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## DEVELOPMENT OF TEACHING MATERIAL WITH *BRIDGING ANALOGY*: LESSON PLAN & MODULE

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### *Abstract*

This study aims to develop teaching materials consisting of a lesson plan and module with the Bridging Analogy Approach for subject matter Relations and Functions. Bridging Analogy is an approach that connects new concepts with analogous real-life problems for the student to a new concept in math by looking for the similarity between the analogy and the new concept. The research method used is Research and Development (R&D), consisting of Define, Design, and Develop and for the disseminate can't be implemented because of pandemic covid-19. The expert and student judged the teaching material. The expert who asses the teaching material consists of 3 lectures from the Math Department and two Junior High School practitioners. The score for the teaching material with Bridging Analogy by the expert is 93.83%, which means the lesson plan is "worthy," and the score for the module is 91.26%, which means the module is "worthy." Thus the module was assessed by the student from SMPN 178 Jakarta to know the teaching material's effectiveness and clarity. The response score from students about the module is 93.62%, meaning the module is "worthy." The conclusion is teaching material: lesson plan and module in this study can be implemented for teaching and learning relations and functions at Junior High School.

**Keywords:** Teaching material, Lesson Plan, Module, Bridging Analogy Approach, Relations and Functions.

### **Abstrak**

Penelitian ini bertujuan untuk mengembangkan bahan ajar yang terdiri dari RPP dan Materi dengan Pendekatan Bridging Analogy Pada Relasi dan Fungsi. Bridging Analogy adalah pendekatan yang mengaitkan konsep baru dengan konsep analogi yang sudah dikenal siswa dengan melihat keserupaannya Model pengembangan yang digunakan dalam penelitian ini adalah model 4-D, namun dalam pelaksanaan penelitian ini terbatas hanya sampai tahap Develop. Subjek yang digunakan diambil dengan menggunakan teknik purposive sampling pada siswa kelas VIII SMP/MTs. Hasil validasi bahan ajar dengan pendekatan Bridging Analogy untuk penilaian RPP mendapat kriteria layak dengan presentase sebesar 93,83% dan penilaian materi mendapat kriteria layak dengan presentase sebesar 91,26%. Adapun, menurut respon siswa menunjukkan bahwa bahan ajar Pendekatan Bridging Analogy mendapat kriteria layak dengan presentase sebesar 93.62%. Dengan demikian, bahan ajar ini termasuk dalam kriteria sangat baik dan dapat digunakan dalam pembelajaran matematika kelas VIII.

**Kata kunci:** Bahan ajar, Pendekatan Bridging Analogy, Materi Relasi dan Fungsi, Model Pengembangan four-D (4-D).

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## **INTRODUCTION**

The development of learning materials or teaching materials set up to be one of the references that will support the development of students so that there is a balance between physical and spiritual needs (Kusumam et al., 2016) according to orientation in the 2013 curriculum application. National Education Minister Regulation (Permendiknas), Number 41 of 2007 concerning process standards, one of which regulates the planning process of learning, states that teachers had expected to be able to develop teaching materials as one of the learning resources.

Planning for a lesson has long been recognized as a primary factor impacting the efficacy of classroom instruction. The lesson plan is a written description of the education process in which it shows what, when, where, and with which method learners should learn and how they should assess. (Nesari & Heidari, 2014) The formal lesson plan is one tool that encourages teachers to make their lesson images explicit and potential objects of thought and reflection (Courtner et al., 2015).

The limited development of lesson plans that use specific approaches or methods is an obstacle in the learning process in schools. A lesson plan and teaching materials must be structured to achieve learning goals. Teachers need to pay attention to several aspects in developing a lesson plan. Teaching materials are related to fulfilling students' needs, organizing facilities and completeness of teaching needs, and learning approaches.

As expressed previously, mathematics had based on the relationship between previous knowledge and new knowledge. (Kepceoğlu & Karadeniz, 2017). Mathematics has a nature of hierarchy, where to understand higher concepts, students must understand the underlying concept (prerequisite material).

Relationships and function are basic math materials that students study in class 8 Junior High School. Relation and function are new knowledge for eighth graders, and related material and function need to be well understood by students. This concept is not only present in many areas of mathematics but is prevalent in the school curriculum and is, of course, studied as a part of the mathematics teacher training programs. (Vásquez et al., 2018).

Therefore, the related material and function, in reality, is a) the analysis of the student's understanding and ability state that students still lack control questions; b) most students, students felt difficult before to filled the answers, and students are less enthusiastic about understanding the question; c) students also feel confused about completing the problems given (Yanti et al., 2019). The above states that the ability of understanding of junior high school students to the relationship material and function is still quite weak.

In supporting the learning process, many learning approaches can direct students to be more independent and active in learning activities. One of the learning innovations used in the

learning process is the Bridging Analogy approach. The analogy compares the similarities of the two concepts (Glynn, 2008). Gentner (1983) described the existence of two elements when describing analogies: source or analog concept (base) and target concept (target). Finding a third intermediate case that shares features with both the base case and the analogous case term is a bridging analogy. (John Clement, 1993).

Based on the results of Richland and Hansend (2013) studies stated that sometimes students cannot generate themselves independently their instructional analogy, so that teachers need to show a rational stimulus who drew an analogous mindset of students. Teacher needs to manipulate the level of liking and relation between analog concepts and the concept of a target that depends on the closest analog context of the analog (Richland, Zur, and Holyoak, 2007).

Previous research suggests that learning with Bridging Analogy's approach makes students more active because some discover new answers to previously unsolved problems using known methods. (Uyen, 2021). The Bridging Analogy learning device developed by John Clement (1993) also encourages students to become aware of alternative conceptions, criticize them actively, and create new ones.

Bridging Analogy in the math learning process connects one concept with another and then search for or see the similarity. (Agustina et al. 2019). Bridging analogy approach emphasizes that it emphasizes the mastery of the concept that can improve mathematical reasoning skills through the concept that students have learned to study new concepts. Analogies are essential in understanding abstract concepts due to the nature of mathematics (Richland, Zur, and Holyoak, 2007).

This study aims to produce teaching materials using the Bridging Analogy approach concerning material and function and determine the student's response and the feasibility level of the material using the Bridging Analogy's approach to concerns and process. The flow of the material explanation for this teaching material uses the characteristics of the Bridging Analogy approach, where each material will begin with an analogy that can be understood by students.

## **METHOD**

According to Glynn (2008). there are six steps that teachers must conduct to attract or obtain an analogy, namely: (1) Introduce the target concept, (2) Remind students of what they know of the analog concept, (3) Identify relevant features of target and analog concept, (4) Connect (map) the similar features of the concept, (5) Indicate where the analogy between the concept breaks down, (6) Draw conclusions.

Brown and Clement (in Richland et al., 2004) suggested several procedures for carrying out learning with the Bridging Analogy approach there are several procedures:

1. Anchoring examples that tap intuitions that are mainly in agreement with accepted theory can be used as starting points, showing that not all preconceptions are a mission between your results or findings and the previous publications by other researchers.
2. Students who experience misconceptions can be explained clearly by asking target questions.
3. The instructor proposes a case as a link in the analog concept or the target concept to attract students' intuition
4. Students were asked to compare analog and target concepts to establish analogous relationships.
5. The instructor finds a middle analogy between the analog and target concepts; when students do not see the analogy, the analogy must be responsible for building a link between the reference and target analogy.

Based on the steps above, in this study, researchers used the stages of the Bridging Analogy approach, including steps – learning as follows:

1. In Introducing an analog concept, students review the familiar ideas or concepts taught in advance. An analogy in the form of situations/problems in everyday life that students already know.
2. Identifying relevant characteristics between analog concepts and target concepts, students can find common forms, models, or similarities between target concepts and analog concepts.
3. Connecting the analog concept associated with the idea of a target, students identify relevant characteristics of the analog image to explain features that had adjusted with the idea of the target.
4. Clarify the target concept, the concept that will teach, and the idea of the goal in the lesson process. Students began to recognize and identify a new situation/problem that is the crucial topic in achieving the target concept.
5. Concluding the target concept of the analogy concept, students conclude the result of the target concept with the help of the analog concept
6. Completing exercises related to an analogy to see students' understanding of the target concept.

Material and function using a Bridging Analogy approach developed in the form of a lesson plan and modules consisting of 4 units. The development stage of this teaching ingredient consists of Define, Design, and Develop.

In the stage of the researcher's design formulation, the purpose of learning, the original design of the teaching material began with the preparation of the initial draft of the lesson plan, determining the flow of the material explanation on the teaching material that uses the characteristics of the Bridging Analogy stage. The last is the preparation of the assessment instrument.

In Phase Develop, researchers conduct development from materials prepared in the Design stage. In the initial step at this stage, the researcher organizes a complete lesson plan and the development of teaching material materials. After the development, the revisions are carried out based on records from the validator. The discussion should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

This research uses the development research method (Research and Development), namely a research method used to produce specific products and test the product's effectiveness (Sugiyono in Putri, F.M., 2016). This study has effects in the form of teaching materials and functions using the Bridging Analogy approach carried out by referring to the 4D development model (Define, Design, Develop, and Disseminate) developed by Thiagarajan. However, the dissemination can't support implementation because of pandemic covid-19. The sampling technique or subject of trials used is the Purposive Sampling technique, which determines samples in specific considerations.

The subject of expert or valid testators consists of 3 Math Education UIN Jakarta lecturers and six math teachers. The issue of testing material products is 31 junior high school students in South Jakarta. The instruments used in this study are questionnaires of expert validation tests and questionnaires on the student's responses. Questionnaire instruments use for assessing teaching materials by experts, including the judgment of lesson plans and modules. The validation instrument for the development of teaching materials was analyzed by experts using the Likert scale using the Likert-validate scale model with three choices viable (3), Sufficient Viable (2), and Decent Enough Viable (1). The data collected are calculated on average scores of all aspects of the assessment using the feasibility formula (Sari & Suswanto formula in Auliya, 2020).

$$p = \frac{\text{Total Responden}}{\text{Sum of Ideal kriterium response}} \times 100\%$$

Description: p = presenter of the feasibility of a teaching material

The next step is to interpret the presenter's feasibility and the student's response based on the teaching material criteria seen in Table 1 (Auliya, l., 2020).

**Table 1. Teaching Material Feasibility and A Student Response**

Percentage	Qualification
33.3 % - 55.5%	Decent Enough Viable
55.6% - 77.8%	Sufficient Viable
77.9 % – 100%	Viable

The research data in qualitative are in the form of comments and suggestions used as a basis for revising teaching materials.

## RESULTS AND DISCUSSION

### *The Results of Validation*

At the expert assessment stage, researchers analyzed data results based on instrument validation value. This assessment of instrument validation aims to see the feasibility of lesson plans and teaching material materials. The expert validation instrument includes two aspects, namely, the aspect of the achievement and serving content. The results of the assessment are shown in the following table 2:

**Table 2. The results of the Validation of Lesson Plan**

No.	Aspect	Percentage (%)	Criteria
1.	Achievement of Indicator	94,44	Viable
2.	Presentation	93,21	Viable
Total Rating		93,83	Viable

The instrument of modules includes five aspects of the feasibility aspect, the feasibility of the language, the feasibility of the presentation, the Bridging Analogy approach, and learning assessment. The results of the evaluation are shown in Table 3.

**Table 3. The results of the Validation of Module**

No.	Aspect	Percentage (%)	Criteria
1.	Material Coverage	90,74	Viable
2.	Language	91,67	Viable
3.	Presentation Technique	92,12	Viable
4.	Bridging Analogy Approach	91,12	Viable
5.	Learning Assessment	90,67	Viable
Overall Rating		91,26	Viable

The assessment of students with this small group trial was limited to 31 junior high school students. In Table 4 below:

**Table 4. The results of Student Response to Module**

No.	Aspect	Percentage (%)	Criteria
1.	Material Coverage	93,01	Viable
2.	Language	94,89	Viable
3.	Presentation Technique	91,67	Viable
4.	Bridging Analogy Approach	93,39	Viable
5.	Learning Assessment	95,16	Viable
Overall Rating		93,62	Viable

The final product produced in this study is in the form of teaching material relationships and functions with a Bridging Analogy approach. The Bridging Analogy approach referred to in this study is the approach in learning that facilitate students to understand the concept by connecting the idea by hooking the image with other pictures by looking at the prototype to get a new concept.

The development of the teaching material begins by making the Implementation lesson plan compiled according to the sequence of material presentation by containing the Bridging Analogy approach to the core learning activities. Module and lesson plan developed consisting of 4 meetings and meeting one sub discussion the concept of relationship and presentation. The analog idea given is a family tree which will later need to be identified and understood by students. Lesson plan meeting 2 contains a subject of the function concept. The analog idea is a flat wake created in a learning group that must identify with the elements attached. Lesson plan meeting 3 contains a sub-functional value. The analog concept is in determining the price of goods and many things. Lesson plan meeting 4 includes the concept sub-concept. The analog idea is a pair of the governor with the province he leads. In the implementation of the Bridging Analogy approach developed in the lesson plan, he also wrote the allocation of time needed for each stage of learning activities and the phase presentation pages on teaching materials. Providing additional information is given with the aim so that the lesson plan is ready to be implemented by the teacher in the learning process.

Furthermore, the purpose of learning and student indicator depends on preparing a lesson plan. In a lesson plan, the teaching flow of materials adjustment to the steps of learning activities used in the material sub-aperture, and the preparation of formative problems adjustment to the aspect focused on in the lesson plan assessment section.

In the presentation of teaching materials, 1 discusses the relationship and presenting them, where the analog concept given is a family tree at the stage of knowing the idea of students' target gifted new problems related to market activities which students need to identify and interpret two associations made. The presentation of unit 2 discusses the concept of function, where the analog idea given is in the form of the work of a group makes a rectangular manner. Knowing the concept of student targets gave new problems regarding the vacation costs. Students need to identify relationships, the elements in relationships, and interpret the two associations made in the form of function presentation.

In the production of unit 3, discuss the concept of function value, where the analog concept given is in the form of determining class contributions. At a stage of knowing the concept of a student target is given a new problem, only in the form of the function to find a function value if the variables are different. The teaching material presentation of unit 4 discusses one-one correspondence, where the analog concept gave in the form of Gov and Provinces he leads. Each team gave exercises about five problems consisting of two options and three essay issues. Expert validators have assessed some module and lesson plan views, and students' responses are in the image below.



Figure 1. Cover Module and One of Lesson Plan

CONCLUSION

The development of teaching materials with the Bridging Analogy approach relationship material and function has been developed using the development stage 3-D by involving experts and students. Expectations of the assessment results divide into modules and lesson plans. The results of lesson plan validation using a Bridging Analogy approach show that the criterion is viable for 93.83%, and the module result is subject to 91.26% with feasible standards. Meanwhile, the assessment results of the student's response get the standards deserved with a percentage of 93.62%. Therefore, it can conclude that the teaching material developed has met the deserved criteria.

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Auliya, L., & Lazim, N. (2020). The Development Of Miss PPL (Advanced Microsoft Power Point) Learning Media At Elementary School. *Jurnal PAJAR ( Pendidikan dan Pengajaran )*. 4(4) DOI : <http://dx.doi.org/10.33578/pjr.v4i2.8027>

Agustiana, N., Supriadi, N., & Komarudin. (2019). Meningkatkan Kemampuan Penalaran Matematis Dengan Penerapan Pendekatan Bridging Analogy Ditinjau Dari Keyakinan Diri. *Inovasi Pembangunan - Jurnal Kelitbang* 7(1). <http://journalbalitbangdalampung.org>

Clement, J. (1993). Using bridging analogies and anchoring intuitions to deal with students' preconceptions in physics. *Journal of Research in Science Teaching*, 30(10), 1241–1257. <https://doi.org/10.1002/tea.3660301007>

Courtney, S. A., Eliustaoglu, E., & Crawford, A. (2015). Examining the Role Lesson Plans Play in Mathematics Education. *North American Chapter of the International Group for the Psychology of Mathematics Education, December*, 1–8.

Espinoza-vasquez, G., Zakaryan, D., & Yañez, J. C. (2017). Use of analogies in teaching the concept of function : relation between Knowledge of Topics and Knowledge of Mathematics Teaching. *Cerme*.

Gentner, D. (1983). Structure-Mapping: Theoretical Framework For Analogy. *Cognitive Science*, 7(2), p. 155–170.

Glynn, S. M. (2008). Making science concepts meaningful to students: Teaching with analogies. *Four Decades of Research in Science Education: From Curriculum Development to Quality Improvement*, 113–125.



- Kepceoğlu, İ., & Karadeniz, S. (2017). Analysis of Analogies in Turkish Elementary Mathematics. *European Journal of Science and Mathematics Education*, 5(4), 355–364.
- Kusumam, A., Mukhidin, M., & Hasan, B. (2016). Pengembangan Bahan Ajar Mata Pelajaran Dasar dan Pengukuran Listrik untuk Sekolah Menengah Kejuruan. *Jurnal Pendidikan Teknologi Dan Kejuruan*, 23(1), 28. <https://doi.org/10.21831/jptk.v23i1.9352>
- Nesari, A. J., & Heidari, M. (2014). The Important Role of Lesson Plan on Educational Achievement of Iranian EFL Teachers' Attitudes. *International Journal of Foreign Language Teaching & Research*, 2(5), 27–34. [http://jfl.iaun.ac.ir/article\\_557178.html](http://jfl.iaun.ac.ir/article_557178.html)
- Yanti, R. N., Melati, A. S., & Zanty, L. S. (2019). Analisis Kemampuan Pemahaman dan Kemampuan Komunikasi Matematis Siswa SMP Pada Materi Relasi dan Fungsi. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 3(1), 209–219. <https://doi.org/10.31004/cendekia.v3i1.95>
- Putri, F. M. (2016). Pengembangan Bahan Ajar Matematika Dasar Layanan Jurusan Non Eksak. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, 2(1), 44. <https://doi.org/10.24853/fbc.2.1.44-52>
- Richland, L. E., Holyoak, K. J., & Stigler, J. W. (2004). Analogy use in eighth-grade mathematics classrooms. *Cognition and Instruction*, 22(1), 37–60. [https://doi.org/10.1207/s1532690Xci2201\\_2](https://doi.org/10.1207/s1532690Xci2201_2)
- Uyen, B. P. (2021). Using Analogy in Solving Problems: a Case Study of Teaching the Radical Inequalities. *European Journal of Education Studies*, 8(5), 101–108. <https://doi.org/10.46827/ejes.v8i5.3715>