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Development of Preserved Resin Specimen of Arthropod Fauna Blocks as a Media for Biology Learning

Anggun Wulandari[1*], Siti Nur Venes Andrea[2]
[1,2]Biology Education, Universitas KH. A. Wahab Hasbullah
*Email: anggun.4w@gmail.com

ABSTRACT
Specimen preservation is an effort to maintain the original condition of living creatures so that they can be used for educational and research purposes. There are two ways of preserving, namely wet preservation and dry preservation. This research aims to determine the feasibility of preserved specimens of arthropod fauna block resin as a biology learning medium and to determine students' responses to arthropod fauna block resin preserved specimens as a biology learning medium. The development model carried out in this research is a 4D development model with development procedures including the stages of define, design, develop and disseminate. The trial involved class X MIPA 1 students as test subjects. Data obtained from material experts, media experts, and students were analyzed descriptively to evaluate the suitability of learning media. The feasibility results for preserved resin block specimens of arthropod fauna from material expert validation results were 77.8% with good criteria. In comparison, for media expert validation results the percentage was 88.8% with excellent criteria. Meanwhile, data from student responses, and learning media in the form of preserved specimens of resin blocks of arthropod fauna, received very interesting criteria with a percentage of 92%. This research is expected to produce preserved specimens of resin blocks of arthropod fauna that are suitable for use as biology learning media, by the needs of students and technological developments in the world of education.

***Keywords**: Specimens, Resin blocks, Arthropods, Learning media*.

INTRODUCTION
Preservation of specimens is an effort made to maintain the condition of living things as they are in nature for a long period (Rahayoe, 2019). Preservation of biological objects in principle has two methods, namely wet preservation and dry preservation, wet preservation is done by preserving biological objects in a preservation liquid, while dry preservation is done by drying biological objects until the water content in the biological object is very low so that the destructive organisms cannot work (Budiwati, 2013). Wet preservation is done for non-shelled animals that are relatively large in size, and soaked in a preservative solution. Dry preservation is done on relatively large organisms by drying the object in the sun and then to make it more durable, the media can be stored in a resin block/bioplastic media. Satino (2007) states that bioplastic is preserving animal or plant specimens in resin blocks to be used as learning media. Meanwhile, according to (Handayani, 2013) bioplastic preservation is the preservation of animals or plants that have been dried in resin blocks. Resin is an organic compound resulting from secondary metabolism, composed of carbon. This compound will undergo polymerization under the right conditions. Bioplastic is the preservation of animal or plant specimens in resin blocks for use as learning media (Nafisah, 2018).

The main material used in the manufacture of preservation is a liquid resin used for fiberglass. Resin is composed of carbon which is an organic compound resulting from secondary metabolism that will undergo polymerization under the right conditions. The polymerization reaction will generate heat because it is exothermic, if left in the open air it will naturally undergo polymerization which takes place slowly. The process of making resin blocks consists of: specimen preparation, making resin blocks,

forming, smoothing, and finishing. The advantages of using resin block preservation include: (a) Preserved specimens can be seen from all sides so that the structural symptoms of the object can be observed, (b) In addition to being a learning medium, it can also be used as decoration (ornament), (c) The beauty of the object can be maintained and can be seen in its entirety so that it can increase students' interest and motivation in studying the object, (d) Stronger and more durable than other preserved specimens such as insectariums and herbariums, (e) Students can use the media to learn while playing, for example, to learn the sequence and characteristics of each phase in the life cycle of a butterfly, each stage/phase is preserved in separate resin blocks, when they are going to be used the specimen blocks are placed randomly then students are asked to observe the characteristics of each phase and sort them correctly, (f) Practical in storage. Although it has many advantages, the use of preserved specimens in resin blocks also has disadvantages. One of them is that the specimen cannot be touched/felt so the symptoms of the object that can be observed are only structural symptoms that rely on the sense of sight alone (Budiwati, 2013).

Along with the development of the era and technological advances, changes to the world of education often occur over time, one of which is teaching and learning activities in schools. The demands and goals of the world of education are faced with technology that is increasingly increasing in both variety and quality. The development of the education system must be carried out so that it can be more responsive to the challenges and demands of society that will be faced in the future (Megahantara, 2017). Arsyad (2011) stated that the use of learning media in the teaching and learning process can generate new interest in ongoing learning, provide stimulation and motivation for learning activities, and can bring psychological influences to students. The effectiveness of the teaching and learning process and the delivery of messages and learning content can be facilitated by the use of learning media so that students can focus on building knowledge independently. The use of learning media as a new experience for students to understand certain concepts so that students can play an active role in the learning process. One of the media that can be used in learning activities is the presentation of biological object specimens as learning media. Presentation of biological object specimens as a form of learning media that can develop skills starting from observation, describing structural symptoms, classifying and finding problems, and interpreting data in the form of preserved biological object specimens (Asmara, 2022).

The learning media of preserved resin block specimens developed are preserved resin blocks of arthropod fauna. Arthropods have jointed legs, which have general characteristics of the body covered by cuticles, exoskeletons made of layers of protein, and chitinous polysaccharides. The cuticle is thick and hard or thin like paper and is flexible on the segments of its body (Campbell, 2008). The use of arthropod fauna as preserved resin block specimens as learning media cannot be separated from the rapid change factor in the world of education. The results of the needs questionnaire analysis conducted on biology teachers at MA Unggulan K.H Abdul Wahab Hasbullah, namely Mrs. Faradian Islamiyah, S.Si stated that the learning media used for teaching and learning activities only use learning media in the form of modules, PPT, pictures/dry preservation media and videos. Learning activities have never used preserved resin block specimens of arthropod fauna as learning media at MA Unggulan K.H. Abdul Wahab Hasbullah and it is hoped that the learning media in the form of preserved resin block specimens of arthropod fauna, can attract students' interest in learning and learning activities can be more effective.

METHOD

This study uses the 4D development model by Thiagarajan with the stages of Define, Design, Develop, and Disseminate. However, the development model in this study is only limited to the develop stage. The stages of developing resin block specimens in the 4D model are as follows.

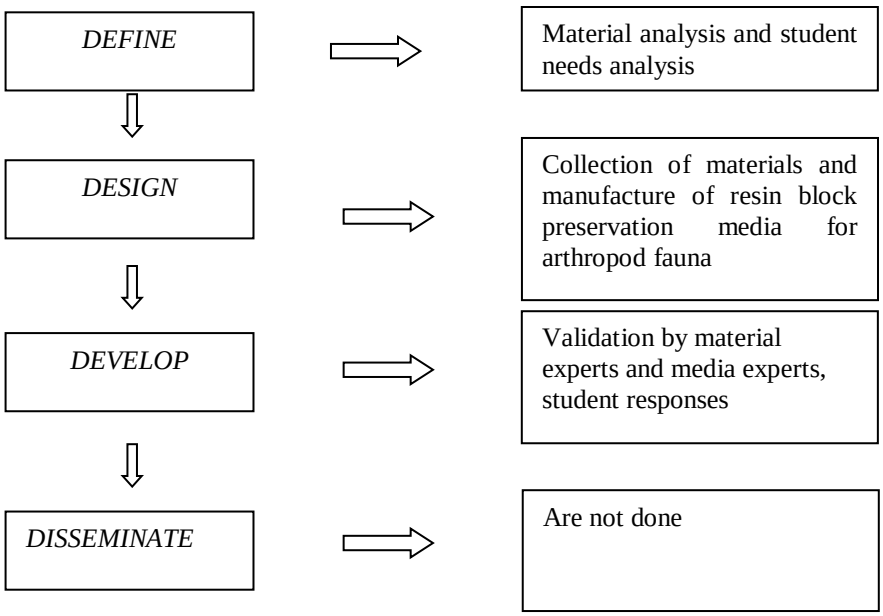

Figure 1. 4D Development Modification

RESULT AND DISCUSSION

The results developed in this study are in the form of arthropod block resin. Specimens preserved in the block resin consist of 4 classes, namely insecta, arachnida, crustacea, and myriapoda. In the insecta class, the preserved specimens are butterflies (*Eurema hecabe*), in the arachnida class, the preserved specimens are spiders (Araneomorphae), in the crustacea class, the preserved specimens are shrimp (*Macrobrachium rossenbergi*), in the myriapoda class, the preserved specimens are millipedes (*Julus nemorensis*). The following is the arthropod block resin media developed.

Figure 2 Developed Resin Block Media

Result

Result data in the research on the development of arthropod fauna resin block media as a biology learning medium in the form of validation data from material expert teachers and media experts and data from student responses to the feasibility and attractiveness of the media. Media validation was carried out by a biology teacher at MA Unggulan K.H A.Wahab Hasbulloh, namely Mrs. Faradian Islamiyah S.Si, and material validation was carried out by a teacher at MAN 8 Jombang, Mrs. Maslikah S.Pd, and for student response data, it was carried out by 21 students at MA Unggulan K.H A.Wahab Hasbulloh.

- Material Expert Validation Result Data
  The data from the validation results of the material expert are the results of a questionnaire that has been given to the biology teacher of MAN 8 Jombang, namely Mrs. Maslikah M.Pd. The validation questionnaire for the development of arthropod fauna block resin media as a biology learning medium contains 9 points that include sheets and suggestions. Comments and suggestions given to the material expert will be used as improvements to the media for the development of arthropod fauna block resin media as a biology learning medium. The validation results in data by the material expert are shown in table 3

Table 3 Material Expert Validation Result Data

No	Question item	Score			Eligibility criteria
		X	Xi	%	
1.	Resin block preservation specimens of arthropod fauna are relevant to basic competencies.	4	5	80	Good
2.	Compliance of preserved resin block specimens of arthropod fauna with Animalia material	4	5	80	Good
3.	The media presented does not contain misconceptions	4	5	80	Good
4.	The completeness of the morphological structure of fauna in the preserved resin block specimens in the form of the head (caput), chest (thorax), and stomach (abdomen) which are by the learning of animalia material.	4	5	80	Good
5.	Preserved resin block specimens of arthropod fauna as a learning medium are useful for increasing students' knowledge.	4	5	80	Good
6.	Equipped with classification and does not contain misconceptions	4	5	80	Good
7.	Fauna used as preserved resin block specimens according to the original	4	5	80	Good
8.	Preserved resin block specimens of arthropod fauna with animalia material according to students' learning needs	4	5	80	Good
9.	Learning activities in the use of preserved resin block specimens of arthropod fauna as learning media can increase student independence in learning.	3	5	60	Enough
Total		35	45	77,8%	Good

Notes:

X : material expert scores
Xi : maximum score

The percentage obtained was 77.8% with good criteria. The comments and suggestions by material experts on the development of preserved resin block specimens of arthropod fauna are as follows: The media made is good but needs to be improved again for shrimp specimens so that they do not smell that the media is more attractive.

- Media Expert Validation Result Data

The data from the validation results of the media expert are the results of a questionnaire that has been given to the biology teacher of MA Unggulan KH. A.Wahab Hasbulloh, namely Mrs. Faradian Islamiyah M.Si. The validation questionnaire for the development of arthropod fauna block resin media as a biology learning medium contains 9 points that include sheets and suggestions. Comments and suggestions given to the material expert will be used as improvements to the media for the development of arthropod fauna block resin media as a biology learning medium. The validation results in data by the material will be shown in Table 4

Table 4 Media Expert Validation Data

No	Question item	Score			Eligibility criteria
		X	Xi	%	
1.	Display of interesting arthropod fauna block resin media	4	5	80	Good
2.	Resin block preserved specimens of arthropod fauna are easy to carry	5	5	100	Excellent
3.	Resin block preserved specimens of arthropod fauna are easy to use for biology learning.	5	5	100	Excellent
4.	Preserved resin block specimens of arthropod fauna are durable for long-term use	4	5	80	Good
5.	The fauna used in the resin block preserved specimens of arthropod fauna have complete morphology	4	5	80	Good

No	Question item	Score			Eligibility criteria
		X	Xi	%	
6.	The fauna used is equipped with a classification	5	5	100	Excellent
7.	The preserved resin block specimen has an interesting color composition	5	5	100	Excellent
8.	Arthropod fauna have proportional sizes	4	5	80	Good
9.	Materials for making media in the form of Arthropod Fauna are easily obtained	5	5	100	Good
Total		**40**	**45**	**88,8%**	Excellent

Notes:

X : media expert scores
Xi : maximum score

The percentage obtained was 88.8% with the criteria Excellent. The comments and suggestions by media experts on the development of preserved resin block specimens of arthropod fauna are as follows: (a) More in preserving the species, (b) Added advantages and disadvantages in the use of resin.

- Student Response Data

The data of the student's responses were obtained from a questionnaire given to 21 students at MA Unggulan KH. A. Wahab Hasbulloh. The questionnaire was filled out by students to determine the feasibility and attractiveness of the media. The students' response questionnaire for developing arthropod fauna resin block media as a biology learning medium has 7 criteria. The data from the students' response questionnaire given by the students will be used as shown in table 5

Table 5 Student Response Result Data

No	Question item	Score			Attractiveness criteria
		X	Xi	%	
1.	Do the resin block preserved specimens have complete fauna morphology?	87	105	91,3	Very interesting
2.	Is the texture of the preserved resin block specimen appropriate?	89	105	93,45	Very interesting
3.	Are the colors of the preserved resin block fauna specimens the original colors?	84	105	88,2	Very interesting
4.	Is there a fauna classification in the preserved resin block specimens that have been presented?	89	105	93,45	Very interesting
5.	Will the presence of resin blocks make students more interested and easier to understand animalia material?	88	105	92,4	Very interesting
6.	Do the preserved resin block specimens that have been created have an attractive appearance?	87	105	91,35	Very interesting
7.	Is it easy to make resin block preservation specimen media?	89	105	93,45	Very interesting
Jumlah		622	735	92%	Very interesting

The percentage obtained from the student response data was 92% with the criteria of Very Interesting without any comments or suggestions from students for the Preserved Resin Block Specimen of Arthropod Fauna as a Biology Learning Media.

Discussion

Based on table 3, it can be seen that the preserved resin block specimen of arthropod fauna obtained a percentage result from the material expert questionnaire of 77.8%, with 8 criteria each getting 80 and 1 criterion getting 60. Indicators 1-8 got a score of 80 for each criterion. The statement of criterion number 9, got a score of 60 with the content, namely "Learning activities in the use of preserved resin block specimens of arthropod fauna as a learning medium can increase student independence in learning" because it is considered not to have helped students to increase student learning independence. According to material experts, preserved resin block of arthropod fauna has not been able to help students to increase

independence so it has not been able to improve student learning outcomes after learning. This is reinforced by the statement by Muhli (2012) who stated that learning effectiveness is a condition that shows the extent of success and results that have been achieved after the learning process, as stated by Ahmad Muhli who stated that of the criteria for learning effectiveness, namely the learning model, is said to be effective in improving student learning outcomes if it shows a difference between understanding before and after learning.

Comments given by material experts stated that "The media made is good but needs to be improved again for shrimp specimens so that they do not smell so that the media is more attractive." This is because the fauna used is not dry so the preserved resin block fauna specimens smell, therefore there are considerations for improvements and suggestions to improve the preserved resin block specimens of arthropod fauna to be even better. This is reinforced by the statement (Satino, 2007) that "Specimens to be blocked with resin must be dry. Specimen drying can be done by dehydration in the open air, using alcohol, or in an oven. The results of the expert's feasibility test of the media specimen resin block preserved arthropod fauna in table 3, it show that the results of the material feasibility are declared "Good". Strengthened by the statement by (Rohmah,et al. 2020), the validation test by the media expert obtained a feasibility percentage of 75%. This percentage shows the qualification of "Good" and is included in the category of "Feasible".

The assessment of the results of media expert validation aims to determine the level of suitability of the media of preserved resin block specimens of arthropod fauna as a suitable biology learning media and can be used as a learning media with revisions based on comments and suggestions from media experts. Based on table 4, the average percentage value is 88.8%, with the criteria of the attractive display of arthropod fauna resin block media getting a value of 80%, Arthropod fauna resin block preserved specimens are easy to carry getting a value of 100%, Arthropod fauna resin block preserved specimens are easy to use for biology learning getting a value of 100%, Arthropod fauna resin block preserved specimens are durable for long-term use getting a value of 80%, Fauna used in arthropod fauna resin block preserved specimens have complete morphology getting a value of 100%, Fauna used are equipped with classification getting a value of 80%, Resin block preserved specimens have an attractive color composition 80%, Arthropod fauna have proportional sizes getting a value of 80%, Media making materials in the form of Arthropod Fauna are Easy to Get getting a value of 80%. In the presentation indicator, there are 4 criteria for getting a score of 100% and 5 criteria for getting 80%. This means that the preserved resin block specimens of arthropod fauna are easy to carry, easy to use during biology learning, fauna have complete morphology and are equipped with classification. From the results of the data above, the feasibility of preserved resin block specimens of arthropod fauna is very suitable for use as learning media, reinforced by the opinion (Rohmah, 2020) of the validation test of resin catalase media by media experts of 90%. This percentage shows the qualification of "excellent" and is included in the category of "Very Eligible". The validation test carried out by the biology teacher obtained a feasibility percentage of 80%. This percentage shows the qualification of "Good" and is included in the category of "Eligible".

Analysis of student response data is a description obtained from the results of student response data. The percentage of student response data results aims to determine the level of attractiveness of the media of preserved resin block specimens of arthropod fauna as an interesting biology learning media and can be used as a learning media. The assessment of the percentage results obtained from the results of the student response questionnaire, namely 92%, is reinforced by the classification interval data (Riduwan & Sunarto, 2014) which shows that the interval is 81% -100% with the category "very interesting". With the statement and percentage of student response data, the preserved resin block specimen is included in Very Interesting with good "qualifications" so that it can be used as a biology learning media. This is by the results of the development of resin block media by Wulandari, et al (2023) that student responses to the development of marine invertebrate resin blocks as a learning media for class X biology at SMK Islam Mbah Bolong can be concluded that the results of student responses to marine invertebrate resin blocks obtained a percentage value of 90.5% with the criteria of "Very Interesting" and can be used without improvement.

However, 3 statements scored 89, 84 and 89. Statement number 2 in the aspect "Is the texture of the resin block specimen appropriate?" got a score of 89 and a percentage of 80.90% because some students considered that the texture of the resin block was quite suitable for use as a learning medium. This is because finishing was not carried out on the resin block specimen of arthropod fauna so the surface of the resin block specimen of arthropod fauna was uneven. As stated by (Budiwati, 2013) The formation aims

to smooth the rough surface and form the right block. After the formation process, it is continued with a smoothing process using graded sandpaper from coarse to fine.

Statement number 3 in the aspect "Does the color of the fauna of the resin block specimen that has been made have the original color?" got a score of 84 with a percentage of 76.36% because students considered that the color of the fauna in the resin block specimen of arthropod fauna did not match the original color. This is because too much catalyst is used so that the fauna used experiences heating and changes in color. As stated by (Sutino, 2007) too much catalyst will cause the specimen to experience heating and the block to crack or break. With this Resin Catalase Media, students can learn the characteristics and morphology of Arthropod species and it becomes easier to classify them.

CONCLUSIONS

The results of the feasibility of preserved resin block specimens of arthropod fauna from the validation results of material experts and media experts obtained good criteria with a percentage of 77.8% each for the results of material validation, while for the results of media expert validation, the percentage was 88.8% with excellent criteria. Data from student responses, learning media in the form of preserved resin block specimens of arthropod fauna received interesting criteria with a percentage of 92%.

REFERENCES

Arsyad, A. 2011. *Media Pembelajaran*. Jakarta: PT. Raja Grafindo Persada.

Asmara, A. (2022). Media Pembelajaran: Pemanfaatan bioplastik untuk pembelajaran dalam jaringan pada masa pandemi. *Proceedings of Seminar Nasional Penelitian dan Pengabdian Universitas Buana Perjuangan Karawang*, *2*(1), 1614-1621.

Budiwati, B. (2013). Spesimen Awetan Dalam Blok Resin Untuk Media Pembelajaran Biologi. *Jurnal Ilmiah Wuny*, *15*(1).

Campbell, R., et al. (2008). *Biologi* 8th editions. Jakarta: Erlangga

Handayani, T. L., Retnoningsih, A., & Herlina, L. (2013). Efektivitas group investigation ditunjang penugasan awetan bioplastik terhadap hasil belajar dan minat wirausaha. *Journal Of Biology Education*, *2*(1).

Megahantara, G. S. (2017). *Pengaruh Teknologi Terhadap Pendidikan Di Abad 21*. Yogyakarta: Universitas Negeri Yogyakarta.

Muhli, A. 2012. *Efektivitas Pembelajaran*. Jakarta: Wordpress.

Nafisah, I. (2018). Pengaruh model project based learning (pjbl) melalui pembuatan awetan bioplastik terhadap keterampilan berpikir kreatif peserta didik kelas vii di smp negeri 12 bandar lampung pada materi keanekaragaman makhluk hidup (quasi eksperimen pada peserta didik kelas vii semester ganjil di smp negeri 12 bandar lampung tahun ajaran 2017/2018) [Dissertation], UIN Raden Intan Lampung)

Rahayoe, A. S. (2019). Kombinasi alkohol dan asap cair sebagai alternatif pengawet spesimen cacing tanah (pheretima sp.). *Indonesian Journal Of Laboratory*, *1*(3), 1-12.

Riduwan. (2014). *Dasar-Dasar Statistika*. Bandung : Alfabeta.

Riduwan & Sunarto. (2019). *Pengantar Statistika untuk Penelitian : Pendidikan, Sosial, Komunikasi, Ekonomi, Dan Bisnis*. Bandung: Alfabeta

Rohmah, D. A., Utami, S., & Primiani, C. N. (2020). Penyusunan ensiklopedia dan media katalase resin berbasis identifikasi keanekaragaman arthropoda tanah di kawasan alas kucur kabupaten ponorogo sebagai sumber belajar sma kelas x. *Prosiding Seminar Nasional Simbiosis* , 5.

Satino. (2007). Penyediaan Spesimen Awetan sebagai Media Pembelajaran Biologi. Disampaikan pada kunjungan guru-guru IPA-Biologi SMP peserta Lesson Study Home Base IV (Kecamatan Sanden, Pandak, dan Srandakan). (Online), (http://staff.uny.ac.id/sites/default/files/tmp/Pelatihan%20Media%20Bioplastik%20Untuk%20Guru.pdf.

Wulandari, A., Maknun, L., Meishanti, O.P.Y. (2023). Respon siswa terhadap pengembangan resin blok invertebrata laut sebagai media pembelajaran biologi kelas x di smk islam mbah bolong. *JoEMS (Journal of Education and Management Studies)*, 6 (5):1-6.