CHAPTER 2
LITERATURE REVIEWS

2.1 Literature Reviews

A research of whether Using Animation or involving it in Learning (Berney & Betrancourt, 2016), will have an enhanced effect in contrast of the difference of the learning quality globally between using animation graphic and static graphic. Literature search and Eligibility criteria are the method used in the research to gather data. The conclusion of the research shows that involvement of Animation Graphic has an overall positive effect of over static graphics, while also shows that several other factors can generate different result, which causes most studies are unable to find the significant factor of the benefit of using animation graphic over static graphic.

A development of 3D Animation of the myth of Toar Lumimuut (Toar, Sugiarso, & Tulenan, 2015), was created using an open-source animating software called Blender. The purpose is to deliver information and educate about the myth of minahasa regency, primarily focusing on Toar Lumimuut. It was created using Blender, because it is equipped with alot of useful features and having a good graphic quality. This research went through 4 main processes, development, pre-production, production and post-production. This research developed a 7,31 minutes long length of an animation showcasing the myth of Toar Lumimuut.

A development of Digital Archiving Learning Media Animation (Wirawan, Indrawati, & Rahmanto, 2017), with the purpose of improving learning quality of SMK Negeri 3 Surakarta Students. The research method used in this development is Hannafin and Peck Research method. The conclusion of this development is that the development does indeed affect positively and has improved the students' score, as of the improvement of previously average score of pre-test, scoring 69,26, outscored by after the involvement of the digital archiving learning media, 80,59.

A development of an multimedia application of Earth which also have the the history of the creation of the earth until the volcanoes shifting (Kunting, Budiwati, & Budiawan, 2017). Education about earth is one of geography's subject being studied and taught in Patra Dharma Balikpapan High School. The purpose of this development is to create a media as a learning media in delivering information about history of the creation of the earth until the volcanoes shifting. The development are mostly developed using Macromedia Flash application. The research method used in this development is ADDIE, which are Analysis, Design, Development, Implementation, and Evaluation. The users reviewed that 80% of the media is very interactive and 90% of the contents are useful in understanding the material about earth.

A research with the aim of determining the differences of the comparison between learning quality by involving Multimedia and not involving one (Septhiani, S, & Ibrahim, 2017). They used Quasi Experiment to gather and conclude the data, and Macromedia flash as the tool in showcasing the media. The research was applied

with SMAN 1 Indralaya as the subject. The conclusion of the research shows that the average learning quality of the students involving Multimedia has higher result than not involving one. The average value of the experiment of 78,99 and 69,01 for the control, and passing the standard value of more than 85% and 64,4% for control.

Based on the literature reviews above, a table is stated as a comparison for the previous researches and the current development (See Table 2.1).

Table 2.1

Literature Reviews

Researcher	Year	Research Conclusion
Berney and Betrancourt	2017	A Research with the statement of the involvement of Animation in learning have an overall positive effect more than static media
Toar, Sugiarso and Tulenan	2015	The researchers developed a 3D Animation of a myth using Blender.
Wirawan, Indrawati and Rahmanto	2017	A development of a learning media using Hannafin and Peck Research Method.
Kunting, Budiwati, dan Budiawan	2017	A learning application about Earth with the theory of the creation of the earth until the volcanoes shifting.
Septhiani, S, and Ibrahim	2017	Learning quality by involving Multimedia has higher result than not involving multimedia.

Based on the researches stated above that have been researched, a conclusion was made by us, which is to develop a 3D Animation with the purpose to act as a big bang theory learning. The conclusion is based on the theory of involving animation

has overall positive learning quality rather than static graphic (Berney & Betrancourt, 2016), theory of involving multimedia has higher learning quality rather than not involving one (Septhiani et al., 2017), creating a 3D Animation with Blender as the main animating software (Toar et al., 2015), using the Hannafin and Peck research method (Wirawan et al., 2017), and improvement of previously created media of earth (Kunting et al., 2017).

2.2 Theoritical Basis

2.2.1 Hannafin and Peck Research Method

Hannafin and peck research method is a product-oriented research method (Dirgatama, Siswandari, & Indrawati, 2017). This method repeatedly improve the development by avoiding any typical errors that, because each phases done in this method will be evaluated and revised if needed. A research and development of learning aids for visually impaired students (Marwan & Hock, 2017), with which the main purpose is to increase the brailing efficiency with slate and stylus, was made using Hannafin and Peck research method. Each phases will take visually impaired students' learning into account. Fig. 1 (Wirawan et al., 2017) shown that there are 3 main phases in Hannafin and Peck Model, which are:

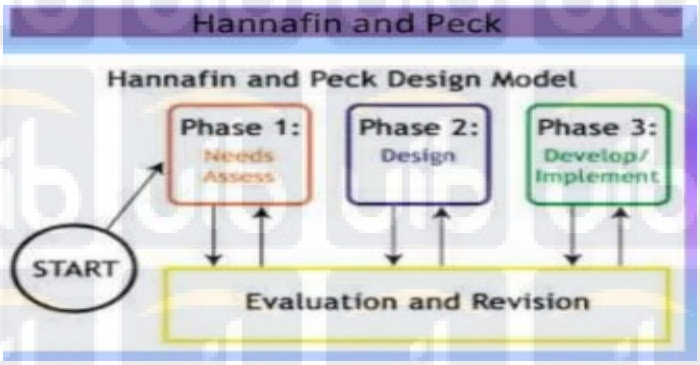

Figure 2.1 Hannafin and Peck Model, source: Wirawan, A. W., Indrawati, C. D. S., & Rahmanto, A. N. (2017). Pengembangan Media Pembelajaran Kearsipan Digital untuk Meningkatkan Hasil Belajar Siswa SMK Negeri 3 Surakarta. *Jurnal Pendidikan Vokasi*, *7*(1), 78–86.

1. Analysis Phase

   There are at least 3 aspect to be considered in analysis phase, Problem analysis, Solution analysis, and method analysis. The purpose of this phase is to identify all the needs and requirements into developing a module as the goal and objective of the development (Triayomi, 2017). This can be done by utilizing tools such as Fishbone Diagram. Fishbone diagram is a tool to identify possible causes of a problem by brainstorming and sorting the ideas into useful categories. Fishbone diagram is also called Cause and effect diagram (Nakiboglu, 2017). Fishbone diagram can be analyzed using these steps (Luo, Wu, & Duan, 2018):

1. Revise the problems to be analyzed, then use accurate describing text. See the problems as “results” and put it into the right side of the FD, then draw the skeleton with an arrow points to the right side.
2. Determine the leading causes' items of the accident, then make them as the main fishbone
3. Use the middle part of the diagram to indicate causes of corresponding problems indicating the causes of the accidents, with description text, which each cause correspond to each fishbone.
4. Expand the layers of the causes mentioned, until it cannot be divided.
5. Draw branches along the skeleton indicating the causes one by one, then use describing text for every causes' name.

A research done by Triayomi (2017), using this phase, they did the analysis by reviewing journals and articles of teaching material in the form of module. They also collected the information to develop goal of module and determining the software and hardware requirements. Evaluation and Revision will be done by expert, just like a development by Hamzah, Subramaniam, Hassan, Ariffin and Rubani (2018), where the researcher reviewed and assessed the platform when the all the needs has been identified, to ensure that it meets all the requirements before the actual development.

2. Designing Phase

In designing phase, the result of analysis phase will be converted into a document, as the solution, just like a development by Wirawan, Indrawati and

Rahmanto (2015), where the researchers built the digital learning media based on the result of the observation on need analysis assessment. When the design has been done, evaluation and revision will yet again be done, just like a development by Ariffin, Harin, M, Subramanian, Hamzah and Rubani (2018) whereas the research interviewed several experts to determine the accurate size of the tile installation tool they will be developed

3. Development and Implementation Phase

In this phase, development of end product of the solution will be done based on the design developed on the previous phase. When the development is done, revision and evaluation will be done by expert just like a development by Pratomo and Irawan (2015), where the storyboard created in the design phase by the researchers are used as the references in developing the flow diagram. After the development, what was developed in development phase will be implemented just like a development by Dirgatama, Siswandari and Indrawati (2017) where the developed and E-Book based on Curriculum 2013 was shared by Supreader supporting software. Revision and evaluation will be revised and evaluated for the final time just like a development by Marwan and Hock (2017), where the learning aids for visually impaired students developed by them has been has been evaluated by experts and receives validity percentage of more than 70 percent.

2.2.2 Multimedia

Multimedia is an unison of two or more integrated media which texts, graphics, picture, photo, audio and animation (Darmawan et al., 2016). The benefit of using multimedia is that it can give an interesting impression with a combination of interesting technology elements in improving the quality of the information (Lubis, Hassan, & Hamzah, 2017). Multimedia initially was formed from the word "teater", which means that a show which involve more than one medium on stage which cover video monitor, synthesized band and human arts as part of the show (Kharisma et al., 2015).

There are two types of multimedia, which are Linier Multimedia and Interactive multimedia. Linier multimedia is the type of multimedia which isn't operated directly, while interactive multimedia involve the user in engaging directly with the media (Widyastuti & Windarto, 2015). Multimedia have multiple elements, which are :

1. Text

   Text is the basic media from processing words (Permana, Nurhayati, & Martono, 2016). Text requirements are based on the purpose of the multimedia application (Kharisma et al., 2015). There are multiple type of typography, which are, Roman, Egyptian, Sans Serif, Script, and Miscellaneous (Pramono, 2016).

2. Picture

   Picture is a media that is able to summarize and to show complex data with new and more useful method (Kharisma et al., 2015). Human is very

oriented towards visual, such as why picture is a good medium to deliver information (Permana et al., 2016). There are two type of picture format, which are Vector (EPS,SVG,AI) and Bitmap (GIF, JPEG, PNG, TIFF) (Haryanto, Purba, & Gunadi, 2016).

3. Audio

Audio can be implemented in multimedia product through sound, music or sound effects (Sidik & Moestavi, 2016). Multimedia without sound is uni-media, not multimedia (Kharisma et al., 2015). Audio format including, MP3, WAV, AAC, WMA, Ogg, Real Audio, MIDI (Wahyudi, Safrianti, & Rahayu, 2015).

4. Video

Video is the most complex element of multimedia due to its communicative information delivery compared to pure graphic (Permana et al., 2016). Video can also be summarized as a media which display sound and is supported by graphic as audio complement (Rahmi & Ahmad, 2017). Video format type have some categories, which are Analog encoding video, Cassette encoding video, Cassette type, optic disc, and digital encoding video. Various video format are based on the application used when displaying the video. The format are AVI, MOV, QT, MPEG-1 , MPEG-2, ASF, WMV, MP4, Flash Video (FLV), RealMedia, 3GP, dan Mastroka (MKV) (Wibowo, Romika, & Ryana, 2017).

5. Animation

Animation is a media of movement created from various media or objects with their own respective movement, effects, and also sound with all of them placed in harmonious with the movement of the animation (Permana et al., 2016). Animation can be text, picture, or even part application which is moving. Animation should be made as interesting as possible to attract interest and creativity (Kharisma et al., 2015).

The advantage of using multimedia is that it is able to attract sensory system to function and attract user's interest, due to the nature of multimedia which involve viewpoint, sound system and movements. In the research by Computer Technology Research, a conclusion was made, which is people is only able to gain information of about 20% from what was seen, and 30% of what was heard, meanwhile 50% of it can be gained from what was seen and heard simultaneously, and 30% of it can be gained if spectating, hearing and engaging is involved (Mardiana, Pradana, Yuliarni, Ariawan, & Setyawan, 2018). The benefit of multimedia is also to shorten practice time, to show picture or animation, video, and easily accessible, and improve security and safety in the process of learning through practice (Novita, Prastowo, & Wahyuni, 2017).

Multimedia product can be divided into two, which are Multimedia content production, and multimedia communication (Yahya, Wibawa, & Afandy, 2017).

1. Multimedia Content Production

   Is the type of multimedia which usage and process involving different media to produce a multimedia with communication purpose. The Media used are texts, audio, video, animation, image, interactivity, special effect, 2D/3D Model, and web.

2. Multimedia Communication

   Is the type of multimedia which involve mass media such as television, with the purpose of exhibiting material such as advertising, publicity, entertainment, news, education, etc. The media used are TV, Radio, Film, print, Music, Game, Entertainment, Tutorial, Internet.

2.2.3 Animation

Based on the developing technique, there are 2 type of animation, which are two dimensional (2D) animation and three dimensional (3D) animation. 2D Animation is purely flat from either the coloring aspect or the character. 3D animation have room dimension and able to be inspected on more than one point of view (Said et al., 2017). Main categories of 3D animation include Modeling, Texturing, Animating and Rendering. Modeling is the function in animating that is used in generating mesh or geometry in the shape of characters or objects (Iwasa, 2015). Texturing is the process of giving texture to the 3D model created (Oriol, Porcino, Richebourg, & Wang, 2016). Texture is a static 2D image that is mapped onto a 2D or 3D Surface. Textures may be created from various source, including 3D graphics, vector art, or text. In Blender, Texturing can be used in 2 types of tools,

Material tools and Texture tools. Material tools is to give basic color in the body of the model, while Texture tools is to give color in only a few part of the model. Animating is to simulate and modify still objects or characters in the form of images by giving them movement as if they are alive (Hidayat & Mustajab, 2015). Rendering is the process of creating frames of images generated from computer. They can also be videos from files, instructions and commands (Devereaux, Cipriano, & Drewes, 2016).

There are 9 types of animation, which are Cell animation, Frame animation, Sprite animation, Path animation, Spline animation, Vector animation, Character animation, Computational animation, Morphing (Sukmana, 2018). Animation is able to improve a media to be more interesting due to the movement and moving picture (Nugraha, 2017).

Animation can be divided into 3 categories, which are (Luhulima, Degeng, & Ulfa, 2018):

1. Traditional Animation, is a very classic animation category.
2. Stop Motion Animation, is an animation which uses recording media to capture object movement of showing various poses, in order to capture the various poses of the object.
3. Computer Graphic Animation, is an animation which whole process is assisted and developed in computer media. This animation category is 2D or 3D.

There are 12 basic animating principles in the development of an animation, which are (Pratiwi, Darmawiguna, & Sunarya, 2016):

1. Solid Drawing

   Solid drawing is to make sure that animated objects feel like they're in three-dimensional space, as to prevent the impression of said objects are too stiff.

2. Timing & Spacing

   Timing is to time when a movement is to be done, and spacing is to adjust the acceleration and decelaration of various movements.

3. Squash & Stretch

   To give object some flexibility so as to make the object as if it's alive.

4. Anticipation

   A preparation of an incoming action.

5. Slow In and Slow Out

   Each movement has to have different acceleration and deceleration.

6. Arcs

   Almost each movement has a circling shape. This is in order to make the movement more smoother and more realistic.

7. Secondary Action

   Extra movement to enhance the main movement to improve the realism of the animation.

8. Follow Through and Overlapping Action

   A part of body will still be moving even after the main object has stopped moving.

9. Straight Ahead Action And Pose to Pose

   These are two ways of drawing animation. Straight ahead action is where you draw each frame of an action one after another as you go along. Pose to pose, is where you draw the extremes, the beginning and end drawings of action, and gradually filling in the frames in-between from the middle frame.

10. Staging

    How the background and environment will affect and improve the desired atmosphere and mood in part of the animation or the whole animation.

11. Appeal

    The whole visual type of the animation.

12. Exaggeration

    To exaggerate the animation's feature and action in an extreme form in order to enhance storytelling.

2.2.4 Storyboard

Storyboard is a group of picture or graphic which is exhibited in sequence to give a visualization of moving graphic (Satria, Trianggana, & Surianti, 2015). The main purpose of storyboard is to assist director in explaining the story plot (Kesuma,

2014). With this, we will create a storyboard as the main reference in developing the video to create the scenes that will be in the final video (Sangian, 2016). There are at least 3 elements in a storyboard, which are characters, actions and objects (Rasheed, 2018). Following are steps in creating a storyboard (Burton & Matthewson, 2015):

1. Decide the structure of the story, and write the narrative of the story in a paper
2. Draw a quick and rough drawing from the narrative written
3. Adjust the drawing accordingly by redrawing and adding or removing frames
4. Arrange them in a storyboard structure, converting the initially drawn drawing into a fully drawn storyboard to be presented.

2.2.5 Adobe Premiere Pro CS6

Adobe Premiere is one of the most popular software by Adobe and is widely used in editing video (Nurhardian, Ferdiansyah, & Dwiyatno, 2015). Adobe premiere is primarily used in joining scene per scene into a video and to connect to the storyboard in the attachment and to edit video (Satria et al., 2015). Some features of Adobe Premiere are ripple, rolling, selection, track, razor, hand, zoom:

1. Ripple

   Adjusting edit point and moving other video clip in the timeline to control balancing.

2. Rolling

   Adjusting edit point between two video creep without affecting the remaining of the timeline.

3. Selection

   Select and to shift clips in the timeline.

4. Razor

   To cut clip in the timeline.

5. Hand

   To adjust viewpoint to the left or to the right.

6. Zoom

   To zoom in and zoom out the display.

2.2.6 Blender

Blender is the primary software used by us in the development of the 3D Animation. Blender is an open source software. Blender is used to create visual effects and interactive 3D (Wrózyński, Sojka, & Pyszny, 2016). Blender have multiple features such as, 3D Modeling, Texturing, Animating, and Rendering (Aslah, Wowor, & Tulenan, 2017):

1. Modeling

   The main function in blender, which is to create and edit 3D Objects. Modeling tools include slice, extrude, rotate, move, scale.

2. Texturing

   The function of giving texture to the 3D Objects.

3. Animating

   The function of animating 3D Scene frame by frame.

4. Rendering

   A function to view the end result of rendering the scenes.