# Developing a Gagne Theory-Based Learning Video for Thematic Subject in Elementary School

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| *Article history:* | **Abstract** |

COVID-19 has shown many significant impacts in life such as in the educational field which required students and teachers to conduct blended learning using creative learning media. It should be able to make the students learn independently. However, that was not an easy thing since the teacher only used conventional learning media: lecturing and textbook. To solve it, this research aimed to design learning media which focused on Thematic Subjects from the Indonesian curriculum of 2013. The development was focused on Science subjects only. The development model used the ADDIE model and implemented Gagne's 9 steps/events of learning theory. The results of the research found that (1) design of Science learning video with the ADDIE model, (2) Science learning video is valid with results: good predicate (80.4%) on expert review of the subject matters, very good predicate (97, 7%) on expert review of the Science learning video media, very good predicate (94.1%) on learning design expert review, very good predicate (93.76%) on the individual test, very good predicate (92.61%) on small group test, and very good predicate (90.45%) on the field test. Importantly, (3) the effectiveness of development concluded that there was a significant difference between the results of the pretest and posttest.

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# 1  Introduction

The occurrence of the COVID-19 pandemic has resulted from many changes such as in the economic, education, and social life sectors of today's society. In the educational field particularly, the government has temporarily closed all schools and universities in all provinces. However, it has been reopened with limited face-to-face. Based on observations made at SD Negeri 2 Anturan, the learning process in schools has changed, which was initially carried out with 100% face-to-face, now 50% distance learning or online/independent learning, and 50% face-to-face which is carried out alternately. In these circumstances, teachers also teach from home by coordinating with students' parents, either through video calls or photos of children's learning activities at home to ensure interaction between teachers and parents (Harike, 2021). As found in SD Negeri 2 Anturan, which during this pandemic, the learning methods often used by teachers are ineffective and unattractive to students, tending to only give assignments to look at their textbooks and give assignments through the WhatsApp forum. So, the students felt difficult to understand the material because it does not provide an innovative learning media to attract students' focus. Not only that, the real fact often occurs in online learning is the lack of innovative learning media used by teachers. It makes students sometimes feel bored in learning with the media used such as textbooks, modules, worksheets, and so on that are printed. Therefore, both online and offline learning process requires skills and mastery of technology for the teacher for the learning process to make it run effectively (Nadiyah & Faaizah, 2015; Allen, 2017).

Another thing that must be considered in addition to mastery of technology for the teacher is learning media. Learning media is a very necessary thing to support the tasks of teachers to motivate and improve students' learning understanding (Mutia et al., 2017). This was stated by Hayati et al. (2017), that using learning media can be used to attract students' interest as a teaching method or technique. Thus, the use of learning media can generate new desires and interests as well as motivation and stimulation of student learning activities in the teaching and learning process. As the field of education develops, there are much-varied learning media which can be used in the learning process, one of which is video learning media.

As learning media, video is effectively used for mass learning processes, namely for individuals and groups. Media with video is more likely to be easy to be remembered and understood the lessons because it does not use only one type of sense (Purwanti, 2015). To the results of research on audio-visual learning conducted by Purwanti (2015), the average score of students before using video in the learning process was 69.19 to 81.48, and the average value was from 69.58 to 81.55 after using instructional video media. In addition, the impact of using learning videos is students can play videos repeatedly wherever and whenever needed. When they forget a material, they can play back the learning video provided (Ario & Asra, 2019).

As Korkut et al. (2015) say, video is an effective and economical media in offering a common platform for providing educational materials, tools, and services to create and deliver rich and powerful training in e-learning. As it was found that many students said video-based learning is more natural, easier, and clearer than text-based learning. Learning with video is said to be very helpful for everything, can be learned anywhere, and can be used anytime.

In addition, designing video-based learning, of course, requires a theory that will be used as a reference in learning video content to make it more effective and structured.  Like Iqbal et al. (2021), who revealed the following statement "To design a theory-based lesson plan and ensure an effective teaching and learning atmosphere, it is crucial to follow constructivism theory, Gagne's nine events of learning and formative assessment blended lesson plan".

According to Gagne, learning involves internal factors (cognitive processes carried out by students) and external factors (stimulation from the environment) (Milka, 2014). Thus, learning is a set of cognitive processes that change the stimulating nature of the environment, passing processing information into new capabilities. Gagne believes that everyone's learning process is very different, not just a single process, but through 9 events/steps that can be applied in both conventional (face-to-face) and online learning processes. The nine stages are (1) attracting attention; (2) conveying the learning objectives; (3) recalling previous learning; (4) presenting the material; (5) providing study guidance; (6) bringing up performance (respond); (7) providing feedback; (8) evaluating performance; and (9) strengthening learning retention and transfer (question and answer) (Chen, & Johannesmeyer, 2021).

The reason for using this theory of 9 events/steps from Gagne is that the developed video is considered to be more structured and systematic in the content of the video. This will certainly make students more focused and systematic in understanding the material contained in the video. Besides, students will be more interested in carrying out the learning process. The second reason is the existence of this theory from Gagne as guidelines in designing the video media so that the media is suitable to be used by students.

Several research results have been analyzed, the first is from Naidoo & Hajaree (2021), which examines exploring the perceptions of 5th graders about the use of videos and PowerPoint presentations when studying fractions in Mathematics. The results of this study are 1) the use of technology-based tools inspires an interesting and fun way of learning fractions, and 2) the use of technology-based tools inspires a joyful atmosphere for learning fractions. In addition, research from Iqbal et al. (2021), on rethinking lesson plan theory for effective teaching and learning. The results of this study found that students preferred academic classes induced by lesson plans. Empirical assessment is also based on the effectiveness of lesson plans based on one of Gagne's nine-event/step learning theories. This factor is important for designing effective lesson plans.

These problems and explanations related to learning media that are effective during this pandemic are audio-visual media or learning videos. To provide media that can be used by teachers who have not yet experienced the use of this technology, a learning video especially for elementary schools has been developed (Haryana et al., 2022; Rasiah, 2014).

## 2  Materials and Methods

The methods used in this study include product development models and learning video models. The Science learning video development model used is the ADDIE model. The procedures presented by Branch (2009), are as follow; (1) analysis, (2) design, (3) development, (4) implementation, (5) evaluation. In analysis, the process can be done by conducting curriculum analysis, students' characteristics analysis, content analysis, and facility analysis. Furthermore, designing can be done by determining basic competencies, determining a learning model, designing learning videos, developing media assessment instruments, and developing lesson plans.

The next is the developing process which has been done by collecting materials from textbooks and internet sources, collecting materials for the needs of learning videos, the editing process, and developing grids for expert trials (content expert trials, learning design expert trials, learning media expert trials, individual trials, small groups, field trials), and conducting the product trials, subject expert trials, instructional design trials, learning media trials, and individual, small group, and limited field trials. The implementation process is conducted at SD Negeri 2 Anturan in grade V by giving a pre-test before watching the video and a post-test after watching it. Last, the evaluation process is done to measure whether the product has been successfully developed or not by using formative and summative evaluation.

In addition, the Science learning video model used Gagne learning theory. The procedures of Gagne 9 events/steps learning theory consist of: (1) attracting attention; (2) conveying the learning objectives; (3) recalling previous learning; (4) presenting the material; (5) providing study guidance; (6) bringing up performance (respond); (7) providing feedback; (8) evaluating performance; and (9) strengthen retention and transfer of learning (question and answer).

The quality of Science learning videos is measured by conducting expert tests and product trials which include individual trials, small group trials, and field trials. Data collection methods and data collection instruments used are: (1) questionnaire method, (2) document recording method, (3) interview method, and (4) written test. In this development research, three data analysis techniques were used, namely: (1) qualitative descriptive analysis, (2) quantitative descriptive analysis, and (3) inferential statistical analysis (correlated t-test). The hypothesis of this research is H0: the application of learning video media development product is not effective in improving learning outcomes of grade V students in the 2021/2022 academic year at SD Negeri 2 Anturan, and H1: the application of learning video media development product is effective in improving learning outcomes of grade V students in 2021/2022 academic year at SD Negeri 2 Anturan.

## 3  Results and Discussions

This research answered three important points such as:

*Design and Development of Learning Video*

Based on ADDIE development models according to Branch (2009), bellows are the list of each procedure and the steps of activities conducted in this research as Figure 1.
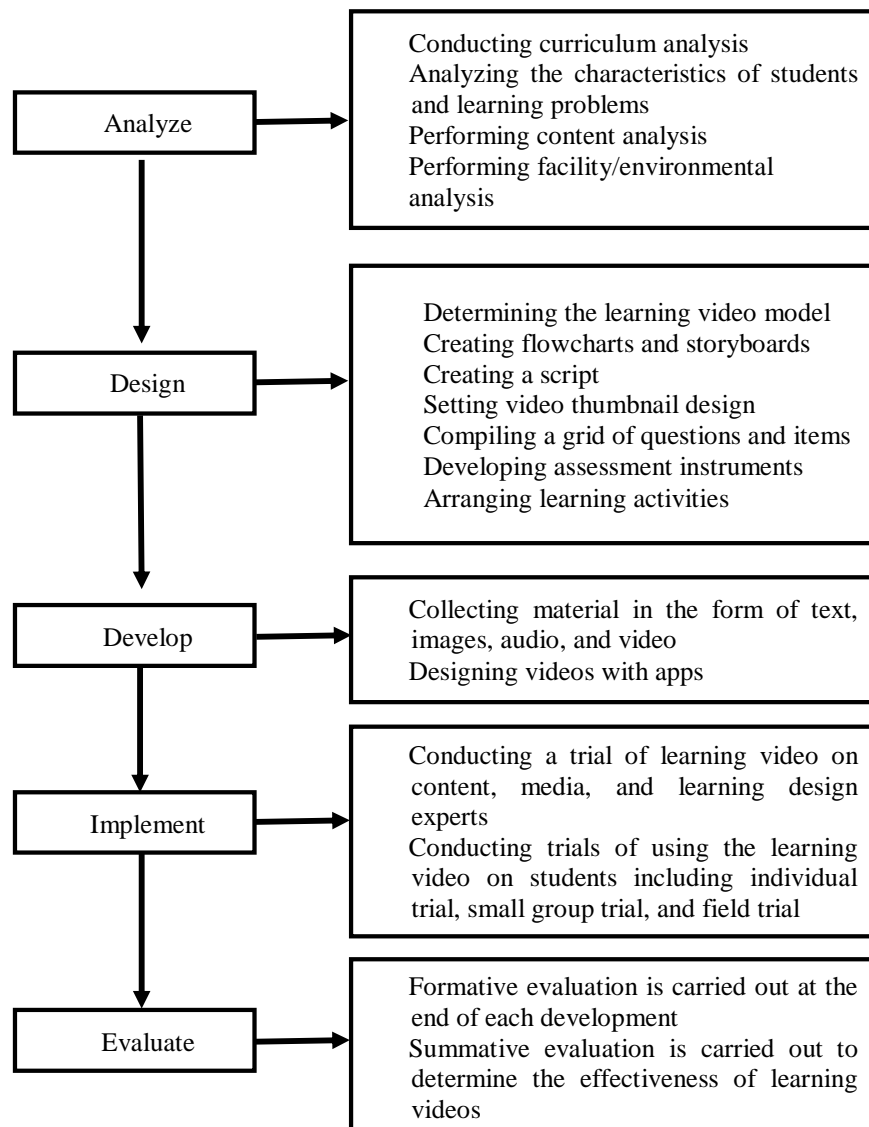
Figure 1. Design and development of learning video

As found in analyzing the curriculum used at SD N 2 Anturan, there are several abstract materials. Those are found in Science subjects, so it is decided to make Science learning video in Theme 5: Ecosystem which consists of 3 sub-themes (Ecosystem Components, Relationships Between Living Things in Ecosystems, Ecosystem Balance) and Theme 6: Heat and its Movement which consists of 3 sub-themes (Temperature and Heat, Heat Transfer around us & Effect of Heat on Life). It is needed to develop such learning media because, at this age, students are already familiar with the use of technology, so they won't get bored learning at school or in their house independently.

In addition, this video is based on Gagne's 5 events/steps learning theory (Chen & Johannesmeyer, 2021). Its usage is to make the learning video structured and organized well. Mukuni (2020) also uses Gagne's 9-step learning theory-based video media creation procedure to teach procedural skills in an online learning environment. In this study, the flowcharts are: (1) before starting the material, there is a scene of the Undiksha logo, the name of the study program, and the name of the developer; (2) there is a scene of the title of the material, (3) the application of Gagne's theory, namely apperception or attracting attention, delivery of learning objectives, reminding of previous learning, and

presentation of material, (4) after the delivery of the material there is an evaluation scene and closing greetings (Dessì et al., 2019; Szpunar et al., 2014).

Then, the development process is done by using Powtoon apps, Adobe Photoshop CC 2018, and Adobe Premiere CC 2018. After that, the experts' judgement is done by experts which have Dr Title and lecturers from Undiksha. They judge the material, content of the video, and the media itself according to the instruments arranged. Lastly, the developed product is implemented at SD N 2 Anturan to know its effect of it.

*Validity of science learning video development*

Table 1
Percentage of Validity Results of Learning Video Development

| No | Learning Video Trials | Results Validity (%) | Description |
|---|---|---|---|
| 1 | Expert review of the subject matters | 80,4 | Good |
| 2 | Learning design expert review | 94,1 | Very good |
| 3 | Expert review of the Science learning video media | 97,7 | Very good |
| 4 | Individual test | 93,76 | Very good |
| 5 | Small group test | 92,61 | Very good |
| 6 | Field test | 90,45 | Very good |

The validity results of the learning video development as a whole obtained a very good and good percentage. Based on the analysis of the feedback, comments, and suggestions of experts judgement in all of the trials, there are suggestions which can be revised. The revised learning video development is finalized as the product being tested in the field test.

*Analysis of the effectiveness of learning video media development*

It is carried out using the multiple choice test method. Multiple-choice test questions were used to collect data on student learning outcomes before and after using the learning video. The purpose of collecting student outcomes data is to determine the level of effectiveness of the use of learning videos in improving learning outcomes by using the *t-test* for correlated samples. Before testing the effectiveness of the learning video development product using the multiple-choice test method, first, the learning outcomes test instrument and prerequisite test were conducted.

Table 2
Normality test result

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Group | Statistic | df | Sig. | Statistic | df | Sig. |
| Score | Pretest | .117 | 24 | .200[*] | .976 | 24 | .812 |
| | Posttest | .117 | 24 | .200[*] | .976 | 24 | .812 |

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Based on the table, it can be seen that the Sig value of the pretest and post-test is $0.200 > 0.05$ so it can be concluded that the pretest data and post-test data are normally distributed.

Table 3
Homogeneity test result

| Test of Homogeneity of Variances | | | |
| --- | --- | --- | --- |
| Score | | | |
| Levene Statistic | df1 | df2 | Sig. |
| .000 | 1 | 46 | 1.000 |

It can be seen that the value of the sig test homogeneity is 1,000 > 0.05 so it can be concluded that the data value of the pre-test and post-test are homogeneous.

Table 4
Hypothesis test result

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Score | Equal variances assumed | .000 | 1.000 | -6.819 | 46 | .000 | -20.41667 | 2.99393 | -26.44314 | -14.39020 |
| | Equal variances not assumed | | | -6.819 | 46.000 | .000 | -20.41667 | 2.99393 | -26.44314 | -14.39020 |

Based on the result table above, it can be seen that the value of sig (2-tailed) equal variances assumed is 0.000 < 0.05 so it can be concluded that there is a significant difference between the results of the pretest and post-test results. The difference between pretest and posttest is presented in the following table.

Table 5
Pretest and Posttest Resullts

| Group Statistics | | | | | |
| --- | --- | --- | --- | --- | --- |
| | Group | N | Mean | Std. Deviation | Std. Error Mean |
| Score | Pretest | 24 | 59.7917 | 10.37128 | 2.11703 |
| | Posttest | 24 | 80.2083 | 10.37128 | 2.11703 |

It can be seen that there is a very significant difference in the average value between the pretest and posttest. Where is the value is posttest mean > pretest mean.

Several aspects must be considered in developing this video media so that the video developed is of good quality. Related to this, Mahadewi et al. (2014), stated that a good learning video is a video that can attract students' attention and foster students' learning motivation. As stated by Lestari & Sujana (2021), video development for elementary school students is feasible because it increases students' motivation and understanding of subject matter based on the assessment of learning videos from aspects of content, learning design, and learning media, with very good qualifications.

The material presented in the Science learning video is focused on only one material in one meeting, this is because students make it easier to understand the lesson and create an image on the material presented. In line with Sudatha & Tegeh (2015), the advantage of using video is that it can show real situations to students so that they can see the best pictures in the application of the relevant lesson concepts such as in the videos made, namely ecosystems and heat.

Prehanto et al. (2021), argued that the use of interactive-animative learning videos can increase students' interest and explore creativity. Video media is effectively used as a learning strategy during the COVID-19 pandemic. In addition, video media is also a teacher's reference for the implementation of learning in a fun and liked by students. Learning video media is a communication process or teacher intermediary in delivering learning material to students who are presented with the use of communication technology (Kako, 2006; Knoeferle et al., 2005). This media difference can provoke students' motivation and curiosity in learning, in line with the statement from Basyirudin and Asnawir written by Ilsa et al. (2021), that a good learning video has the following characteristics: (1) following the learning theme, (2) can attract students' interest, (3) correct and authentic, (4) up to date in setting, clothing, and environment, (5) according to the maturity level of students, (6) correct language vocabulary.

Very good qualifications are also obtained from the practicality of students in accessing Science learning videos, in which these Science learning video has been uploaded on a platform, so it will be easier for students to find the video that has been developed via mobile phones or PCs. In addition to the practicality of accessing videos, this Science learning video also leads to active learning, because without the help of the teacher, students can learn independently by watching to Science learning video. In line with Kurniawan's (2017), statement, active learning requires a decrease in teacher dominance in the classroom. The role of the teacher is minimized and shifted by the role of learning media around students or even learning resources which are also the source of the learning message. In addition, Effendi (2016), also argues that students are directed to learn actively by touching, feeling and looking and experiencing for themselves so that learning is more meaningful and quickly understood by students. In the case of active learning as mentioned above, learning with learning videos is included in looking so that students can remember what is explained in the Science learning video (Oka, 2021).

Seeing the mean value or mean posttest which is greater than the mean value or means pretest, it can be said that Science learning videos can improve student learning outcomes. This shows that Science learning video has a significant influence on Science learning outcomes. This is because Science learning videos make it easy for students to understand the material given, compared to using only textbooks and lecture methods. In line with the results of research Naidoo & Hajaree (2021); (1) the use of technology-based tools inspires an interesting and fun way of learning fractions; (2) the use of technology-based tools inspires a joyful atmosphere for learning fractions. In addition, Chan (2010), found that video instruction was favoured by students and had good potential as a support tool for formal learning outside of traditional classroom settings. Meanwhile, Suwarnisi (2021), researched the development of interactive learning videos and found that the videos produced were valid videos based on the validator's assessment, with an average score of 3.63 from a maximum score of 4.0. So that it is feasible to use and the videos developed are effective in increasing interest and learning achievement. In the Science learning video that has been developed, the material presented is equipped with picture illustrations and video supporting explanations related to the subject matter, so that the material will be more easily understood by students and can encourage students' motivation to learn.

In addition, Science learning videos also help increase students' enthusiasm for learning, this can be seen from the enthusiasm of students when the Science learning video is shown in class. So, it can be assessed that the effectiveness of the learning video in terms of the learning process in the classroom is feasible and recommended for use. In addition to the learning process, student learning outcomes can also increase, the increment is caused by the quality of the Science learning video which influences the learning outcomes of grade 5 students.

## 4 Conclusion

Based on the results, a Science learning video using the ADDIE product development model, which includes five stages and is based on the learning theory of Gagne's 9 stages/steps have been successfully developed. It has validities, including; (a) The results of the subject matter expert review showed good qualifications (80.4%), (b) The results of the learning design expert review showed very good qualifications (94.1%), (c) The results of the learning media expert review showed very good qualifications (97.7%), (d) The results of individual learning video trials showed very good qualifications (93.76%), the results of small group trials of learning videos showed very good qualifications (92.61%), and the results of field trials the learning video shows very good qualifications (90.45%).

Meanwhile, the effectiveness developing Science learning videos that have been developed effectively improves learning outcomes. The Sig value of the pretest and post-test is 0.200 > 0.05 so it can be concluded that the pretest and post-test data are normally distributed. the homogeneity sig test value is 1,000 > 0.05 so it can be concluded that the pretest and post-test data values are homogeneous. The average score (Mean) of the students' pre-test was 59.7, and the average score (Mean) of the students' post-test was 80.2. Seeing the mean value or mean posttest which is greater than the mean value or means pretest, it can be said that Science learning videos can improve student learning outcomes.

*Conflict of interest statement*
The authors declared that they have no competing interests.

*Statement of authorship*
The authors have a responsibility for the conception and design of the study. The authors have approved the final article.

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