

Development of Mathematics Learning Devices Integrated Problem-Based Learning Model Character Education on Social Arithmetic Materials

Defnie Devie Adam¹, Anetha L. F. Tilaar², Ichdar Domu³

^{1, 2, 3}Master of Mathematics Education Study Program, Postgraduate Program, Manado State University

¹Defnieadam[at]gmail.com

²anethatilaar[at]unima.ac.id

³ichdardomu[at]unima.ac.id

Abstract: *The problem of the character of students which is worrying lately, has prompted researchers to design learning that accommodates character education of students in a learning material for Social Arithmetic. The learning design in question is based on the Problem-Based Learning model, which is outlined in a package of Learning Implementation Plans, Student Worksheets and Learning Outcomes Tests. To get learning tools that meet the valid, practical and effective criteria (Nieveen, 1999), research on the development of the ADDIE model was carried out with the stages of Analyze (Analysis), Design (Design), Develop (Development), Implement (Implementation) and Evaluate (Evaluate). The focus of the research is to create learning tools for Social Arithmetic by integrating the Character Education of Students according to the Problem-Based Learning model. After two rounds of developing the ADDIE model, a learning device is produced that accommodates the education of the characteristics of students in a lesson for Social Arithmetic material using a Problem-Based Learning model that meets the valid, practical, and effective criteria.*

Keywords: problem-based learning model, development procedure, ADDIE model, character education, valid, practical and effective

1. Preliminary

The character of some students lately is very worrying for all parties, but education and learning in schools that place special emphasis on building the character of students is rare. This fact also happened at the Motoling Christian Middle School, South Minahasa Regency. In the learning process, both Mathematics and other subjects, there has not been a special emphasis on strengthening student character education. Presidential Regulation number 87 of 2017 concerning Strengthening Character Education (Ariyana, 2019), requires or requires teachers to make character education an educational movement under the responsibility of the education unit to strengthen the character of students through harmonization of heart, taste, thought, and exercise. sports with the involvement and cooperation between education units, families and communities as part of the National Movement for Mental Revolution (GNRM). This Presidential Regulation is the initial basis for placing character education as the main soul in the implementation of education in Indonesia, reinforced by the Regulation of the Minister of Education and Culture (Permendikbud) Number 20 of 2018 concerning Strengthening Character Education in Formal Education Units. The facts and government policies encourage researchers to design learning that accommodates the character education of students in Mathematics learning, especially Social Arithmetic material. The learning design in question is based on the Problem-Based Learning model, which is outlined in a package of Learning Implementation Plans, Student Worksheets and Learning Outcomes Tests.

Efforts to improve education that have been carried out leading to student centered learning (student centered, learning oriented) show that the Problem Based Learning

model has a very positive impact on students with low learning outcomes. The Problem-Based Learning Model transforms students from passive recipients of information into active, independent learners and problem solvers, and shifts the emphasis of educational programs from teaching to learning (Akinoglu et al., 2007). According to Tan On Seng (Ariyana (2019)), the Problem-Based Learning model is learning that uses the various thinking abilities of students individually and in groups as well as the real environment to overcome problems so that they are meaningful, relevant, and contextual. Some basic research says that the development of problem-based learning model-oriented mathematics learning tools can improve students' critical thinking skills (Tanjung, et al, 2018). Based on the results of research and discussion on research on the effects of the implementation of the problem-based learning model on the creativity and critical thinking skills in mathematics learning that learning mathematics with the Problem-Based Learning model has a positive effect on students' creative character and has an effect on critical thinking character. students (Cahyaningsih, et al, 2016).

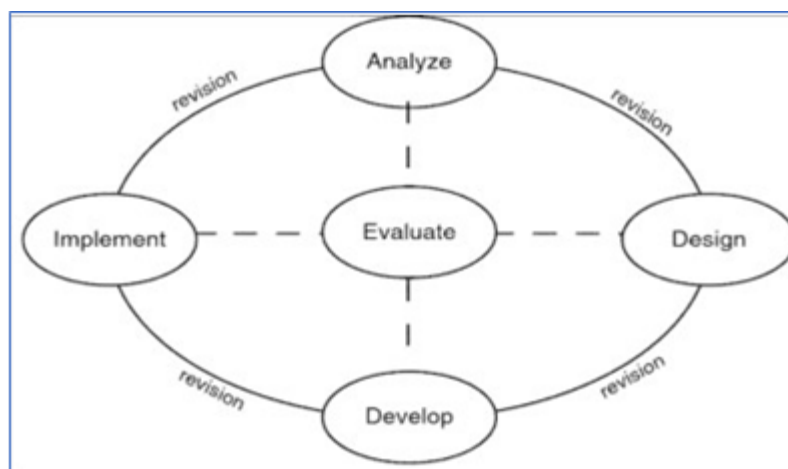
Character education is defined as teaching designed to educate and assist students in developing basic civic values and character, service ethics and the surrounding community, improving the school environment and student achievement. The program may include teaching and trust including honesty, integrity, reliability and loyalty, respect including concern for others, tolerance and courtesy, responsibility, including hard work, economic independence, accountability, diligence, and self-control and fairness including fairness as a consequence from bad behavior, principles of non-discrimination and freedom from prejudice; caring includes kindness, empathy, compassion, consideration, generosity and charity; and citizenship includes love of country, concern for the

common good, respect for authority and the law and the mindset of society (Elkind & Sweet, 2004). Character education is about teaching students how to make good decisions and how to behave according to the rules. Character education improves students' knowledge, skills and abilities through its provision. To make good choices is appropriate to have responsibility (Ryan & Bohlin, 1999). Character education within the scope of classroom learning can be interpreted as an effort to design and implement a strategy or learning model that aims to develop academic abilities and build character. The purpose of character building must be designed intentionally (by design) not as a side effect (impact accompaniment). Those characters must be depicted explicitly in the designed learning steps. These characters are values, abilities, beliefs, morality, emotional control, and behavior that are directly or indirectly related to the characteristics and nature of these subjects. When learning Indonesian, it is possible to emphasize values and good language ethics, while when studying mathematics, values related to reasoning are taught. Mathematics education also encourages the emergence of values about universal properties such as good or bad, the value order sometimes applies locally and depends on the values that apply to one's culture. Consistent mathematics in its system gives birth to a consistent attitude and obeys the rules, and is responsible. Characteristics in mathematics indirectly teach ways of thinking and acting that are smart, responsible, open, creative, innovative, productive, general thinking, and consistent or obeying the rules (Siswono, et

al. 2012). In the learning device for Social Arithmetic material based on the Problem-Based Learning model developed, inclusive student character education in the subject matter, namely Social Arithmetic.

2. Research Procedure

The research procedure used to obtain learning tools that meet the valid, practical and effective criteria (Nieveen, 1999), is research on the development of the ADDIE model with the stages of Analyze, Design, Develop, Implement and Evaluate (Soesilo, 2020). The ADDIE development model has the advantage of being simpler, more organized, and widely used in making programs and learning products effectively and validated by experts. The main weakness of the ADDIE model is that it takes a long time and places too much emphasis on content rather than experiential learning (Sites & Green, 2014). This weakness can be overcome by careful preparation and the addition of components that are lacking such as learning experiences. The relationship between stages in ADDIE is shown in Figure 1. The product to be developed is an integrated problem-based learning model of mathematics learning tools for character education to teach Social Arithmetic material. The learning tools include Learning Implementation Plans (RPP), Student Activity Sheets (LKPD), and Learning Outcomes Tests (THB) for SMP class VII semester II students



Graph 1: Tahapan Pengembangan Model ADDIE (Soesilo, 2020)

Activities at each stage of development according to the ADDIE model in Figure 1, are: (1). At the Analyze stage, data is collected on the needs of learning devices, learning model needs, student characteristics, and curriculum obtained through surveys, pre-tests, observations, interviews, and questionnaires and review the data for; (2) Design stage (Design); designing learning models, preparing Learning Implementation Plans (RPP), compiling student activity sheets (LKS) and compiling student character assessment instruments; (3) the Develop stage (Development); development of learning models and supporting learning tools, validation, and revision; (4) Implement stage (implementation); limited trial to determine the quality of learning tools from the aspect of effectiveness and practicality; (5) the Evaluate stage (Evaluation); the

evaluation carried out was to analyze the data from the assessment of the quality of learning devices. At each stage the model is revised if it is found that the process results do not meet the criteria. The implementation stage in this research was carried out at the Motoling Christian Middle School located on Jalan Sam Ratulangi Motoling, Motoling District, South Minahasa Regency. The research will be carried out from March to May 2022 or the even semester of the 2021/2022 academic year. The subjects of this study were the seventh grade students of Motoling Christian Junior High School with 22 students. The instruments used in this study include instruments to assess product quality which include aspects of validity, practicality and effectiveness. Validity data was collected using a validity format filled in by the validators according to their assessment of each

developed device. Especially for the learning outcomes test instrument, empirical validation is also carried out to achieve valid, sensitive, and reliable criteria. If it has reached the specified criteria, then the learning outcome test instrument can be used to measure student learning outcomes in order to meet the criteria for the effectiveness of the device. Practical data were collected using an observation format on the skills of teachers in carrying out learning. Effectiveness data, which includes student learning outcomes data and student response data to learning tools, were collected using learning outcomes test instruments and student response questionnaires. After the data is collected and presented, then data analysis is carried out, the results of which will be used to revise the learning tools developed in order to produce good learning tools according to the specified criteria. Learning tools are said to be good if they meet the criteria, namely valid learning tools based on expert validation, teachers are able to carry out the developed learning, students give positive responses to learning tools, and learning outcomes tests are valid, sensitive, and reliable. The expert assessment data for each learning device was analyzed using descriptive statistical analysis techniques then from the validation results of the learning device experts were analyzed taking into account the input, comments and suggestions of the validators.

initial draft of a special mathematics learning device for Social Arithmetic material was obtained which was based on the Integrated Problem-Based Learning model of Character Education. Furthermore, through the following 3 (three) stages, validity assessments and trials are carried out so that the developed products reach valid and effective criteria. In two rounds of expert validation, a second draft learning device was obtained that met the valid criteria. In Table 1, a description of the assessment results of the Validators in the second validation process of the Learning Implementation Plan is presented. Table 1 states that on a “scale of 1 – 5”, each validator gives an average value of more than 4. If it is consulted with the established criteria, then the Learning Implementation Plan developed has met the valid criteria. In the resulting lesson plans, there are four aspects that characterize the 2013 curriculum. The four aspects are spiritual, social, skills, and knowledge aspects. Strengthening Character Education is focused on the first two aspects so that the design of the learning activity components in the lesson plans is adjusted to accommodate activities within the framework of Character Education: (1) The spiritual aspect in this case relates to strengthening religious character education, the closeness between humans and their God. Aspects in this study can strengthen students' faith in God Almighty

3. Results and Discussion

Through the first 2 (two) stages of the ADDIE Development Model, namely the Analyze stage and the Design stage, an

Table 1: The results of the second validation of the Learning Implementation Plan

No	Assessment Aspect	Average Component Value		
		Validator 1	Validator 2	Validator 3
1.	RPP format; There are 4 sub-aspects, namely the identity of the lesson plans, the use of type and size of letters, numbering and spatial arrangement (layout), and clarity of material distribution.	4	4.25	4.25
2.	The contents of the RPP consist of 5 (five) sub-aspects, namely:			
	1). Learning Objectives with 5 assessment items	4	4.2	4.4
	2) Material with 4 assessment items	4	4.5	4.75
	3) Media and Learning Resources with 2 assessment items	4	5	5
	4) Learning Activities, with 11 assessment items	4.36	4.81	4.91
	5) Assessment, with 4 assessment items	4	4.5	4.5
3	Language and Writing ; consists of 3 sub-aspects	4.33	4	4.33
4.	Time Allocation, with 2 sub aspects	4	4	4
Averages		4.09	4.41	4.52

(2) The social aspect relates to the closeness of one human to another. In this case the relationship between teachers and students and students with other students. In this study, through strengthening character education which was integrated into social arithmetic material through a problem-based learning model, researchers found several changes in students where students who initially had bad characters eventually showed good characters, namely: (a) There were students who did not want to group because they feel they have intellectual abilities that exceed their friends after getting the strengthening of Character Education, these students are happy to cooperate, share knowledge, and are willing to accept the shortcomings of other friends; (b)

There are students who initially lack confidence because they feel they have low knowledge skills so they don't want to be in groups, by strengthening character education, these students want to work together in groups without feeling inferior; (c) There are students who are not disciplined or do not obey the rules often late and in and out of class. by strengthening character education, most of the students obey the rules; (d) There are students who do not care about the existence of other friends by providing strengthening Character Education, the more students who care about each other's shortcomings. In Table 2, a description of the assessment results of the Validators in the second validation process on the Student Worksheet is presented.

Table 2: The results of the second validation of the Student Worksheet

No	Assessment Aspect	Average Component Value		
		Validator 1	Validator 2	Validator 3
1.	LKPD format; There are 2 sub-aspects, namely (1) the suitability of the LKPD component with the rules in the Teaching Material Development Guide and (2) the suitability of the layout/layout arrangement, including the type and size of letters, image layout and columns.	4	4	4.5
2	The contents of the LKPD consist of 9 (nine) sub-aspects, namely: (1) learning indicators, (2) the suitability of the material with the learning objectives, (3) the suitability of the content with the phase of the learning model, (4) organization of the material, (5) the scope of the material to the learning process. indicators, (6) systematics of subject matter, (7) relevance of illustrations, questions and problems with the material, (8) linkage of illustrations, questions and problems with the concepts being taught, (9) use of contextual problems	4.11	4.56	4.67
3	The language used by LKPD; consists of 4 sub-aspects: namely (1) compliance with the rules of the Indonesian language, (2) clarity of sentences, (3) consistency of symbols and terms, (4) the accuracy of the use of directions and instructions	4	4	4
4.	Concept accuracy, with 2 sub-aspects, namely (1) simplicity of concept formulation in the material, (2) systematic arrangement of concepts	4	4	4
Rata-rata		4.03	4.14	4.29

Table 2 states that on a “scale 1 – 5”, each validator gives an average score of more than 4. If it is consulted with the established criteria, the developed Student Worksheet has

met the valid criteria. In Table 3, a description of the assessment results of the Validators in the second validation process of the Learning Outcome Test is presented.

Table 3: The results of the second validation of the Learning Outcome Test

No	Assessment Aspect	Average Component Value		
		Validator 1	Validator 2	Validator 3
1.	Contents of THB ; There are 3 sub-aspects, namely (1) the suitability of the items with the indicators (2) the clarity of the question formulation and instructions, (3) the suitability of the content of the material with the objectives	4	4.3	5
2	THB construction: consists of 3 sub-aspects, namely: (1) writing question commands, (2) setting the processing time, (3) writing accuracy of mathematical symbols	3.67	3.67	3.67
3	The language used by THB; consists of 3 sub-aspects: namely (1) compliance with the rules of the Indonesian language, (2) clarity of sentences, (3) simplicity of the language used	4	3.99	4
Averages		3.89	4.14	4.22

Table 3 states that on a “scale of 1 – 5”, 2 (two) validators gave an average score of more than 4 and 1 (one) validator gave a score of less than 4. developed has met the valid criteria. Furthermore, the second draft document which has been declared valid will be tested to obtain Practicality and Effectiveness data (see **Figure-1**). In the first trial, almost all

of the indicators have not reached the set criteria, but after the second trial, practicality and effectiveness data were obtained where each set indicator has been achieved, so that in this second trial the researchers managed to get practical and effective tools, as shown in the tables below.

Table 4: Practicality Observation Results (Implementation of Learning Devices in Trial II)

No	Indicators to Observe	Skor		Averages
		Meeting I	Meeting II	
I.	Introduction			
	a. Readiness of space, tools and learning media.	5	5	5
	b. Checking student readiness	4	5	4.5
	c. Strengthening character education	5	5	5
II.	Learning Activities			
	a. The teacher conveys the learning objectives	5	5	5
	b. The teacher conveys the learning activities that will be carried out, namely using the Problem-Based Learning model	5	5	5
	c. The teacher does apperception	5	5	5
	d. The level of implementation of all stages of learning	5	4	4.5
	e. The implementation of the sequence of learning activities reflects the Problem-Based Learning model	5	5	5
III.	Material Mastery			
	a. Demonstrate mastery of learning materials	5	5	5
	b. Relate material to relevant knowledge	5	5	5
	c. Relate matter to the reality of life	5	5	5
Total		54	54	54
Average		4.9	4.9	4.9

Based on the criteria for implementing learning tools, the implementation of learning carried out by the teacher at the first meeting until the third meeting averaged 4.9 aspects of the observer's assessment on a scale of 0-5. Thus, this learning tool can be categorized as practical.

Furthermore, the results of the data analysis on the effectiveness of the device are presented which include data on student learning outcomes and data on student responses to learning and its devices. In table 5, the data on learning outcomes in Trial II are shown.

Table 5: Data on Student Learning Outcomes in Trial II

Number of Students	The number of students who complete	Percentage of completeness	Number of Unfinished Students	Percentage of incompleteness
23	20	86.9%	3	13.4%

Based on Table 5 above, it can be seen that the number of students who succeeded in achieving complete learning was 20 students or 86.9%. Based on the assessment criteria, it can be said that one of the effectiveness criteria has been met. Furthermore, in Table 6, the results of the Student Response Questionnaire, totaling 23 people, after participating in learning on Social Arithmetic material using the Integrated Problem-Based Learning model of Character Education, obtained the following data

Table 6: Percentage of Student Responses to Learning Components

Aspects of feeling responded	Happy	Not Happy
Subject matter	91.30%	8.70%
LKPD	86.96%	13.04%
Classroom Learning Atmosphere	100%	0%
Teacher's way of teaching	100%	0%
Aspects of the opinions responded	New	Not New
Subject matter	95.65%	4.35%
LKPD	100%	0%
Classroom Learning	100%	0%
How to learn	100%	0%
Aspects of interest responded	Interested	Not Interested
Percentage of Response (Interest) of Students	100%	0%
Aspects of the opinions responded	Attractive	Not Attractive
Languages spoken in LKPD and THB	91.30%	8.70%
Appearance (writing, pictures, location of pictures) contained in LKPD and THB	95,65%	4,35%

Berdasarkan hasil angket respon peserta didik pada Tabel di atas dan kriteria yang ditetapkan bahwa respon peserta didik terhadap semua aspek berada diatas 80% yang termasuk dalam kriteria yang ditetapkan. Artinya setiap aspek direspon positif oleh peserta didik. Dengan demikian, perangkat pembelajaran tidak mengalami revisi berdasarkan respon peserta didik.

4. Conclusions and Suggestions

Berdasarkan hasil penelitian dapat disimpulkan beberapa hal berikut : (1) Berdasarkan pengembangan perangkat pembelajaran dengan menggunakan model ADDIE, dihasilkan perangkat Pembelajaran Berbasis Masalah Terintegrasi Pendidikan Karakter pada materi Aritmatika Sosial yang memenuhi kriteria valid, praktis, dan efektif. Perangkat pembelajaran tersebut terdiri dari: (1) Rencana Pelaksanaan Pembelajaran (RPP); (2) Lembar Kegiatan Peserta Didik (LKPD); (3) Tes Hasil Belajar (THB) dan lembar observasi penilaian peserta didik, (2) Perangkat Pembelajaran yang dikembangkan dengan model

Pembelajaran berbasis masalah memenuhi kriteria efektif. Hal ini ditunjukkan oleh: (a) Ketuntasan belajar individu dan klasikal siswa terpenuhi ; (b) Respon siswa terhadap pembelajaran dalam kategori baik. Karena telah terbukti bahwa perangkat pembelajaran dengan model pembelajaran berbasis masalah terintegrasi Pendidikan Karakter pada materi Aritmatika Sosial yang memenuhi kriteria valid, praktis, dan efektif sehingga guru diharapkan dapat menindaklanjuti penelitian ini pada topik lainnya untuk membuat siswa tertarik, senang, aktif dalam belajar matematika serta dapat memperbaiki karakter peserta didik serta aspek sikap spiritual dan sosial. Guru atau pihak lain yang ingin mengembangkan perangkat pembelajaran dengan model pembelajaran berbasis masalah terintegrasi penguatan Pendidikan karakter pada materi pokok matematika yang lain atau pada mata pelajaran yang lain dapat merancang/mengembangkan perangkat pembelajaran dengan memperhatikan karakteristik peserta didik, sintak model pembelajaran dan karakteristik dari materi pelajaran yang akan dikembangkan.

Acknowledgement

Dengan penuh kerendahan hati saya selaku penulis artikel dan sebagai mahasiswa menyampaikan terimakasih kepada pihak Pimpinan dan seluruh Jajaran Manajemen Universitas Negeri Manado dan khususnya Pimpinan dan Jajaran Program Pascasarjana yang telah memberikan kesempatan kepada peneliti selaku mahasiswa dalam mendalami ilmu pengetahuan pada program Magister Pendidikan Matematika sejak tahun 2020

References

- [1] Akinoğlu, O., & Tandoğan, R. Ö. (2007). The effects of problem-based active learning in science education on students' academic achievement, attitude and concept learning. *Eurasia journal of mathematics, science and technology education*, 3(1), 71-81.
- [2] Ariyana, Y., Bestary, R., & Mohandas, R. (2018). Buku pegangan pembelajaran berorientasi pada keterampilan berpikir tingkat tinggi. *Direktorat Jenderal Guru dan Tenaga Kependidikan Kementerian Pendidikan dan Kebudayaan Hak*.
- [3] Ariyana; et al. (2019). Buku Pegangan Pembelajaran Berorientasi pada Keterampilan Berpikir Tingkat Tinggi. *Direktorat Jenderal Guru dan Tenaga Kependidikan, Jakarta*
- [4] Bridges, S., McGrath, C., & Whitehill, T. L. (2012). Problem-based learning in clinical Education. The next generation. *The Interdisciplinary Journal of Problem-based learning*, 6(1), 126-128.

- [5] Cahyaningsih, U., & Ghufron, A. (2016). Pengaruh penggunaan model problem-based learning terhadap karakter kreatif dan berpikir kritis dalam pembelajaran matematika. *Jurnal Pendidikan Karakter*, (1).
- [6] De Graaf, E., & Kolmos, A. (2003). Characteristics of problem-based learning. *International Journal of Engineering Education*, 19(5), 657-662.
- [7] Elkind, D. & Sweet, F. (2004). You are a character educator 7RGD\¶V 6FKRRO Peter Li Education Group
- [8] Fatade, Alfred Olufemi, et. al. 2013. Effect of Problem Based Learning on Senior Secondary School Students Achievements in Further Mathematics. *Acta Didactica Napocensia*, 6 (3).
- [9] Ilyas, M., Ma'rufi, M. R., & Nisraeni, N. (2015). Metodologi Penelitian Pendidikan Matematika.
- [10] Kurt, Serhat, 2018. ADDIE Model : Instructional Design. <https://t.co/5VVQmbBamZ> : Educational Technology
- [11] Laws, S., Harper, C., Jones, N., & Marcus, R. (2013). *Research for development: A practical guide*. Sage
- [12] Mansur, A. (2017). Pengaruh Penerapan Model Pembelajaran Terhadap Hasil Belajar Matematika Ditinjau dari Kemampuan Awal Matematika dengan Mengontrol Motivasi Belajar Peserta Didik (*Doctoral dissertation, Pascasarjana*).
- [13] Maryati, I. (2018). Penerapan model pembelajaran berbasis masalah pada materi pola bilangan di kelas vii sekolah menengah pertama. *Mosharafa: Jurnal Pendidikan Matematika*, 7(1), 63-74.
- [14] Nasution, N. R., & Surya, E. (2017). Penerapan Model Pembelajaran Berbasis Masalah (Problem Based Learning) Terhadap Kemampuan Berpikir Kreatif Matematika Siswa. *Jurnal. Mahasiswa PPS Jurusan Pendidikan Matematika, Unimed*.
- [15] Pattimura, S. C., Maimunah, M., & Hutapea, N. M. (2020). Pengembangan Perangkat Pembelajaran Matematika Menggunakan Pembelajaran Berbasis Masalah untuk Memfasilitasi Pemahaman Matematis Peserta Didik. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 4(2), 800-812.
- [16] Purwadi Sutanto, (2017). Model-model Pembelajaran. *Direktorat Pembinaan Sekolah Menengah Atas Direktorat jendral Pendidikan Dasar dan Menengah Kementerian Pendidikan dan Kebudayaan*, 1-54.
- [17] Rahmawati, U., & Suryanto, S. (2014). Pengembangan model pembelajaran matematika berbasis masalah untuk siswa SMP. *Jurnal Riset Pendidikan Matematika*, 1(1), 88-97.
- [18] Richey, R. C., & Klein, J. D. (2014). Design and development research. In *Handbook of research on educational communications and technology* (pp. 141-150). Springer, New York, NY.
- [19] Ryan, K., & Bohlin, K. E. (1999). Building character in schools: Practical ways to bring moral instruction to life (*ERIC Document Reproduction Service No. ED423501*).
- [20] Samani, Muchlas., Hariyanto. 2011. Konsep dan Model Pendidikan Karakter. Bandung: *Rosdakarya*
- [21] Siswono, T. Y. E. (2012, November). Implementasi Pendidikan Karakter dalam Pembelajaran Matematika. In *Prosiding Seminar Nasional Pendidikan Matematika UIN Syarif Hidayatullah Jakarta*, Hal (pp. 1-12).
- [22] Sites, R., & Green, A. (2014). Leaving ADDIE for SAM Field Guide. *Alexandria: ASTD Press*.
- [23] Soedjadi, R. 2000. Kiat Pendidikan Matematika di Indonesia: Konstataasi Keadaan Masa Kini Menuju Harapan Masa Depan. Jakarta: *Direktorat Jenderal Pendidikan Tinggi, Departemen Pendidikan Nasional*
- [24] Soesilo, A., & Munthe, A. P. (2020). Pengembangan Buku Teks Matematika Kelas 8 Dengan Model ADDIE. *Scholaria: Jurnal Pendidikan dan Kebudayaan*, 10(3), 231-243.
- [25] Stepien, W., & Gallagher, S. (1993). Problem-based learning: As authentic as it gets. *Educational leadership*, 50, 25-25.
- [26] Sugianto, L., Kriswinarso, T. B., Bachri, S., & Lihu, I. (2021). Pengembangan perangkat pembelajaran matematika berbasis masalah berorientasi pada hasil belajar peserta didik. *Pedagogy: Jurnal Pendidikan Matematika*, 6(2), 149-162.
- [27] Sumartini, T. S. (2016). Peningkatan kemampuan pemecahan masalah matematis siswa melalui pembelajaran berbasis masalah. *Mosharafa: Jurnal Pendidikan Matematika*, 5(2), 148-158.
- [28] Tanjung, H. S., & Nababan, S. A. (2018). Pengembangan perangkat pembelajaran matematika berorientasi model pembelajaran berbasis masalah (pbm) untuk meningkatkan kemampuan berpikir kritis siswa SMA Se-Kuala Nagan Raya Aceh. *Genta Mulia: Jurnal Ilmiah Pendidikan*, 9(2)