

# The Hybridization of Mathematics in Literary Works to Increase Students' Motivation in Learning Mathematics

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**Abstract:** This research is motivated by the existence of a paradigm that mathematics is only related to numbers that seem difficult and rigid. The two disciplines of Science and literature are still considered have different study that is impossible to put them together. Philosophically, literature adheres to philosophy of idealism and phenomenology, while science is a scientific product and adheres to the philosophy of materialism and positivism. Therefore, the hybridization of mathematics in literary works is one of the ways that can change the paradigm of mathematics. Poetry is one of the works that is very popular with all circles. Thus, the presentation of mathematics in poetry will remove the impression of rigidity. Writing mathematical poetry work uses an experiential learning model which is consists of several stages, namely concrete experience, reflective observation, abstract conceptualization, active experimentation. In other words, this research aims to find out whether the hybridization of mathematics in literary works provides motivation in learning mathematics. The type of research is descriptive quantitative research. The research subjects were 85 students of fifth semester at Department of Mathematics Education. Data collection techniques are questionnaires and interviews. Questionnaire data analysis technique uses a Likert scale. The results of the study show that (1) the hybridization of mathematics in literary works can contribute to the learning of mathematics. This can be seen from the work of mathematical poetry. (2) the hybridization of mathematics in literary works can provide motivation to learn mathematics which can be seen from the results of the questionnaire that there are 0% stated strongly disagree, 9.41% or 8 students stated disagree, 51.76% or 44 students agreed, and 38.82% or 33 students stated strongly agree. Thus, it can be concluded that the hybridization of mathematics in literary works give a positive effect on motivation in learning mathematics.

## 1 INTRODUCTION

Science and literature are two disciplines that are visible in contrast, so the merging of the two still sounds very taboo. This paradigm was then broken by Pramono and Ansori (2016) in a study entitled "*Phenomenon of the hybridization of science in literary works*" which concluded that the interdisciplinary study between science and literature could complement the lack of both disciplines. For science, literature can be used as a medium for delivering science that is too rigid and seems "haunted", while literature can use science as a medium to develop stories in each work so as not to appear too absurd and dry in the creative process of literature. So that Saryono (2015) said that the background of literary and scientific hybridization is

one of which is shifting the view of mono-disciplinary towards inter-disciplinary.

Mathematics is very closely related to literature. This was revealed by Sa'adillah (2014) that Reviel Netz, a professor at Stanford University, revealed the similarities between Hellenistic poetry and mathematical texts in the same era in ancient Greece, and finally echoed a creed, that mathematics same with literature, mathematics is Literature. Likewise with Sofia Kovalevskaya, creator of the Cauchy-Kovalevsky Theorem, said that it was impossible to become a true mathematician without having the soul of a poet.

Mathematics basically contains beauty. In his research entitled "*Mathematics, national character, and his role in the development of science and technology*", Widodo (2011) quoted an explanation

from Soehakso who was the first mathematics professor in Indonesia, that mathematics had a very interesting pattern, that made him often said that mathematics like the prettiest girl in the whole world. This was also conveyed by Sriyanto (2007) that mathematics as an integral part of human culture contains dimensions of humanity and has its own beauty. Beauty is usually explained through its elements such as harmony, order, harmony, balance, uniformity, wholeness and so on. Thus, the purpose of this study was to determine whether the role of the hybridization of mathematics in literary works on motivation to learn mathematics.

## 2 LITERATURE REVIEW

Soedjadi (1994) argues that in school, mathematics teaching can be oriented to the values contained in mathematics, among others, aesthetic values, namely values related to "beauty" and the value of beauty or stimulation, namely the value associated with power beautiful flavor generator.

In literature, poetry is a literary work that is very popular with all circles. Pradopo (2005) explains that the poem expresses thoughts that evoke feelings, stimulates the five senses imagination in a rhythmic arrangement.

Poetry is one of the literary products intended by the poet as a medium to channel the contents of his soul. The nature of poetry does create or create, because with and through poetry someone creates his own world, namely a world that contains a picture of a particular atmosphere, a certain impression, even certain messages both outward and inward (Putra, 2010).

Regarding its function, Nuryatin (2010) explains that Literature can provide the audience with beauty and usefulness. This is one of the literary functions that Horatius called *dulce et utile*, namely giving usability and pleasure. In line with the phrase *dulce et utile* of Horatius, it was stated by Edgar Allan Poe, an American poet and writer as quoted by Rene Wellek & Austin Warren that literature functions to entertain and teach something.

Therefore, poetry is a recording and interpretation of human experience that is changed in the most meaningful form by providing language (Ristri Wahyuni, 2014). Poetry as a personal figure of a poet or personal expression means poetry is an overflow of feelings or as a product of the imagination of poets operating on perceptions (Sayuti, 2002).

In poetry writing, the experiential learning model is very effective, as presented by munawaroh et al (2016) in his article explaining that the experiential learning method is a suitable method to use poetry writing skills because this method requires students to process their experiences according to their imagination, creativity and skills -each students by further exploring students' thinking without any harmful effects that can be expressed in writing.

The learning stages with the experiential learning model (Indriana, 2011) are as follows:

- a. Concrete Experience. Learning begins with providing activities that are able to create an atmosphere, and a conducive framework.
- b. Reflective Observation. At this stage, students actively find out about the aims and objectives of the activities or events they experience. Students tend to gather information and use imagination to solve problems. This stage allows students to be better at seeing concrete situations with several different points of view.
- c. Abstract conceptualization. At this stage students begin to gather creative ideas based on the two previous learning stages. These ideas are put together into a concept or abstraction which will then be developed into a new product or innovation.
- d. Active Experimentation. At this stage, students begin to pour their ideas into a product according to the concepts that have been prepared in the previous stage.

Kolb (Sriyanti, 2013) added Generalize as the final stage in learning with the experiential learning model. At this stage, students present their work which is then given criticism and suggestions by the teacher and other students. This stage is used as a basis for improving student work.

Step-by-step poetry copyright works using the experiential Learning model as follows:



Figure 1: Experiential Learning Model.

Therefore, if mathematics is presented into poetry, mathematics can be seen from a new perspective that is more interesting and does not seem stiff. In other words, poetry can help reveal the other side of mathematics that is not only fixed on numbers, but from the point of beauty. In other words, by giving new experience and new perspective can increase students' motivation in learning mathematics.

### 3 METHODS

This research is a descriptive quantitative. According to Sugiono (2012) this research method can be interpreted as a scientific way to obtain valid data with the aim of being able to find, develop, and prove certain knowledge so that in turn it can be used to understand, solve and anticipate problems. The subjects of this study were the fifth semester students at the department of Mathematics Education of the Faculty of Teacher Training and Education, Khairun University in the 2017/2018 academic year, which is consist of 85 people spread across VA and VB.

Data collection of this research used questionnaire and documentation. The questionnaire in this study was a closed questionnaire. Understanding the questionnaire or questionnaire method according to Arikunto (2006) questionnaire

is a written statement that is used to obtain information from the respondent in the sense of personal reports or things he knows. While according to Sugiyono (2012) questionnaire or questionnaire is a technique of data collection conducted by giving a set of questions or written statements to respondents to be answered. The questionnaire in this study was written questions that were questioned to 85 respondents after attending workshops and poetry works. Documentation is also one of the data collections. The documentation in this research is in the form of photos of research activities from beginning to end.

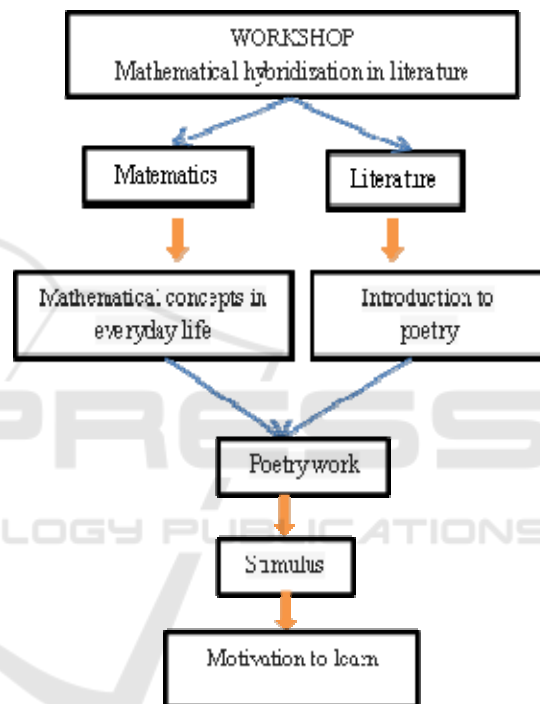


Figure 2: Flowchart of Research.

The questionnaire data analysis technique uses a Likert scale. As Djaali and Muljono (2017) explain that the Likert scale is used to measure attitudes, opinions, and perceptions of a person or group about a phenomenon of educational phenomena.

In its measurement, each respondent was asked for his opinion about an answer. The answer option consists of 4 (four) and each has a different value. This can be seen in the following:

Table 1: Alternative response to Questionnaire.

Skor	Alternative Response
1	Strongly Agree (SS)

2	Agree (S)
3	Disagree (TS)
4	Strongly Disagree (STS)

The number of questionnaires obtained will be explained by the researcher as a statement so that qualitative data was obtained, and then the data was converted into a quantitative form with a statistical analysis approach.

## 4 RESULT AND DISCUSSION

### 4.1 Data Validity Testing

Validity testing is done with the help of a computer using the SPSS version 20 program, in this study validity testing was only carried out on 85 respondents. Decision making is based on the corrected Item Total Correlation. Obtained from 30 questionnaire items after validation only 23 valid questionnaires this is indicated by the acquisition of significant values for each questionnaire, namely above  $r\text{-count} > r\text{-table}$  0.211, for  $df = 85 - 2 = 83$ ;  $\alpha = 0.05$ .

Table 2: List of Motivational Questionnaires.

BUTIR	Nilai Corrected Item Total correlation / r hitung	Sig	r tabel	Kriteria
1	0.323	003	0.211	valid
2	0.491	000	0.211	valid
3	0.391	000	0.211	valid
4	0.406	000	0.211	valid
5	0.148	0.176	0.211	tidak valid
6	0.634	000	0.211	valid
7	0.364	0.01	0.211	valid
8	-0.114	0.297	0.211	tidak valid
9	-0.25	0.21	0.211	tidak valid
10	0.368	0.001	0.211	valid
11	0.528	000	0.211	valid
12	-.132	0.227	0.211	tidak valid
13	0.582	000	0.211	valid
14	0.567	000	0.211	valid
15	0.498	000	0.211	valid
16	0.357	001	0.211	valid
17	-0.42	0.703	0.211	tidak valid
18	0.497	000	0.211	valid
19	0.161	0.141	0.211	tidak valid
20	0.461	000	0.211	valid
21	0.408	000	0.211	valid
22	0.637	000	0.211	valid
23	0.539	000	0.211	valid
24	0.687	000	0.211	valid
25	0.469	000	0.211	valid
26	-0.58	-.595	0.211	tidak valid
27	0.415	000	0.211	valid
28	0.323	003	0.211	valid
29	0.562	000	0.211	valid
30	0.492	000	0.211	valid

### 4.2 Reliability Test

Test reliability for question items that are declared valid. A variable is said to be valid or reliable if the answers to questions are always consistent. Based on the results of reliability testing in Table 5.2, it is known that the Cronbach alpha number is  $0.881 >$  from the Cronbach alpha value of 0.6. Therefore, it can be explained that the research instrument used to be able to measure variables Motivation to learn mathematics and is said to be reliable. Questionnaire reliability

Table 3: Reliability Statistics.

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.881	.882	23

Data on this questionnaire were obtained from the results of questionnaires that had been disseminated during the completion of the workshop on Mathematics Hybridization in literary works. The highest score obtained is 92 and the lowest 23. Each question is measured with a score of 1 to 4. So that the lowest value of expectation is 23 and the highest 92. From the score, the length of the interval class is 23.

Table 3: Classification of Motivational Questionnaire.

Score	Scale
70-92	Strongly Agree
47-69	Agree
24-46	Disagree
$\leq 23$	Strongly Disagree

Because in this instrument there are 23 statements, the lowest score is 23 (the results of multiplication between scores 1 with the number of statements 23 items), and the highest score is 92 (the result of multiplication between scores 4 with the number of statements 23 items). From the distribution data obtained, a table of frequency distribution of mathematics learning motivation was made as follows:

Table 4: Frequency Distribution of Learning Motivation.

Category	Frequency	Percent
Strongly Disagree (1)	0	0%

Disagree (2)	8	9,41%
Agree (3)	44	51,76 %
Strongly agree (4)	33	38,82 %
Amount of	85	100%

Based on frequency distribution of learning motivation, the frequency distribution of answers provided by questionnaire respondents showed that respondents who stated that the assessment strongly disagreed was 0%, meaning that no one answered the category at all, there were 8 respondents who answered No Agree or 9.41%, there were 44 respondents or 51.76% who agreed and 33 respondents or 38.82% who answered strongly agree.

The most frequency of learning motivation, indicated by 51.76% in the agree category that learning motivation increases in mathematics learning through literature and at least 0% or strongly disagrees.

### 4.3 Normality Test

From the above output based on the Kolmogorov Smirnov test, the Sig value is  $0.478 > 0.05$ , it can be concluded that the data is normally distributed. The table describes the results of statistical tests on the dissemination of motivational data in mathematics learning through literature with the Kolmogorov-Smirnov one-sample test technique. From the table it appears that the mean = 91.7529, standard deviation = 6.71690 and a significant level of all sides with a confidence level of 5% is 0.478. If the H1 hypothesis is formulated, it is normally distributed, and H0 is an abnormal distribution. Then H1 is accepted if  $p > 0.05$ , and H1 is rejected if  $P < 0.05$ . In table 5.5 shows that  $p = 0.478 > 0.05$ . So H1 is accepted, meaning that the motivation to learn mathematics through hybridization of literary works is normally distributed.

With the hybridization of mathematics in this literary work it can be a refresher for both fields of science, and especially for mathematical students who can understand mathematical concepts from different angles. In other words, the hybridization of mathematics in literary works can be a stimulus that can encourage mathematics students to better understand mathematical concepts. This can also be proven by the results of filling in student questionnaires which show that there are 0% stated strongly disagree, 9.41% or as many as 8 students disagree, 51.76% or as many as 44 students agree,

and 38.82% or 33 students stated strongly in agreement.

Based on these data it can be illustrated that there are 51.76% of students who can or more understand mathematics through poetry, and make them want to know a lot of things about mathematics, and there were 38.82% of students who were enthusiastic about learning mathematics after attending the workshop, and said that mathematics lessons were very interesting. While there were 9.41% who disagreed because they were still having trouble finding words in making poetry.

The introduction of mathematical hybridization in literature to the 85 students in the fifth semester (five) at the Department of Mathematics Education through a workshop with two presenters in the fields of mathematics and literature, and also a poetry reader who would read mathematical poetry. The presentation of mathematics at this workshop was devoted to the beautiful side of mathematics in everyday life. As expressed by Soehakso who is the first mathematics professor in Indonesia, that mathematics has a very interesting pattern, he often said that mathematics is like the prettiest girl in the whole world.

The literature presentation at this workshop focused on one of the literary works, namely poetry. According to the Son (2010) the essence of poetry does create, because with and through poetry someone creates his own world, namely a world that contains a picture of a particular atmosphere, a certain impression, and certain messages both outward and inward.

Mathematical hybridization in literary works is the unification of mathematics and literary in the form of mathematical poetry. In the stage of creating mathematical poetry, students are guided by using the *experiential learning model*, which is a method that is suitable for poetry writing skills because this method requires students to process their experiences according to the imagination, creativity, and skills of each student by further exploring students' thinking without harmful effects that can be stated in the form of writing (Munawaroh et al, 2016).

This is also supported by Wahyudi (2009) who states that humans have the potential of the soul, that is, humans do not just forget the experience. Even the experience in his life settles in his life settling in him. The deposition of experience is placed in the deepest human mind. Humans have the potential to be able to process that experience in the process of imagination and make it in the form of literary works. Literary works are born from the creative

process of the author. Poetry is born from the creative process of the author. The learning stages with the experiential learning model (Indriana, 2011) consist of concrete experience, reflective observation, abstract conceptualization, and active experimentation.

At the stage of concrete experience, it begins with reading a number of mathematical poetry works accompanied by instruments that can make the atmosphere more relaxed and pleasant. While listening to mathematical poetry read out, students are required to digest and understand the mathematical concepts contained in poetry. This is a stimulus that can guide students in understanding the various mathematical concepts acquired during the learning process of mathematics during lectures that can be linked in their personal lives, or in other words, these experiences are experienced or directly felt personally.

Reflective observation stage, students begin to connect their concrete experiences in the form of various understanding of mathematical concepts that will be used as information. Students are asked to use their imagination to connect understanding mathematical concepts with everything in life. This can spur students to better understand various mathematical concepts as information, so that there is no expenditure of meaning when connected to a sentence.

At the stage of abstract conceptualization stage, students have arrived at the stage of gathering creative ideas after going through the two previous stages of creative ideas in the form of concepts or abstractions that relate experience in the form of mathematical concepts that are realized in life that are ready to be poured into the form of poetry.

The active experimentation stage is the final stage, students are asked to pour all their imaginations in the form of concepts or abstractions about the experience of mathematical concepts in existing at the stage of abstract conceptualization into a form of poetry that will be presented.

From the results of the mathematical poetry work, students poured out various understandings of their mathematical concepts that were related to their personal experiences in everyday life. This looks different, both from the poem itself and mathematics that can be understood from a different perspective. Pramono and Ansori (2016) states that for science, literature can be used as a medium for delivering science that is too rigid and seems "haunted", while literature can use science as a medium to develop stories in each work so as not to appear too absurd and dry in the creative process of literature.

## 5 CONCLUSIONS

Based on the results of data analysis and discussion of research results, it can be concluded that:

- a. Research on mathematical hybridization in literary works can be a refresher for both fields of science, and especially for mathematics students to be able to understand mathematical concepts from different angles.
- b. Mathematical hybridization in literary works can be a stimulus that can encourage mathematics students to understand mathematical concepts.

## REFERENCES

- Arikunto, Suharsimin. 2006. *Metodologi penelitian*. Yogyakarta : Bina Aksara.
- AAN SA'ADILLAH. 2014. *Meningkatkan Kemampuan Matematika Dengan Belajar Sastra*. [online]. Tersedia : <http://info-bejo.blogspot.co.id/2014/03/matematika-sastra.html>.
- Bayu Pramono, Redhitya Wempi Ansori. 2016. *Fenomena Hibridasi Sains Dalam Karya Sastra*. ISSN: 2355-4126.volume 3 no.2.
- Fananie, Z. 2000. *Telaah Sastra*. Surakarta: Muhammadiyah University Press.
- Faribarca. 2012. *Matematika Sebagai Seni*. Tersedia : [Online] <http://feribarca.blogspot.com/2012/04/matematika-sebagai-seni.html>
- Hamdah Munawaroh , Endang Sri Markamah, M. Ismail Sriyanto. 2016. *Penerapan Metode Experiential Learning Untuk Meningkatkan Keterampilan Menulis Puisi*. Jurnal Didaktika Dwija Indria (Solo). Vol.4, no 6.2016.
- Kanzunudin, Mohammad. 2011. *Bahasa Indonesia untuk Perguruan Tinggi*. Rembang: Yayasan Adhigama.
- Oemar Hamalik. (2011). *Proses belajar mengajar*. Jakarta Bumi Aksara.
- Putra, R. M. S. 2010. *Principles of Creative Writing*. Jakarta: Penerbit Indeks.
- Sardiman A.M. (2012). *Interaksi dan Motivasi Belajar Mengajar*. Jakarta: Rajawali Pers.
- Sayuti, Suminto A. 2002. *Berkenalan dengan Puisi*. Yogyakarta: Gama Media.
- Soehakso. (2012). *Keindahan Matematika*. Tersedia: [Online] <http://p4tkmatematika.org/2012/04/keindahan-matematika/>.
- Sriyanto. (2007). *Strategi Sukses Menguasai Matematika*. Jakarta : PT. Buku Kita.
- Soedjadi, R. (1992). *Meningkatkan Minat Siswa Terhadap Matematika*. Surabaya: Media Pendidikan dan Ilmu Pengetahuan.
- Sriyanti, Maya. 2013. Keefektifan Metode Pembelajaran Berbasis Pengalaman (Experiential Learning) dalam

- Pembelajaran Menulis Narasi Ekspositoris pada Siswa Kelas X SMA Negeri 1 Seyegan Sleman.
- Sutikno, Sobry. 2007. *Menggagas Pembelajaran Efektif dan Bermakna*. Bandung. NTP Press.
- Sugiyono. 2012. *Metode Penelitian Bisnis*. Bandung. Pusat Bahasa Depdiknas.

