Content Analysis of Class X High School Physics Learning Video by Koh Ben on the Big Course YouTube Channel

Muh Fajrin Arifa[1]*, Restu Widiatmono[1], Jumadi[1]

[1] Magister Pendidikan Fisika, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia.

Abstract: This paper reports research that aims to determine the feasibility of a learning video made by Koh Ben on the 'BIG Course' YouTube channel. Video learning is one of the most frequently used learning media and only videos that are appropriate can provide maximum benefits in learning physics. This study used a content analysis design with 4 analyzes carried out, namely content analysis, presentation analysis, graphic analysis, and language analysis. The learning videos analyzed were taken directly from the YouTube channel totaling 20 videos containing material for class X physics in the 2013 curriculum. From the results and discussion, it was concluded that the 20 videos for teaching physics for class X were very feasible with a percentage of 89.25% on the content aspect, 86% on the aspect delivery, 91.5% in the graphic aspect, and 99.75% in the language aspect.

Keywords: Content Analysis; Physics Learning; Video Feasibility; YouTube learning videos

Introduction

In the rapidly developing industrial 4.0 era, the role of digital technology and high connectivity has changed the learning landscape, including in physics learning. Industry 4.0 signifies the rapid development of technology and affects various aspects of learning (Sari & Wilujeng, 2020). The existence of scientific innovation activities, technological innovation, and the use of technology is very important in adapting learning in the industrial era 4.0 (Aquilani et al., 2020; Roblek et al., 2020). Technology products continue to develop and are often used in physics learning such as learning videos, electronic teaching materials, learning applications, educational games and many more. Sari and Wilujeng (2020) state that the information technology knowledge possessed by teachers generally knows more about instructional videos than other technologies.

Learning videos are a type of instructional media that can support teachers in the classroom. Learning videos, both obtained from YouTube and those developed by teachers, are the teaching materials most often used by teachers (Rasmitadila et al., 2020). According to previous research, using learning videos can help teachers achieve learning goals, as well as increase student achievement and curiosity about the world around them (Hochberg et al., 2020). The learning videos used in the classroom also have several eligibility criteria so that the videos used as learning media can function according to their purpose.

Learning videos can assist teachers in delivering learning material in class. Learning videos generally consist of information-rich images and sounds that aim to increase students' motivation, interest, and curiosity. (Susilawati et al., 2022). This is of course very helpful for teachers in lightening the workload and consuming time when teaching in class. However, the problem now is that not all teachers are able to make proper learning videos.

The feasibility of learning videos refers to evaluating the extent to which a video can be used as an effective and useful tool in learning. Learning videos are considered appropriate if they meet several criteria. Previous research conducted by Yuwono et al. (2023), showed that analysis of learning video content can be done by analyzing 4 aspects of the video, namely content, presentation, graphics, and language where the analysis of these four aspects is an assessment of feasibility in National Education Standards Agency and bookkeeping center. Murniati et al. (2022), have

explained a little about this aspect of the assessment. Appropriateness of presentation is a systematic presentation technique and presentation completeness which includes pictures, illustrations, and symbols. Language feasibility is the suitability of language development at the level of students and the use of language that is integrated and logically structured. Graphic eligibility is eligibility which refers to standard cover sizes, video designs, and attractive content layouts.

Decent learning videos must be relevant to the material being taught and the learning objectives to be achieved. Unfortunately, teachers often do not have an explicit purpose for using video in learning. They select and use videos in their lessons intuitively (Wijnker, 2019). This is based on the fact that teachers sometimes have difficulty making video lessons. teachers usually lack the skills to make videos with a professional look. they found it easier to make videos by recording their classrooms because it was the most likely scenario for their abilities (Perez-Navarro et al., 2021).

In addition to the factors mentioned earlier, the teacher's competency factor is also a challenge in using appropriate learning videos in the classroom. Previously Taib & Mahmudi (2022) examined teacher competence in Main Ternate. The fact is that 15 out of 21 teachers have low competence so they cannot make their own learning videos. The competencies referred to include Technological Pedagogical and Content Knowledge (TPACK) in teachers who are still lacking and affect the learning process (Nuruzzakiah et al., 2022). In the end, teachers are less skilled in making interesting media or teaching materials (Yudana et al., 2022). For this reason, besides continuing to conduct training for teachers in making their own videos, teachers can use videos that are already available.

In addition to making their own learning videos, teachers have an alternative option, namely using learning videos that are already available on various platforms. YouTube is a social media platform that can be accessed at any time for free. However, this has some drawbacks, such as teachers not knowing many YouTube learning channels and video quality mismatch (Richtberg & Girwidz, 2019). On YouTube there are many 'YouTubers' or people who become creators who produce interesting content for teaching and disseminating physics (Aragoneses & Messer, 2020). Teachers have the option of taking available videos if they don't have time to make them themselves. However, the videos that will be taken need to be analyzed for feasibility.

Several previous studies have conducted research to determine the feasibility of learning videos on the YouTube channel. YouTube itself is a channel that can be used to support the teaching and learning process (Otodu & Khoiriyah, 2023). The BIG Course channel developed by Koh Ben in 2019 focuses on producing explanatory videos for Physics, Chemistry and Mathematics. With a detailed explanation system, Koh Ben creates viewable playlists to watch learning videos by class. In class X there are 20 learning videos that have potential as learning media by teachers in class. Therefore, it is necessary to do research to analyze these videos to increase the possibility of the number of videos that are feasible and can be used by teachers in teaching physics.

Method

A qualitative research design using the content analysis method was used to determine the feasibility of the video by analyzing four aspects, namely content analysis, presentation analysis, graphic analysis, and language analysis.

The content analysis method used consists of several stages, namely: unitizing, sampling, recording, reducing, inferring, and narrating (Krippendorff, 2004). Unitizing is the first step to determine the video aspect data to be analyzed. Then the sampling stage to determine the research sample. Followed by recording to record data from the sample in accordance with the specified aspects. The next stage is reducing, namely filtering and simplifying the data so that it is easy to understand. Next is inferring or drawing conclusions. And finally narrating to describe the conclusions from the results of the analysis of physics learning video content (Azizah et al., 2021). The sample of this study were 20 videos taken from the BIG Course YouTube channel which had the topic of class X physics material. Detailed information on research subjects can be seen in Table 1.
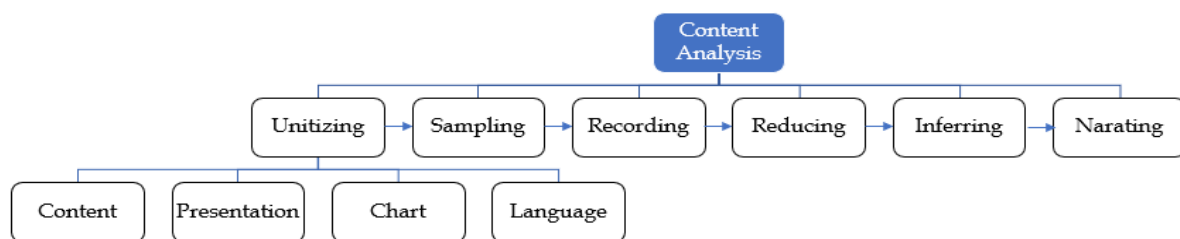

Figure 1. Stages of Content Analysis of Physics Learning Videos

Table 1. Information on Physics Learning Videos from the BIG Course YouTube Channel

Title	Upload date	Duration
Class X Physics - Quantities, Dimensions and Significant Figures	20/11/2019	0:31:07
Class X Physics - Vector part 1 - How to Draw and Calculate Vectors	2/10/2022	1:17:56
Physics class X - Vector part 2 - Calculate the above 2 vectors by means of tables, analytics and box shapes	9/10/2022	0:45:55
Class X Physics - Straight Motion(GLB, GLBB, GVA, GVB, GJB) part 1	24/10/2019	0:34:34
Class X Physics - Straight Motion(GLB, GLBB, GVA, GVB, GJB) part 2	24/10/2019	0:25:04
Class X Physics - Parabolic Motion / Blending Motion	26/11/2019	0:48:24
Class X Physics - Parabolic Motion / Blending Motion part 2 - A fast way to solve problems	14/11/2021	0:28:35
Class X Physics - Circular Motion	7/11/2019	0:41:40
Physics class X - Dynamics of Particle Motion part 1 - Application of Newton's Law 1	16/1/2020	0:27:56
Physics class X - Dynamics of Particle Motion part 2 - Application of Newton's 2nd Law in Plane	22/1/2020	0:26:02
Class X Physics - Dynamics of Particle Motion (part 3): Inclined Planes and Pulleys	27/1/2020	0:35:35
Class X Physics - Particle Motion Dynamics part 4 - How to Understand Problems	30/1/2022	0:57:47
Class X Physics - Gravity part 1: Gravitational Force and Field Strength	17/7/2020	0:41:34
Class X Physics - Gravity part 2 : Energy & Gravitational Potential and Kepler's Laws	25/03/2020	0:17:29
Class X Physics - Gravity part 3 - The Law of Conservation of Gravitational Energy	21/2/2022	0:29:41
Class X Physics - Work and Energy	16/3/2020	0:46:16
Class X Physics - Momentum part 1 : Definition, Impulse, Law of Conservation of Momentum & Coefficient of Restitution	20/4/2020	0:49:40
Class X Physics - Momentum part 2 : Coefficient of Restitution of Bouncing Ball & Relationship of Momentum with Energy	20/4/2020	0:22:01
Class X Physics - Simple Harmonic Vibration part 1 - Theory of Springs & Simple Harmonic Vibration	31/3/2020	0:26:51
Class X Physics - Simple Harmonic Vibrations part 2 - Practice Problems and Swings / Pendulums	1/4/2020	0:30:20

Learning videos are said to be feasible if they meet the predetermined aspect indicators. Content analysis has indicators of suitability of material with learning outcomes, accuracy of material, supporting learning materials, material updates. Presentation analysis indicators include presentation techniques, presentation support, presentation and completeness. In the aspect of language, a video is said to be appropriate if it meets straightforward, communicative, dialogic and interactive language, appropriate to the development of students (Sesmiyanti et al., 2021).

Each video will be assessed based on indicators and given a value of 1-4 based on a Likert scale. Later the total score in each analysis will be calculated by the percentage and then the eligibility categorization will be carried out as shown in Table 2.

Table 2. Eligibility percentage criteria

Percentage (%)	Criteria
0 – 20	Very Unworthy
21 – 40	Less Eligible
41 – 60	Decent Enough
61 – 80	Worthy
81 – 100	Very Worth it

(Utami et al., 2021).

Result and Discussion

Twenty physics learning videos can be seen in Figure 1 which shows the title, upload date and video duration. Of the 20 class X physics learning videos taken, overall, it can be said to be feasible. This evidence can be seen in Table 3.

Table 3. Overall Feasibility Analysis Results

Aspect analysis	Average Percentage (%)	Category
Content analysis	89.25	Very Worth it
Presentation analysis	86	Very Worth it
Graphic analysis	91.5	Very Worth it
Language analysis	99.75	Very Worth it

From these results it was found that the 20th language aspect of the video had the highest percentage of 99.75%. This is due to the fact that BIG Course videos continue to incorporate standards with age-appropriate language. The language used during subject presentations is appropriate for students' developmental stages, and the phrases chosen are standard, straightforward, and easy to understand. There are several terms that are used consistently and explained in detail the meaning of these terms.

Conversely, the presentation aspect has the least percentage even though it is said to be very feasible at 86%. This is because the BIG Course physics learning video is less consistent in preparing the material so that the systematics of the material is sometimes not sequential and sometimes even incomplete. But besides that, the presentation of the information provided is

very clear and detailed which is conveyed in a clear voice so that students will find it easy to understand.

Meanwhile, in terms of content and graphics, it met the very decent category of 89.25% and 91.5%, although sometimes the quality of some videos is not given enough attention. Even so, eligibility above 80% can be used for students to improve students' abilities (Wahyuni et al., 2021).

In total, 20 class X physics learning videos that are on the 'Big Course' channel can be used in class because they are deemed appropriate. It's just that the teacher needs to make a few adjustments so that the content and presentation in the video is in accordance with the learning objectives. Several previous studies stated that the use of proper learning videos can help learning achievements. Rahayu et al. (2023), stated that appropriate learning videos can improve critical thinking skills which are the learning objectives. The use of appropriate learning videos can be used by teachers in increasing students' understanding of the material (Octavyanti & Wulandari, 2021).

Content aspect analysis

Based on the content analysis shown in Table 4 below, the 20 videos have an eligibility percentage of 80% and above.

Table 4. Percentage of Eligible Content Analysis

Video	Presentation (%)	Category
1	95	Very Worth it
2	85	Very Worth it
3	95	Very Worth it
4	95	Very Worth it
5	90	Very Worth it
6	90	Very Worth it
7	85	Very Worth it
8	85	Very Worth it
9	85	Very Worth it
10	80	Worth
11	90	Very Worth it
12	85	Very Worth it
13	95	Very Worth it
14	90	Very Worth it
15	90	Very Worth it
16	90	Very Worth it
17	90	Very Worth it
18	90	Very Worth it
19	90	Very Worth it
20	90	Very Worth it
Average	89.25	Very Worth it

One of the videos has the smallest percentage, namely video 10. This is because in the video the material provided is not sequential, namely where the material should start from Newton's 1st law, then Newton's 2nd law, and end with Newton's 3rd law. However, in the video, Koh Ben presents material in the order of Newton's 1st law - Newton's 3rd law - Newton's 2nd law. In addition, there are facts and data that were originally presented in accordance with reality but were not explained thoroughly. Submission of sequential material is an indicator that says a media or teaching material is valid (Hasanah et al., 2020).

In another video, namely video 2, Koh Ben gives a detailed explanation but with a very long duration of 1 hour 17 minutes. This can cause students to feel bored while watching the video. The designed learning videos should not be too long, because long learning videos will make students bored to watch and less concentrated on videos (Zainuddin & Attaran, 2016).

Presentation aspect analysis

In this aspect, the learning videos made by BIG Course are incomplete, namely they don't convey closing material and sometimes they don't even convey opening material. This can make students confused about the purpose of the material and the composition of the material to be studied. In several videos the presentation of concepts is presented from difficult to easy so that viewers who have different initial knowledge will follow the learning videos at different speeds.

Table 5. Percentage of Eligibility of Presentation Analysis

Video	Percentage (%)	Category
1	90	Very Worth it
2	90	Very Worth it
3	95	Very Worth it
4	95	Very Worth it
5	90	Very Worth it
6	90	Very Worth it
7	85	Very Worth it
8	95	Very Worth it
9	75	Worth
10	75	Worth
11	75	Worth
12	85	Very Worth it
13	90	Very Worth it
14	90	Very Worth it
15	85	Very Worth it
16	80	Worth
17	95	Very Worth it
18	90	Very Worth it
19	75	Worth
20	75	Worth
Average	86	Very Worth it

Behind these deficiencies, the information conveyed is according to the needs of students so that it can help strengthen their understanding. Submissions are also delivered in a clear voice so that students do not experience difficulties.

Graphic aspect analysis

Based on the results of the graphic analysis, the learning videos made using different equipment so that the 20 videos do not have the same quality. Equipment used such as whiteboards with different sizes, and markers that only use 1 color. This causes Koh Ben to sometimes write and explain concepts on the blackboard in full and sometimes even not visible because of the small writing. Koh Ben got around this by displaying a sample problem image on a layer, but unfortunately the image provided is broken and doesn't have a good resolution. In one video there is a title that is displayed on a different layer from the material being explained so that it created confusion. This is related to the low clarity of images and writing which needs to be avoided so as not to cause multiple interpretations (Putri & Zukhrufurrohmah, 2019).

Shooting techniques are also a concern in physics learning videos. A black background is used when using small whiteboards. This causes the focus of students can be fixed on the blackboard. But the video ratio becomes less suitable because the blackboard looks small. This was later fixed by changing the whiteboard to be bigger in the next video. Video quality is consistent at 720p and that is the highest quality. If the video can be loaded at a higher quality then it is possible that the previous problem can be resolved. When viewed from the order of the upload date, early videos before 2020 have errors such as blur and shaking. Meanwhile, for videos uploaded in 2020 and beyond, the issue has been resolved.

Table 6. Percentage of Feasibility of Graphical Analysis

Video	Percentage (%)	Category
1	100	Very Worth it
2	85	Very Worth it
3	90	Very Worth it
4	90	Very Worth it
5	90	Very Worth it
6	95	Very Worth it
7	100	Very Worth it
8	95	Very Worth it
9	90	Very Worth it
10	100	Very Worth it
11	100	Very Worth it
12	95	Very Worth it
13	70	Worth
14	80	Worth
15	100	Very Worth it
16	90	Very Worth it
17	90	Very Worth it
18	90	Very Worth it
19	90	Very Worth it
20	90	Very Worth it
Average	91.5	Very Worth it

Analysis of language aspects

Many language aspects meet the criteria very well. The videos presented are delivered in appropriate language and sentences that make it easy for students to understand the material. There is only 1 video that is lacking which allows the language aspect in the YoutTube channel 'Big Course' to be said to be perfect. In video 10, Koh Ben used terms that were not generally understood and these terms were not explained further. The existence of terms that are difficult to understand when learning can cause learning to be less effective (Putri & Ardi, 2021). The results of language analysis can be seen in Table 7.

Table 7. Percentage of Eligible Language Analysis

Video	Percentage (%)	Category
1	100	Very Worth it
2	100	Very Worth it
3	100	Very Worth it
4	100	Very Worth it
5	100	Very Worth it
6	100	Very Worth it
7	100	Very Worth it
8	100	Very Worth it
9	100	Very Worth it
10	95	Very Worth it
11	100	Very Worth it
12	100	Very Worth it
13	100	Very Worth it
14	100	Very Worth it
15	100	Very Worth it
16	100	Very Worth it
17	100	Very Worth it
18	100	Very Worth it
19	100	Very Worth it

Conclusion

Based on these findings and discussions, it was determined that the 20 class X physics learning videos produced by BIG Course on the YouTube channel were very suitable for use by teachers in teaching physics in class, with an overall percentage score of 89.25%, 86%, 91.5% and 99.75% from the aspects of content, delivery, language, and graphics. Teachers should pay attention to the use of video and make note of any areas where they fall short, such as the initial delivery, where the learning objectives are presented, and the closing. This is in line with the Daily Learning Implementation Plan which divides learning activities into opening, core and closing activities (Kemendikbud, 2014). It should be remembered that learning videos are learning media where video-based learning media is needed because it is able to influence students' physics learning activities and is in great demand (Haidir et al., 2021). For this reason, teachers can use learning videos as a tool to achieve learning goals.

Conflicts of Interest
The author declares no conflict of interest

References

Aragoneses, A., & Messer, R. (2020). Developing Educational YouTube Videos as a Tool to Learn and Teach Physics. *The Physics Teacher*, *58*(7), 488–490. https://doi.org/10.1119/10.0002068

Aquilani, B., Piccarozzi, M., Abbate, T., & Codini, A. (2020). The Role of Open Innovation and Value Co-Creation in The Challenging Transition from Industry 4.0 To Society 5.0: Toward A Theoretical Framework. *Sustainability*, *12*(21), 8943. https://doi.org/10.3390/su12218943

Azizah, S., & Maryani, M. (2021). Analisis Gerak Kendaraan pada Kasus Kecelakaan sebagai Bahan Ajar Fisika di Sekolah Menengah Atas. *Jurnal Edutech Undiksha*, *9*(1), 40-47. https://doi.org/10.23887/jeu.v9i1.33085

Haidir, M., Farkha, F., & Mulhayatiah, D. (2021). Analisis Pengaruh Media Pembelajaran Berbasis Video pada Pembelajaran Fisika. *Jurnal Pendidikan Fisika*, *9*(1), 81-89. http://dx.doi.org/10.24127/jpf.v9i1.3266

Hasanah, S. N., Effendi, M. M., & Putri, O. R. U. (2020). Pengembangan Space Geometry Flipbook Audio Visual Berbasis Digital Literacy Untuk Siswa SMP. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *9*(3), 506-515. https://doi.org/10.24127/ajpm.v9i3.2951

Hochberg, K., Becker, S., Louis, M., Klein, P., & Kuhn, J. (2020). Using Smartphones as Experimental Tools—a Follow-up: Cognitive Effects by Video Analysis and Reduction of Cognitive Load by Multiple Representations. *Journal of Science Education and Technology*, *29*(2), 303–317. https://doi.org/10.1007/s10956-020-09816-w

Kemendikbud. (2014). *Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia*. Jakarta: Kemendikbud. Retrieved from https://kurikulum.kemdikbud.go.id/wp-content/uploads/2022/06/033_H_KR_2022-Salinan-SK-Kabadan-tentang-Perubahan-SK-008-tentang-Capaian-Pembelajaran.pdf

Krippendorff, K. (2004). *Content Analysis: An Introduction to Its Methodology (2nd ed.)*. Thousand Oaks, CA: Sage Publications.

Murniati, Makki, M., & Musaddat, S. (2022). Analisis Buku Siswa Sekolah Dasar Kelas III Tema I Pertumbuhan dan Perkembangan Makhluk Hidup Aspek Bahasa, Penyajian dan Tampilan. *Journal of Classroom Action Research*, 4(3), 10-15. https://doi.org/10.29303/jcar.v4i3.1824

Nuruzzakiah, N., Hasanuddin, H., Artika, W., Supriatno, S., & Rahmatan, H. (2022). Competency Analysis of Technological Pedagogical and Content Knowledge (TPACK) Biology Teachers. *Jurnal Penelitian Pendidikan IPA*, *8*(1), 325-335. https://doi.org/10.29303/jppipa.v8i1.1166

Otodu, S., & Khoiriyah, K. (2023). Students' Preference of Speaking Activities in Online ESP Classes. AL-*ISHLAH: Jurnal Pendidikan*, *15*(2). https://doi.org/10.35445/alishlah.v15i2.2644

Octavyanti, N. P. L., & Wulandari, I. G. A. A. (2021). Video Pembelajaran Berbasis Pendekatan Kontekstual pada Mata Pelajaran Matematika Kelas IV SD. *Jurnal Edutech Undiksha*, *9*(1), 66-74. https://doi.org/10.23887/jeu.v9i1.32223

Perez-Navarro, A., Garcia, V., & Conesa, J. (2021). Students' Behavior and Perceptions Regarding Complementary Videos for Introductory Physics Courses in An Online Environment. *Applied Sciences*, *11*(2), 523. https://doi.org/10.3390/app11020523

Putri, A. A., & Ardi, A. (2021). Meningkatkan Hasil Belajar Siswa melalui Multimedia Pembelajaran Interaktif Berbasis Pendekatan Saintifik. *Jurnal Edutech Undiksha*, *9*(1), 1-7. https://doi.org/10.23887/jeu.v9i1.33931

Putri, O. R. U., & Zukhrufurrohmah, Z. (2019). Pengembangan Lembar Kegiatan Kalkulus Bercirikan Representasi Matematis. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *8*(3), 362-373. https://doi.org/10.24127/ajpm.v8i3.2259

Rahayu, E. Y., Nurani, Y., & Meilanie, S. M. (2023). Pembelajaran yang terinspirasi STEAM: Menumbuhkan Keterampilan Berpikir Kritis melalui Video Tutorial. Jurnal *Obsesi: Jurnal Pendidikan Anak Usia Dini,* *7*(3), 2627-2640. https://doi.org/10.31004/obsesi.v7i3.4228

Rasmitadila, R., Aliyyah, R. R., Rachmadtullah, R., Samsudin, A., Syaodih, E., Nurtanto, M., & Tambunan, A. R. S. (2020). The Perceptions of Primary School Teachers of Online Learning during the COVID-19 Pandemic Period: A Case Study in Indonesia. *Journal of Ethnic and Cultural Studies, 7*(2), 90–109. http://dx.doi.org/10.29333/ejecs/388

Richtberg, S., & Girwidz, R. (2019). Learning Physics with Interactive Videos–Possibilities, Perception,

And Challenges. In *Journal of Physics: Conference Series*, *1287*(1), 012057. https://doi.org/10.1088/1742-6596/1287/1/012057

Roblek, V., Meško, M., Bach, M. P., Thorpe, O., & Šprajc, P. (2020). The interaction between internet, sustainable development, and emergence of society 5.0. *Data*, *5*(3), 80. https://doi.org/10.3390/data5030080

Sari, W. K., & Wilujeng, I. (2020). Education Change in The Industry 4.0: Candidate Science Teacher Perspective. In *Journal of Physics: Conference Series*, *1440*(1), 012090. http://doi.org/10.1088/1742-6596/1440/1/012090

Sesmiyanti, S., Antika, R., & Suharni, S. (2021). The Development of Reading Textbook Oriented to Character Education using Multimodality in College. *AL-ISHLAH: Jurnal Pendidikan*, *13*(1), 283-300. https://doi.org/10.35445/alishlah.v13i1.436

Susilawati, S., Doyan, A., Rahmana, F., Kosim, K., & Muliyadi, L. (2022). Practicality of Problem-Based Physics Learning Tools with Video Assistance to Improve Problem-Solving Ability of Students. *Journal of Science and Science Education*, *3*(1), 55–59. https://doi.org/10.29303/jossed.v3i1.1614

Taib, B., & Mahmud, N. (2021). Analisis Kompetensi Guru Paud Dalam Membuat Media Video Pembelajaran. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *6*(3), 1799-1810. https://doi.org/10.31004/obsesi.v6i3.1842

Utami, F., Rukiyah, R., & Andika, W. D. (2021). Pengembangan media flashcard berbasis augmented reality pada materi mengenal binatang laut. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *5*(2), 1718-1728. https://doi.org/10.31004/obsesi.v5i2.933

Yudana, I. K. T. P., Sudatha, I. G. W., & Sukmana, A. I. W. I. Y. (2022). Video Pembelajaran Berpendekatan Kontekstual untuk Meningkatkan Kompetensi IPA. *Jurnal Edutech Undiksha*, 10(1), 89-97. https://doi.org/10.23887/jeu.v10i1.41526

Yuwono, M. R., Yuliana, Y., & Munif, F. A. (2023). Analisis Kendala Calon Guru Matematika dalam Pembuatan Video Pembelajaran. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *12*(1), 342-353. http://dx.doi.org/10.24127/ajpm.v12i1.6055

Wahyuni, S., Halim, A., Evendi, E., Syukri, M., & Herliana, F. (2021). Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Pendekatan Investigative Science Learning Environment (Isle) Untuk Meningkatkan Keterampilan Berpikir Kreatif Siswa. *Jurnal Penelitian Pendidikan IPA*, 7(SpecialIssue), 39-45. https://doi.org/10.29303/jppipa.v7iSpecialIssue.903

Wijnker, W., Bakker, A., van Gog, T., & Drijvers, P. (2019). Educational Videos from A Film Theory Perspective: Relating Teacher Aims to Video Characteristics. *British Journal of Educational Technology*, *50*(6), 3175-3197. https://doi.org/10.1111/bjet.12725

Zainuddin, Z., & Attaran, M. (2016). Malaysian Students' Perceptions of Flipped Classroom: A Case Study. *Innovations in Education and Teaching International*, *53*(6), 660–670. https://doi.org/10.1080/14703297.2015.1102079