

The Urgency of Understanding the Definition and Category of Teaching Materials as Knowledge for Biology Education Students

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Abstract

This research discusses the development of teaching materials needed in the world of education. This research uses a skinative research method with secondary data methods, namely through literature studies. Teaching materials are one of the most important components in the learning process, and can help students learn more easily. Instruction consists of two categories: printed instructions and non-printed instructions. One type of printed teaching material is textbooks. Teaching materials can be defined as any type of material used to help teachers or instructors carry out teaching and learning activities in the classroom. Print teaching materials through the media of books, handouts, maps, magazines, etc. Non-print teaching materials audio programs, display teaching materials, overhead transparencies (OHT) models, videos and computer-assisted teaching materials. Knowledge of teaching materials is needed so that students can apply it in the form of product development or research related to teaching materials. In learning biology, delivery requires teaching material media as a lat in channeling knowledge.

1. Introduction

Learning is the development of students' knowledge, skills, and perspectives while interacting with information and the environment where these activities can occur at any time. Learning, on the other hand, can be defined as a way of delivering information. Some examples of information delivery methods include discussions, lectures, and learning practices that you have learned before. You can choose these learning methods to help students understand the content of the subject or achieve goals. Media, on the other hand, functions as a message sender or information sender between the source and recipient of information. In this case, as a source of information, you must choose the right media so that your message can be received properly and clearly by your students as recipients of information.

Teaching aids as learning materials and methods are massive, meaning they complement and increase the effectiveness of learning. Whether or not a teaching material is useful in the learning process depends largely on your ability to develop and use it. To do this, you must master the stages of developing educational materials. However, it should also be remembered that the development of teaching materials may not run smoothly if you do not know the types and roles of teaching materials in learning and the factors that need to be considered in their development. So that in this study, it is explained in detail what is called teaching materials and why it is important to know, in addition to knowledge, it is certainly expected that students can practice making teaching materials, both for training purposes, research and also as expertise as students who will become educators.

2. Method

The method used in this study is a qualitative approach with secondary data methods, namely through literature studies obtained from journals or supporting articles. (Afifuddin 2012),

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Literature review is an important tool as a context review, where literature is very useful and very helpful in providing context and meaning in the writing that is being done and through this literature review researchers can also state explicitly and readers know why the thing to be studied is a problem that must be studied, both in terms of the subject to be studied and any environment from the side of the relationship between the research and other relevant research.

3. Result and Discussion

Teaching materials are one of the most important components in the learning process, and can help students learn more easily. Instructions consist of two categories: printed instructions and non-printed instructions. One type of printed teaching material is a textbook. Teaching materials can be defined as any type of material used to help teachers or instructors carry out teaching and learning activities in the classroom (Prastowo, 2018). Teaching materials are systematically arranged subject matter used by teachers and students during the learning process (Pannen, 1995). Teaching materials are very unique and specific because they can only be used for certain students during a certain learning process and are unique because the content of the teaching materials is designed in such a way as to achieve certain goals for certain students. The delivery system is also adjusted to the subjects and students who use it.

Classification of teaching materials according to their types is done in different ways by a number of experts, and each expert has their own reasons for grouping them. Heinich, et al. (1996) classified the types of manuals according to their functions. For that, classifying educational materials into five main groups, namely: non-projected teaching materials such as photos, diagrams, displays, models;

1. projected teaching materials, such as slides, filmstrips, overhead transparencies, computer projections;
2. audio teaching materials, such as cassettes and compact discs;
3. video teaching materials, such as videos and films;
4. computer teaching materials (media), for example Computer Mediated Instruction (CMI), Computer based Multimedia or Hypermedia.

Ellington and Race (1997) grouped the types of teaching materials based on their form. They grouped the types of teaching materials into 7 types.

1. Printed Teaching Materials and their duplicates, for example handouts, student worksheets, independent learning materials, materials for group learning.
2. Non-projected Display Teaching Materials, for example flipcharts, posters, models, and photos.
3. Projected Still Display Teaching Materials, for example slides, filmstrips, and others.
4. Audio Teaching Materials, for example audiodiscs, audio tapes, and radio broadcasts.
5. Audio Teaching Materials connected to still visual materials, for example sound slide programs, sound filmstrip programs, model tapes, and realia tapes.
6. Video Teaching Materials, for example television broadcasts, and videotape recordings.
7. Computer Teaching Materials, for example Computer Assisted Instruction (CAI) and Computer Based Tutorial (CBT).

Rowntree (1994) on the other hand, has a slightly different perspective from the two experts above in grouping these types of teaching materials. According to Rowntree, types of teaching materials can be grouped into 4 (four) groups based on their nature, namely:

1. printed teaching materials, including books, pamphlets, student study guides, tutorial materials, student workbooks, maps, charts, photos, materials from magazines and newspapers, and others;
2. technology-based teaching materials, such as audiocassettes, radio broadcasts, slides, filmstrips, films, video cassettes, television broadcasts, interactive videos, Computer Based Tutorials (CBT) and multimedia;
3. teaching materials used for practice or projects, such as science kits, observation sheets, interview sheets, and others;

4. teaching materials needed for human interaction (especially in distance education), such as telephones and video conferencing.

In accordance with the 3 experts above, the author will group the syllabus of this course into 2 large groups, namely the type of printed curriculum and the type of non-printed teaching materials. The types of printed teaching materials covered in this guidebook are modules, handouts, and worksheets. Although those included in the category of non-printed teaching materials are actual teaching materials, teaching materials made of simple elements, still and displayed teaching materials, videos, transparent audio bars and projectors (OHT).

1. Printed Teaching Materials

Printed teaching materials are a number of media prepared on paper that can be used for learning or information purposes (Kemp and Dayton, 1985). Currently, printed textbooks are still very popular and widely used as teaching materials in schools. Printed teaching materials are usually used by teachers and students, and schools can now produce and copy them directly using printers, copiers, or photocopiers. Facilities and means for compiling printed teaching materials are currently available in all schools.



Figure 1. Types of printed teaching materials. 1. Module. 2. Magazine. 3. Textbooks

In the framework of teaching materials, printed teaching materials make a significant contribution to the learning process. Most of the learning processes at various levels of learning mainly use printed textbooks. One of the reasons why printed teaching aids are still the main media in school supplies is because so far printed teaching aids are the easiest to obtain and more standardized than conventional computer teaching aids (Bates, 1995). In addition, educational materials printed in book form can often be read and studied anywhere, such as at school, at home, and on the city bus. Reading can also be done anywhere and anytime, whether morning, afternoon, evening, night, or even early morning, depending on your routine. Another advantage of printed educational materials is that no special and expensive tools are required to use them. In terms of delivery, these printed teaching materials are relatively easy, efficient and fast, and relatively cheaper compared to the shipping costs of other types of teaching materials.

In terms of learning, printed educational materials outperform other types of educational materials. Indeed, printed teaching materials are very complex documents in terms of developing students' ability to learn facts and understand general and abstract principles using logical arguments. In terms of the quality of delivery, printed educational materials can be in the form of words, numbers, musical symbols, two-dimensional images, and diagrams. Alternatively, if cost is not an issue, print media can also be highlighted with colorful artwork. From the user's perspective, these printed educational materials are self-sufficient. This means that they can be used directly or do not require other tools to use them, are easy to carry anywhere (portable) because they are relatively small and light, the information to be delivered can be accessed quickly and is easy to read. user's glance (navigation).

Printed teaching materials can be used as textbooks, textbooks are one of the learning resources needed for lectures. According to (Prastowo, 2012) educational materials are all forms of materials that help teachers/instructors or lecturers to carry out teaching and learning activities in the classroom. The construction of teaching materials in terms of material, content and language must be in accordance with the purpose of use, especially in responding to the industrial revolution 4.0. Research and development are directed at product development, in the form of textbooks, course contracts, course work plans, internship guides, assessment tools and authentic assessments that lead to high-level thinking skills (Hasruddin et al, 2016).

In addition to the above advantages, printed textbooks also certainly have disadvantages and shortcomings. The disadvantages include the inability to describe motion, the presentation of material in printed teaching aids is linear, the inability to present events sequentially, it takes a lot of money to make the printed teaching aids good and requires good reading skills of the reader. Finally, the main disadvantage of printed educational materials is the difficulty of guiding readers who have difficulty understanding certain parts of printed educational materials and the difficulty of providing feedback on questions asked, especially questions with multiple answers. or ask for complex and in-depth answers. , which are included in the catalog of printed teaching materials covered in this module are as follows.

Types of Printed Teaching Materials	Characteristics
Module	Consists of a variety of written materials used for independent study.
<i>Handout</i>	It is a type of printed material that can provide information to students. This handout is usually related to the material being taught. In general, this handout consists of notes (either complete or just the outline), tables, diagrams, maps, and other additional materials.
Student worksheet	Included in it are case sheets, reading lists, practicum sheets, project and seminar briefing sheets, worksheets, etc. These Student Worksheets (LKS) can be used for various learning situations.

Table .1. Types of teaching materials and characteristics

In addition to the experts above, Rowntree (1996) also provides examples of several teaching materials that can be categorized as printed teaching materials, as follows.

1. Books, pamphlets, and other printed materials that are published or specifically written and developed for certain purposes.
2. Student study guides that are deliberately developed to complement standard books or main books.
3. Independent learning materials, which are deliberately developed for distance education programs, for example UT modules
4. Teacher and student workbooks that are deliberately developed to complement audio, video, computer programs, and others.
5. Practical guides and others.

2. Non-printed Teaching Materials

In recent years, various types of non-printed teaching materials for learning purposes have been available on the market in increasing numbers from year to year. Among these types of non-

printed teaching materials are teaching materials in the form of audio programs, display teaching materials, models, overhead transparencies (OHT), videos and computer-assisted teaching materials.

a. Display teaching materials

The nature and characteristics of display teaching materials are somewhat different from printed and non-printed teaching materials because their contents include all written or graphic materials that can be displayed in class, small groups or individual students without using projection tools. In general, this type of display teaching material is used by teachers when they deliver information to their students in front of the class. Examples of the types of display teaching materials in this module include flipcharts, adhesives, charts, posters, maps, photos, and realia.



Figure .2. Examples of display teaching materials. 1. Poster. 2. Flipchart

b. Overhead Transparencies (OHT)

Overhead Transparencies (OHT) is a type of non-printed teaching material that does not contain moving elements and is usually in the form of text and graphic images on transparent paper sheets that can be presented in front of the class or group using overhead. spotlights. projectors. (OHP). OHT is very popular and widely used by teachers in learning programs, especially useful for different group learning and also allows students to learn independently.



Figure 3. Example of OHT teaching materials

c. Audio

Audio programming is a system of direct use of radio signals that can be broadcast or heard by a person or group of people. However, teachers sometimes underestimate the contribution of sound, music, and speech in the learning process. Sound, music, and speech can be used for face-to-face teaching, especially language teaching. Examples of audio programs, such as radio programs.

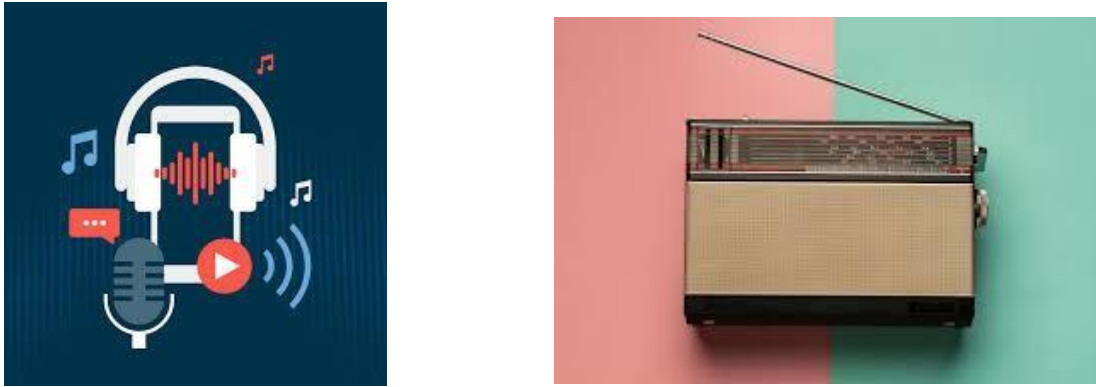


Figure 4. Example of audio teaching materials

Radio programs can be used for academic activities and can reach students who are spread out in large numbers. In addition to radio programs, another example of an audio program is an audio tape. This cassette is more useful than a radio program because students can record it and use it wherever they are. Students can also control the use of this cassette independently.

d. Video

Video and television are non-printed educational materials that are informative and easy to use in learning programs because they can be accessed directly by students. In addition, video adds a new dimension to learning. Students can find images in printed teaching materials and audio in audio programs, but video can provide students with moving images, in addition to accompanying audio, so that students feel as if they are in the same place as the performance shown in the video.

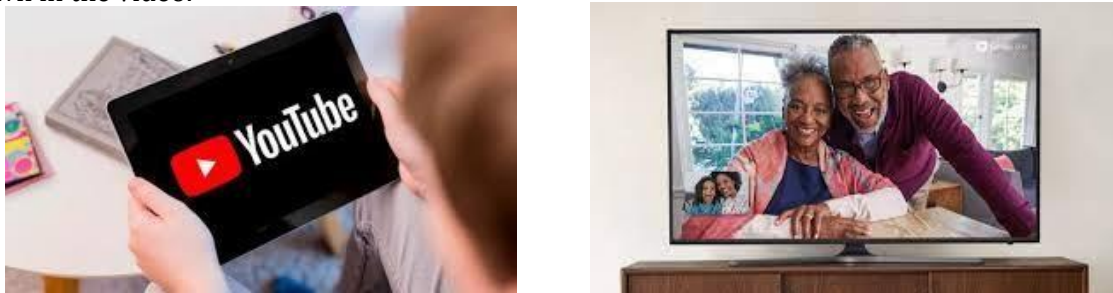


Figure .5. Examples of teaching materials from videos. 1. YouTube. 2. TV.

Meanwhile, what is included in the video category is anything that sequentially combines audio signals with moving images. Examples of video programs include video cassettes and television shows. Video programs can be used in learning programs, including providing unexpected experiences for students by demonstrating the very complex process of blood circulation, for example, or being able to see something clearly that was initially invisible. Video displays can be combined with animation and rhythm to show changes over time or highlight real-life case studies that can spark student discussion.

e. Computer-based learning materials

The use of computers for learning programs has increased recently. The use of computers for learning programs can be directly manipulated by students or connected to other computers. Meanwhile, computer programs for learning include many types of non-printed educational materials that require computers to display something to be learned.

The computers used by students in the learning process are usually stand-alone computers or terminal computers attached to the main computer. Computer networks (local, national, or even international) allow students to access databases remotely. In addition, it also allows them to communicate with other computer users via email or computer conferences. Information in the form of words, sounds, images, and animations is available to students on CD-ROMs connected

to personal computers (PC). From the explanation of various teaching materials, of course this is very related to how to convey knowledge through various media. In the field of Biology knowledge, this is very important because all materials in biology cannot only rely on teacher explanations orally, but are assisted by various media to be better understood and clear.

4. Conclusion

Teaching materials can be defined as any type of material used to help teachers or instructors carry out teaching and learning activities in the classroom. Printed teaching materials through books, handouts, maps, magazines, etc. Non-printed teaching materials audio programs, display teaching materials, overhead transparencies (OHT) models, videos and computer-assisted teaching materials. Knowledge of teaching materials is needed so that students can apply it in the form of product development or research related to teaching materials. In biology learning, delivery requires teaching material media as a tool in channeling knowledge, as well as to be clearer in delivery, and can also be more efficient. Author Contributions.

Author Contributions

All the authors contributed to the study.

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The current study do not comply to any conflict of interest.

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