

# DEVELOPMENT OF VIDEO TUTORIAL LEARNING MEDIA ON WEB PROGRAMMING COURSES USING HANNAFIN AND PECK MODEL

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**Abstract:** *A web programming course is a course that requires the ability to understand the structure of program code, algorithmic logic, and database processing. Some of the student learning problems are student difficulties. In addition, the data on student learning outcomes is not optimal. Namely, there are 43% of students still have low grades. The solution is to develop video tutorial learning media in web programming courses at the Mataram University of Technology. The research method used in this study is Research and Development with the Hannafin and Peck development model approach. The steps taken are in three stages Needs Assessment, Design, and Development and Implementation. The results showed that the video tutorial learning media developed was feasible to be implemented in learning. This can be seen from the results of the one-to-one evaluation of 91.47%, the small group evaluation of 94.88%, and the field trial results of 92%. Based on students' answers to questions about learning motivation when field trials reached 95.2%, it was found that learning through video tutorials that had been developed could increase students' motivation in learning web programming.*

**Keywords:** *video tutorial, learning media, web programming, Hannafin and Peck*

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## Introduction

The web programming course is one of the practicum courses that must be taken by students of the Informatics Engineering Study Program and the Information Systems Study Program at the Mataram University of Technology. Students studying web programming at the Mataram University of Technology must pass prerequisite courses, namely introduction to information technology, web design, database systems, and algorithms. The learning process in web programming courses focuses on understanding the structure of program code, algorithmic logic, and database processing.

Students often have difficulty in learning. The final score for web programming courses obtained by Mataram University of Technology students is seen from the percentage of students with A and B grades in the 2018/2019 and 2019/2020 academic years, only 57% of the total 173 students. This means that there are still 43% or 75 students who have not achieved good learning outcomes. In a study, students' problems or difficulties in learning computer programming are generally related to programming concepts, contexts or cases, programming structures, and personal challenges of students (Dijkstra et al., 1991).

Based on the preliminary research results, students face several problems in learning web programming. From a survey conducted online via google form to students who have taken web programming courses with 71 students as respondents, the results showed that there were 33% of students who had difficulty understanding and memorizing web programming syntax, 25.6% of students answered that there was no mentor, they had to learn self-taught, and 20.5% responded that it was challenging to understand algorithmic logic in learning programming. The rest answered difficulties in English and less supportive learning resources. This shows that there needs to be an appropriate solution in overcoming student learning problems to improve their learning outcomes.

From the survey results in the preliminary research, data were also obtained regarding the media most often used by students in learning web programming. The results of student answers are 74.4% of students using video tutorials, 15.4% of students using lecture modules, and the rest using books and articles on the internet. This is the main reason in this research that it is necessary to develop learning media in video tutorials to support the student learning process in web programming courses.

### **Theoretical Concept**

Learning is a lasting behavior change, or the capacity to behave in a certain way, resulting from practice or other experience forms (Schunk et al., 2012). In contrast, learning is defined as changing one's abilities, attitudes, beliefs, knowledge, and skills (Spector et al., 2012). Another definition states that learning is a series of events that affect students or learners so that changes in behavior are called facilitated learning outcomes (Suparman et al., 2014). Thus, learning is a change in behavior that occurs due to the learning process.

According to Prasetyo, learning media are tools or equipment to carry out processes that allow educators and students to carry out learning activities (Widodo & Wahyudin, 2018). According to Muspiqon, learning media is defined as a tool in the form of physical and non-physical used by teachers in delivering material to students to be more effective and efficient so that learning materials are accepted by students as a whole and attract students to learn more (Puspitarini & Hanif, 2019). It can be concluded that teaching media are tools or equipment used by teachers and students in the learning process.

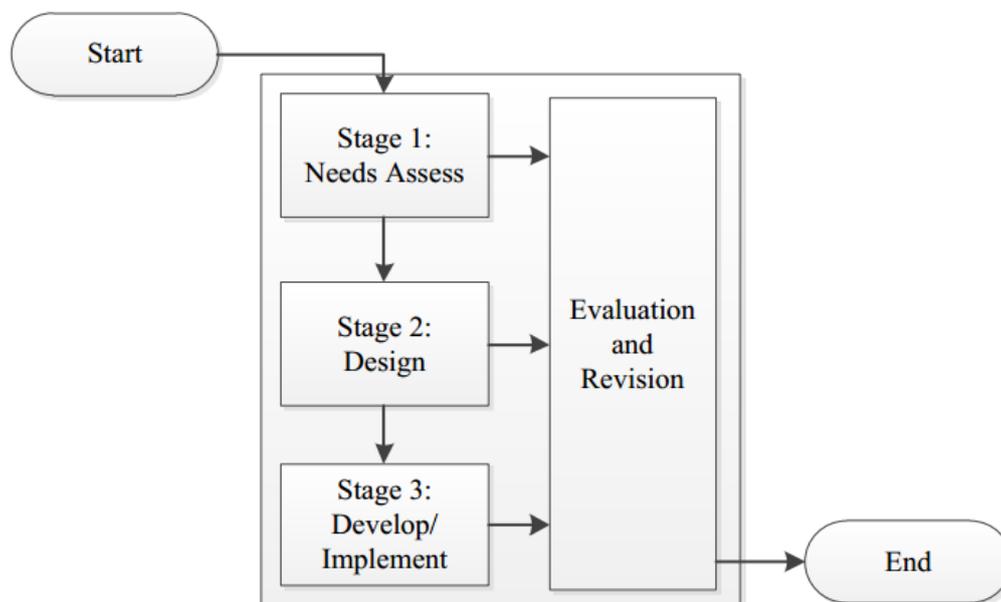
According to Rusman in Lestari, the tutorial provides direction, assistance, guidance, and motivation to students to learn effectively and efficiently (Lestari, 2015). One form of tutorial learning is through video. A research result states that by learning through video tutorials that are well designed, expertly validated, and feasible, students' conceptual understanding, skills, and creativity in developing computer programs increase significantly (Huda et al., 2018). In simple terms, the tutorial learning stages consist of: presenting material on a computer layer, student responses, student responses are evaluated by the computer with an orientation towards

students in taking the next achievement, and continuing or repeating the previous stage (Syafmen & Theis, 2020).

In the concept of the computer curriculum issued by the ACM (Association for Computing Machinery), web programming is a software application development course on a platform, it is included in platform-based development studies. (ACM et al., 2013). In the Information Systems or Information Management curriculum, web programming is in application development and programming studies, and web programming is a compulsory subject (ACM et al., 2020). ACM is an international association in computers and informatics that provides curriculum standards internationally. At the Mataram University of Technology, the web programming course is a compulsory subject in most studies in informatics and computers. Like other programming courses, web programming courses also require a lot of practice or practice. Learning programming can be done through video tutorials or multimedia visualizations. The study results stated that video technology into interactive screens provides a fun programming learning atmosphere (Bhatti et al., 2019).

### Method

The research method used is Research and Development with the Hannafin and Peck development model approach. This model is an instructional design to produce a learning media product in learning videos, multimedia, or modules. This model consists of three essential stages: the Needs Assessment, design, development, and implementation stages. Each step is followed by a comprehensive evaluation and revision (Ely et al., 2019). The following are the stages in the Hannafin and Peck model:



**Figure: Hannafin and Peck Model**

Based on Figure 2 above, the Hannafin and Peck model consist of three stages: Need Assessment, Design, and Develop/Implementation. In this model, each step is evaluated and revised.

The first stage of the Hannafin & Peck model is the Need Assessment. This needs analysis is the basis for designing the learning to be implemented. According to Glasgow, the needs

analysis stage is a plan to collect information about gaps and use the information to make decisions about priorities. These needs are discrepancies between what is available and what is expected, and needs assessment is the process of gathering information about gaps and determining priorities for opportunities to be resolved (Wina et al., 2013).

The second stage designs. This design stage identifies and documents the best rules for making the media, such as a storyboard. Hannafin and Peck model has described reciprocity at each step. This will make it easier to know the mistakes made in media, such as learning media. In this second stage, do not forget to do a test or assessment before proceeding to the development and implementation stage.

The last or third stage is Develop/Implement. This stage produces flowcharts, testing, and formative and summative assessments. In this stage, the media is developed, and learning is carried out by the objectives made based on the needs analysis and design carried out. Formative assessment is carried out during the media development process, while summative assessment is carried out at the end.

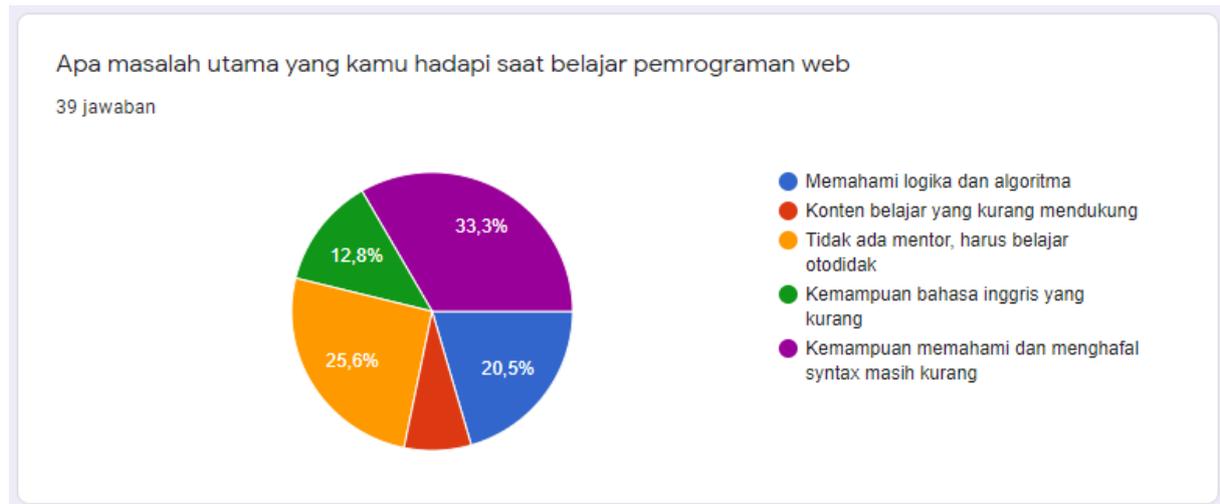
Hannafin and Peck's model has been widely used in learning media development. One of the studies showed that the development of e-learning by using the steps of the Hannafin and Peck model provides interest and learning satisfaction for students (Rabiman et al., 2020). Other studies have shown that the Hannafin and Peck model can also develop training materials and increase trainees' self-study motivation (Andriani et al., 2021).

## **Result and Discussion**

This study was carried out in a structured manner according to the steps in the Hannafin and Peck model. The research process is as follows:

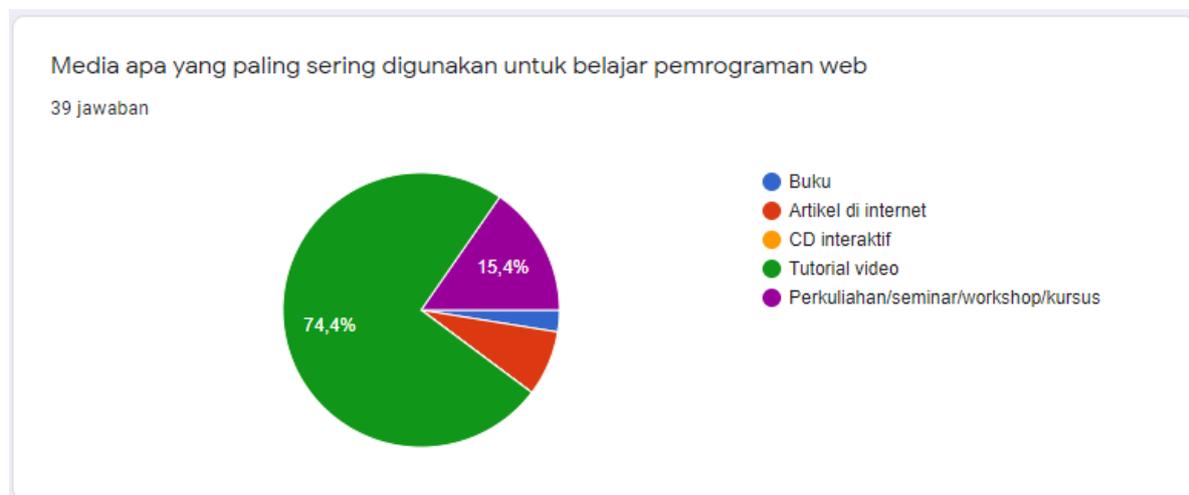
### **The Needs Assessment stage**

Needs assessment is carried out to find out the latest data and information regarding the learning outcomes of web programming courses and the problems faced in learning. This is done by observing the research location, the Mataram University of Technology, and conducting preliminary research surveys. Preliminary research involved 71 respondents. The survey was conducted online via google form by asking 5 questions. These questions are related to 1) the length of time learning web programming, 2) the obstacles faced in learning, 3) the most frequently used media, 4) the solutions used when there are learning problems, and 5) other problems related to learning web programming. This stage results obtained data that 43% of students have not achieved good learning outcomes. In addition, at this stage, information was obtained about the problems faced by students, namely 33.3% of students had difficulty understanding and memorizing programming syntax, 25.6% of students needed a mentor or guide in learning, and 20.5% of students had trouble understanding logic and algorithms. This can be seen in Figure 2.



**Figure 2: Survey on preliminary research (Question 1)**

Information is also obtained about what students most often use media, where 74.4% use video tutorial media, while the rest use other media such as lecture modules, books, and articles on the internet. This can be seen in Figure 3.

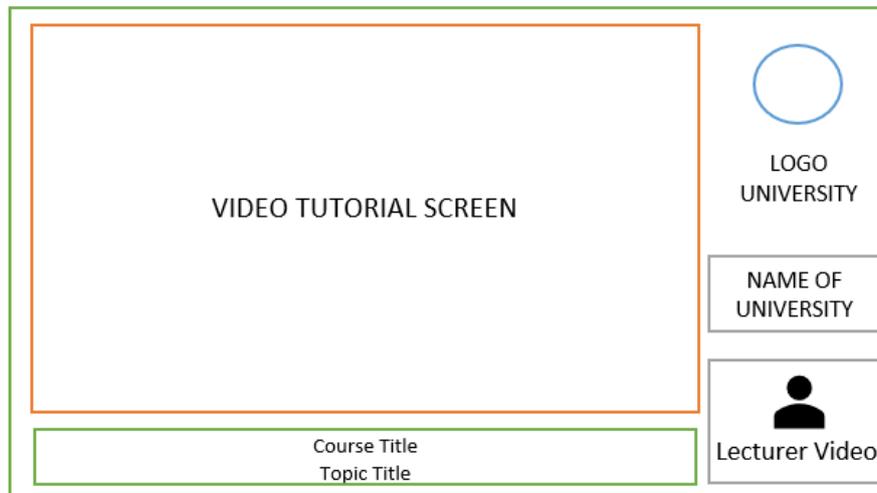


**Figure 3: Survey on preliminary research (Question 2)**

At this needs assessment stage, it also carries out several activities, namely: 1) analyzing existing learning plans such as learning objectives, learning methods, learning time, structure and sequence of learning materials, exercises, and assignments, references; 2) identification topics, and learning materials for each meeting; 3) prepare the required hardware and software needed in the development.

### The design stage

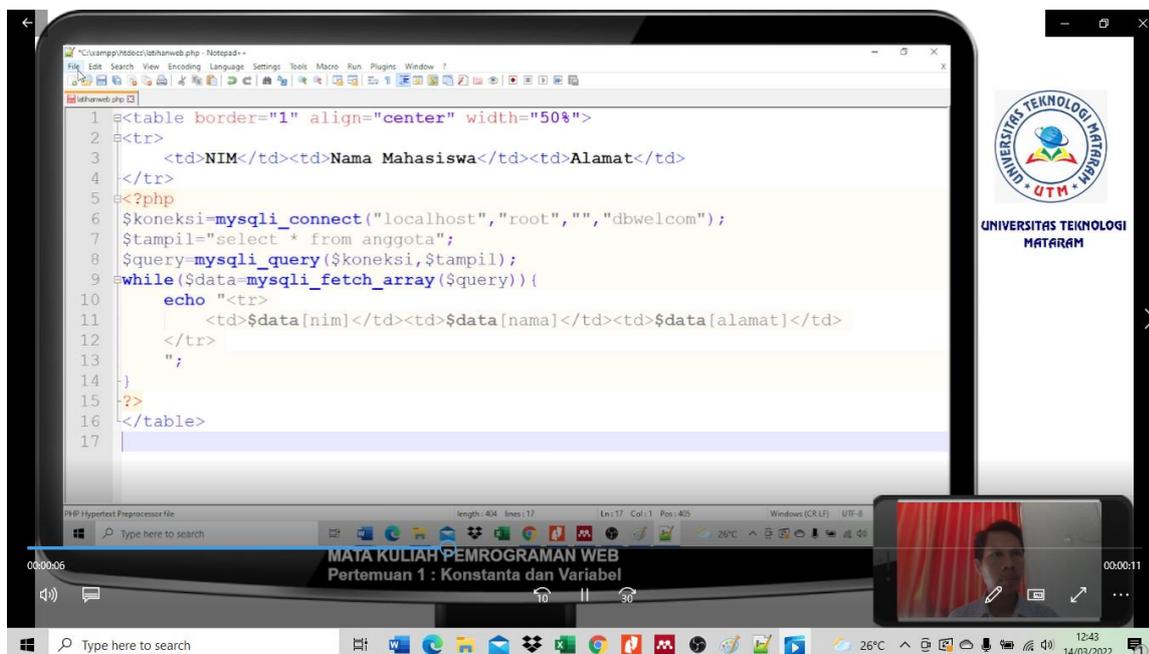
The design stage is done by designing the design and layout of the video tutorial that will be developed. Each form will be drawn and become a reference when making a product or video. The video screen consists of several contents: the primary or tutorial material layer, lecturer videos, university logo, university name, the course title, and topic or meeting title. An example of the created video layout can be seen in Figure 4.



**Figure 4: Design and layout video tutorial**

### The develop/implement stage

The develop/implement stage is the media production stage. Video production using OBS Studio 27.1.3 64bit running on Microsoft Windows operating system. To make the video display more attractive, in the OBS application, the layout is arranged using several images such as a monitor image to display tutorial videos and handphone images to display videos from lecturers who teach. The number of videos produced was 14 videos for 14 meetings. Each video has a duration of 20-30 minutes divided into the first 3 minutes as the introduction, 20-25 minutes of presenting the material, and the last 3 minutes as the conclusion or closing. The example of a video tutorial can be seen in Figure 5.



**Figure 5: Video tutorial display**

The presentation of the material in the video tutorial is made in a structured manner with the stages of opening, presenting the material, and closing. In the opening section, the lecturer conveys the course's learning objectives, and objectives from the topics explained. The opening

takes about 3 minutes. The second stage is the presentation of the material. At this stage, the lecturer opens a text editor and browser screen. The text editor is used to type the source code of the program and the browser screen to display the results of the generated code. The lecturer explains while typing the source code and showing the results in the browser.

The video tutorial consists of 14 videos for 14 meetings for one semester. Each video is presented discussing one topic for one lecture meeting. In 1 semester, there are 16 meetings consisting of 14 lecture meetings, one meeting for the midterm exam, and one meeting for the final semester exam. Table 1 shows the 14 topics discussed in the video tutorial for one semester.

**Table 1: Topics Discussed in The Video Tutorial**

No. Video	Topic	Duration
Video 1	Introduction to PHP and web server installation	00:25:00
Video 2	Variables, constants, and operators	00:20:30
Video 3	Logical structure: If Then Else	00:29:00
Video 4	Loop structure	00:28:00
Video 5	Implementing PHP functions	00:26:20
Video 6	Date and time function	00:22:00
Video 7	Form processing	00:28:00
Video 8	PHP and MySQL Connection	00:27:00
Video 9	Input data to MySQL table	00:29:00
Video 10	Displaying data from a MySQL table	00:28:00
Video 11	Updating data from a MySQL table	00:29:00
Video 12	Deleting data from MySQL table	00:26:00
Video 13	Register and login user	00:27:00
Video 14	Responsive Templates	00:28:30

At the final stage, trials of the video tutorials that have been made are also carried out. The feasibility of learning media can be obtained from formative evaluation, which includes one-to-one evaluation, small group evaluation, and field trials. The one-to-one evaluation was conducted by giving question instruments to 3 students and got 91.47% results. The results of the small group evaluation were carried out by providing question instruments to 9 students and obtained a percentage of 94.88%. The field trial results were given to 30 students, and the percentage yield was 92%. Students' answers to questions about learning motivation when field trials reached 95.2%.

### Conclusion

The video tutorial learning media in the web programming course which was developed by following the steps of the Hannafin and Peck model has gone through formative evaluations of one-to-one, small group, and field trials. The results of the one-to-one evaluation of 91.47%, the results of the small group evaluation of 94.88%, and the results of the field trial of 92%. The results of the evaluation concluded that this video tutorial learning media product is feasible to implement. Based on students' answers to questions about learning motivation when field trials reached 95.2%, it was found that learning through video tutorials that had been developed could increase students' motivation in learning web programming.

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