YouTube vlog channels in basic mathematics as e-learning during the COVID-19 pandemic

Vera Dewi Susanti [*] (iD)**, Ika Krisdiana** (iD)**, Wasilatul Murtafiah** (iD)**, Reza Kusuma Setyansah** (iD)**, Titin Masfingatin** (iD)

Mathematics Education Study Program, Universitas PGRI Madiun, Kota Madiun, Indonesia
* Corresponding Author. E-mail: vera.mathedu@unipma.ac.id

ARTICLE INFO	ABSTRACT
	This research aimed to produce YouTube vlog channels that are valid, practical, and effective to be used in facilitating e-learning in a basic mathematics course. The method used in this research is Research and Development (R&D), which consists of four stages, namely define, design, develop, and disseminate. The subjects in this study were 62 third-semester students of the Mathematics Education Study Program at PGRI University of Madiun, Indonesia, where 50 students were field test subjects and 12 students were limited test subjects. The instruments used in this research were a validation sheet, a student response questionnaire, and a student learning outcomes test. This research produced YouTube vlog channels. Based on the validation results on teaching materials, an average score of 77% was obtained which was declared valid. Based on the student response questionnaire at the field test stage, it was obtained an average value of 75.46% which was stated to be practical. While at the limited test stage obtained a score of 81.94% which is also declared practical. Based on the learning outcomes test in the field test, the percentage of completeness was 81.82% which stated that the YouTube vlog channel was effective. Meanwhile, in the limited test stage, the completeness percentage was 82% which was also declared effective. Therefore, the produced YouTube vlog channel is feasible for use in e-learning environment.

How to Cite:

INTRODUCTION

More than 200 countries have infected by Coronavirus disease (COVID-19) and experienced many deaths (Shereen et al., 2020; Wahyono et al., 2020; Worldometer, 2020; Zhao et al., 2020). The disease caused by SARS-CoV-2 that was first reported in Wuhan City, Hubei Province, China (Phan, 2020; Qin et al., 2020; Shereen et al., 2020; Wang et al., 2020; Zhao et al., 2020). On January 30, 2020, WHO has also declared a public health emergency that is troubling the world (Cucinotta & Vanelli, 2020; Lloyd-Sherlock et al., 2020; Mahase, 2020; Sohrabi et al., 2020; Watkins, 2020). The COVID-19 pandemic affects almost all aspects of life, including education (Anderson, 2020; Azzi-Huck & Shmis, 2020; Cucinotta & Vanelli, 2020; Horn, 2020; Huang et al., 2020; OSPI, 2020; Sohrabi et al., 2020; US Department of Health and Enviromental Control, 2019; Yan, 2020; Zhang et al., 2020).

In order to break the spreading of COVID-19, face-to-face learning activity at school was shifted to remote learning or learning from home activity. As a consequence, educators, education personnel, students, and parents have to use digital or online learning systems, which is better known as e-learning (Aderholt, 2020; Karp & McGowan, 2020; UNESCO, 2020a). Subsequently, the majority of educational institutions choose online learning options (Azzi-Huck & Shmis, 2020; Bartlett et al., 2020; Horn, 2020; International Baccalaureate, 2020; Maine Department of Education, 2020; The World Bank, 2020; Ting et al., 2020; UNESCO, 2020b; Yan, 2020; Zhang et al., 2020). The Ministry of Education and Culture of the Republic of Indonesia strictly enforced the online learning policy (Irawan, 2020; Katili, 2020; Makdori, 2020; Putsanra, 2020; Wahyudi, 2020). Minister Nadiem Anwar Makarim also issued circular letter concerning the implementation of education in the emergency of COVID-19, so that learning

activities are carried out continuously online to prevent the spread of COVID-19 (Kemendikbud, 2020). Changes in learning process due to COVID-19 would certainly never be separated from the role of teachers (Collie et al., 2011; Yusof, 2012; Thien et al., 2014; Zacharo et al., 2018), especially changes to online learning environment, with respect to creating an online learning.

In the online learning process, the government also provides internet quota to learn for students, university students, and educators. However, the internet quota can only be accessed for certain learning applications. One of the learning applications that can be accessed for online learning is eLMA (e-learning Universitas PGRI Madiun). In the implementation of lectures at eLMA, students can access learning materials, assignments, and create presentations. Learning materials that can be accessed by students can be in the form of document (.doc), portable document format (.pdf), presentation file format (.ppt), and learning videos. Based on our experience in facilitating students to learn through eLMA, when students were only given learning materials in the form of the first three formats, they still had difficulty in learning the given learning materials by themselves. Considering this finding, there is a need for an explanation regarding the learning material that could help students in their learning by making a learning video. However, due to the limitation of eLMA in terms of storage capacity for uploading file or document, presenting a learning video to students is done by developing a vlog on the YouTube channel and then uploading the link (video URL) of that learning video on eLMA.

Vlog stands for video blog; some say it is via blogging. More specifically, vlog is a form of blogging activity or self-achievement to communicate with others using the medium of video over the use of text or audio as a source of media devices, such as a cell phone camera or digital cameras that can record videos which are then uploaded on YouTube (Adani, 2020; Aisyah et al., 2018; Urbani et al., 2018). Since the emergence of YouTube in 2005, making vlogs has grown in popularity. For this reason, we developed a vlog regarding the rectangular topic in the basic mathematics study course. This vlog has advantages including being easy to create, more dynamic than text-based content, and developing communication options. There are many learning videos on YouTube, but not all students could understand the existing learning material. Accordingly, a learning video made by the lecturer should use language that is easily understood by students. By using learning videos, it is hoped that learning can be easier to understand and interesting, offer time and energy efficiency, improve the quality of learning outcomes, be done anywhere and anytime, and foster a positive attitude towards learning with respect to the learning process and materials that are used (Aqib, 2013).

The results of a research conducted by Kristanto (2011) showed that the use of learning media in the form of learning videos is better than only use PowerPoint media besides it can increase students' understanding of the learning material. Learning video developed by Kristanto (2011) has met the very good category and that was suitable for use in learning process. Other research was related to the development of video blogs for chemistry course by Sari (2020) with the results that the videos developed meet valid, practical, and effective criteria. In addition, other researches showed that learning video could increase students' interest towards learning process and learning achievement (Ario & Asra, 2019; Fadhli, 2015; Mutia et al., 2017; Tegeh et al., 2019). Referring to these researches, we would produce YouTube vlog channel which was then could be synchronized with eLMA so that students could immediately watch the learning videos presented in eLMA. The development of YouTube vlog channel also aimed to take advantage of internet quota for learning that has been given by the government to students because eLMA is an application that can be accessed for online learning using that internet quota.

One of the topics in the basic mathematics study course is a quadrilateral. A quadrilateral is a plane shape that has four sides and four angles (Sinaga, 2014). This topic has been learned by students in elementary, junior high, and senior high school. Subsequently, this topic is assumed has been well understood by students. Understanding towards quadrilateral topic is important because it is a prerequisite for learning further topics such as solid (3-D) shapes. Based on investigations to students' understanding of the quadrilateral, students experienced errors and difficulties when describing quadrilaterals and classifying them (Agustin, 2017). Even since primary and secondary education, it has been seen that the understanding of the concept of the quadrilateral is still low and occupies an alarming position so that it experiences difficulties when learning geometry at the secondary school level (Fuys et al., 1988; Khoiri, 2014). In addition, considering that the students are prospective mathematics teachers, students are expected to be able to understand the quadrilateral and be able to explain it. There is already a learning video regarding quadrilateral material, but the learning video is in the form of sound and material that is explained so it is less interesting besides that the effectiveness of the learning video has not been tested (Sa'idah et al., 2020; Setyadi & Qohar, 2017). Based on the description above, this research was intended to produce and describe the charac-

teristics of a YouTube vlog channel in the basic mathematics study course for the topic of a quadrilateral that was feasible in terms of its validity, practicality, and effectiveness.

METHODS

This research used the research and development (R&D) method, where the use of this method is intended to produce a special product and test the effectiveness of the product (Sugiyono, 2017). The model of R&D used was 4D which consists of 4 stages, namely define, design, develop, and disseminate (Thiagarajan et al., 1974). At the defining stage, development needs analysis activities were carried out. The need analysis included the analysis on product development requirements that satisfy user needs as well as a suitable model of R&D for producing a product (Thiagarajan et al., 1974). In the designing stage, we made a design of the learning videos and that was ready to be validated by the validator (Hobri, 2009; Mulyatiningsih, 2011; Simatupang, 2016). The validity assessment included content validation which included the assessment towards the appropriateness and correctness of contents contained in the learning videos that have been developed at the designing stage (Hobri, 2009). The developing stage produces a revised draft of learning videos based on the expert validation and suggestions and data obtained from trials (Hobri, 2009). The disseminating stage is an activity where the produced product is distributed to the desired target of development (Mulyatiningsih, 2011; Simatupang, 2016). The detailed process of producing learning videos contained in YouTube vlog channel is presented in Figure 1.
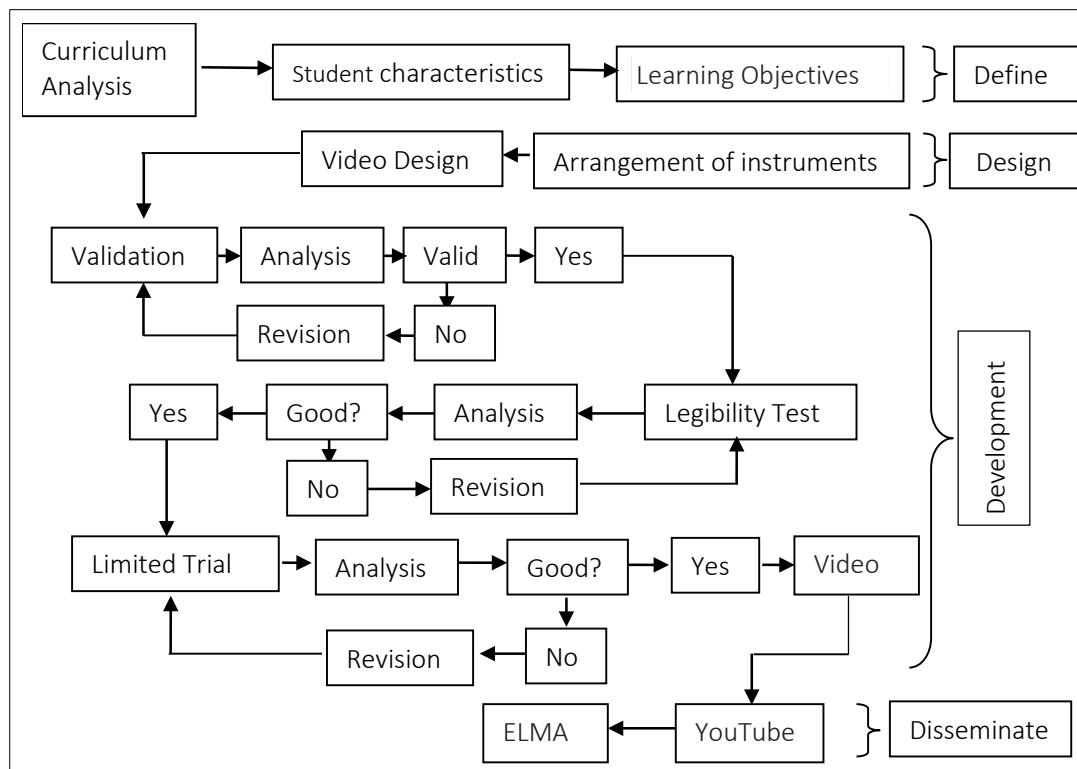

Figure 1. The process of producing learning videos contained in YouTube vlog channel

This research was conducted by involving 62 third-semester students of Mathematics Education Study Program, PGRI University of Madiun, Indonesia as the subject for limited trial. The object of this research is the YouTube vlog channel for the basic mathematics course with the topic of a quadrilateral. Data collection techniques used in this research were interviews, questionnaire distribution, documentation, observation, and learning outcomes test. This interview was conducted with mathematics education lecturers and students to determine the characteristics of students and the conditions of learning activities that have taken place so far. The questionnaire is intended to collect data by giving a set of questions or written statements to respondents to answer (Sugiyono, 2017). In this study, a closed questionnaire was given to students to collect their responses to the products that had been developed. The documentation in this study was carried out during the testing process of the product being developed. In this study, observation was carried out by observing the facilities and infrastructure as well as learning activities during the COVID-19 pandemic. The learning outcome test is a test aimed to measures students' mastery of the

competence facilitated by the teacher or learned by students. The test which has been validated by two validators then was administered to students after they learned competences about quadrilaterals by optimizing the use of the YouTube vlog channel.

The assessment towards the quality of the developed product, a YouTube vlog channel, was based on three criteria: validity, practicality, and effectiveness. We used a validity assessment sheet to collect data about the validity of learning materials contained in learning videos based on the expert (or validator) judgment. There were three validators (i.e., two mathematics education lecturers and one informatics engineering lecturer) involved in this research to fill out validity assessment sheet. The validators could judge the validity for each aspect or statement through 4-point scale ranging from invalid (score = 1), less valid (score = 2), sufficiently valid (score = 3) to very valid (score = 4). The score obtained based on the research of validator will then be presented to determine the validity level of the teaching materials developed. The level of learning materials contained in learning videos was presented by the percentage of the division of total score obtained from a validator by the maximum score that could be obtained (Akbar, 2013). The final validity judgment was obtained from the average of percentage of validity of three validators. The final judgment then was interpreted based on the validity criteria which is presented in Table 1. The validity criterion for the YouTube vlog channel that contained learning videos was acceptable when the final judgment was greater than 70% (at least it was sufficiently valid) (Akbar, 2013).

Table 1. Validity criteria of learning materials contained in learning videos of the YouTube vlog channel

The final judgment	Interpretation
85.01% – 100.00%	Very valid, or it can be used without any revision
70.01% – 85.00%	Sufficiently valid, or it can be used after minor revision
50.01% – 70.00%	Less valid, or it is recommended not to use because of major revision
01.00% – 50.00%	Invalid or it cannot be used

Data used to examine the practicality of the YouTube vlog channel were obtained through a questionnaire on student responses to the learning materials presented in learning videos. Response questionnaires were administered to students after they used the YouTube vlog channel in their online learning. The questionnaire used a Guttman with a checklist method. The response on the questionnaire was provided by students by giving a checklist in the column "YES" if they agreed to a statement given or in the column "NO" if they did not agree to the statement given. Every "YES" response to a positive statement would be given a score of 1, while the response to "NO" would be given a score of 0. The opposite scoring mode was applied for negative statements. The learning videos contained in YouTube vlog channel were said to meet practicality criterion if at least 70% of students gave a positive response (Saputro, 2011). This percentage was obtained from the division of the total score obtained by the ideal total score.

The last criterion that should be satisfied is the effectiveness. The effectiveness reflected the mastery of standard competences that was expected to be achieved through online learning process facilitated by lecturer through the use of YouTube vlog channel. The YouTube vlog channel was said to be effective when at least 80% of students actively participated in online learning that use the YouTube vlog channel and could achieve at least a score of 60 on a scale of 100 (Hobri, 2009). The percentage of students' learning completeness was calculated by following a formula used by Trianto (2010), that is the total scores obtained by students is divided by the total score then the result of this division is multiplied by 100%.

RESULTS

This section presents the results of our research based on the model used, that was 4D (Define, Design, Develop, and Disseminate). The results are presented in the form of step-by-step of development process starting from define step to disseminate step. Furthermore, we also provide the results of assessment towards the quality of the YouTube vlog channel in terms of its validity, practicality, and effectiveness.

Define

At the define stage, we analyzed the curriculum, student characteristics, and learning objectives. Based on the analysis on the curriculum, it was declared that the curriculum used is the Indonesian Qualifications Framework or *Kerangka Kualifikasi Nasional Indonesia* (KKNI)-based curriculum for basic mathematics course for the standard

competences about quadrilaterals. In addition, the results of interviews and observations revealed that the average competence of students was still low and the learning styles of students were varied consisting of visual, auditory, and kinesthetic learning styles. Accordingly, the use of YouTube vlog channel that provides learning videos was expected to help students in learning to master standard competences in an online learning environment. Furthermore, the results of analysis on the learning objectives showed that through (online) learning activities facilitated by lecturer students were expected to be able to relate the perimeter and area formulas of various types of quadrilaterals and solve contextual problems related to the area and perimeter of the quadrilaterals (square, rectangle, rhombus, parallelogram, trapezoid, and kite).

Design

The design activities carried out in this research included the development of instruments and design of learning videos. We considered the quality of the sound, the images or materials that would be inserted in the video have to be clear so that the learning videos could be easier to understand, and the right lighting that could optimally presents ideology, emotion, color, depth, and style in designing the learning videos. A good quality of video editing was also required to produce a good video as well.

Development of Instruments

As we have mention earlier in the Methods section, the instruments used in our research consist of a validation sheet, learning outcomes test, and practicality questionnaire. The validation sheet was developed by containing four statements about learning material aspect, four statements about display quality aspect, three statements about attractiveness aspect, two statements about evaluation aspect, and two statements about language aspect. In total, there are 15 statements that the validators need to examine by following a 4-point scale of validity (invalid = 1, less valid = 2, sufficiently valid = 3, and very valid = 4). Accordingly, the possible maximum score that could be obtained for validity is 60. In addition, the learning outcomes test was developed to examine the effectiveness of the YouTube vlog channel that was integrated on eLMA as a learning media that was expected to be able to help students in mastering standard competences about quadrilaterals. The test consists of five contextual problems about quadrilaterals (i.e., two easy problems with the maximum score is 15 for each, two moderate problems with the maximum score is 20 for each, and one difficult problem with the maximum score is 30). As for the practicality questionnaire, this questionnaire was developed to gather the responses of students after they used learning videos contained in YouTube vlog channel as the main resource of their learning for achieving standard competences on quadrilaterals. This questionnaire comprises of 12 statements, i.e., six positive statements and six negative statements with two available options. Students ticked the column "YES" if the student agrees with the statement given or ticked the column "NO" if they did not agree with the statement given.

Learning Video Design

The learning videos were fully designed starting from recording, lighting, and video editing by using information and digital technology and considering the suggestions of the experts in information and digital technology. The design of learning videos contained in the YouTube vlog channel is presented in Figure 2.
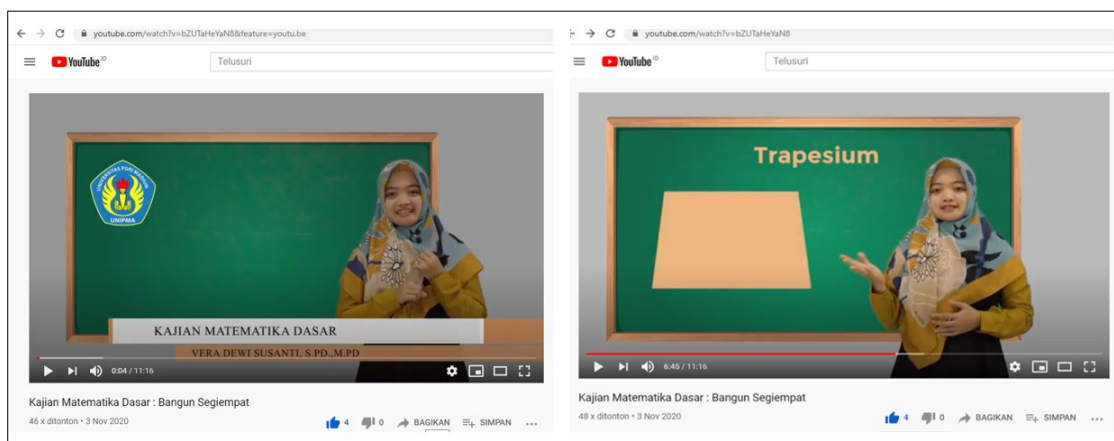

Figure 2. The design of learning videos contained in the YouTube vlog channel

When the learning videos contained in the YouTube vlog channel was integrated into eLMA, the results would be as show in Figure 3.
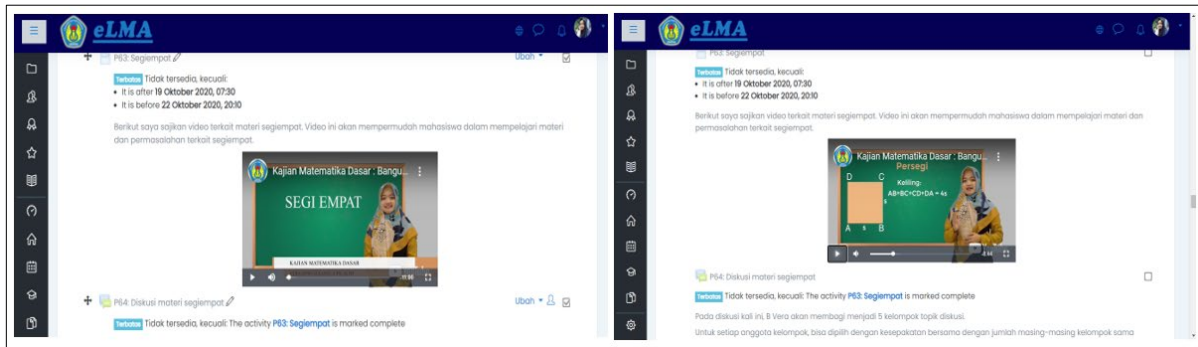

Figure 3. The integration of learning videos contained in the YouTube vlog channel into eLMA

Development

At the development stage, we did several things, namely validation of learning videos and learning outcomes test, limited trials, and field trials. The results of these three activities are provided as follows.

Expert Validation and Validation on the Learning Outcomes Test Items

The results of validation conducted by three validators on the learning videos contained in the YouTube vlog channel is presented in Table 2. Table 2 demonstrates that the learning videos developed was sufficiently valid (the final judgment was about 77%) and a minor revision was required before they were used in online learning. In other words, in our research, the validity criterion was satisfied. As for the validation on the learning outcomes test items, Validator I gave a score of 51 (85%) and Validator II gave a score of 53 (88.33%). Therefore, we could conclude that, with the average percentage of 86.67%, the learning outcome test items could be used to collect data about the effectiveness of YouTube vlog channel.

Table 2. The results of expert validation on the learning videos contained in the YouTube vlog channel

Validator	Total score of validation	Percentage (Total score of validation × 100% ÷ 60)
I	49	81.67
II	45	75.00
III	45	75.00

Limited and Field Trial

The number of students who took part in the limited trial were 12 while in the field trial were 50. The results of the limited trial showed that the number of students who gave positive response to the YouTube vlog channel was greater than 70%, that is about 82% (see Table 3), so the YouTube channel vlog met the practicality criterion. In addition, the results of limited trial on the aspect of student learning outcomes reveled that the percentage of student learning completeness was 82 (see Table 4) which indicates that the YouTube vlog channel could be said to be effective in facilitating online learning that helps students in mastering standard competences about quadrilaterals because the percentage of learning completeness is not less than 80. Meanwhile, the results of the field trial demonstrated that the number of students who gave positive response to the YouTube vlog channel was greater than or equal to 70%, that is 75.46% (see Table 3) meaning that the YouTube vlog channel was practical. Furthermore, the percentage of student learning completeness was 81.82 (see Table 4). This result indicated that the YouTube vlog channel could be said to be effective because the percentage of learning completeness is not less than 80.

Disseminate

Based on the validity criteria of 77%, the practicality level of the YouTube vlog channel was 81.94% for the limited trial and 75.46% for the field trial (see Table 3) and the effectiveness level of the YouTube vlog channel in the limited and field trials were 82% and 81.82%, respectively (see Table 4). Hence, the YouTube vlog channel that

has been developed through this research could be said to be feasible for use to facilitate online learning that promotes students' standard competences on quadrilaterals. The next stage was dissemination. This stage was done by uploading learning videos to the YouTube vlog channel (see https://youtu.be/bZUTaHeYaN8)and eLMA (see http://elma.unipma.ac.id/course/view.php?id=27&sesskey=sDT9ws2E2u&edit=on). In order to access the learning videos integrated in eLMA, students have to be participants in the basic mathematics course at eLMA.

Table 3. The results of student response to the practicality of learning videos contained in YouTube vlog channel

Aspect	Indicator	Positive response (%)		Negative response (%)	
		Limited trial	Field trial	Limited trial	Field trial
Clarity of information delivered	Make learning meaningful	75.00	70.00	25.00	30.00
	Make learning easy to remember	91.67	74.00	8.33	26.00
	Make learning easy to understand	83.33	68.00	16.67	32.00
Stand-alone	Can be used independently	75.00	80.00	25.00	20.00
	Does not depend on other learning materials	83.33	70.00	16.67	30.00
User-friendly	Easy to understand	75.00	74.00	25.00	26.00
	Can be operated	91.67	82.00	8.33	18.00
Content re-presentation	Can explain learning material	83.33	86.00	16.67	14.00
Visualization with media	Contains text, animation and sound	91.67	92.00	8.33	8.00
Use high resolution quality	Use a high image resolution	83.33	80.00	16.67	20.00
	Can be used on all computers or android	75.00	78.00	25.00	22.00
Can be used collaboratively or individually	Can be used in individual learning	83.33	68.00	16.67	32.00
	Can be used in group learning	66.67	50.00	33.33	50.00

Table 4. The results of learning outcomes test

Category of test item difficulty	Item	Average learning outcomes test scores	
		Limited trial	Field trial
Easy	1	13.56	12.45
	2	14.21	14.56
Medium	3	17.44	16.72
	4	15.23	13.01
Difficult	5	25.46	23.29

DISCUSSION

The learning materials contained in the learning videos developed could be declared to be feasible for use if they meet the three criteria, namely validity, practicality, and effectiveness. Our research has been successful in producing a valid, practical, and effective YouTube vlog channel which contains learning videos that could be use as learning media for pre-service mathematics teachers in online learning. This research involved three experts consisting of two mathematics education lecturers and one informatics engineering lecturer. The validation results from the experts were used as the basis for revising and improving the learning videos. Based on the expert judgment on the validity of the items contained in the learning outcomes test, in general, it was said that the test items could be used with some revisions, one of them is to remove the figure that was intended to help students in solving the problem. This revision was required to provide opportunity to students to analyze the meaning of the problem. After the test items were revised based on the experts' suggestions and comments, the experts then filled in the validation sheet.

Based on the results of validation on the learning materials contained in learning videos and learning outcomes test items, we obtained that both learning materials contained in learning videos and learning outcomes test items were valid. If the validation results from the validator are not valid, it is necessary to revise them so that new learning videos are obtained and then they are given to experts or validators to be judged in terms of their validity. Data collection on the validity can also be done by using a validity sheet consisting of content validity and construct validity sheets. The content validity focused on the measures of content components that should be in a learning materials or media (Badan Standar Nasional Pendidikan, 2007; Nengsih et al., 2019), while construct validity, in this case, focused on the construction of learning materials or media in terms of structure, framework, language, and so on (Latisma, 2011; Yusup, 2018). The content of a test item concern how far a test measures the level of mastery of certain contents based on the learning objectives. In other words, a test item that has a good content validity is a test item that measures the mastery of standard competences based on the learning objectives that have been set (Matondang, 2009). In our research, we employed a blueprint in developing test items to ensure that the test items cover the overall content and standard competences that should be mastered by students so that the test used can fulfill the content variety and content validity criterion. In our research, a theoretical review process was carried out starting from the formulation of the construct, determining dimensions and indicators, to the elaboration and writing of test items. Furthermore, in our research, the construct validity of the YouTube vlog channel that contains learning videos was carried out by experts consisting of people who mastered the substance or content of the variables to be measured. Previous research conducted by Nugroho et al. (2017) showed that the results of the validation score above the average or more than 4.2, so the blog-assisted learning media was very good in terms of its validity and could be used for further trials. Considering previous research and the results of our research, the validation results of the validators have been declared valid. In other words, it can be said that the YouTube vlog channel that contains learning videos about quadrilaterals and learning outcome test items can also be used as the development objectives.

The practicality of the YouTube channel vlog used was analyzed based on the results of a student response questionnaire consisting of students who involved in limited trial and field trial on the implementation of online learning using the YouTube vlog that is integrated into the eLMA. The results regarding the practicality criterion have shown that most of the percentage of the results of the student response questionnaires were on good condition, but some indicators were not optimal such as the use of the YouTube vlog channel for group activities. During group activities, students discussed in eLMA by using a discussion forum feature. By using this feature, students need a long time to type mathematics equations. In addition, when the discussion required students to provide a quadrilateral figure, students need to draw it first and then upload it to the discussion forum. Even so, such group activities could still be carried out, but it is necessary to pay more attention to the time required for such activities. The results of the student response questionnaire showed that 12 students on the limited test obtained a score of 81.94% which means that it is declared practical. Meanwhile, the results of the questionnaire responses of 50 students in the field trial obtained a score of 75.46% which means that it is also declared practical. From the results of the student response questionnaire for both the limited trial and the field trial, more than 70% students gave positive responses. This shows that the learning videos contained in the YouTube vlog channel is practical. The practicality of the YouTube vlog channel can be shown by the positive response from students who stated that the materials or contents described on the YouTube channel vlog is quite easy to understand and interesting. It is very easy to understand in terms of presenting the material in the form of a video with explanations accompanied by pictures and material and sound that are very clear and can be operated with a computer or a smartphone. It is interesting because of the suitability between the color presentation design and the lighting techniques used in the video.

The effectiveness of the YouTube vlog channel is seen based on the completeness of the student learning test results after learning using the YouTube vlog channel integrated on eLMA. The results of the learning outcomes test showed a low average score of students on the item 4 that has medium level of difficulty and on the item 5 that has high level of difficulty when it is compared to the maximum score that students can obtain in those items, i.e., 20 and 30, respectively. However, overall, the combined average is good as well as the percentage of student learning completeness classically shows a value above 70%. Also, the learning outcomes test scores obtained by 12 students in the limited trial showed excellent learning completeness results, that was 82%, with the average score obtained was 85.83. While the learning outcomes test score of 50 students in the field trial showed that the learning completeness was 81.82% with the average score obtained was 79.77. These results indicated that the YouTube

channel vlog is effective in terms of facilitating students to master standard competences about quadrilaterals through basic mathematics course. This result, therefore, in line with the results of research conducted by Shodiqin and Zuhri (2016) that mathematics learning materials developed in were declared effective because the average field trial results reach 83.13. Another research was conducted by Gazali (2016) aimed to produced learning materials used a criterion that the learning materials is said to be effective if the percentage of completeness of students classically reaches 70%. In that research, the learning materials produced were effective with a completeness percentage of 71.43%. Based on the description that has been provided, our research demonstrated that the YouTube vlog channel that contains learning videos about quadrilaterals has an impact on increasing the percentage of student learning completeness. Hence, the YouTube vlog channel developed can meet the effectiveness criterion. Students were quicker to understand the learning materials and master standard competences through the use of YouTube vlog channel integrated into eLMA than before using the YouTube vlog channel.

CONCLUSION

The R&D that has been conducted resulted in a YouTube vlog channel that meets the validity criteria with an average result obtained from the media validation questionnaire of 77%. The practicality level of the YouTube channel vlog with the average results obtained from the student response questionnaire in the limited trial was 81.94% and the field trial was 75.46%. The level of effectiveness of the YouTube channel vlog development with the average results obtained from the questionnaire on student learning outcomes in limited trials was 100% and field trials were 81.82%. Through this learning video, it is hoped that it can motivate and attract students' attention and can stimulate student understanding and creativity about the material being studied, to maximize competence attainment according to the set learning objectives. For other researchers who want to develop similar research, they are expected to develop learning videos that are more interesting and have character values, and can facilitate students to be more enthusiastic about learning and achieving the standard competencies. During the COVID-19 pandemic, the development of this learning video is very helpful in the online learning process.

REFERENCES

Adani, M. R. (2020). *Apa itu vlog dan cara membuat konten video untuk channel YouTube*. Sekawan Media. https://www.sekawanmedia.co.id/cara-membuat-vlog/

Aderholt, R. (2020). *Coronavirus outbreak shining an even brighter light on internet disparities in rural America*. The Hill. https://thehill.com/blogs/congress-blog/technology/488848-coronavirus-outbreak-shining-an-even-brighter-light-on

Agustin, R. D. (2017). Analisis kesalahan mahasiswa pendidikan matematika dalam investigasi segiempat. *Prosiding Seminar Nasional Pendidikan Matematika*.

Aisyah, S., Bahfiarti, T., & Sonni, A. F. (2018). Video blog sebagai media representasi diri vlogger di Kota Makassar. *Kareba: Jurnal Ilmu Komunikasi, 7*(1), 74–82. https://doi.org/10.31947/kareba.v7i1.6166

Akbar, S. (2013). *Instrumen perangkat pembelajaran*. Remaja Rosdakarya.

Anderson, J. (2020). *Should schools close when coronavirus cases are still rare*. Yahoo! Finance. https://finance.yahoo.com/news/schools-close-coronavirus-cases-still-090027702.html

Aqib, Z. (2013). *Model-model, media, dan strategi pembelajaran kontekstual (inovatif)*. Yrama Widya.

Ario, M., & Asra, A. (2019). Pengembangan video pembelajaran materi integral pada pembelajaran flipped classroom. *Aksioma: Jurnal Program Studi Pendidikan Matematika, 8*(1), 20–31. https://doi.org/10.24127/ajpm.v8i1.1709

Azzi-Huck & Shmis, T. (2020). *Managing the impact of COVID-19 on education systems around the world: How countries are preparing, coping, and planning for recovery*. World Bank Blogs. https://blogs.worldbank.org/education/managing-impact-covid-19-education-systems-around-world-how-countries-are-preparing

Badan Standar Nasional Pendidikan. (2007). Kegiatan penilaian buku teks pelajaran pendidikan dasar dan menengah. *Buletin BSNP, 2*(1), 14–23.

Bartlett, J. D., Griffin, J., & Thomson, D. (2020). *Resources for supporting children's emotional well-being during the COVID-19 pandemic. Child Trends*. https://www.childtrends.org/publications/resources-for-supporting-childrens-emotional-well-being-during-the-covid-19-pandemic

Collie, R. J., Shapka, J. D., & Perry, N. E. (2011). Predicting teacher commitment: The impact of school climate and social-emotional learning. *Psychology in the Schools*, *48*(10), 1034–1048. https://doi.org/10.1002/pits.20611

Cucinotta, D., & Vanelli, M. (2020). WHO declares COVID-19 a pandemic. *Acta Biomedica*, *91*(1), 157–160. https://doi.org/10.23750/abm.v91i1.9397

Fadhli, M. (2015). Pengembangan media pembelajaran berbasis video kelas IV sekolah dasar. *Jurnal Dimensi Pendidikan dan Pembelajaran*, *3*(1), 24–29. https://doi.org/10.24269/dpp.v3i1.157

Fuys, D., Geddes, D., & Tischler, R. (1988). The van Hiele model of thinking in geometry among adolescents. *Journal for Research in Mathematics Education Monograph Series*, *3*, 1–198. https://doi.org/10.2307/749957

Gazali, R. Y. (2016). Pengembangan bahan ajar matematika untuk siswa SMP berdasarkan teori belajar Ausubel. *Pythagoras: Jurnal Pendidikan Matematika*, *11*(2), 182–192. https://doi.org/10.21831/pg.v11i2.10644

Hobri, H. (2009). *Metodologi penelitian pengembangan: Aplikasi pada penelitian pendidikan matematika*. Pena Salsabila.

Horn, M. B. (2020). *COVID-19's long-term impacts on education in 2020 and beyond*. EdSurge. https://www.edsurge.com/news/2020-03-23-covid-19-s-long-term-impacts-on-education-in-2020-and-beyond

Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., Zhang, L., Fan, G., Xu, J., Gu, X., Cheng, Z., Yu, T., Xia, J., Wei, Y., Wu, W., Xie, X., Yin, W., Li, H., Liu, M., …, & Cao, B. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*, 395(10223), 497–506. https://doi.org/10.1016/S0140-6736(20)30183-5

International Baccalaureate. (2020). *Online learning, teaching and education continuity planning for schools*. International Baccalaureate Organization. https://www.ibo.org/globalassets/news-assets/coronavirus/online-learning-continuity-planning-en.pdf

Irawan, H. (2020). *Inovasi pendidikan sebagai antisipasi penyebaran COVID-19*. Ombudsman Republik Indonesia. https://ombudsman.go.id/artikel/r/artikel--inovasi-pendidikan-sebagai-antisipasi-penyebaran-covid-19

Karp, P., & McGowan, M. (2020). *'Clear as mud': Schools ask for online learning help as coronavirus policy confusion persists*. The Guardian. https://www.theguardian.com/australia-news/2020/mar/24/clear-as-mud-schools-ask-for-online-learning-help-as-coronavirus-policy-confusion-persists

Katili, D. L. (2020). *Belajar bahagia dalam bencana COVID-19*. LPMP Provinsi DKI Jakarta. https://lpmpdki.kemdikbud.go.id/belajar-bahagia-dalam-bencana-covid-19/

Kemendikbud. (2020). *Surat Edaran Nomor 4 Tahun 2020 tentang pelaksanaan pendidikan dalam masa darurat penyebaran Coronavirus Disease (COVID-19)*. https://www.kemdikbud.go.id/main/blog/2020/03/se-mendikbud-pelaksanaan-kebijakan-pendidikan-dalam-masa-darurat-penyebaran-covid19

Khoiri, M. (2014). Pemahaman siswa pada konsep segiempat berdasarkan teori van Hiele. *Prosiding Seminar Nasional Matematika 2014*, *1*(1), 262–267. https://jurnal.unej.ac.id/index.php/psmp/article/view/957

Kristanto, A. (2011). *Pengembangan model media video pembelajaran mata kuliah pengembangan media video/TV Program Studi Teknologi Pendidikan, Fakultas Ilmu Pendidikan, Universitas Negeri Surabaya* [Master's thesis, Universitas Sebelas Maret]. Digital Library UNS.

Latisma, L. (2011). *Evaluasi pendidikan*. UNP Press.

Lloyd-Sherlock, P., Ebrahim, S., Geffen, L., & McKee, M. (2020). Bearing the brunt of COVID-19: Older people in low and middle income countries. *BMJ*, *368*(1), 1–2. https://doi.org/10.1136/bmj.m1052

Mahase, E. (2020). Coronavirus: Covid-19 has killed more people than SARS and MERS combined, despite lower case fatality rate. *BMJ*, *368*(1), 1–1. https://doi.org/10.1136/bmj.m641

Maine Department of Education. (2020). *Coronavirus (COVID-19) resources for schools*. Maine Department of Education. https://ncsi-library.wested.org/resources/433

Makdori, Y. (2020). *Kemendikbud luncurkan platform guru berbagai untuk bantu pengajar lakukan pembelajaran daring*. Liputan 6. https://www.liputan6.com/news/read/4216300/kemendikbud-luncurkan-platform-guru-berbagai-untuk-bantu-pengajar-lakukan-pembelajaran-daring

Matondang, Z. (2009). Validitas dan reliabilitas suatu instrumen penelitian. *Jurnal Tabularasa*, *6*(1), 87-97.

Mulyatiningsih, E. (2011). *Metode penelitian terapan bidang pendidikan*. Alfabeta.

Mutia, R., Adlim, A., & Halim, A. (2017). Pengembangan video pembelajaran IPA pada materi pencemaran dan kerusakan lingkungan. *Jurnal Pendidikan Sains Indonesia*, *5*(2), 108–114. https://doi.org/10.24815/jpsi.v5i2.9825

Nengsih, N. R., Yusmaita, E., & Gazali, F. (2019). Evaluasi validitas konten dan konstruk bahan ajar asam basa berbasis REACT. *EduKimia*, *1*(1), 1–10. https://doi.org/10.24036/ekj.v1i1.104017

Nugroho, A. A., Putra, R. W. Y., Putra, F. G., & Syazali, M. (2017). Pengembangan blog sebagai media pembelajaran matematika. *Al-Jabar: Jurnal Pendidikan Matematika*, *8*(2), 197–203. https://doi.org/10.24042/ajpm.v8i2.2028

OSPI. (2020). *Novel coronavirus (COVID-19) in K-12 schools: A parent guide*. Washington Office of Superintendent of Public Instruction. https://www.k12.wa.us/sites/default/files/public/communications/COVID-19%20in%20Schools_Parent%20Guide.pdf

Phan, T. (2020). Genetic diversity and evolution of SARS-CoV-2. *Infection, Genetics and Evolution*, *81*(1), 1–3. https://doi.org/10.1016/j.meegid.2020.104260

Putsanra, D. V. (2020). *Daftar e-learning Kemendikbud, sekolah online untuk mencegah Corona*. Tirto.id. https://tirto.id/daftar-e-learning-kemendikbud-sekolah-online-untuk-mencegah-corona-eFrR

Qin, M., Zhang, Y.-C., & Su, C.-W. (2020). The essential role of pandemics: A fresh insight into the oil market. *Energy Research Letters*, *1*(1), 1–6. https://doi.org/10.46557/001c.13166

Sa'idah, N. M., Mustangin, M., & Walida, S. E. (2020). Pengembangan video animasi pembelajaran bermuatan PPK, 4C, dan HOTS pada materi bangun datar segi empat kelas VII. *Jurnal Penelitian, Pendidikan, dan Pembelajaran*, *15*(33), 29–37. http://riset.unisma.ac.id/index.php/jp3/article/view/8066

Saputro, A. T. (2011). *Pengembangan perangkat pembelajaran matematika dengan media Visual Basic. Net 2008 pada materi lingkaran di kelas VIIIB MTs Negeri Krian Sidoarjo* [Undergraduate thesis, IAIN Sunan Ampel Surabaya]. Digital Library UIN Sunan Ampel Surabaya. http://digilib.uinsby.ac.id/9332/

Sari, M. (2020). Pengembangan vlog (video blog) channel YouTube berbasis STEM pada materi laju reaksi kelas XI SMA/MA. *Journal of Research and Education Chemistry*, *2*(2), 73–84. https://doi.org/10.25299/jrec.2020.vol2(2).5725

Setyadi, D., & Qohar, A. (2017). Pengembangan media pembelajaran matematika berbasis web pada materi barisan dan deret. *Kreano: Jurnal Matematika Kreatif-Inovatif*, *8*(1), 1–7. https://doi.org/10.15294/kreano.v8i1.5964

Shereen, M. A., Khan, S., Kazmi, A., Bashir, N., & Siddique, R. (2020). *COVID-19 infection: Emergence, transmission, and characteristics of human coronaviruses*. *Journal of Advanced Research*, *24*(1), 91–98. https://doi.org/10.1016/j.jare.2020.03.005

Shodiqin, A., & Zuhri, M. S. (2016). Pengembangan bahan ajar matematika SMA berbentuk tabloid berbantuan software Wolfram Mathematica dengan pendekatan kontekstual pada materi integral. *JIPMat: Jurnal Ilmiah Pendidikan Matematika*, *1*(2), 97–103. https://doi.org/10.26877/jipmat.v1i2.1235

Simatupang, H. A. (2016). *Pengembangan media pop-up pada materi organisasi kehidupan untuk meningkatkan motivasi dan hasil belajar peserta didik SMP kelas VII* [Undergraduate thesis, FMIPA Universitas Negeri Yogyakarta]. ePrints UNY. https://eprints.uny.ac.id/30076/4/BAB III.pdf

Sinaga, B., Sinambela, P. N. J. M., Sitanggang, A. K., Hutapea, T. A., Sinaga, L. P., Manullang, S., Simanjorang, M., & Bayuzetra, Y. T. (2014). *Matematika SMA/MA/SMK/MAK*. Pusat Kurikulum dan Perbukuan, Balitbang, Kementerian Pendidikan dan Kebudayaan.

Sohrabi, C., Alsafi, Z., O'Neill, N., Khan, M., Kerwan, A., Al-Jabir, A., Iosifidis, C., & Agha, R. (2020). World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *International Journal of Surgery*, *76*(1), 71–76. https://doi.org/10.1016/j.ijsu.2020.02.034

Sugiyono, S. (2017). *Metode penelitian kebijakan: Pendekatan kuantitatif, kualitatif, kombinasi, R&D, dan penelitian evaluasi*. Alfabeta.

Tegeh, I. M., Simamora, A. H., & Dwipayana, K. (2019). Pengembangan media video pembelajaran dengan model pengembangan 4D pada mata pelajaran Agama Hindu. *Jurnal Mimbar Ilmu*, *24*(2), 158–166. https://doi.org/10.23887/mi.v24i2.21262

The World Bank. (2020). *Brief: Remote learning, EdTech & COVID-19*. The World Bank. https://www.worldbank.org/en/topic/edutech/brief/edtech-covid-19

Thiagarajan, S., Semmel, D. S., & Semmel, M. I. (1974). *Instructional development for training teachers of exceptional children: A sourcebook*. Leadership Training Institute/Special Education, University of Minnesota.

Thien, L. M., Razak, N. A., & Ramayah, T. (2014). Validating teacher commitment scale using a Malaysian sample. *SAGE Open*, *4*(2), 1–9. https://doi.org/10.1177/2158244014536744

Ting, D. S. W., Carin, L., Dzau, V., & Wong, T. Y. (2020). Digital technology and COVID-19. *Nature Medicine*, *26*(4), 459–461. https://doi.org/10.1038/s41591-020-0824-5

Trianto, T. (2010). *Model pembelajaran terpadu*. Bumi Aksara.

UNESCO. (2020a). *Distance learning solutions*. UNESCO. https://en.unesco.org/covid19/educationresponse/solutions

UNESCO. (2020b). *Motivating learners during remote learning due to COVID-19: Tips for teachers*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000373132/PDF/373132eng.pdf.multi

Urbani, J., Krötzsch, M., Jacobs, C., Dragoste, I., & Carral, D. (2018). Efficient model construction for horn logic with VLog. In D. Galmiche, S. Schulz, & R. Sebastiani (Eds.), *IJCAR 2018: Automated, Lecture Notes in Computer Science* (pp. 680–688). Springer. https://doi.org/10.1007/978-3-319-94205-6_44

US Department of Health and Environmental Control. (2019). *Higher education guidance on novel coronavirus or guidance for IHE that do not have COVID-19 identified in their community*. South Carolina Department of Health and Environmental Control (DHEC). https://scdhec.gov/sites/default/files/media/document/Higher%20Education%20Guidance%20on%20Novel%20Coronavirus%20or%20COVID-19.pdf

Wahyono, P., Husamah, H., & Budi, A. S. (2020). Guru profesional di masa pandemi COVID-19: Review implementasi, tantangan, dan solusi pembelajaran daring. *Jurnal Pendidikan Profesi Guru*, *1*(1), 51–65. https://doi.org/10.22219/jppg.v1i1.12462

Wahyudi, M. (2020). *Covid-19 dan potret pembelajaran berbasis e-learning*. Republika. https://republika.co.id/berita/q8gkaa374/covid19-dan-potret-pembelajaran-berbasiselearning

Wang, H., Wang, Z., Dong, Y., Chang, R., Xu, C., Yu, X., Zhang, S., Tsamlag, L., Shang, M., Huang, J., Wang, Y., Xu, G., Shen, T., Zhang, X., & Cai, Y. (2020). Phase-adjusted estimation of the number of Coronavirus Disease 2019 cases in Wuhan, China. *Cell Discovery*, *6*(10), 1–8. https://doi.org/10.1038/s41421-020-0148-0

Watkins, J. (2020). Preventing a covid-19 pandemic. *BMJ*, *368*(1), 1–2. https://doi.org/10.1136/bmj.m810

Worldometer. (2020). *COVID-19 coronavirus pandemic*. Worldometer. https://www.worldometers.info/coronavirus/

Yan, W. (2020). *How will COVID-19 impact global education*. China Daily. https://news.cgtn.com/news/2020-03-16/How-will-COVID-19-impact-global-education--OTZKvx8tbO/index.html

Yusof, N. M. (2012). School climate and teachers' commitment: A case study of Malaysia. *International Journal of Economics Business and Management Studies*, *1*(2), 65–75.

Yusup, F. (2018). Uji validitas dan reliabilitas instrumen penelitian kuantitatif. *Jurnal Tarbiyah: Jurnal Ilmiah Kependidikan*, *7*(1), 17–23. http://doi.org/10.18592/tarbiyah.v7i1.2100

Zacharo, K., Marios, K., & Dimitra, P. (2018). Connection of teachers' organizational commitment and transformational leadership. A case study from Greece. *International Journal of Learning, Teaching and Educational Research*, *17*(8), 89–106. https://doi.org/10.26803/ijlter.17.8.6

Zhang, J. -J, Dong, X., Cao, Y. -Y, Yuan, Y. -D, Yang, Y. -B, Yan, Y. -Q, Akdis, C. A., & Gao, Y. -D. (2020). Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. *Allergy: European Journal of Allergy and Clinical Immunology*, *75*(7), 1730–1741. https://doi.org/10.1111/all.14238

Zhang, W., Wang, Y., Yang, L., & Wang, C. (2020). Suspending classes without stopping learning: China's education emergency management policy in the COVID-19 outbreak. *Journal of Risk and Financial Management*, *13*(3), 1–6. https://doi.org/10.3390/jrfm13030055

Zhao, S., Lin, Q., Ran, J., Musa, S. S., Yang, G., Wang, W., Lou, Y., Gao, D., Yang, L., He, D., & Wang, M. H. (2020). Preliminary estimation of the basic reproduction number of novel coronavirus (2019-nCoV) in China, from 2019 to 2020: A data-driven analysis in the early phase of the outbreak. *International Journal of Infectious Diseases*, *92*(1), 214–217. https://doi.org/10.1016/j.ijid.2020.01.050