

Improving Digital Literacy through Training on the Use of Technology-Based Learning Applications in Elementary Schools

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ABSTRACT

This study aims to analyse strategies for improving digital literacy in primary school students through training in the use of technology-based learning applications. Digital literacy is an essential skill in today's digital era, where the ability to understand and use technology effectively is one of the keys to educational success. Using the literature study method, this research examines various educational technology approaches and applications that can improve digital literacy. The findings show that training in the use of learning applications, such as e-learning platforms, educational games and video-based applications, can improve students' digital literacy skills. In addition, the involvement of teachers as facilitators in the technology-based learning process is a key factor in the success of the training.

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1. INTRODUCTION

The advent of digital transformation has brought about significant changes in various sectors of life, including education. In the contemporary era, technology not only affects the manner in which information is presented and accessed, but also the very process of learning itself. In the context of education, digital transformation is driving a shift from traditional learning methods based on physical classrooms and printed books to more interactive and technology-based methods. Digital technology has enabled access to a wider, more diverse and flexible array of information sources, affording students the opportunity to learn independently, at their own pace and in a manner that suits them (Uzule et al., 2024).

In conjunction with the advancement of technology, digital literacy has emerged as a pivotal skill, particularly for students preparing to navigate the information age. Digital literacy encompasses the capacity to comprehend and utilize technology in a critical and effective manner across academic,

social, and professional contexts. This competency extends beyond mere technical proficiency in operating digital devices such as computers or tablets. It also encompasses the ability to think critically, manage digital information, and understand digital ethics and safety.

In an educational context, digital literacy enables students to adapt rapidly to technological developments, cultivate critical thinking abilities and enhance their comprehension of learning content conveyed through digital media. Students who are digitally literate will be better positioned to leverage technology in their learning process and will also be better prepared to confront future challenges, particularly in an increasingly digitalised world of work (Ilomäki et al., 2023).

Although the importance of digital literacy is widely acknowledged, its implementation in primary schools still encounters several challenges. One of the most significant obstacles is the lack of digital understanding and proficiency among students and educators. Many students in primary schools are not yet accustomed to using digital devices in their daily lives, and for the majority of teachers, the integration of technology in the learning process is still novel and not fully comprehended.

The factors that contribute to this limitation include:

- **Infrastructural limitations:** Not all primary schools have access to the technological devices that they require. Limited internet access, limited availability of devices such as computers or tablets, and a lack of technical support for device maintenance are common constraints in primary schools, especially in remote areas.
- **Insufficient Training for Teachers:** Educators frequently lack adequate training to utilise technology in the learning process. Teachers who are not familiar with technology may encounter difficulties in effectively implementing technology-based learning applications in the classroom (Amelia et al., 2023).

The digital divide between students who have access to technology at home and those who do not represents another significant challenge. Students from economically deprived families may lack familiarity with technological devices, which further exacerbates the existing gap between socio-economically advantaged and disadvantaged students.

To address these challenges, training in the use of technology-based learning applications is a pertinent solution. Technology-based learning apps encompass a range of digital platforms designed to facilitate a more interactive, adaptive and effective learning process. Examples of such applications include e-learning platforms, digital-based educational games and multimedia-based applications that utilise videos and images to explain material, all of which are commonly used in primary schools. Training on the utilisation of these applications emphasises several pivotal elements, including:

- **Technical Skill Development:** Training enables students and teachers to gain an understanding of how to utilise digital tools in an effective manner. For instance, the use of e-learning apps allows students to learn how to access course materials, participate in online quizzes and complete assignments in a digital format.
- **Integrating Technology in the Curriculum:** The objective of training is to equip teachers with the requisite skills to integrate technology into their daily lessons. For instance, apps such as Kahoot! or Quizziz can be utilised to assess students' comprehension in real-time in an engaging and competitive environment, whereas apps like Google Classroom facilitate the digital delivery of materials and assignments, as well as the provision of prompt feedback to students (Dewi Megawati & Romadhon Parada Dian Palevi, 2024).

The development of critical and collaborative thinking skills is another key benefit of digital learning apps. These apps are often designed to encourage students to work together in groups, solve problems and think critically. Technology-based educational games or simulations allow students to learn through virtual experiments, thereby deepening their understanding of abstract concepts.

The training also encompasses non-technical aspects, including digital ethics, data security and appropriate online conduct. This is crucial to guarantee that students not only possess the technical skills required to utilise technology, but also understand the importance of doing so in a responsible manner.

The literature study method was employed in this research to examine previous studies that explored the impact of technology use in learning on the improvement of digital literacy among primary school students. The findings indicate that the utilisation of technology-based learning applications can:

- Enhance Learning Motivation: Students who utilise digital applications frequently report heightened motivation to learn, largely attributed to the engaging and interactive learning methodologies.
- Enhance Learning Outcomes: The utilisation of e-learning applications and educational games has the potential to enhance student learning outcomes, particularly in terms of facilitating a more profound comprehension of the subject matter and the capacity to apply knowledge in a practical setting.

Furthermore, technology-based learning applications facilitate parental involvement in the learning process, for instance by providing parents with the ability to monitor their child's learning progress.

2. METHODS

This research employs the method of a literature review, which entails the collection and analysis of information from a range of pertinent secondary sources. In this context, the literature review was conducted by tracing previous research outcomes, scientific journals, books, and research reports pertaining to digital literacy, the utilisation of technology in learning, and training in the use of technology-based learning applications in primary schools. The principal objective of this method is to gain insight into the current state of research and to draw conclusions based on existing findings.

The following section provides a detailed account of the methodology employed in the literature review, which formed an integral part of this research project.

The initial stage of the literature study is the collection of relevant and credible literature sources.

The initial phase of the literature study method entails the identification and collection of pertinent and reliable literature sources. This process encompasses:

- The identification of relevant topics is a crucial initial step in the literature review process. In this case, the topic of digital literacy, technology applications in education, and teacher and student training were selected for investigation. Establishing clear criteria for these topics is essential to ensure that the research remains focused and that irrelevant information is excluded.
- The literature sources were obtained from a variety of academic databases, including Google Scholar, ScienceDirect, JSTOR, and ProQuest. These databases provide access to peer-reviewed scientific journals, and were therefore deemed appropriate for this study. In addition, educational textbooks, research reports, and conference papers related to the topic of digital literacy and educational technology were also used (Ajra et al., 2024).

Following the collection of literature, an evaluation of source credibility is essential. Sources from indexed scientific journals and reputable academic publishers were prioritised, as they offer greater validity. The selection of sources was based on methodological quality and the relevance of the findings to the study.

The literature sources were grouped according to the principal themes that emerged from the analysis, including digital literacy strategies, training in the use of technology in primary education and the impact of learning apps on students.

Content analysis

The subsequent phase was content analysis, which entailed a comprehensive examination of the findings from the collected research. This analysis encompassed:

- Contextualisation of the Research: Each literature source was subjected to a process of contextualisation, with the aim of gaining insight into the context in which the research was

conducted. This included consideration of factors such as the learning environment, the backgrounds of the students involved, the methods used to provide technology training, and the types of applications employed. This approach enables the mapping of factors that may influence the success of digital literacy training in primary schools.

- The process of analysis entails the identification of previous research methods. This involves an examination of the methods employed in previous studies, including whether the research was conducted through experiments, surveys, or case studies. By understanding the methods used, it is possible to identify the strengths and weaknesses of these approaches and their relevance for this study.
- The evaluation of research outcomes entailed an assessment of the extent to which students' digital literacy was enhanced through the utilisation of technology applications. In addition, previous research demonstrating the efficacy or inefficacy of this training was subjected to a critical examination, with a view to identifying potential avenues for improvement in the future.
- Patterns and trends are also identified and documented. These include common patterns or trends that emerge from the research results, such as the types of technology apps that are most effective in improving digital skills, the role of teachers, or challenges faced in training.

Synthesis of Research Results

The final stage of this literature review method is to synthesise the findings from the various studies in order to arrive at a comprehensive conclusion. This process involves:

- The synthesis of research findings is achieved by combining the analysed results to provide a comprehensive account of the impact of digital literacy training in primary schools. This synthesis is not merely a summary of the research results; rather, it is an in-depth interpretation and understanding of the manner in which the various findings complement or contradict each other.
- Identifying Relationships Between Factors: In the synthesis process, the relationships between key factors, such as students' digital skills, the types of apps used and the training strategies employed, will be analysed. This will allow us to identify which factors most influence the effectiveness of the training.
- Inference: Based on the synthesis, final conclusions are drawn regarding the impact of technology-based app training on the digital literacy of primary school students. These conclusions are not only based on the empirical findings but also consider the relevant social, cultural and educational contexts (Zare et al., 2024).

The synthesis of results also aims to identify gaps in previous research, which may require further investigation. These include areas that have been under-researched or challenges in the implementation of technology in learning that have not been addressed.

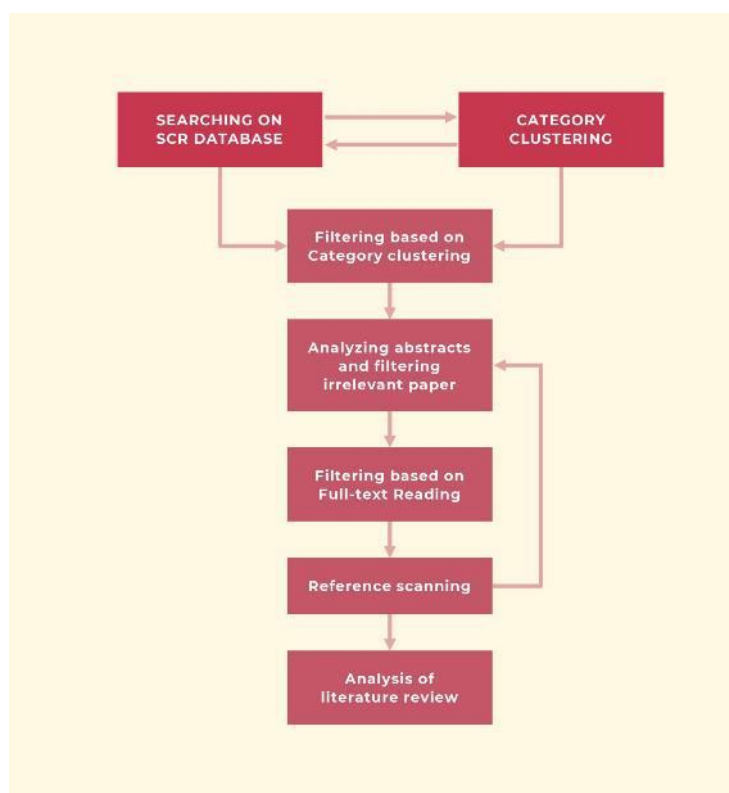


Figure 1. Literature Review Research

3. FINDINGS AND DISCUSSION

Educational games are technology-based learning tools that integrate educational elements with game elements to create an interactive, fun and challenging learning experience. The use of apps such as Kahoot! and Duolingo has been proven effective in improving students' critical thinking skills and digital comprehension. By applying a gamification approach, these apps transform the learning process into a more engaging experience and motivate students to be actively involved in learning (Priyo, J. S., Mohamad, B., & Adetunji, 2019).

3.1 E-Learning Platforms: Google Classroom and Edmodo in Online Learning

E-Learning platforms have become an essential component in modern education systems, especially with the increasing need for flexible and efficient online learning. Two e-Learning platforms that are very popular in primary to secondary education environments are Google Classroom and Edmodo. Both provide a digital space for students and teachers to access, share and interact with learning materials online, helping to digitalise the classroom learning experience (Yang, 2024).

Google Classroom

Google Classroom is an e-Learning platform designed by Google to help teachers manage and simplify the online learning process. The platform is integrated with various other Google applications such as Google Docs, Google Slides, Google Drive, and Google Meet, allowing students and teachers to collaborate online on assignments, presentations, or group discussions. Key features of Google Classroom include:

- Notice Board: Teachers can share important information or assignments quickly through the announcement feature that is accessible to all students.
- Task Management: Teachers can assign tasks, deadlines, and grading rubrics, as well as monitor student work progress in one structured platform.

- Online Collaboration: Through integration with Google Docs and Google Slides, students can work collaboratively on the same document, enhancing digital co-operation skills.
- Real-Time Feedback: Teachers can provide immediate feedback on assignments uploaded by students, which encourages continuous learning (Setiawan et al., 2021).

Google Classroom is designed to support independent and structured learning. With Google Classroom, students can access course materials, assignments and projects at any time, allowing them to learn at their own pace. This helps in developing self-directed learning skills, which is an important aspect of 21st century learning (Yusiana & Farida, 2022).

In addition, Google Classroom allows teachers to share resources in various formats, including text, videos, images, or links to external resources, which facilitates students' information retrieval capabilities. Students can also upload their assignments online, comment on their teachers' or friends' posts, and participate in structured discussions within the platform. This creates an ongoing interaction between students and teachers, albeit in a digital environment.

Using Google Classroom helps students become familiar with digital tools and ways to interact in the digital world. They learn how to:

- Use word processing applications, presentations, and online collaborative tools.
- Interact through digital platforms by adhering to digital etiquette, such as how to give constructive feedback and respect privacy in online discussions.
- Manage and organise tasks digitally, which strengthens time management skills and personal responsibility (Sadieda & Sutini, 2023).

Edmodo

Edmodo is a social learning platform that allows teachers, students and parents to communicate and share information easily. Unlike Google Classroom which is more integrated with the Google ecosystem, Edmodo focuses on building a learning community with social media-like features. The main features of Edmodo include:

- Discussion Forum: Teachers can create discussion rooms where students can participate in Q&A or share opinions on specific lesson topics.
- Virtual Classroom: Edmodo allows students to participate in virtual classes organised online, complete with course materials, quizzes and assignments.
- Parent Connection: This feature allows parents to monitor their child's learning progress and communicate with teachers.
- Resource Bank: Edmodo provides access to a global library of educational resources, which helps teachers find quality content to support learning (Prastyo & Solihah, 2021).

Edmodo facilitates collaborative learning through its discussion forum feature, where students can interact directly with their teachers or classmates in a more interactive environment. Teachers can post questions, assignments, or other learning materials, and students can respond or participate in discussions. This develops students' digital collaboration skills as well as encourages them to think critically and share knowledge with each other (Y. Ariani et al., 2017).

In addition, Edmodo gives students the opportunity to become familiar with information search and selection through various materials uploaded or provided by teachers and the global community. Students can easily access appropriate supplementary materials to deepen their knowledge outside the physical classroom.

Edmodo strengthens students' digital literacy by facilitating more structured and more active interactions. By adapting features similar to social media platforms, students also learn to use technology in an educational context, developing skills such as:

- Critical thinking in online discussions, ensuring they can convey ideas in a clear and focused manner.
- Digital etiquette, by respecting the opinions of others in discussions and understanding the rules of appropriate behaviour in learning platforms.

- Information management skills, as they can access various educational resources from digital libraries, while learning how to filter relevant information (Hong & Kim, 2024).

3.2 Definition of Gamification in Learning

Gamification is the application of game principles in a non-game context, such as education, to increase participation and engagement. In educational game applications, elements such as badges, challenges, levels and immediate feedback are used to encourage students' intrinsic motivation. Gamification allows students to feel more engaged due to the element of competition, rewards, and a sense of achievement when they successfully complete challenges in the app (Zadeja & Bushati, 2022).

Kahoot: Improving Critical Thinking Skills through Interactive Quizzes

Kahoot! is a quiz game platform that allows teachers to create interactive quizzes that students can access directly through their devices. With its time-based approach, Kahoot! creates a competitive and collaborative learning atmosphere.

Some of the ways Kahoot! improves students' critical thinking skills:

- Quick Analysis and Decision Making: Time-constrained questions force students to quickly analyse information and choose the right answer. This trains quick thinking skills and the ability to analyse options appropriately.
- Collaboration and Discussion: Kahoot! allows the use of group mode which requires students to work together to choose the best answer. This collaboration develops critical thinking skills as students have to discuss their answers with their teammates.
- Immediate Feedback: Students receive immediate feedback after answering a question, which helps them understand their mistakes and improve their thinking for the next question. This error-based learning is an important component in the development of critical thinking skills.

Through the use of Kahoot!, students are not only passively learning the subject matter, but are also required to actively engage, process information quickly, and think critically to choose the correct answer amidst time pressure (Adetunji & Ade-Ibijola, 2024).

Duolingo: Language Mastery and Digital Literacy Through Gamification

Duolingo is an educational game app designed to facilitate interactive language learning. It uses a gamification approach through the awarding of points, rewards and levels, which keeps students motivated to continue learning new languages in a fun and structured way (Sh. Zh. Zholdas et al., 2024).

Some of the ways Duolingo improves students' digital comprehension and critical thinking skills:

- Gradual Learning: Duolingo teaches languages in stages, where students must complete certain levels before moving on to more complex challenges. This process allows students to build a strong foundation in the language they are learning, while improving critical thinking skills as they have to understand and remember vocabulary and grammar rules.
- Error and Auto-Correction: Whenever students make a mistake, Duolingo provides clear auto-corrections, helping them understand where the error occurred and how to correct it. These corrections also facilitate the development of critical analysis and reflection skills.
- Repetition and Progress Monitoring: Duolingo uses a repetition system to reinforce understanding. Students can monitor their progress, which encourages them to continuously improve their language skills and digital skills, such as the use of technology-based devices and applications (Tuong & Dan, 2024).

Through gamification in Duolingo, students not only learn languages but also develop digital literacy, which is the ability to use digital technology to access, understand, and process information. The learning experience becomes more engaging as students feel motivated by gradual challenges, competition, and adequate feedback.

Benefits of Gamification in Educational Game Applications

Gamification, as implemented in Kahoot! and Duolingo, provides many benefits for primary school students, including:

- **Increases Motivation and Engagement:** Game elements such as rewards, levels, and challenges make students more excited and interested in learning. Students feel motivated to complete challenges to earn rewards or advance to the next level.
- **Active and Interactive Learning:** In apps like Kahoot!, students are actively involved in answering quiz questions or collaborating with friends. This turns passive learning into more active and fun.
- **Improved Technology Skills:** Regular use of technology-based apps improves students' ability to understand, use and utilise digital devices. This digital literacy is very important in the modern era.
- **Improved Critical Thinking Skills:** Educational games often require quick analysis, wise decision-making and problem-solving. This trains students to think critically and strategically in solving problems (F. Ariani & Afrita, 2024).

Challenges in Using Educational Game Apps

While educational gaming apps have many benefits, there are some challenges that need to be considered:

- **Dependence on Technology:** Students may become overly dependent on technology apps, requiring a balance between technology-based learning and traditional methods.
- **Technology Access:** Not all schools or students have adequate access to technology devices, so the implementation of these apps can be uneven.

2.3 Video-Based Applications: Developing Visual Literacy and Independent Learning Skills

Video-based apps have become one of the essential tools in modern learning, especially in primary schools. With visually rich content, apps like YouTube Kids and Seesaw offer a range of advantages that can help students develop visual literacy and independent learning skills (Hita et al., 2024).

YouTube Kids

YouTube Kids is a version of YouTube designed specifically for children with safer, age-appropriate content. The app offers a wide range of video content, such as educational videos, nursery rhymes, skill tutorials, and short documentaries designed to appeal to children.

Advantages of YouTube Kids in Visual Literacy Development:

- **Engaging Visuals:** Videos on YouTube Kids usually use bright visuals, interesting animations, and simple narratives. This helps students in developing visual literacy, which is the ability to understand and interpret information through visual elements such as images, graphics, and animations.
- **Educational Content:** Many videos teach basic educational concepts such as reading, arithmetic, natural science, and social skills. Through this content, children are encouraged to understand information in an easy and fun way.
- **Independent Concept Understanding:** Children can choose videos that they like, allowing them to learn independently. By watching videos that interest them, children can develop an understanding of various topics without the need for direct intervention from teachers or parents (O'Connor et al., 2023).

The Role of YouTube Kids in Enhancing Independent Learning Ability:

- **Access to Multiple Sources of Information:** Students can explore different topics that may not have been covered in class. With its kid-friendly search feature, YouTube Kids allows students to choose topics that match their interests, from academic lessons to hobbies like art, music, or science experiments.

- **Flexibility in Time and Place:** YouTube Kids can be accessed anytime and anywhere, giving students the flexibility to learn independently. They can repeat videos to deepen their understanding of a concept, according to their individual learning pace.
- **Technology Skill Development:** Using this app also trains students to recognise and understand how to work on digital platforms, which is part of digital literacy. This experience is important for students to develop the technological skills they will need in the future.

Seesaw

Seesaw is a learning app that integrates the use of visual, audio and text content, where students can create, share and comment on their assignments independently. It facilitates communication between teachers, students and parents and encourages students to learn independently through reflection and feedback.

Advantages of Seesaw in Visual Literacy Development:

- **Visual Content Creation:** Seesaw allows students to create videos, images, and infographics as part of their assignments or projects. Students not only consume visual content, but are also trained to produce their own visual content, which is important in improving visual literacy.
- **Interaction with Multimodal Media:** Students can combine visual elements with audio and text in their assignments. For example, they can record an explainer video about their project or create a visual presentation. This engages them in more interactive learning and enhances their creative and analytical thinking skills (Bawamenewi et al., 2024).

Seesaw's Role in Enhancing Independent Learning Ability:

- **Customisation of Independent Assignments:** Teachers can assign personalised tasks through Seesaw, which encourages students to work independently and at their own pace. For example, students can create digital journals containing personal reflections on their learning.
- **Real-Time Feedback:** Teachers can provide real-time feedback through the app in the form of text, voice, or video. This helps students to improve their work independently based on suggestions from the teacher, thus encouraging active engagement in the learning process.
- **Digital Portfolio:** Seesaw allows students to store and track their learning progress in a digital portfolio. Students can view their work over time and reflect, which is an important element in self-directed learning. With the ability to see their progress, students feel more responsible for their own learning process (Pradina, 2022).

Comparison of the Effects of the Two Apps

YouTube Kids focuses more on content consumption, where students learn through videos that have been prepared by content creators. This provides an opportunity for students to learn independently by exploring topics that interest them. Visual literacy is developed through interaction with visually and audibly rich videos.

Seesaw, on the other hand, is more interactive and content production-based. Students are not only consumers, but also producers of content. They develop visual literacy skills by creating visual content and getting feedback from the teacher, which encourages self-directed learning in a more structured manner.

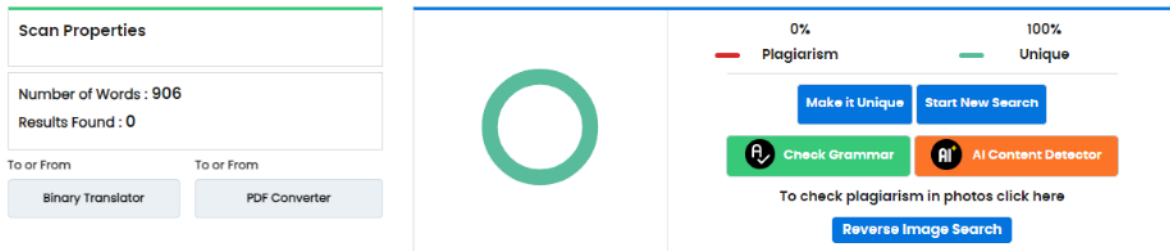
4. CONCLUSION

Training in the utilisation of technology-based learning applications in primary schools has a considerable impact on the enhancement of students' digital literacy. The utilisation of diverse e-learning platforms, educational games and video-based applications enables students to cultivate the digital competencies requisite for the contemporary era. It is imperative for educators to proactively engage in the facilitation of such technologies, thereby optimising the enhancement of digital literacy. Further research is necessary to ascertain the challenges and barriers that may be encountered in the implementation of technology in the primary school setting.

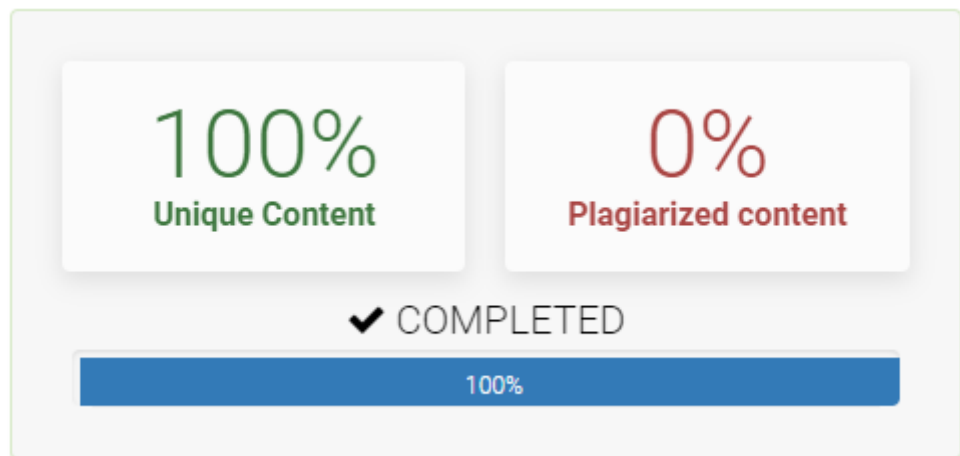
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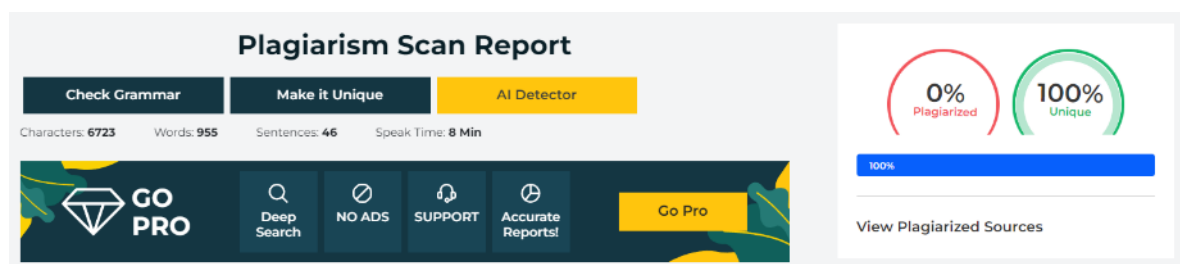
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Introduction



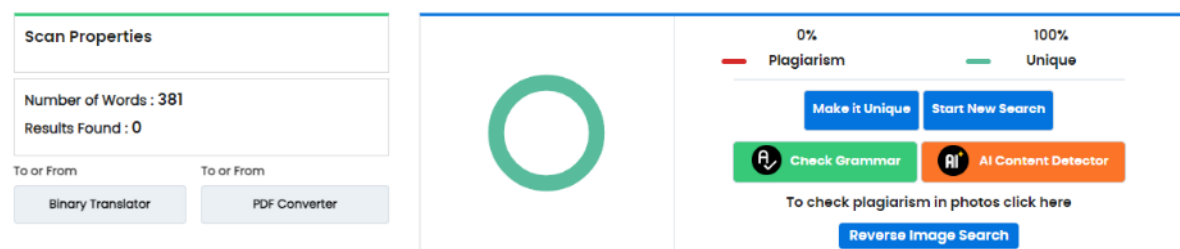
Method



Result & Discussion



Result & Discussion



Result & Discussion