoretical basis is carried out in statements (6) and (7). Modifications of the model component aspects were made to statement items (1), (2) into one item due to the different aspects being considered, and statement items (3), (4), (5), (6), and (7) were made editorial changes. .

Table 1. Learning model book validation sheet

Number	Aspect	Statement Items	Score			
			1	2	3	4
1	Rational Model Development	1. Rational model development is supported by comprehensive and up to date theoretical studies				
		2. The rationale for developing the model is explained coherently and supported by relevant theory				
		3. Information about the need to develop learning models is sufficient				
2.	Theoretical foundation	4. Rational model development with the model to be developed in accordance				

		5.	The characteristics of the model developed with the target of model development are appropriate
		6.	The learning theory that underlies the model development is relevant to the characteristics of the model being developed
		7.	The steps for developing a learning model are in accordance with model development theory
		8.	The theory of model development is explained coherently and outlines the direction of model development that will be carried out
		9.	The relationship between one theory and other theories is clear
		10.	The theoretical study presented is sufficient to base model development
3.	Learning Model Components	11.	The syntax of the learning model is structured coherently, clearly, and is supported by relevant theory
		12.	The syntax clearly describes the steps that the teacher can take
		13.	The syntax clearly describes student activities at each step
		14.	Social systems are structured coherently, clearly, and are supported by relevant theories
		15.	The reaction principles are coherent, clear, and supported by relevant theory
		16.	The support system is sufficient for implementing the learning model
		17.	The learning impact of the learning model is structured in a coherent, clear and measurable manner
		18.	Syntax and principle of corresponding reactions
		19.	Syntax and social systems correspond
		20.	Syntax and support systems are compatible
		21.	Syntax and learning impact correspond
4.	Model Implementation Instructions	22.	Implementation of the use of learning models is structured coherently, clearly, and supported by relevant theories
		23.	Instructions for teacher preparation before using the learning model are coherent, clear, and supported by relevant theory

Learning Tool validation sheet

The learning device validation sheet is used to obtain the validity of the devices (in the form of: teaching modules, worksheets, and teacher's books) that

are developed. The teaching module validation sheet contains 6 aspects, namely: (1) the format used to assess the systematicity of the teaching module, (2) the content used to assess the suitability of the objectives, material and relevance of the questions, (3) the teaching aids used to assess the suitability of the teaching aids in learning, (4) questions on mastery of teaching materials used to assess questions on mastery of teaching materials, (5) tests used to assess the quality of the content of the questions, and (6) response questionnaires used to assess student response statements. The LKS validation sheet and teacher's book contain 3 aspects, namely: (1) the content used to assess the suitability of the objectives, material and relevance of the questions according to the characteristics of student activities that have been designed, (2) the language used to assess the use of language, terms and symbols, (3) the accuracy of the concept used to assess the accuracy of the concept and the hierarchy of the concept. Some statement items for each assessment aspect were developed by researchers and some modified or adopted concepts from Parta (2009) and Wulandari (2020).

Researchers developed their own statement items for aspects of format, teaching aids and tests. In the format aspect, a statement was developed which contained the systematic suitability of the model based on the curriculum reference used. For the teaching aids aspect, three statements were developed to assess the suitability of the teaching aids to the material being studied.

Modifications to the concept from Wulandari (2020) were carried out in the aspects of mastery of teaching materials and response questionnaires. Modifications to aspects of mastery of teaching materials were carried out in points (1), (2), (4), (5), and (8) with editorial changes, point (3) with the addition of sufficient time for solving questions. Meanwhile, points (6) and (7) are not used because they do not correspond to the aspects being considered. Modifications to aspects of the response questionnaire were made to items (1) and (2) to become one statement item, item (3) with editorial changes and statement items (4), (5), and (6) to become one statement item.

Modification and adoption of the concept from Parta (2009) was carried out in the aspects of content, concept accuracy and language. Modifications to the content aspects were carried out in statement item (1) with editorial changes, item (2) which was developed into two statements, item (6) which was developed into 3 statement items, item (7) with editorial changes. Meanwhile, other items, namely (3), (4), and (5) were not taken because they did not correspond to the aspects being considered. Adoption is carried out on aspects of concept and language accuracy by taking all the statement items that have been developed.

Next, the device validation sheets (teaching modules, worksheets, and teacher's books) that are compiled are then validated by two validators who are the same as the learning model validation sheet validators. The data obtained was analyzed descriptively. The device validation sheet (teaching module, worksheet, and teacher's book) can be seen in the following table.

Table 2. Teaching module validation sheet

Number	Aspect	Statement Items		Score			
				1	2	3	4
1.	Format	1.	The format (systematics) in the teaching module is clear (not confusing)				
2.	Content	2.	Learning objectives are in accordance with the characteristics of the model being developed				
		3.	Learning objectives are stated in clear and measurable terms				
		4.	The teacher's activities in each learning step are structured coherently, clearly, not confusingly and do not deviate from the learning objectives				
		5.	Student activities in each learning step are structured coherently, clearly, not confusingly, and do not deviate from the learning objectives				
		6.	The syntax of the learning model is arranged in learning steps in a coherent, clear and not confusing manner				
		7.	Learning activities in the learning steps are structured coherently, clearly and not confusingly				
		8.	Learning steps can be implemented within the allocated time				
		9.	The image presentation in the teaching module can be read clearly				

Number	Aspect	Statement Items		Score			
				1	2	3	4
3.	Props	10.	The selected props can be easily operated by students				
		11.	The selected teaching aids are sufficient to carry out learning activities				
		12.	The characteristics of the teaching aids chosen are appropriate to the characteristics of the students and the material the students are studying so that they can help explain the concept				
4.	Questions about Mastery of teaching materials	13.	Mastery of teaching materials can measure students' mastery of the material being studied				
		14.	The time given to complete questions regarding mastery of teaching materials is sufficient				
		15.	Answer keys and scoring guidelines are presented clearly				
		16.	Questions about mastery of teaching materials can explore student understanding				
5.	Test questions	17.	Tests can measure student understanding				
		18.	The time given to complete the test is sufficient				
6.	Response Questionnaire	19.	Statements in the student response questionnaire are clear, do not give rise to double meanings, and do not depend on each other				
		20.	The statements in the response questionnaire represent and measure students' responses during learning using the learning model				
		21.	The language in the response questionnaire is communicative and easy for students to understand				

Table 3. LKS validation sheet

Number	Aspect	Statement Items		Score			
				1	2	3	4
1.	Content	1.	Learning objectives are stated in clear and measurable terms				
		2.	The organization of material describes a complete unit of materials				
		3.	Activity materials help students to build knowledge independently				
		4.	Activity material encourages students to think				
		5.	Activity material emphasizes mastery of concepts				
		6.	Activity materials are arranged systematically				

Number	Aspect	Statement Items	Score			
			1	2	3	4
		7. The activity material covers all the contents of the material units				
		8. The questions given are relevant to the scope of the material				
2.	Concept Accuracy	9. The concepts contained in the activity material are presented in simple formulations				
		10. The hierarchy of one and the following concepts is clear				
		11. The concept coverage in each activity unit can represent the material in the sub-topic				
3.	Language	12. Use short, clear and firm language				
		13. The terms and symbols used are consistent				
		14. The terms used are not boring				

Table 4. Teacher's book validation sheet

Number	Aspect	Statement Items	Score			
			1	2	3	4
1.	Content	1. Learning objectives are stated in clear and measurable terms				
		2. The organization of material describes a complete unit of materials				
		3. Material helps teachers build students' knowledge				
		4. Material helps teachers to develop students' understanding				
		5. The material emphasizes mastery of concepts				
		6. The material is arranged in an orderly and systematic manner				
		7. Material includes the entire contents of material units				
		8. The questions given are relevant to the scope of the material				
2.	Concept Accuracy	9. The concepts contained in the material are presented in a simple formulation				
		10. The hierarchy of one and the following concepts is clear				
		11. The concept coverage in each activity unit can represent the material in the sub-topic				
3.	Language	12. Use short, clear and firm language				
		13. The terms and symbols used are consistent				
		14. The terms used are not boring				

The development product validator will assess each statement item with a score of 1-4. The score used modifies the score from the 1-5 Likert scale by eliminating scale 3 (middle category). According to Kulas & Stachowski (2009),

someone who chooses the middle category is indicated to be doubtful, does not understand the point of the statement, their response is conditional, or they choose neutral. The scores and their meanings can be seen in the following table.

Table 5. Meaning of scores on the validation sheet

Score	Score Meaning
Score 1:	If the statement items do not correspond to aspects of the development product
Score 2:	If the statement items do not match the aspects of the development product
Score 3:	If the statement items correspond to aspects of the development product
Score 4:	If the statement item is very appropriate to aspects of the development product

The structured learning model validation sheet is then validated by two validators. The selected validator has qualifications of a doctorate in Indonesian language education and a doctorate in basic education. The selected validators have experience in similar research. The validation results are presented in the following table. The data obtained was then analyzed descriptively.

Table 6. Validation results of the learning model validation sheet

N	Statement Items	Score		Mean
		V1	V2	
1.	Instructions for filling out the “model book validation sheet” are clear	4	4	**4**
2.	The statements in the “model book validation sheet” are clear (no double meaning)	4	4	**4**
3.	The statements in the “model book validation sheet” explicitly assess the rationale for model development	4	3	**3,5**
4.	The statements in the “model book validation sheet” explicitly assess the strength of the theory underlying the model development	3	3	**3**
5.	The statement in the "model book validation sheet" explicitly assesses the existence of the model components: syntax, social system, reaction principle, support system and learning impact	3	3	**3**
6.	The statement in the “model book validation sheet” explicitly assesses consistency between components in the learning model	4	3	**3,5**
7.	The statement in the "model book validation sheet" explicitly assesses the instructions for implementing the learning model	4	4	**4**
8.	The statements in the “model book validation sheet” are independent of one another	3	4	**3,5**
9.	The statements in the “model book validation sheet” do not overlap	4	4	**4**
10.	The statements in the "model book validation sheet" cover all aspects	4	3	**3,5**
Mean		**3,7**	**3,5**	**3,6**

From Table 6, an average of 3.6 ≥ 3 is obtained. Based on the established criteria, the model validation sheet meets the validity requirements (can be used to validate the model book).

Table 7. Validation results of teaching module validation sheet

N	Statement Items	Score		Mean
		V1	V2	
1.	Instructions for filling out the "teaching module validation sheet" are clear	4	4	**4**
2.	Each statement in the "teaching module validation sheet" is clear (does not have double meaning)	4	4	**4**
3.	The statement in the "teaching module validation sheet" explicitly assesses the suitability of basic competencies and learning steps	3	3	**3**
4.	The statements in the “teaching module validation sheet” explicitly assess the appropriateness of the syntax and learning steps	4	3	**3,5**
5.	The statements in the “teaching module validation sheet” explicitly measure student understanding	3	3	**3**
6.	The statements in the "teaching module validation sheet" are independent of one another	4	4	**4**
7.	The statements in the “teaching module validation sheet” do not overlap	4	4	**4**
8.	The statements in the "teaching module validation sheet" cover all aspects	4	3	**3.5**
Mean		**3,75**	**3,5**	**3,64**

Conclusion Table 7, obtained an average of 3.64 ≥ 3, so that according to the criteria, the teaching module validation sheet has valid criteria (can be used to validate teaching modules).

Table 8. LKS validation sheet validation results

N	Statement Items	Score		Mean
		V1	V2	
1.	The instructions for filling out the "LKS validation sheet" are clear	4	4	**4**
2.	Each statement in the "LKS validation sheet" is clear (does not have double meaning)	4	4	**4**
3.	The statement in the "LKS validation sheet" explicitly assesses the suitability of the activity material designed in the LKS	3	3	**3**
4.	The statements in the "LKS validation sheet" are independent of one another	4	4	**4**
5.	The statements in the "LKS validation sheet" do not overlap	4	4	**4**
6.	The statements in the "LKS validation sheet" cover all aspects	4	3	**3,5**
Mean		**3,8**	**3,7**	**3,75**

Based on Table 8, an average of 3.75 ≥ 3 is obtained. So the validation sheet meets the validity requirements. Reliability is checked based on varying assessments from two validators.

Table 9. Validation results of teacher's book validation sheet

N	Statement Items	Score		Mean
		V1	V2	
1.	The instructions for filling out the “teacher book validation sheet” are clear	4	4	**4**
2.	Each statement in the "teacher book validation sheet" is clear (does not have double meaning)	4	4	**4**
3.	The statement in the "teacher's book validation sheet" explicitly assesses the suitability of the activity material designed in the teacher's book	3	3	**3**

4.	The statements in the "teacher book validation sheet" do not depend on one another	4	3	**3,5**
5.	The statements in the "teacher book validation sheet" do not overlap	4	4	**4**
6.	The statements in the "teacher book validation sheet" cover all aspects	4	4	**4**
Mean		**3,83**	**,67**	**3,75**

From Table 9, an average of 3.75 ≥ 3 is obtained, so according to the criteria, this validation sheet can validate the teacher's book.

4. Conclusion

A valid validation sheet is a validation sheet that is considered valid by the validator with certain criteria. The validation sheets that researchers have developed are model book validation sheets, teaching module validation sheets, LKS validation sheets and teacher book validation sheets. This validation sheet has valid criteria because the average validity obtained is ≥ 3. This means that this validation sheet can be used to assess model products. The implication of the research results is the applicability of the learning model product validation sheet format as a tool for obtaining the validity of the learning model product

References

Akker, J. V. D., & Plomp, T. (1999). *Principles and Methods of Development Research*. *In J. van den Akker, R. M. Branch, K. Gustafson, N. Nieveen, & T. Plomp (Ed.), Design Approaches and Tools in Education and Training*. Enschede: Kluwer Academic Publishers.

Akker, J. V. D., Branch, R. M., Gustafson, K., Nieveen, N., Plompt, T. (1999). *Designing and Tools in Educational and Training*. Enschede: Kluwer Academic Publisher.

Arends. (2004). *Clasroom Instruction and Management.* New York: McGraw-Hill Companies.

Ikhsan, M. (2015). Pengembangan Model Pembelajaran Berbasis Teori Van Hiele untuk Meningkatkan Kemampuan Geometri Siswa SMP di Kota Banda Aceh, *Jurnal Pengajaran MIPA,* Vol. 2: 164-172. UPI: Bandung.

Iksan, Z. H., Zakaria, E., Meerah, T. S. M., Osman, K., Lian, D. K. C., Mahmud, S. N. D., & Krish, P. (2012). Communication Skills among University Students. *Procedia - Social and Behavioral Sciences*, *59* (June 2014). DOI: 10.20414/betajtm.v9i2.14.

Joyce, B. R. Weil, M. & Calhoun, E. (2015). *Models of Teaching*. New Jersey: Prentice-Hall, Inc.

Nieveen, N. (1999). *Prototyping to Reach Product Quality. In J. Van den Akker, R. M. Branch, K. Gustafson, N. Nieveen, & T. Plomp (Ed.), Design Approaches and Tools in Education and Training*. Enschede: Kluwer Academic Publishers.

Nieveen, N. (2013). *Formative Evaluation in Educational Design Research*. *In J. Van den Akker, R. M. Branch, K. Gustafson, N. Nieveen, & T. Plomp (Ed.), Design Approaches and Tools in Education and Training*. Enschede: Kluwer Academic Publishers.

Nur'aeni, L. E., Muharram, M. R.W., Pranata, O. H., & Apriani, I. F. (2020). SPADE: Model Pembelajaran Geometri Di Sekolah Dasar. *Indonesian Journal of Primary Education*, 4(2), 204–211

Parta, I. N. (2017). *Model Pembelajaran Inkuiri: Refleksi Membangun Pertanyaan Penghalusan Pengetahuan Internalisasi Pengetahuan*. Malang: UM Press.

Plomp, T. (2013). *Educational Design Research: A Introduction Educational Design Research*. Enshede: Netherlands Institute.

Plomp, T., & Nieveen, N. (2010). *Educational Designs Research*. Enshede: Netherlands Institute.

Subanji. 2013. *Pembelajaran Matematika Kreatif dan Inovatif*. Malang: UM Press.

Wardhani, I.S., (2023). Pengembangan Model Pembelajaran Imajinatif Spasial Untuk Menumbuhkan Keterampilan Spasial Siswa Sekolah Dasar. Disertasi Tidak Dipublikasikan: Malang

Wardhani, I.S., Nusantara, T., Parta, I.N., Permadi, H., (2023). The Model of Geometry Learning With Spatial Skills Features: Is It Possible?. *Journal of Higher Education Theory & Practice.* Vol. 23 Issue 14, p225-240. 16p. DOI: /10.33423/jhetp.v23i14.6397.

Wulandari, S. (2020). *Pengembangan Model Pembelajaran Imajistik Untuk Meningkatkan Kemampuan Spasial Siswa Kelas VIII SMP*. Disertasi tidak dipublikasikan: Malang.

Wulandari, S., Sa'dijah, C., As'ari, A.R., Sulandra, & I.M., (2019). Spatial Representation on Geometry. *International Journal of Scientific & Tecnology Research*. Volume 8, Issue 12.