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Video-blogs (Vlogs)-based Project: A Meta Analysis

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***Abstract*—This study aims to analyze the relationship between using video-blogs (vlogs)-based projects on student academic achievement through project-based learning. This study applied a meta-analysis through comprehensive sources, either from the international or the Indonesian index by considering certain criteria. The data sources in this research were obtained from twenty-seven studies that had met the inclusion criteria. The inclusion criteria used are 1) research published in 2020-2024; 2) research must be obtained from the Google Scholar database; ScienceDirect; ERIC; Wiley and IEEE; 3) Publications indexed by SINTA, Scopus, and Web of Science; 4) publications must be related to Vlog-based project; 5) the research has a value (R); (t) or (f) and 6) sample size (N) ≥ 30 students. The study showed that the Vlog-based project significantly influenced students' academic achievement (z = 8,042; p < 0.001; CI 95 % [0.526; 0.962]. The effect size in this study is a high effect size category (*rRE* = 1,024). In this meta-analysis, the data presented is accurate, valid, and representative, free from publication bias. This finding explains that V-logs-based project-based learning positively affects students' academic achievement. This study shows that using Vlogs-based projects has a positive impact on students' academic achievement, and it encourages teachers to enhance students' academic performance. Furthermore, the Vlogs-based project motivates students to engage more actively and creatively with the learning materials.**

***Keywords*—Project based learning; vlog; academic achievement; meta-analysis.**

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I. INTRODUCTION

Student academic achievement is a key indicator of educational success that has a significant impact on the future of individuals and society [1]. High academic achievement reflects students' understanding of the subject matter and their ability to apply that knowledge in a variety of situations [2], [3]. This is important because good academic achievement is often a prerequisite for continuing education to a higher level, getting a scholarship, and entering the competitive world of work [4]. In addition, academic achievement can also increase students' confidence and motivate them to continue learning and developing [5], [6].

Furthermore, student academic achievement also has broad implications for the social and economic development of a country [7]. Outstanding students tend to have the skills necessary to contribute positively to society through innovation, leadership, or active participation in various sectors of life. Quality education and high academic achievement can reduce the unemployment rate, increase productivity, and encourage economic growth [8].

The academic achievement of students in Indonesia faces various problems. achievement gaps are often influenced by socioeconomic factors, access to quality educational resources, and family support [9]–[11]. Students from low economic backgrounds tend to have limitations in accessing additional tutoring, adequate educational materials, and a conducive learning environment. In addition, traditional teaching methods that are less adaptive to students' learning styles can also hinder academic achievement. This problem is caused by the lack of training and professional development for teachers in implementing innovative and effective learning strategies [12], [13]. As a result, many students fall behind in academic achievement, which not only impacts their ability to continue their education to a higher level but also on their future career prospects and well-being [7], [14].

To overcome the low academic achievement of students in learning, the latest innovation in the learning process needs to be implemented. Technology-based learning can make learning activities more enjoyable. One of the learning models that can encourage students' academic achievement in learning is project-based learning [15]–[17]. Project-based learning is one of the learning models that can improve students' academic achievement in learning. Project Based

Learning (PBL) is a learning model that puts students at the center of the learning process by involving them in relevant and meaningful projects [18], [19]. In the Project-based learning model, students are allowed to explore complex problems or questions that require them to develop critical thinking, collaboration, and communication skills [20]. Through this project, students not only learn academic concepts but also apply that knowledge in real-world contexts. The project-based learning model encourages students to work independently and in groups, plan and manage their projects, and produce products or solutions that can be presented and evaluated [21], [22].

Furthermore, the project-based learning model encourages students to increase student engagement and motivation in learning. In addition, project-based learning helps students develop 21st-century skills, such as problem-solving, creativity, and adaptability [5], [23].Teachers in the project-based learning model play the role of facilitators who guide and support students throughout the learning process, not just as conveyors of information [24], [25]. Nonetheless, implementing PBL requires careful planning, strong commitment from educators, and adequate support in terms of resources and time to ensure its successful implementation.

Project-based learning can be connected with video blogs (Vlog). Vlogs are digital media that is increasingly popular among students and educators as a practical learning tool [26]. In an educational context, Vlogs allow students to express their ideas and understanding through video formats, which not only enhances students' creativity but also their communication skills [27]. The use of vlogs in learning offers several advantages, such as making the subject matter more engaging and interactive and providing opportunities for students to learn independently and collaborate with their peers. In addition, vlogs can be accessed anytime and anywhere, thus supporting flexible and personalized learning concepts [28]. By engaging students in creating vlog content, they can deepen their learning material while developing relevant technical and digital skills in today's technological era.

The vlog-based project can effectively improve student learning outcomes [3], [29]. Other research results conducted outside Indonesia Vlog-based learning effectively improves students' understanding of concepts [30]. However, no research has been found related to how much Vlog-based project impacts students' academic achievement. To fill in the gaps in the research, a meta-analysis is necessary to reach an accurate and in-depth conclusion related to the Vlog-based project. Based on this, this study aims to explore the impact of Vlog-based projects on students' academic achievement.

II. Materials and Method

A. Materials

This research is a type of meta-analysis research. Meta-analysis is a study that analyzes the same research that can be quantitatively measured to reach a conclusion [31]–[33]. This meta-analysis aims to determine the influence of Vlog-based projects on student academic achievement. To obtain valid research data, it must follow the inclusion criteria, namely 1) research published in 2020-2024; 2) research must be obtained from the Google Scholar database; ScienceDirect; ERIC; Wiley and IEEE; 3) Publications indexed by SINTA, Scopus and Web of Science; 4) publications must be related to Vlog-based project; 5) the research has a value (R); (t) or (f) and 6) sample size (N) ≥ 30 students.

TABLE I
26 STUDIES MET INCLUSION CRITERIA

Journal Code	Years	*N*	*r*	*t*	*F*	Sample	Country	Index
AP1	2022	120	0.71			Junior School	Indonesia	Sinta
AP2	2023	90	0.93			High School	Pakistan	Scopus
AP3	2023	60		8.04		High School	Spanyol	Scopus
AP4	2024	72		7.81		High School	China	WoS
AP5	2022	50	0.59			College	China	Scopus
AP6	2022	36	0.38			College	Egypt	Scopus
AP7	2021	110	0.79			High School	Mexico	Scopus
AP8	2024	200	0.42			High School	Indonesia	SINTA
AP9	2024	94	0.91			High School	Indonesia	SINTA
AP10	2020	40		7.93		College	Indonesia	SINTA
AP11	2020	60		3.46		College	Indonesia	SINTA
AP12	2020	82	0.65			College	Thailand	Scopus
AP13	2023	114	0.84			College	Indonesia	Scopus
AP14	2022	100			14.05	Junior School	Indonesia	SINTA
AP15	2020	220			67.18	College	Malaysia	Scopus
AP16	2024	160	0.72			High School	Malaysia	Scopus
AP17	2023	48	0.57			High School	China	Scopus
AP18	2021	60	0.33			High School	China	WoS
AP19	2021	32	0.87			High School	China	WoS
AP20	2024	80		9.06		High School	Indonesia	SINTA
AP21	2024	94	0.91			High School	Indonesia	Scopus
AP22	2022	130	1.08			High School	Indonesia	Scopus
AP23	2023	48		12.82		College	Indonesia	SINTA
AP24	2022	78	0.77			College	Indonesia	SINTA
AP25	2024	66		7.49		College	Inggris	Scopus
AP26	2024	130		6.31	17.05	High School	China	WoS

Data that meets the inclusion criteria is obtained through Google Scholar database, ERIC, ScienceDirect, Wiley, and IEEE. The keywords used are "Vlog-based project" and "Academic achievement." In the collection process, 26 studies were obtained that met the inclusion criteria, as can be seen in Table 1.

B. Methods

In the statistical analysis meta-analysis research, namely Converting the value of *f* to *t* and *r*, the fiber converts the value of *t* to *r*; conducting homogeneity tests, takes the normality test, conducting heterogeneity tests; calculates the mean effect size and standard error values; calculate the summary effect size value and check publication bias with the plot funnel and Egger's Test. Statistical analysis is carried out with the help of the JSAP application. Furthermore, the effect size criteria in this study can be seen in Table 2 [32].

TABLE II
EFFECT SIZE CRITERIA

Classification	Criteria
Weak Effect Size	0 until 0.1
Modest Effect Size	< 0.3
Medium Effect Size	< 0.5
Strong Effect Size	< 0.8
Very Strong effect size	≥ 0.8

III. RESULTS AND DISCUSSION

A. Results

Only 26 studies of the 451 research samples met the inclusion criteria. The 26 publications obtained *r, t*, and *F* values for each study. Furthermore, the value was converted, and the effect size value of each study was calculated. Before the hypothesis test stage is carried out, a heterogeneity test for each research effect size is necessary, as can be seen in Tables 3 and 4.

TABLE III
THE HETEROGENEITY TEST

	Q	df	p
Omnibus test of Model Coefficients	242.087	1	< 0.001
Test of Residual Heterogeneity	96.117	25	< 0.01

TABLE IV
THE RESIDUAL HETEROGENEITY TEST

	Estimates	**Lower bound**	**Upper Bound**
τ^2	0.481	0.579	0.918
τ	0.702	0.619	1.382
I^2 (%)	97.084	95.085	98.268
H^2	29.114	34.096	43.195

Based on Tables 3 and 4, the 26 research publications analyzed show heterogeneous distributed data. Score Q = 242.087; $p < 0.001$; τ^2 or $\tau > 0$ and score I^2 (%) almost 100%. The next step was to test the summary or mean effect size of the 26 research publications included in the meta-analysis data. The summary effect size calculation results can be seen in Table 5.

TABLE V
SUMMARY EFFECT SIZE

	Estimates	Standard Error	*z*	*p*	Lower	upper
Intercept	1.082	0.306	8.264	< 0.001	0.632	1.412

Table 5 shows the analysis results obtained *a p* < value of 0.001. These findings show that project-based learning based on video blogs (Vlogs) significantly affects student academic achievement. This influence is included in the category of firm effect size because the estimated value is 1,082; Standard Error 0.306 [0.632; 1.412]. The next step is checking publication bias through the plot funnel and the Egger's Test. The results of checking publication bias through the funnel plot can be seen in Fig.1.

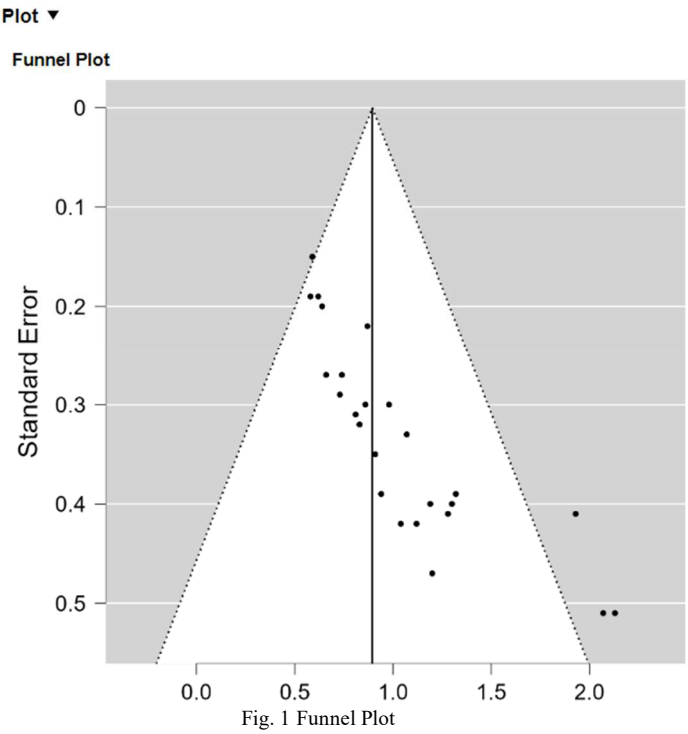

Fig. 1 Funnel Plot

Fig. 1 shows bias analysis from 26 studies, explaining that the effect size curve point makes it difficult to know whether a publication bias is symmetrical or asymmetrical. Therefore, as seen in Table 6, further tests are necessary through Egger's test.

TABLE VI
EGGER'S TEST

	Z	P
Sei	4.961	< 0.001

Based on Table 6, the analysis of Egger's test obtained a p < value of 0.05. These findings show that the distribution of 26 research publications on the funnel plot curve is symmetrical. These results explain that the analysis of the 26 studies included in this meta-analysis has no publication bias.

B. Discussion

Based on the analysis of 26 studies, the data was heterogeneous. Furthermore, the results of calculating the summary effect size value were obtained *rRE* = 1,082; P <0.001, so applying a Vlog-based project significantly affects student academic achievement. Furthermore, the analysis of publication bias through funnel plot and Egger's test concluded that the data did not contain publication bias. Project-based learning based on video blogs can encourage interest and learning outcomes that can support students' academic achievement. With a Vlog-based project, students learn more actively and creatively in understanding concepts

[34], [35]. This finding is supported by [3], Vlog-based learning projects positively impact students' interest and learning achievements.

This learning method allows students to actively engage in the learning process by creating vlogs that reflect their understanding of the material being studied [36]. Vlogs not only help students hone their critical and creative thinking skills but also help them develop communication and presentation skills. This is very relevant, considering the current digital era where the ability to convey information effectively through digital media is crucial [37] . In addition, Vlog-based projects promote more personalized and engaging learning. Students are free to explore topics they are interested in and present them in a more dynamic and interactive format. This increases learning motivation and allows students to relate academic knowledge to real-world situations. Thus, learning becomes more meaningful and enjoyable, which can directly improve academic achievement in students

The use of Vlogs as a medium in project-based learning also opens up opportunities for students to get real-time feedback from their teachers and classmates [38]. This feedback is crucial in the learning process because it helps students understand which areas need improvement and how they can do better [25], [39]. This reflective process is essential for students' academic and personal growth, as it allows them to reassess their approach to learning and make the necessary adjustments. The vlog-based projects facilitate teamwork and collaboration among students. When working together to produce Vlogs, students learn to negotiate, collaborate, and communicate effectively with others [40] These skills are an integral part of 21st-century learning and will be helpful in the academic environment and students' future professional lives. Through teamwork, students can learn from each other and develop a broader and deeper understanding of the material being studied.

IV. Conclusion

From the results of this meta-analysis, it can be concluded that the Vlog-based project significantly influences students' academic achievement ($z = 8.042$; $p < 0.001$; CI 95 % [0.632; 1.412]. The effect size in this study is a high effect size category (rRE = 1,082). In this meta-analysis, the data presented is accurate, valid, and representative, free from publication bias. This finding explains that Vlog-based projects positively affect students' academic achievement. This finding has positively impacted teachers to apply a Vlog-based project learning model to develop students' academic achievements in learning. Not only that, but the Vlog also-based project encourages students to learn more actively and creatively in understanding learning materials.

References

[1] Y.-D. Li, G.-H. Ding, and C.-Y. Zhang, "Effects of learner-centred education on academic achievement: a meta-analysis," *Educ. Stud.*, vol. 50, no. 3, pp. 285–298, May 2024, doi:10.1080/03055698.2021.1940874.

[2] P. G. Zhang and C. C. Tu, "Impact of Chinese College Students' Professional Identity on Their Academic Achievement: Career Maturity as a Mediator.," *Int. J. Educ. Methodol.*, vol. 9, no. 2, pp. 397–408, 2023.

[3] N. Masrucha, I. G. A. A. S. Diarini, and I. W. Suryanto, "Penerapan Model Pembelajaran Project Based Learning Melalui Media Vlog Untuk Meningkatkan Minat Belajar Dan Prestasi Belajar Siswa," *Cetta J. Ilmu Pendidik.*, vol. 4, no. 3, pp. 635–643, 2021.

[4] K. D. Caratiquit and L. J. C. Caratiquit, "Influence of social media addiction on academic achievement in distance learning: intervening role of academic procrastination," *Turkish Online J. Distance Educ.*, vol. 24, no. 1, pp. 1–19, Jan. 2023, doi:10.17718/tojde.1060563.

[5] E. Göktaş and M. Kaya, "The effects of teacher relationships on student academic achievement: a second order meta-analysis," *Particip. Educ. Res.*, vol. 10, no. 1, pp. 275–289, 2022.

[6] R. R. Naungayan, I. J. B. Vivencio, and M. M. Caplis, "Involvement of Working Parents in Students' Academic Achievement: Basis of Support Programs," *Int. J. Res. Educ. Sci.*, vol. 10, no. 1, pp. 62–82, Feb. 2024, doi: 10.46328/ijres.3281.

[7] M. E. Isikgöz, "Analysis of the Relationship between Online Learning Activities and Academic Achievement of Physical Education and Sports School Students.," *Turkish Online J. Educ. Technol.*, vol. 22, no. 1, pp. 29–36, 2023.

[8] P. P. Canuto, M. Choycawen, and R. Pagdawan, "The influence of teaching competencies on teachers' performance and students' academic achievement in primary science education," *Probl. Educ. 21st Century*, vol. 82, no. 1, pp. 29–47, Feb. 2024, doi:10.33225/pec/24.82.29.

[9] M. Alkharji and L. S. Cheong, "Relationship Between Educational Factors and Academic Achievement of Deaf and Hard of Hearing Students in Saudi Universities: The Mediating Role of Teaching Expertise," *Int. J. Educ. Pract.*, vol. 10, no. 2, pp. 107–127, Apr. 2022, doi: 10.18488/61.v10i2.2978.

[10] M. H. A. Al-Abyadh and H. A. H. Abdel Azeem, "Academic Achievement: Influences of University Students' Self-Management and Perceived Self-Efficacy," *J. Intell.*, vol. 10, no. 3, p. 55, Aug. 2022, doi: 10.3390/jintelligence10030055.

[11] A. Amzil, "Working Memory Capacity, Cognitive Regulation, and Their Relationship to Academic Achievement in University Students," *J. Educ. Learn.*, vol. 11, no. 6, p. 133, Oct. 2022, doi:10.5539/jel.v11n6p133.

[12] Ö. Tutal, "Does Context-Based Learning Increase Academic Achievement and Learning Retention?: A Review based on Meta-Analysis," *J. Pract. Stud. Educ.*, vol. 4, no. 5, pp. 1–16, Aug. 2023, doi: 10.46809/jpse.v4i5.71.

[13] Y. K. Türel and O. Dokumaci, "Use of media and technology, academic procrastination, and academic achievement in adolescence," *Particip. Educ. Res.*, vol. 9, no. 2, pp. 481–497, Mar. 2022, doi:10.17275/per.22.50.9.2.

[14] G. Bırni, "Exploring the Effects of Academic Achievement, Class Engagement, and its Motivations on University Students' Mental Well-being," *Eur. J. Psychol. Educ. Res.*, vol. volume-6-2, no. volume-6-issue-4-december-2023, pp. 205–215, Dec. 2023, doi:10.12973/ejper.6.4.205.

[15] B. D. Lazić, J. B. Knežević, and S. M. Maričić, "The influence of project-based learning on student achievement in elementary mathematics education," *South African J. Educ.*, vol. 41, no. 3, pp. 1–10, Aug. 2021, doi: 10.15700/saje.v41n3a1909.

[16] N. F. Assaf, "Impact of the Rigorous Curriculum Design for Project-Based Learning Implementation on Middle School Students' Science Achievement and MAP Progress," *J. Educ. Learn.*, vol. 12, no. 6, p. 139, Oct. 2023, doi: 10.5539/jel.v12n6p139.

[17] Badawi *et al.*, "Integration of Blended Learning and Project-Based Learning (BPjBL) on Achievement of Students' learning goals: A Meta-analysis study," *Pegem J. Educ. Instr.*, vol. 13, no. 4, Aug. 2023, doi: 10.47750/pegegog.13.04.32.

[18] A. Pimpimool, "Instructional Management Through Project-Based Learning Combined with Collaborative Learning to Enhance Learning Achievement of Undergraduate Students," *Int. Educ. Stud.*, vol. 16, no. 5, p. 84, Sep. 2023, doi: 10.5539/ies.v16n5p84.

[19] L. Hao, K. Tian, U. K. Mohd Salleh, H. L. Chin, S. Ge, and X. Cheng, "the Effect of Project-based Learning and Project-based Flipped Classroom on Critical Thinking and Creativity for Business English course at higher vocational colleges," *Malaysian J. Learn. Instr.*, vol. 21, no. 1, pp. 159–190, Jan. 2024, doi: 10.32890/mjli2024.21.1.6.

[20] W. Zhang, Y. Guan, and Z. Hu, "The efficacy of project-based learning in enhancing computational thinking among students: A meta-analysis of 31 experiments and quasi-experiments," *Educ. Inf. Technol.*, Jan. 2024, doi: 10.1007/s10639-023-12392-2.

[21] J. C. Taylor, L. M. Allen, J. Van, and M. Moohr, "The Effects of Project-Based Learning on Student Behavior and Teacher Burnout in an Emotional/Behavioral Support Classroom," *J. Emot. Behav. Disord.*, vol. 32, no. 2, pp. 81–94, Jun. 2024, doi:10.1177/10634266241235933.

[22] Z. C. Ozkan, "The Effect of Project-Based Learning in Visual Arts Lesson on Lesson Outcomes and Attitudes," *Int. J. Soc. Educ. Sci.*, vol. 5, no. 2, pp. 367–380, Jun. 2023, doi: 10.46328/ijonses.565.

[23] W. N. Sulong, K. Sermsook, O. Sooknit, and W. Worapun, "Project-Based Learning in General Psychology Class for Undergraduate Students," *J. Educ. Learn.*, vol. 12, no. 6, p. 82, Sep. 2023, doi:10.5539/jel.v12n6p82.

[24] K. Sisamud, P. Chatwattana, and P. Piriyasurawong, "The Project-based Learning using Design Thinking Model via Metaverse to Enhance Buddhism Innovators," *High. Educ. Stud.*, vol. 13, no. 3, p. 10, Jun. 2023, doi: 10.5539/hes.v13n3p10.

[25] J. E. Dillon, "Project-based learning: Toward a world-centered music education," *Int. J. Educ. Arts*, vol. 24, no. 13, 2023.

[26] N. A. Madzlan, G. H. Seng, and H. V. Kesevan, "Use of Video Blogs in Alleviating Public Speaking Anxiety among ESL Learners," *J. Educ. e-Learning Res.*, vol. 7, no. 1, pp. 93–99, 2020, doi:10.20448/journal.509.2020.71.93.99.

[27] N. Varisa and A. A. Fikri, "Development of biology learning media based on video blogs (vlog) on environmental change topic," *Res. Dev. Educ.*, vol. 2, no. 1, pp. 33–39, Jul. 2022, doi:10.22219/raden.v2i1.22056.

[28] O. Petrovic, "Design, Development and Evaluation of a Field Learning Video Blog.," *Int. Assoc. Dev. Inf. Soc.*, 2016.

[29] A. H. Khotimah and M. S. Rizal, "Penggunaan Media Pembelajaran Berbasis Video dalam Pengerjaan Proyek Vlog pada Materi Teks Berita," *J. Inovasi, Eval. dan Pengemb. Pembelajaran*, vol. 4, no. 1, pp. 68–74, Apr. 2024, doi: 10.54371/jiepp.v4i1.380.

[30] S. Andiappan, G. H. Seng, and S. R. Shing, "The use of vlogging to enhance speaking performance of ESL students in a Malaysian secondary school," *Teach. English with Technol.*, vol. 22, no. 1, pp. 23–39, 2022.

[31] F. A. Yusuf, "Meta-Analysis: The Influence of Local Wisdom-Based Learning Media on the Character of Students in Indonesia," *Int. J. Educ. Methodol.*, vol. 9, no. 1, pp. 237–248, Feb. 2023, doi:10.12973/ijem.9.1.237.

[32] M. Çevik and B. Bakioğlu, "The Effect of STEM Education Integrated into Teaching-Learning Approaches (SEITLA) on Learning Outcomes: A Meta-Analysis Study," *Int. J. Progress. Educ.*, vol. 18, no. 2, pp. 119–135, Apr. 2022, doi: 10.29329/ijpe.2022.431.8.

[33] Ş. Karaşah Çakici, Ö. Kol, and S. Yaman, "The Effects of STEM Education on Students' Academic Achievement In Science Courses: A Meta-Analysis," *Kuramsal Eğitimbilim*, vol. 14, no. 2, pp. 264–290, Apr. 2021, doi: 10.30831/akukeg.810989.

[34] N. Jalinus, S. Syahril, R. A. Nabawi, and Y. Arbi, "How project-based learning and direct teaching models affect teamwork and welding skills among students," *Int. J. Innov. Creat. Chang.*, vol. 11, no. 11, pp. 85–111, 2020.

[35] A. Syawaludin, Z. K. Prasetyo, C. S. A. Jabar, and H. Retnawati, "The effect of project-based learning model and online learning setting to analytical skills of discovery learning, interactive demonstrations, and inquiry lessons on the pre-service elementary teachers," *J. Turkish Sci. Educ.*, vol. 19, no. 2, 2022.

[36] P. E. S. Abad and N. M. D. Borbon, "Influence of travel vlog: Inputs for destination marketing model," *Int. J. Res. Stud. Manag.*, vol. 9, no. 3, Oct. 2021, doi: 10.5861/ijrsm.2021.m7729.

[37] Y. Rahmi, L. Sekarasih, and B. Sjabadhyni, "The Influence of Beauty Vlog on Perceived Source Credibility and Purchase Intention," *Makara Hum. Behav. Stud. Asia*, vol. 21, no. 1, p. 13, Jul. 2017, doi: 10.7454/mssh.v21i1.3496.

[38] P. H. Silaban, W.-K. Chen, T. S. Nababan, I. J. Eunike, and A. D. K. Silalahi, "How Travel Vlogs on YouTube Influence Consumer Behavior: A Use and Gratification Perspective and Customer Engagement," *Hum. Behav. Emerg. Technol.*, vol. 2022, pp. 1–16, Jun. 2022, doi: 10.1155/2022/4432977.

[39] L. Miller, C. A. Hafner, and C. N. K. Fun, "Project-Based Learning in a Technologically Enhanced Learning Environment for Second Language Learners: Students' Perceptions," *E-Learning Digit. Media*, vol. 9, no. 2, pp. 183–195, Jun. 2012, doi: 10.2304/elea.2012.9.2.183.

[40] A. Jaime, J. M. Blanco, C. Dominguez, and R. Arruabarrena, "Creation and Sharing of Lessons Learned by Blogging in the Context of Project-Based Learning," *IEEE Access*, vol. 10, pp. 114346–114354, 2022, doi: 10.1109/access.2022.3217473.