

Development of Android-Based 3d Animation Learning Applications to Support Distance Learning for the D4 Animation Study Program, Udinus Semarang

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Abstract -The existence of the COVID-19 pandemic has become a big problem in practicum courses, especially the 3D1 Animation course at the Dian Nuswantoro University animation study program, Semarang. Lecturers cannot guide students directly when experiencing obstacles in the learning process such as during face-to-face learning. The purpose of this research is to create an android application for learning media 3d1 animation. In this application there are several menus including the semester learning plan menu, video tutorials, task collection, consultation with lecturers, remote desktop requests and others Remote desktop features to make it easier for lecturers to guide students remotely. This study uses the waterfall method, namely software requirements analysis, design, development, testing, and maintenance with testing using the black box method. The test results show that each aspect has results that can be concluded as successful and feasible. This research succeeded in developing android-based 3d1 animation learning media.

Keywords - Android Application, Learning Media, 3d1 Animation Course, Remote Desktop

1. INTRODUCTION

Dian Nuswantoro University Semarang is a Private University with A Accreditation in Semarang City, Central Java. Udinus is currently the 10th best private university in Indonesia according to webometrics 2022 [1]. The 3d 1 animation course is a course in the animation study program that is practicable. With this course, students are expected to be able to make basic 3d animations such as bouncing balls, walking characters, running, mendong and so on.

One of the areas affected by the COVID-19 pandemic is the world of education in Indonesia [2]. Currently, the learning process is in the form of online learning, where every meeting relies on video conferencing and the lecturer also makes video tutorials that are distributed to students, so it is hoped that the material will be conveyed well. However, in practicum courses there are obstacles where students even though they follow the steps in the video tutorial, sometimes there are still no errors and cannot run well like a video tutorial.

Technological progress is currently very fast in various fields, one of which is the world of smartphones. According to the Ministry of Communication and Information, the number of smartphone users in Indonesia reaches 89% [3]. The current smartphone is not only used as a communication tool, but can be used to install various applications available on the Playstore and various other sources. In addition, it is also an alternative to be a solution to problems in the implementation of the teaching and learning process.

The research related to this research include.

1. Research by Ibnu Siswanto and Ade Viyan Surya Aji entitled Development of video tutorials to create android-based learning media using adobe animate cc. In this study, we want to know the feasibility of Adobe Animate CC material in the form of video tutorials in producing learning media [4].
 2. Research by Yeka Hendriyan and Yeni Marita Juanda entitled Development of Video Tutorial-Based Learning Media in Visual Programming Courses Using the Addie Method. The result of this research is the creation of Visual Programming learning media [5].
- From the research above, it can be taken as a reference that adobe animate cc can be used to produce android-based learning media applications.

With the above problems, innovation is needed in the form of applications that can answer these problems. Therefore, this study aims to produce an Android-based 3d1 Animation course learning application, where there are video tutorials and remote desktop request features so that lecturers can remotely real-time student laptops. So if students experience problems when making 3d1 animations, they can be resolved quickly without having to meet face to face.

a. Learning Media

Steffi Adam and Muhammad Taufik Syastra (2015) state that, learning media are everything that is physical and technical in nature that makes it easier for teachers to teach material to students in achieving learning goals. [6]. Understanding learning is an activity to make students learn to achieve teaching and learning objectives by involving several elements, both intrinsic and extrinsic inherent in teachers and students and teachers as well as the environment [7]. Learning media in electronic form, for example, can be in the form of videos, websites, ebooks, animations, augmented reality, virtual reality and can be in the form of android-based applications. While physical learning media can be in the form of books, props and so on.

b. Mobile Learning

The definition of mobile learning is the use of cellular technology and mobile devices (HP) in a learning model as a learning medium. M-learning is presented in the form of multimedia such as video, audio, text and images so that it becomes interesting as learning material that is easy to understand. Mobile learning has advantages including not depending on time and place [8].

Mobile learning can be used by students because it is easy to access information, not limited by space and time, easy to carry anywhere, relatively easy cost. In addition, with the existence of Android-based learning media, you do not have to look for information from Google whose material is still extensive so that it takes longer to collect information [9].

c. Android Based Application

Android-based applications are applications that can be run on the Android operating system. According to Murtiwiayati and Glenn Lauren (2013) the content in android applications can be in the form of media for science, education or education, games and so on [10]. According to Holla and Mahima (2012) the Java programming language can be used to develop Android applications. In developing android applications, SDK and JDK are also needed [11].

d. 3d Animation

The development of 3d animation is currently growing rapidly. In the development of 3d animation, there is a lot of software to make it. Blender, virtual 3ds and 3ds max is one of the software to develop this application. In 3d animation can not be separated from the principle of animation because without adhering to the principles of animation, 3d animation cannot look real and natural.

e. User Interface (UI)

Satzinger, Jackson, and Burd (2012, p189), stated that the user interface is input and output that directly involves the end user system. There are factors that distinguish the user interface, such as the characteristics of the device to be used, user characteristics and the purpose of manufacture [12]. The reaction between the system and the user occurs in the user interface, therefore the user interface is very important. The assessment of the system that has been made is called user experience [13].

In the user interface there are inputs and outputs. Input can help users to input data, edit data and so on. While the output is the part to display the data resulting from data changes made by the user.

f. User Experience (UX)

User experience determines the ease of accessing an application. This convenience is based on one's experience in accessing previously used applications. User Experience is a measure of success and not a design in society, especially in digital media design [14].

2. RESEARCH METHOD

The waterfall method is a sequential and systematic information system development model [15]. In the development of applications in this study using the waterfall method based on the research objective, namely to create an android-based 3d1 animation learning media. The stages of the waterfall development method are as follows.

1. Data Collection

In the process of designing the data, in this case, the material to be delivered, the source material in the form of Semester Learning Plans (RPS), supporting books and other sources. Next, a tutorial is made in the form of a video with appropriate material from RPS and various other sources.

2. Tools and Materials

In developing 3D1 animation learning media based on Android, a laptop with Core i3 specifications, 8GB RAM, 2GB VGA and 120GB SSD is needed. The software needed is adobe animate cc 2017 and other supporting software such as adobe photoshop and so on.

3. Research Stages

The stages of research in the process of making this android-based learning media application are as follows:

a. Data analysis

That is analyzing what data is needed to compile this learning media.

b. Design

Design is needed to create user interfaces, illustration images and so on.

- c. Coding
Enter programming code for buttons and other items to make them work as intended.
- d. Testing
Conduct trials to see the success of the program, so that if there are still errors, they are corrected again.
- e. Implementation
That is, applying the application to the audience so that they get input for improving the application.

3. RESULTS AND DISCUSSION

1. Description of Android Based Learning Media

This application was created to support learning 3d animation courses 1 at the animation study program at Dian Nusawantoro University, Semarang. The software used is Adobe Animate CC 2017 using the Action Script 3.0 programming language. This application when installed on Android requires adobe air, but when publish to apk format, adobe animate cc 2017 can already include adobe air so there is no need to install it again from the external.

2. Design

a. Flowchart

Flowchart is a design that describes the workflow of a program. With this flowchart, it will be easier to check parts that may be forgotten, but it can also be a medium of communication between programmers and the team in a project [16]. The program flow is described as follows.

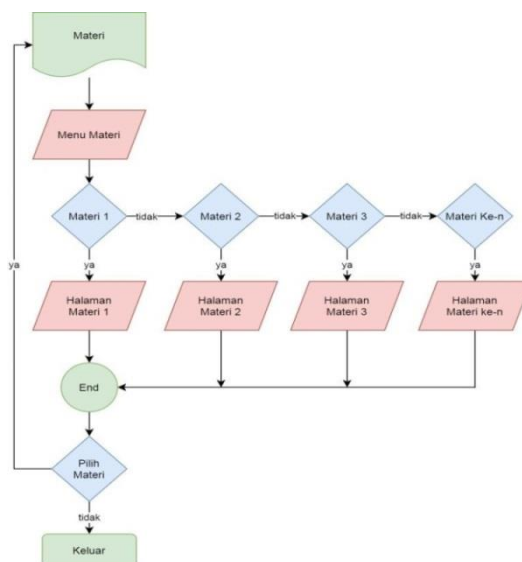


Figure 1. Material Flowchart Design

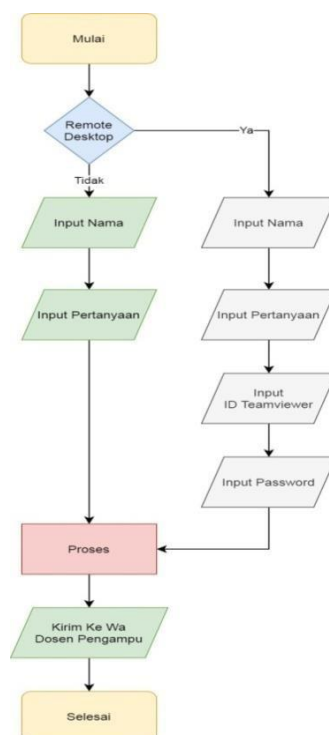


Figure 2. Remote Desktop Request Design

b. *Hipo* Diagram

This hypo diagram aims to map the navigation of the application to be made so that it detects what page needs are needed. In addition, with the existence of this hypo diagram, it can detect linkages or relationships between pages in the application. The hypo diagram in the android-based 3d1 animation learning media application in this study is as follows.

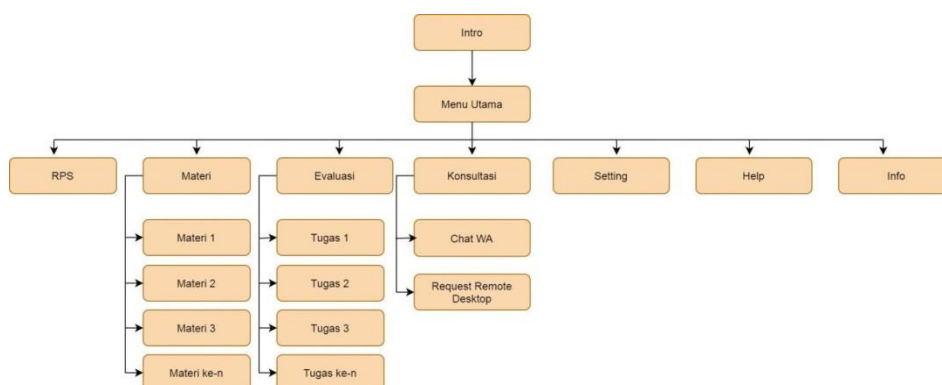


Figure 3. Navigation Design

3. Coding Implementation

After all the designs have been fulfilled, then proceed to the implementation stage. The stages of implementing the design are as follows:

a. Implementation of Design into Program

The implementation stage is the stage where the results of the flowchart and hypo diagram designs are realized using Adobe Animate CC 2017 software in which Action Script 3.0 has been installed including the material content that has been provided.

b. Implementation of Program View

At this stage it produces a program display that has been given the program code so that it runs as desired. In this program, on the main page there are several menus including the RPS menu or semester learning plans, materials, evaluations or assignments, and consultations. For the icon itself, there are several icon settings, developer information, audio controller, help and quit.

4. Black Box Testing

Wahyudi & Arief (2016) stated that the Black Box Testing process was carried out by trying the functions of the program or application that had been created. With this test, it will be known whether the function is running as expected or not [17]. In this study, the testing was carried out using the black box method, while the test results were as follows.

Table 1. Black Box Test Results

No.	Aspect of Testing	Test Form	Expected Results	Conclusion
1	Main course	Click App Icon	Go to Main Menu	Valid
2	RPS Menu	Click the RPS Button	Enter the RPS Menu	Valid
3	Material Menu	Click Material Button	Go to Material Menu	Valid
4	Evaluation Menu	Click the Evaluation Button	Enter the Evaluation Menu	Valid
5	Consultation Menu	Click the Consultation Button	Go to Consultation Menu	Valid
6	Information Menu	Click the Developer Information Icon	Go to Developer Information Menu	Valid
7	Sound Menu	Click the Sound Icon	Enter the Sound Menu	Valid
8	Settings menu	Click the Settings icon	Go to Settings Menu	Valid
9	Help menu	Click the Help icon	Go to Help Menu	Valid
10	Exit Menu	Click the Exit Icon	Exit App	Valid

5. Maintenance

This stage is the last stage in the waterfall method. If a program has become the next very important step is maintenance. This must be done so that the application can continue to run and can be used by the audience. Next, if development is needed, application development must also be planned so that it can answer user needs.

6. Display ImplementationProgram

a. Main page

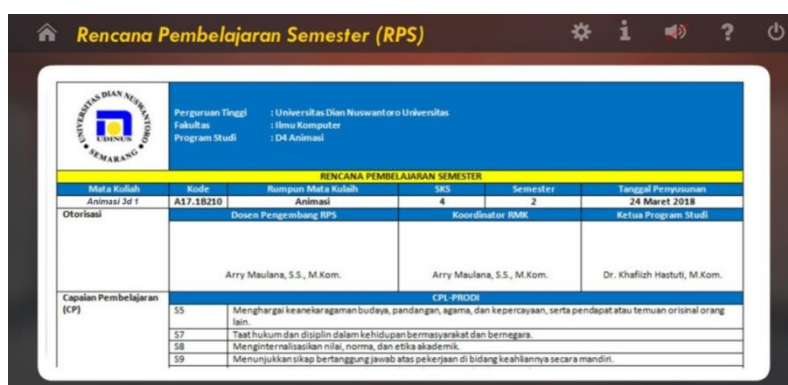
This page buttons and icons to go to the desired page. This page is also designed in the form of buttons and icons to make it interesting and communicative.



Figure 4. Main Menu Page

b. RPS Page

This page contains the RPS for each meeting. This is important because it contains information on Learning Outcomes, Materials, Targets, Timeline and so on.



Mata Kuliah	Kode	Rumpun Mata Kuliah	SKS	Semester	Tanggal Penyusunan
Animasi 3D I	A17.18210	Animasi	4	2	24 Maret 2018
Otorisasi	Dosen Pengembang RPS		Koordinator RPP		Ketua Program Studi
	Arry Maulana, S.S., M.Kom.		Arry Maulana, S.S., M.Kom.		Dr. Khafizh Hastuti, M.Kom.
Capaian Pembelajaran (CP)	CP1-IP004				
	55	Menghargai keanekaragaman budaya, pandangan, agama, dan kepercayaan, serta pendapat atau temuan orisinal orang lain.			
	57	Taat hukum dan disiplin dalam kehidupan bermasyarakat dan bernegara.			
	58	Menginternalisasikan nilai, norma, dan etika akademik.			
	59	Menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya secara mandiri.			

Figure 5. Semester Lesson Plan Page

c. Material Page

This page contains video tutorials in accordance with the selected material. Technically the video will be made by the presenter and recorded using Camtasia. Then the file will be uploaded to YouTube and the link will be embedded in the application. The selection of this method is very helpful because if everything is entered in the application then the application file will be too large.

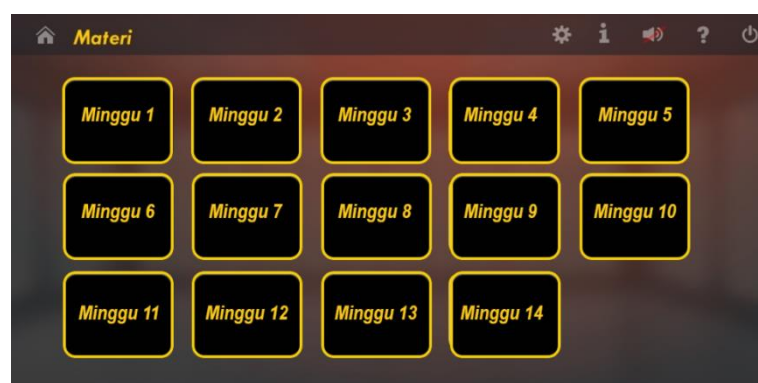


Figure 6. Material List



Figure 7. Video Material

d. Tasks Page

This page contains a list of weekly assignments that students must complete. This is made so that students do not forget their assignments every week.



Figure 8. Assignment List Page

e. Assignment Submission Page

This page contains features for collecting 3d tasks. Technically, student assignments are uploaded on google drive then the link will be entered into the text input link so that when clicked it will send a link to the lecturer's WhatsApp (WA) complete with the name, number and link of the assignment.

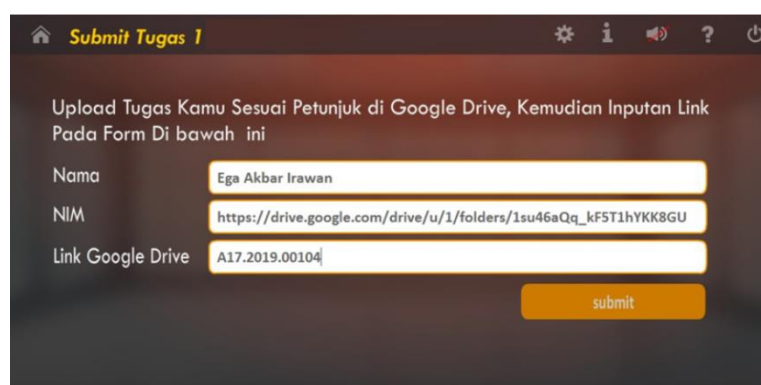


Figure 9. Assignment Submission Page

f. Setting Page

This page contains a feature to save the name and number of the lecturer. This is important because it is possible that in one course there will be different lecturers. So there needs to be this menu to make it more custom to contact the course lecturers.

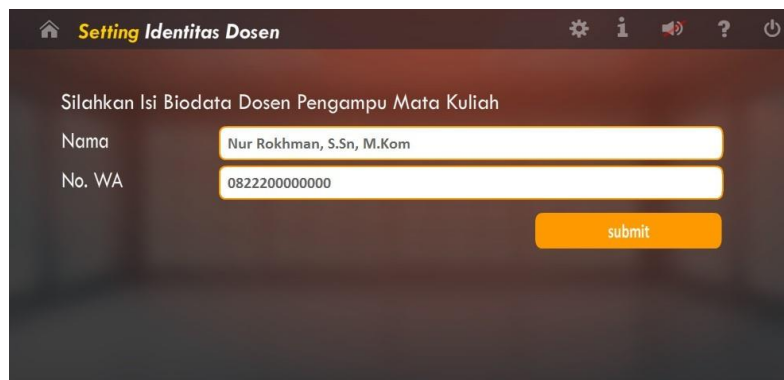


Figure 10. Lecturer Biodata Settings Page

g. Consultation Page

This page serves to select the type of consultation in the form of questions only or in the form of remote desktop.



Figure 11. Consulting Page

h. Question Consultation Page

This page serves to send questions about obstacles and additional references to the lecturers. This is important because reference videos may also be provided from other sources if the material presented in the video tutorial is still insufficient.

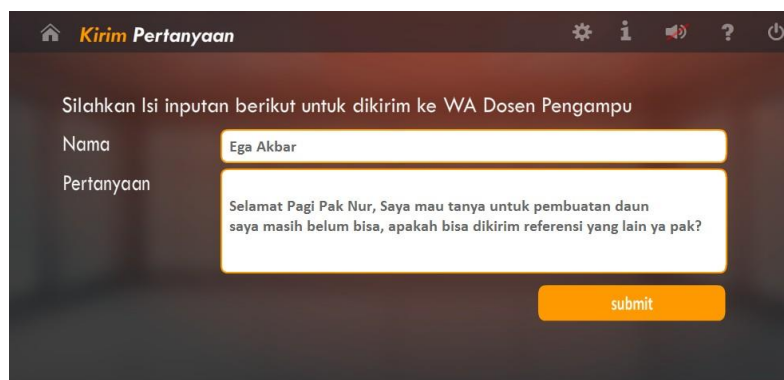


Figure 12. Send Question Page

i. Remote Desktop Request Page

This page serves to send questions to the lecturer. This question requires the lecturer to do a remote desktop on the student's laptop or PC so that they will be guided which things cannot be followed from the video tutorials that have been made.



Figure 13. Request Remote Desktop Page

4. CONCLUSION

In this research can produce 3d1 animation learning media applications. In this application there are several menus including the semester learning plan menu, video tutorials, task collection, consultation with lecturers, remote desktop requests and others. The development of this android-based 3d1 animation learning media application uses the waterfall method with black box testing. The application will be implemented in the learning process of the 3d 1 animation course, so that it can support the learning of the 3d1 animation course.

REFERENCES

- [1] T. Septiana, "15 Universitas Swasta Terbaik di Indonesia 2022 versi Webometrics," 21 Juli 2022, 2022. <https://lifestyle.kontan.co.id/news/15-universitas-swasta-terbaik-di-indonesia-2022-versi-webometrics-kampus-ini-nomor-1> (accessed Aug. 08, 2022).

- [2] M. Siahaan, "Dampak Pandemi Covid-19 Terhadap Dunia Pendidikan," *J. Kaji. Ilm.*, vol. 1, no. 1, pp. 1–3, 2020.
- [3] Z. Hanum, "Kemendikbud : 89% Penduduk Indonesia Gunakan Smartphone," *Minggu*, 07 Maret 2021, 2021. <https://mediaindonesia.com/humaniora/389057/kemendikbud-89-penduduk-indonesia-gunakan-smartphone> (accessed Jul. 08, 2022).
- [4] A. V. S. Aji and I. Siswanto, "Pengembangan video tutorial membuat media pembelajaran berbasis android menggunakan adobe animate cc," *J. Taman Vokasi*, vol. 9, no. 2, pp. 141–148, 2021, [Online]. Available: <https://jurnal.ustjogja.ac.id/index.php/tamanvokasi/article/view/10311%0Ahttps://jurnal.ustjogja.ac.id/index.php/tamanvokasi/article/view/10311/4663>
- [5] Y. M. Juanda and Y. Hendriyani, "Pengembangan Media Pembelajaran Berbasis Video Tutorial Pada Mata Kuliah Pemrograman Visual dengan Metode ADDIE," *Jav. J. Vokasi Inform.*, vol. 2, no. 1, pp. 121–130, 2022, doi: 10.24036/javit.v2i1.81.
- [6] S. Adam and M. T. Syastra, "Pemanfaatan Media Pembelajaran Berbasis Teknologi Informasi Bagi Siswa Kelas X Sma Ananda Batam," *J. CBIS*, vol. 3, no. 2, p. 79, 2015.
- [7] A. Prasetowo, *Pengembangan Bahan Ajar Tematik*. Yogyakarta: Diva Pers, 2013.
- [8] B. Warsita, "Mobile Learning Sebagai Model Pembelajaran Yang Efektif Dan Inovatif," *J. Teknodik*, vol. 14, no. 1, pp. 062–073, 2018, doi: <https://doi.org/10.32550/teknodik.v14i1.452>.
- [9] R. Minner and N. Sears, "Aplikasi Mobile Learning Berbasis Smartphone Android Sebagai Sumber Belajar Mahasiswa Program," vol. 6, no. November, pp. 85–98, 2016.
- [10] Murtiwiati and G. Lauren, "Rancang Bangun Aplikasi Pembelajaran Budaya Indonesia Untuk Anak Sekolah Dasar Berbasis Android," *J. Ilm. Komputasi.*, vol. 12, no. 2, p. 2, 2013.
- [11] dan M. M. K. Suhas Holla., *Android Based Mobile Application Development and its Security*. India: Department of Information Science & Engg, R V College of Engineering., 2012.
- [12] S. D. B. John W. Satzinger, Robert B. Jackson, *Introduction To System Analysis And Design*. Boston, 2012.
- [13] R. A. Yudarmawan, A. A. K. Oka, D. Made, and S. Arsa, "Perancangan User Interface dan User Experience SIMRS pada Bagian Layanan," vol. 1, no. 2, 2020.
- [14] M. B. Wiryawan, "User Experience (Ux) sebagai Bagian dari Pemikiran Desain dalam Pendidikan Tinggi Desain Komunikasi Visual," *Humaniora*, vol. 2, no. 2, p. 1158, Oct. 2011, doi: 10.21512/humaniora.v2i2.3166.
- [15] R. . Pressman, *Rekayasa Perangkat Lunak: Pendekatan Praktisi*, 2nd ed. Yogyakarta: Penerbit Andi, 2002.
- [16] R. Nurmalina, "Perencanaan dan Pengembangan Aplikasi Absensi Mahasiswa Menggunakan Smart Card Guna Pengembangan Kampus Cerdas (Studi Kasus Politeknik Negeri Tanah Laut)," vol. 9, no. 1, pp. 84–91, 2017.
- [17] M. R. Wahyudi, R., Utami, E., & Arief, "Sistem Pakar E-Tourism Pada Dinas Pariwisata D.I.Y Menggunakan Metode Forward Chaining," *J. Ilm. DASI*, vol. 17, no. 2, pp. 67–75, 2016.