Frederick Chandra[1]

DIGITALIZATION ON EDUCATION: EXPLORING THE IMPACT AND ADAPTATION

Abstract

Digitalization is rapidly changing education across the world, including Cendekia Harapan School in Bali. The research analyses digital tools usage in schools, and their benefits and challenges. On the basis of qualitative methods, such as document analysis, expert interview, survey, and literature review, the study analyzes how teachers and students assist with the process of digitization at school. The findings show that technology enhances lesson planning, facilitates students in learning with the help of interactive tools, and enhances progress tracking through systems such as Moodle. On the other hand, some challenges are resource limitation, teacher adaptation, and over dependence on technology. Schools address these issues through training programs, better access to resources, and policies for encouraging responsible technology use. This research has pointed out the need to balance digital tools with traditional learning so that all students benefit while still developing critical thinking skills. The study provides an overview of how to improve digital education in Bali and other regions facing similar challenges.

Keywords: Digital, Education, Challenges

INTRODUCTION

The digitalization of education has emerged as a critical focus for educational institutions worldwide, and Bali's Cendekia Harapan shows this transformative trend. Unlike many other schools, Cendekia Harapan has integrated advanced technology and artificial intelligence (AI) into its education. This integration aims to enhance lesson preparation for teachers and facilitate more effective learning and assignment completion for students. Such initiatives reflect a wider global trend where the adoption of digital tools is increasingly seen as essential for improving educational outcomes (Selwyn, 2016; Voogt & Roblin, 2012).

Despite the potential benefits, the digitalization of education faces numerous challenges. These include lack of resources, both in terms of technology and infrastructure, difficulty adapting, and too much dependence on technology. The Indonesian government has responded by rapidly implementing digital initiatives, operating under the assumption that digital transformation will enhance educational quality and access to information (Kementerian Pendidikan dan Kebudayaan, 2020). Nevertheless, this approach has been uneven, resulting in a significant number of schools, particularly in underserved regions, remaining undigitalized and struggling to meet modern educational demands (Petrusevich, 2020).

The root causes are identified as a lack of infrastructure, investment in professional development, and approach to digital policy implementation. Reflecting on Marshall McLuhan's idea that the medium is the message, this study considers that the shift from traditional to digital education represents not only a change in tools but a transformation in knowledge dissemination and absorption (McLuhan, 1967). This theoretical perspective underscores the importance of understanding how digital tools reshape educational processes beyond their functional use.

Previous attempts to address these challenges have centered on increasing internet access and providing digital resources to schools. While government efforts have achieved notable progress, with approximately 81% of Indonesian schools now connected to the internet, disparities remain (Kominfo, 2023). This uneven progress has led to educational inequalities,

[1]SMP Cendekia Harapan
email: frederick@cendekiaharapan.sch.id

with some institutions developing while others left behind.

The limitations of these solutions include their implementation and the lack of a comprehensive strategy that encompasses all aspects of digitalization from infrastructure development to teacher training and community engagement. This research proposes an approach aimed at not only expanding access to digital tools but also ensuring that educators are well equipped to use these tools effectively, and that all schools, regardless of their location, are committed to the digital transformation.

The primary objective of this research is to determine the impact of digitalization towards education, adaptation and various ways to expand digitalization in education within Bali. This involves examining how local educational institutions are integrating digital tools and resources, identifying the challenges they face, and exploring opportunities to enhance digital literacy among students and educators. This research benefits educators, policymakers, and students by providing insights into digitalization in education, identifying challenges, and proposing strategies to enhance digital literacy, accessibility, and innovation in Bali's educational landscape.

Literature Review

Marshall McLuhan was a famous thinker who studied media and how it shapes our lives. One of his most well known ideas is that "the medium is the message" which means that the way we send information like through TV, books, or the internet affects not just the content, but how we understand it. In education, for example, switching from traditional to digital methods doesn't just change the way teachers teach it changes how students think and learn.

McLuhan developed his theories in the mid-20th century, during a time when new media like television and radio were becoming popular. He believed these new forms of communication were doing more than just sharing information they were changing the way people thought and behaved. His goal was to help people understand that the media are not just passive tools for information, but active forces that reshape our minds and our society.

McLuhan's central idea, the medium is the message, emphasizes that different media like print, television, and digital platforms affect communication and human experience in unique ways. For him, the "message" wasn't just the words or pictures being shared, but the medium itself, which alters how we act, think, and interact.

His background influenced his views greatly. He studied literature at the University of Cambridge and was inspired by writers like James Joyce and scholars like Harold Innis, who looked at how media affects societies. At the University of Toronto, he saw how media and communication were changing, and he used an interdisciplinary approach that combined literature, media studies, and cultural analysis to develop his unique theories. He thought technology, like literature, was a powerful force that could change how people see the world.

McLuhan was driven by a desire to understand the impact of media on culture and society. He thought of media as extensions of our senses for example, television extends our sight. He wanted to explore how media like this could change how we see and understand the world. His work was both about explaining these effects and encouraging people to be aware and thoughtful about the changes media bring to our lives.

Despite his influence, some scholars disagreed with McLuhan. One well known critic, Raymond Williams, thought that McLuhan focused too much on technology itself and not enough on how people actually use it. Williams believed that social, political, and economic factors are essential in shaping how media affect society, while McLuhan focused on the power of the media format itself. Others, like Paul K. Jones, argued that McLuhan ignored the importance of the content within the media. They believed that content, culture, and context are just as important as the medium in understanding the media's impact.

McLuhan's ideas continued to change as new technologies developed. Later, he wrote about the concept of the global village where he saw the world becoming more connected through digital media, creating a shared, global awareness. He predicted a world where social media and constant digital connectivity would blur the lines between individual and collective experiences.

In summary, McLuhan's ideas offer an important view of how media shapes our thinking and social structures. He believed that the way we communicate, the medium changes how we

interact, learn, and understand the world. However, his ideas have faced criticism, especially from scholars who argue that social context and human decisions are essential to fully understanding media's effects. Even though his theories are from decades ago, they still provide valuable insight into today's digital world, showing how media, technology, and society are closely connected.

Marshall McLuhan's theory of "the medium is the message" provides a critical framework for understanding the impact of digitalization in education, particularly in Bali. McLuhan argued that media are not just passive tools for delivering content rather, they actively shape how individuals think, learn, and interact with information. Applying this perspective to school digitalization, the shift from traditional to digital learning does not merely change the mode of instruction but fundamentally transforms students' cognitive processes, teacher-student dynamics, and institutional learning structures. Digital tools such as interactive platforms, AI based tutoring, and online classrooms extend learning beyond physical spaces, similar to how McLuhan viewed media as extensions of human senses. This shift raises key questions about how students process knowledge in digital environments whether digital learning enhances critical thinking and engagement or fosters passive consumption of information.

Additionally, McLuhan's concept of the global village is highly relevant in the context of digital education, as online learning connects students in Bali to a broader, global knowledge network. However, as critics like Raymond Williams argue, focusing solely on the medium risks overlooking the importance of content and context. Digital transformation in education must therefore be evaluated not only in terms of technological adoption but also in the effectiveness of digital content, the quality of instruction, and the socio economic accessibility of digital tools. Furthermore, the digital divide remains a key challenge, as access to technology varies among schools and communities, influencing the effectiveness of digitalization efforts.

By integrating McLuhan's theories into this research, the study moves beyond a surface level analysis of digital adoption and instead explores the deeper cognitive, behavioral, and cultural shifts that digital media bring to education in Bali. This perspective allows for a more comprehensive understanding of how digitalization reshapes the learning experience, ensuring that technological advancements align with meaningful educational outcomes.

METHOD

This research was conducted in order to determine the impact, current approach and various methods to expand digitalization in education, utilizing qualitative research methods. In order to answer these research goals, the researcher uses document analysis, reviewing existing documents such as reports, letters or media articles to obtain the view of digitalization in education in line with this topic.

A literature review is also utilized, a critical and in depth evaluation of previous research on a particular topic, a summary and synopsis of a particular area of research (R. Kiteley). Different news articles and reports will be compiled into this research to support the arguments and theory being brought within this research. To ensure that the information being brought is reliable, the news articles and reports will be from credible resources such as the Kominfo, CNN, WHO, etc.

This research will use information brought by experts with interviewing on the topic to ensure relevance of the topic. People that will be interviewed are experts such as the teachers or even the government if possible as well as students who experienced digitalization in their education and how it changes the learning process. Additionally surveys will also be conducted to gather data from a broader audience, including students and teachers.

This research would also use thematic analysis, a flexible method for identifying, analyzing and interpreting patterns of meaning in qualitative data (Clarke, V., & Braun,V.) This approach allows the study to find common themes in what participants say, making it easier to understand their experiences and opinions. By grouping similar ideas, thematic analysis highlights important patterns giving a clearer picture of the topic discussed.

RESULT AND DISCUSSION

Based on the interview, experts adopt and apply digitalization in education because they recognize the need to solve specific problems that impact teaching efficiency and resource allocation. The decision to implement digitalization comes from identifying problems in daily life at school, such as the time consuming process of locating or finding students during pickup times. The school found that having 5 to 7 teachers searching for students was a waste of time this time could rather be used for teachers to prepare materials instead. The experts also believe that technology should help make school runs better and more efficient. Digitalization not only addresses problems but it is making education more organized , allowing educators to focus more on their primary responsibilities of teaching and mentoring students.

This study further explores how digitalization has impacted teaching and learning practices. For teachers, digitalization simplifies lesson planning by providing tools like Canva and other platforms that make materials more visual and accessible. The use of visual materials and interactive digital tools enhances the delivery of lessons, making them more engaging and easier to understand for students. Digital tools make it easier for teachers and students to work together and learn from each other. They also save teachers time by reducing paperwork, so they can focus more on fun teaching methods and helping students learn in ways that suit them best.

Students benefit significantly from systems like Moodle, which allow them to evaluate their progress in real time and compare their performance in class and online. This instant feedback mechanism encourages self assessment and helps students identify areas for improvement. AI tools, when used effectively, contribute positively to learning experiences by offering new ways to understand concepts and solve problems. These tools promote creativity and new ideas by giving students more resources and ways to solve school problems. However, relying too much on them can harm students' ability to think critically and solve problems on their own. Teachers emphasize teaching students to use these tools wisely, so they help build important skills instead of weakening them.

Another key finding is the role of training and resource support in successful digitalization. Teachers are trained in using digital tools, programming, and even foreign languages to adapt to the evolving educational landscape. This ongoing professional development ensures that teachers remain equipped to leverage new technologies effectively. Schools also provide additional facilities, such as improved computer labs, to ensure all students, regardless of their personal access to digital devices, can participate in digital learning. For example, students without personal laptops or devices can use school provided resources, ensuring inclusivity in education.

Challenges in adopting digitalization include building the mindset of teachers, parents, and students. Teachers from older generations often find it difficult to transition to digital methods, requiring extensive support and guidance. Schools address this challenge by offering training programs and mentorship from more tech savvy colleagues. Parents, on the other hand, may struggle to understand or accept advanced educational technologies. Their traditional educational experiences may make them hesitant to embrace digitalization, viewing it as overly complex or unnecessary. Schools need to involve parents through workshops and communication to bridge the gap and help them understand how digital tools can improve their children's education.

Students often struggle to access necessary resources, like laptops, due to financial issues or restrictions set by parents. Schools address these challenges by promoting adaptability through training and offering shared resources, like computer labs. Besides having the right tools, students also need guidance on how to use technology responsibly and effectively. For example, there's a concern about students overusing AI tools like ChatGPT for schoolwork. To tackle this, schools have policies against plagiarism and promote critical thinking. Teachers stress the importance of using AI as a helpful tool, not a replacement for independent thinking and effort.

The theory of medium is the message by Marshall Mcluhan focuses on how media shapes our thinking and social structures. Despite not being directly related, the core principle of medium is the message can still be applied to digitalization in education.

The results of this study closely connect with Marshall McLuhan's concept of "the medium is the message." McLuhan believes that the medium through which we communicate or receive information has a bigger impact on society than the content itself. In the case of digitalization in education, tools, and platforms such as Canva, Moodle, and AI tools not only improve the way lessons are delivered but also change the whole learning experience. Such digital tools reshape how teachers and students interact with one another and the material and from traditional approaches toward more collaborative and interactive ways of learning.

McLuhan also believes that a change in medium changes the way people think and perceive the world. In education, it would suggest that what is happening is not a matter of digital technologies making teaching and learning more efficient but, rather, they change how students interact with content and how teachers work. For instance, through the use of real time feedback and interaction tools, students are able to take a more active position in their learning processes, which, in turn, shifts the power balance away from teacher centeredness to student centeredness. In this study, digitalization also contributes to teachers being able to spend less time on administrative work and more time teaching, which is their core business. Again, this goes hand in glove with McLuhan's argument that the medium shapes our approach to tasks and priorities. Digital tools can free teachers to think about innovative and interactive approaches to teaching, rather than being mired in mundane and time consuming activities.

In general, McLuhan's theory shows that digitalization does not mean the introduction of new tools but how those tools change education. Digital tools in education change the way teaching and learning are done; hence, it has made education dynamic and more interactive. This supports McLuhan's idea that the medium is shaping and changing the message, or, in other words, the medium being digital technology, education, and learning.

While McLuhan's theory suggests that the medium changes society in a great way, it doesn't fully address the potential downside. It doesn't fully capture the challenges involved in adapting to new mediums. While McLuhan highlights the importance of new media in shaping societies, he doesn't go into detail about the struggles people face when transitioning to the new way of thinking or working. The study shows that many teachers, especially from the older generations, need extensive training to adapt to digital tools and some parents are struggling to understand these changes.

Comparing the result found to other's similar studies by (Prithwiraj Das & Dhanujakshi. A Study on Transformation of the Education Sector through Digitalization. 2020) The findings from both studies show several similarities and differences about digitalization in education. Both agree that digital tools have a positive impact on teaching and learning by saving time, improving lesson planning, and making learning more engaging. Students are generally happy with digital education in both studies, with 63% in the secondary data showing interest in innovative learning through ICT (Information and Communication Technology) . They both dwell on the aspect of inclusion, especially with the mention of shared resources like computer labs to help students who cannot afford personal devices. Equally, they affirm that training teachers is necessary for effective integration and use of digital tools and recognize challenges of attitude adjustment among teachers, students, and parents.

However, there are differences between the two. While the interview findings focused more on teachers and how digital tools helped to raise teaching efficiency, encouraging critical thinking, the secondary findings put more emphasis on students, showing statistics like 63% of students satisfied with digital education. The secondary data also discusses how digital skills acquired from ICT help with career development. The interview findings, however, are concerned about overusing AI tools like ChatGPT and emphasizing the use of technology responsibly. Social networks are also part of digital education, as mentioned in the secondary data, which is not discussed in the interview findings. These differences are due to the different methods applied in the studies. The findings are based on expert opinions, which emphasize real life challenges and recent issues like AI overuse. On the other hand, the secondary data comes from student surveys, which are more experience based and related to their satisfaction. All these findings put together provide a holistic view of the benefits and challenges of digital education.

This study shows school digitalization has significantly transformed education by

improving teaching efficiency, enhancing the learning experience, and increasing accessibility. Digital tools streamline administrative tasks, reducing teachers' workload and allowing more time for lesson planning and student engagement. Platforms like Moodle provide real-time feedback, helping students track their progress and improve learning outcomes, while interactive tools such as Canva and AI driven platforms make lessons more engaging and visually appealing. Moreover, digital education fosters inclusivity by ensuring that students, regardless of their financial background, have access to digital resources through shared facilities like computer labs. It also promotes global connectivity, allowing students and teachers to collaborate beyond geographical boundaries and access diverse perspectives. Additionally, exposure to digital platforms enhances students' technological adaptability and critical thinking, equipping them with essential skills for the modern world.

However, despite these benefits, school digitalization also presents challenges. One of the key issues is teacher and parent adaptation, as older educators often struggle with transitioning to digital platforms and require extensive training, while some parents resist digital education due to unfamiliarity with advanced learning technologies. Another concern is the over-reliance on AI and digital tools, which may weaken students' critical thinking and independent problem solving skills. Schools must establish ethical AI policies to encourage responsible use. Additionally, the digital divide remains a major challenge, as students from lower income backgrounds may lack access to personal digital devices, requiring schools to invest in shared resources and infrastructure to ensure equal learning opportunities. Cybersecurity and data privacy are also growing concerns, as increased reliance on online platforms raises the risk of data breaches and cyber threats, necessitating strong cybersecurity policies to protect students' information. Furthermore, excessive screen exposure can impact students' mental health, focus, and social skills, highlighting the need for a balanced approach that integrates offline activities, discussions, and hands on learning.

In conclusion, while digitalization positively reshapes education by making learning more efficient, engaging, and globally connected, it also introduces challenges that schools must actively address. McLuhan's theory of "the medium is the message" supports the idea that digital tools do more than enhance education they redefine how students learn, interact, and think. However, for digitalization to be truly effective, schools must focus on bridging technological gaps, providing necessary training, ensuring responsible AI use, and maintaining a balanced digital environment to create an inclusive and sustainable learning system. The conceptual framework of the digitalization in education shown on the diagram below.
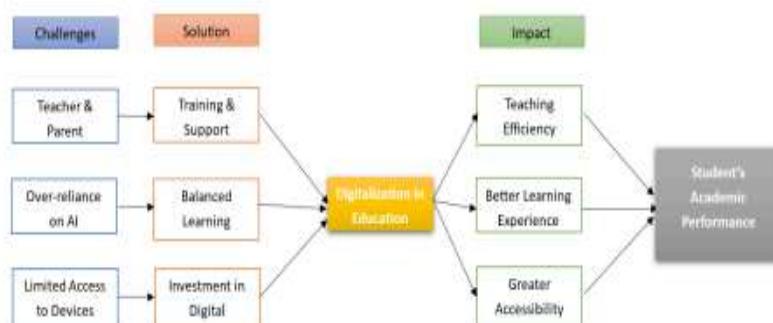
Picture 1. The Conceptual Framework of Digitalization in Education

The diagram illustrates the conceptual framework of Digitalization in Education by outlining its challenges, solutions, impacts, and ultimate effect on students' academic performance. On the left, challenges include teacher and parent resistance, over-reliance on AI, and limited access to digital devices, which hinder the effective integration of digital tools in education. To address these challenges, solutions such as training and support for teachers and parents, balanced learning methods to regulate AI dependence, and investment in digital infrastructure are proposed. These solutions enable the successful implementation of digitalization in education, represented at the center of the diagram. As a result, digitalization enhances teaching efficiency, improves the learning experience, and increases accessibility,

which collectively contribute to better academic performance for students. This structured approach highlights the importance of overcoming barriers through targeted strategies to maximize the benefits of digital education.

Despite these valuable insights, this study has limitations. The findings are based primarily on expert opinions, which, while insightful, may not fully capture the perspectives of students and parents who directly experience digital education daily. Additionally, the study focuses on Bali's educational landscape, which may limit the generalizability of the results to other regions with different technological infrastructures and socio-economic conditions. Future research could expand on these findings by conducting large-scale surveys involving students, parents, and teachers to gain a more holistic understanding of digital education's impact. Further studies could also examine long-term effects of digitalization on learning outcomes, teacher effectiveness, and student engagement while exploring emerging concerns such as digital addiction, cybersecurity risks, and ethical AI usage in education. By addressing these gaps, future research can provide deeper insights into how digitalization can be optimized to create a more inclusive, effective, and sustainable educational system.

CONCLUSION

Digitalization in education has brought many positive things, like making learning more interactive, improving efficiency, and helping teachers focus more on teaching rather than administrative tasks. However, it's important to use digital tools very carefully to ensure a balance between technology and our knowledge or skills. Schools need to make sure that while they adapt to new technologies, they don't lose sight of the value of teacher helps and emotional support in education.

Training teachers is essential to help them use digital tools effectively. At the same time, students need to learn how to use these tools responsibly and critically so they can succeed in both school and their future careers. Digital tools should be seen not just as a way to make learning easier but as an opportunity to create a more creative, interactive, and inclusive learning environment.

However, overusing technology can have drawbacks, like reducing creativity, critical thinking, and social skills. A mix of traditional teaching and digital tools is the best approach, allowing students to benefit from both. Schools should also address challenges like unequal access to technology, ensuring that every student, no matter their background, has the resources they need to succeed.

It's also important to be aware of potential risks, such as too much screen time, privacy issues, and misuse of AI tools. Clear guidelines and policies can help protect students and teachers while making the most of digital education. Digitalization has the power to transform education by making it more dynamic and inclusive. With proper planning, training, and balance, schools can create a system that prepares students for the demands of a modern, technology driven world while maintaining the personal connection that makes education meaningful.Digitalization in education has brought many benefits, like making learning more engaging, improving efficiency, and helping teachers focus more on teaching rather than administrative tasks. However, it's important to use digital tools thoughtfully to ensure a balance between technology and the personal touch of traditional teaching. Schools need to make sure that while they embrace new technologies, they don't lose sight of the value of human interaction and emotional support in education.

Training teachers is essential to help them use digital tools effectively. At the same time, students need to learn how to use these tools responsibly and critically so they can succeed in both school and their future careers. Digital tools should be seen not just as a way to make learning easier but as an opportunity to create a more creative, interactive, and inclusive learning environment.

However, overusing technology can have drawbacks, like reducing creativity, critical thinking, and social skills. A mix of traditional teaching and digital tools is the best approach, allowing students to benefit from both. Schools should also address challenges like unequal access to technology, ensuring that every student, no matter their background, has the resources they need to succeed.

It's also important to be aware of potential risks, such as too much screen time, privacy issues, and misuse of AI tools. Clear guidelines and policies can help protect students and teachers while making the most of digital education.

In conclusion, digitalization has the power to transform education by making it more dynamic and efficient. With proper planning, training, and balance, schools can create a system that prepares students for the demands of a modern, technology driven world while maintaining the personal connection that makes education meaningful.

REFERENCES

Bhandari, P. (2020). What is qualitative research? Methods & examples. Scribbr. https://www.scribbr.com/methodology/qualitative-research/

Buchanan, R. A. (1998, July 20). History of technology: Evolution, ages, & facts. Encyclopedia Britannica. https://www.britannica.com/technology/history-of-technology/Atomic-power

Clarke, V., & Braun, V. (2017). Thematic analysis. https://www.semanticscholar.org/paper/Thematic-analysis-Clarke-Braun/29ecd3d0d9bb081333253cca5e86d2f22284818c

Das, P., & Dhanujakshi. (2020). A study on transformation of the education sector through digitalization. https://www.semanticscholar.org/paper/A-Study-on-Transformation-of-Education-Sector/640229a4678f69b4a338e8aaea5bd97bfcbd08e1

Kementerian Pendidikan dan Kebudayaan. (2020). Strategi digitalisasi pendidikan di Indonesia. https://www.kemdikbud.go.id

Kominfo. (2023). Digitalisasi sekolah percepat perluasan akses pendidikan berkualitas di daerah 3T. https://www.kominfo.go.id

Kiteley, R., & Stogdon, C. (2014). What is a literature review? https://www.semanticscholar.org/paper/What-Is-a-Literature-Review-Kiteley-Stogdon/da7ccde1ebc0f698966f9eb4b7f06b095bdd2365

Logan, R. K. (2010). Understanding new media: Extending Marshall McLuhan. Peter Lang Publishing.

Marchessault, J. (2005). Marshall McLuhan: Cosmic media. SAGE Publications.

McLuhan, M. (1964). Understanding media: The extensions of man. McGraw-Hill.

McLuhan, M. (1967). The medium is the message. Bantam Books.

McLuhan, M., & Powers, B. R. (1989). The global village: Transformations in world life and media in the 21st century. Oxford University Press.

Petrusevich, D. A. (2020). Modern trends in the digitalization of education. Journal of Physics: Conference Series, 1691(1), 012223. https://doi.org/10.1088/1742-6596/1691/1/012223

Schwab, K. (2016). The fourth industrial revolution. Crown Business.

Selwyn, N. (2016). Education and technology: Key issues and debates. Bloomsbury.

Voogt, J., & Roblin, N. P. (2012). A comparative analysis of international approaches to 21st-century competencies. Journal of Curriculum Studies, 44(3), 299–321.

Williams, R. (1974). Television: Technology and cultural form. Fontana.

Jones, P. K. (1998). Raymond Williams's sociology of culture: A critical reconstruction. Palgrave Macmillan.

Jones, P. K. (1998). The technology is not the cultural form? Raymond Williams's sociological critique of Marshall McLuhan. https://www.researchgate.net/publication/279642072_The_Technology_is_not_the_Cultural_Form_Raymond_Williams's_Sociological_Critique_of_Marshall_McLuhan

SD IT Fajar Ilmu. (n.d.). Mendorong transformasi pendidikan melalui digitalisasi sekolah. https://sditfajarilmu.sch.id/mendorong-transformasi-pendidikan-melalui-digitalisasi-sekolah/

https://docs.google.com/document/d/166AFijKTHWYPc8XzuNMMarEVixP8YGoYX_GaxdZywK8/edit

https://docs.google.com/document/d/16xPxtwTEd1R7uR82I5cn67dbRyVDp-JnpmUTvLp_1bg/edit