

Enhancing Hots and Entrepreneurial Competencies Through Avnet Academic Applications in English Learning

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ABSTRACT

The development of e-learning in the independent curriculum for Senior High School Students (SHS) aims to foster critical reasoning, collaboration, creativity, and inspire independent learning for each student. **In accordance** with the results of the research data taken from the learning interaction in class tenth of the SHS in Humbahas Regency, Avnet Academic (A2) is able to develop autonomous learning, talents, attitudes, and academic competencies. They also were able to organize their own learning management. **The research result** showed that they improved their self-quality and the educational quality. The series of the research patterns analyzed all interactions within the A2 which was characterized by HOTS. A2 applied to the grade ten students. The students were randomly selected as many as **500 participants**. Using the A2 in learning interactions required mobile devices, Pc Computers and Laptops as access entry to serve with the various learning activity features. **The features** are integrated with YouTube, Google, Learning ID, school website and other internet-connected applications. **The research** used mixed methods as: data processing using the Excell, Amos and NVIVO applications. **Research showed** that $t_{count}=33.5$ is much greater than $t_{table}=1.96$ so it can be concluded that the A2 is not only trains English language skills but can also be integrated with other **subjects** so that cognitive, affective and psychomotor elements can be innovated, collaborated, evaluated and developed sustainably so as to produce students with HOTS character.

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1. INTRODUCTION

The characteristics and techniques of e-learning are specifically influenced by learning systems and traditions post the New Normal era [1–4]. This can be seen through the hybrid learning processes and interactions in the current curriculum which still characterize e-learning [5–8]. Aware of the level and impact of this change in learning, e-learning learning interactions with collaborative, interactional and innovative learning patterns are applied with various forms of approach with the aim of e-learning to revitalize learning interactions

so that it focuses on developing character, skills, attitudes and values [1, 9, 10].

What distinguishes A2 from other existing e-learning platforms is its specific integration with localized educational resources, the ability to personalize content based on regional challenges, and a collaborative environment that directly fosters skills such as creativity and critical thinking in underdeveloped areas. Unlike other general e-learning tools, A2 is designed to bridge the gap between urban and rural education accessibility through simplified mobile interfaces and integration with widely-used platforms like Google Learning and YouTube.

This learning interaction format which focuses on developing character, skills, attitudes and values is guided by Law no. 20 of 2003 concerning the quality of education and Sustainable Development Goals (SDGs), the Independent Curriculum and minimum competency assessments based on High Order Thinking Skills (HOTS). This research will make a real contribution to scientifically analyzing the findings of the investigation and showing the impact of e-learning characterized by higher order thinking skills. By using the results of a survey on the use of e-learning characterized by higher order thinking skills on the learning interactions of HKBP High School students in Humbahas Regency, it was found that the ability to critically reason, collaborate, be innovative and communicate is very low and this is a reflection of the inadequacy of current high school students. high level thinking [11–14].

Furthermore, according to PISA, the quality of Indonesian education is currently very low [15, 16]. This answers the current problem, namely the weak quality of universal good values, creativity, innovation, intelligence and personality in high school students. So it is really necessary to accelerate and access information, equalize access to learning and increase human resource skills through an e-learning approach characterized by higher order thinking skills with various forms of active, collaborative, innovative, quality and skilled integrated learning for each student according to their characteristics, culture and nomination social [10, 17–20].

Implementation of e-learning learning interactions characterized by higher order thinking skills developed with the Avnet Academic (A2) based e-learning application for State High School students at HKBP Humbang Hasundutan in the English subject of writing aspects. The A2 application is a virtual learning activity and interaction space that bridges limitations in interest, access and learning activities due to geographical conditions, time, space, interest, creativity and integration of various learning activities [10, 17, 21, 22]. The use of A2 is really needed for the reasons: simplicity, social proof, good provider, accessibility, practicality, applicability and effectiveness [23–28].

Higher order thinking skills overcome limitations in increasing the values of universal goodness, reasoning, understanding, independence, responsibility, innovation and collaboration in learning [29–31]. This research specifically shows the scientific strength of A2 Application collaboration based on higher order thinking skills in English language learning interactions in writing aspects [32–35] so that an increase in reasoning, creativity, independence, skilled, superior and character is found [36, 37] in accordance with the vision and mission of Humbahas Regency (<https://humbanghasundutankab.go.id/>).

The importance of this research being carried out is divided into two parts, namely: First, to produce an English e-learning application that is fun, easy, and interesting [23, 38, 39], called the A2 Application, which not only trains English language skills but can also be integrated with other subjects so that cognitive, affective, and psychomotor elements can be innovated, collaborated, and evaluated naturally. This aims to produce students with HOTS character according to their potential and abilities. Apart from that, the development of the A2 application is the result of a campus laboratory, which is expected to improve the quality of education in the farthest and most underdeveloped regions, villages, sub-districts, and districts, providing a foundation for improving quality and character.

This research aims to ensure that every participant from the school community, especially teachers and students, can use the A2 Application to develop every potential from their geographical, social, economic, and cultural location to become a force for improving education in Indonesia, especially in Humbahas Regency. As shown in Figure 1 RCA, the A2 application addresses these root causes by providing structured solutions that foster HOTS development. HOTS is a learning interaction method that develops the Pancasila Student Profile, as stipulated in the Minister of Education and Culture Regulation Number 22 of 2020 concerning the Strategic Plan of the Ministry of Education and Culture for 2020–2024. RCA illustrates the step-by-step process of identifying and addressing the root causes of educational challenges faced by students. This analysis directly supports the study's focus on improving HOTS through targeted interventions within the A2 application.

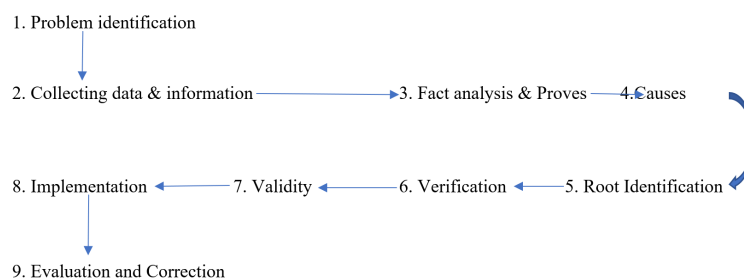


Figure 1. RCA (Root Cause Analysis)

First, as a form of transformation of independent education by Higher Education [9, 40–42], where researchers as academic cadres see education as a complete integral between educational units at the high school to university level. Then, this is also to translate Minister of Education and Culture Regulation no. 53 of 2023 to the high school equivalent level. Development of an integrated independent learning program so that the outward potential of each student in accordance with the spirit of Ki Hajar Dewantara is stimulated and developed with independence, collaboration and innovation through HOTS learning with the development of the A2 application. Furthermore, in terms of quality assurance, the A2 application is able to map the resources, strengths, challenges and weaknesses that exist in schools to then be modified and moderated by internal quality assurance in schools, for example school human resources who do not understand and master e-learning with features. Satisfaction questionnaires can map teacher problems so that effective and efficient ways are found for teachers to be able to apply e-learning in learning. And the same goes for the accuracy and speed of administrative communication channels, interactive school bureaucracy. School supervision and management can also be carried out more easily. E-learning applications can be maximally useful in supporting school needs, presenting the future and being creative beyond geographic, time and space flexibly [8, 10, 43, 44].

Second, as part of the transformation of independent education by Higher Education [9, 40–42], researchers, as academic cadres, view education as an integral system from high school to university levels. This also translates Minister of Education and Culture Regulation no. 53 of 2023 to the high school level. The development of an integrated independent learning program stimulates each student's potential in the spirit of Ki Hajar Dewantara, promoting independence, collaboration, and innovation through HOTS learning via the A2 application. In terms of quality assurance, the A2 application maps the resources, strengths, challenges, and weaknesses in schools, which can then be modified and addressed through internal quality assurance measures. For instance, satisfaction surveys help identify teacher challenges, leading to efficient solutions for e-learning adoption. This also improves the accuracy and speed of administrative communication and enhances interactive school bureaucracy. School supervision and management become more streamlined. Overall, e-learning applications support school needs by enabling flexible, creative learning beyond geographic, time, and space constraints [8, 10, 43, 44].

1.1. Problem Formulation

There is not yet an English learning application that supports the HOTS application according to the characteristics of the main problem studied in this research. To overcome this problem, researchers will utilize a similar learning syntax, for example PBL, to integrate the data found in the development of A2. The formulation of this research problem is:

- Do HOTS skills (analyzing, evaluating, and creating) improve after the implementation of the A2 application?
- What are students perceptions, in terms of usefulness, satisfaction and ease of the A2 application?
- A2 be useful in developing Sustainable Development Goals (SDGs)?

1.2. Problem Formulation

The approach to problem solving is implemented in three parts:

- Short term approach. Forming the concept and prototype of the SDGs-based A2 Application.
- Medium term approach. Research and produce SDGs-based learning models that improve the quality of human resources.

1.3. State of The Art and Novelty

Through various novelty search applications, the Avnet Academic Application has never been used anywhere and at any time, so that through carrying out this research, it is hoped that its application and development can be optimized more optimally with more diverse subjects, objects, research models and variables. Compared to traditional teaching methods, which often rely on rote memorization, the A2 platform leverages interactive assessments and scenario-based learning to directly engage students in the application of HOTS skills. The difference lies in its adaptability A2 dynamically adjusts to student progress, fostering critical thinking through continuous feedback, a feature that traditional methods lack. The novelty of this research is to explain in detail and clearly the findings of the results of using web based learning A2 which is characterized by higher order thinking skills in the interaction of learning to write English for class X students of the Merdeka Belajar curriculum in high schools throughout Humbahas Regency. Apart from that, the A2 web based learning application characterized by higher order thinking skills contributes solutions to complex educational problems in Indonesia.

1.4. Academic Avnet Application

This web school acts as a digital hub where teachers and students can have more space to do teaching and learning interaction interactively. Teachers have spaces to share their topics, materials, curriculum, quizzes, assignment, and project. Then students and teachers have an engaging learning experience based on the curriculum. This website also helps students feel connected to each other and their teachers. This academic website provides spaces for students to discuss, chat and work on group projects. Then it also shares help to the students to stay motivated and on track with their studies.

As there are sciences and social lessons in high school curriculum, the web designers provided students with sorts of symbols, design, and connection to apps online. This brings learning experiences and collaboration from their environment to all around the world easily. Through their account and password, the students can access all the materials on the class which is shared on the web everywhere and every time.

Academic Avnet Application constructed and granted learning access for all the students, rather than a privileged minority group. The academic application brings access to abundant learning resources. And characteristics of active learning as HOTS learning also can be applied. HOTS learning characteristics as focus on question, analyzing, defining, determining, employing, processing, application and creating are successfully applied on the web and bring interesting learning experiences to the students.

As a product of new educational era, the academic application <https://aplikasiakademik.id/login> solves the problem of distance education, natural disasters and pandemic diseases. People has known how to operate their smart phones effectively and use them to support teaching-learning interaction. They can easily do experiential learning smartly. Then more and more schools have used e-learning, digital learning and also educational web to help their students more interesting in order to create and to innovate. Schools changes as educational environment changes and follow the technology enhancement. Through the academic application, students develop their autonomous learning, critical thinking, communicating competences, collaboration and creativity. The characteristics and how the work of the Academic Avnet Application in every teaching interaction are shared in the explanation below:

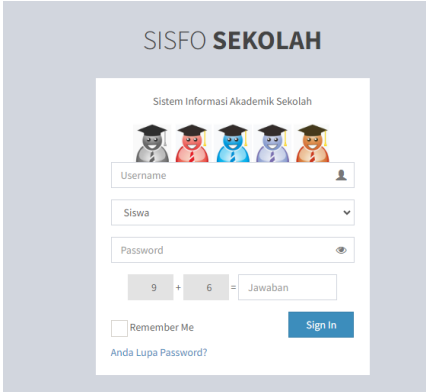


Figure 2. Verification Account

This is the main menu of the Avnet Academic Application, on the dashboard side, user has domains as a visitor then click to join with the group. The groups are teachers, students, administrators, staff and parents. Inside the group every visitor can see announcement and information of the academic programs as enrollment, curriculum, academic information, human resources, facilities, academic calendar, and FAQ. Then there are also social media and online advertising that allow every visitor to do more search, comment and share anything about the school. This helps the school connected and reach more potential students.

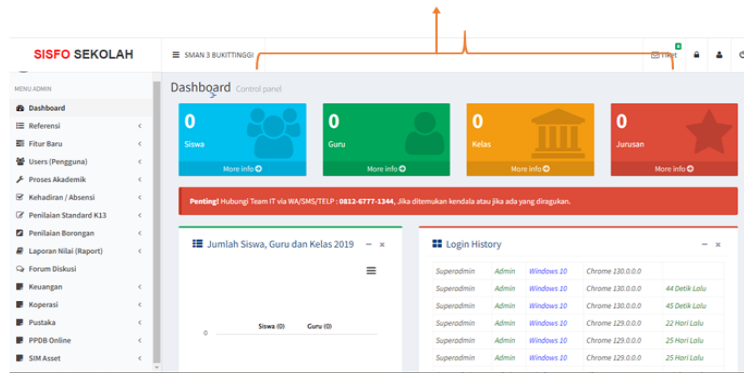


Figure 3. Front Look

On the left side of the Avnet Academic Application, visitor has access to the online attendance list, e-learning class, quizzes, group project, mid-term and final examination report, e-book, comment, and questionnaires. Every part is designed visible to scroll then from the main page to the other page keep visitors engaged. Users can quickly access the information they need without having to spend unnecessary time clicking around the site. Students have e-learning access on multiple devices as laptops, tables, and smartphones.

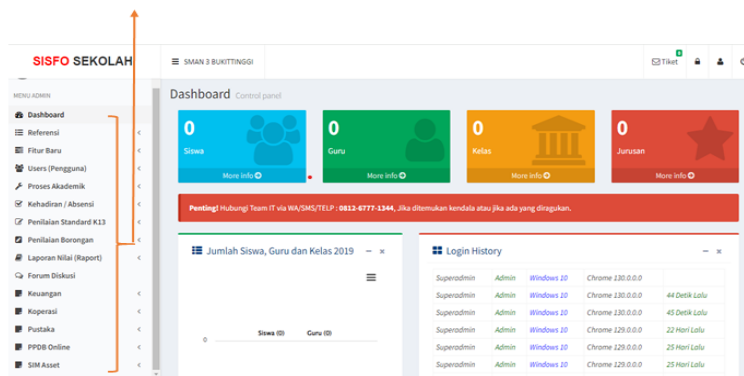


Figure 4. The Parts of the Academic Modul

2. RESEARCH METHOD

The research method used is the mixed methods approach. Excel was used for preliminary data organization, AMOS for structural equation modeling, and NVIVO for qualitative data analysis, ensuring a comprehensive understanding of both quantitative and qualitative findings. Mixed methods were chosen to examine the influence and process of e-learning applications in learning interactions. This research is based on interviews with users, namely, 500 randomly selected high school students in Humbahas Regency. Our survey results will also measure the usage of the A2 application, revealing its advantages and disadvantages to inform its future development. Data testing was carried out using an experimental model. To measure the population's English writing proficiency, the Bloom's Taxonomy approach was used. Mixed methods were employed to measure the impact of using the A2 application and the satisfaction survey results. To answer research question number 1, a quasi-experiment will be applied, while for questions 2 and 3, a questionnaire (5 Point Likert

Scale) will be distributed to students using the A2 application. The initial design, in the form of learning steps, has been formulated by researchers by completing the A2 Application with various learning tools, such as: Teaching Modules, Quizzes, Essays, Media, UTS, and UAS. Experimental data will be analyzed using SPSS version 25 and one-way ANOVA, while questionnaire data will be analyzed using descriptive statistics. To ensure accurate results, SPSS version 25 will be used throughout the analysis. The flow of this research is as follows:

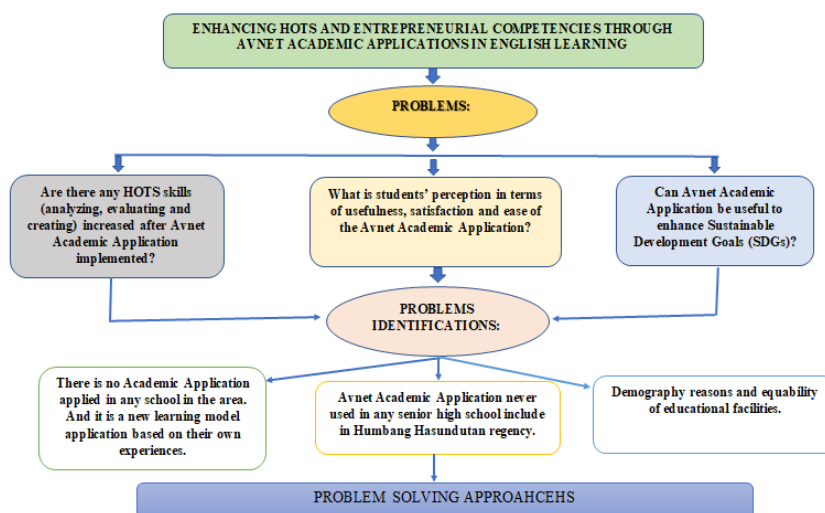


Figure 5. Research Methods

3. RESULTS AND DISCUSSION

The results of this research have a draft which has been studied using the mixed methods. The A2 application implemented shows that the Avnet Academic Application (A2) is able to meet e-learning learning needs, such as the availability and ease of access to learning features. Furthermore, the implementation of A2 which is characterized by HOTS obtains satisfaction because the test results are in accordance with the student's abilities and can be seen transparently. The A2 application specifically addresses the geographical and infrastructural challenges faced by students in remote regions by optimizing content delivery for low-bandwidth conditions and offline access. The significant improvement in post-test scores directly supports the research question on HOTS development. For instance, students demonstrated enhanced problem-solving abilities by applying critical thinking in scenario-based exercises. The app includes features that allow students to download materials in advance, ensuring continuous learning even with intermittent internet connectivity. The objects of this research were 500 class X SMA Humbahas Regency students. The results of the research obtained the following data. This significant increase in post-test scores highlights the A2 application's role in enhancing cognitive abilities related to HOTS. The source of the pre-test and post-test data comes from a controlled study conducted with 500 high school students in Humbahas Regency :

- Average pre-test score (before using AVNet): 65
- Average post-test score (after using AVNet): 80
- Estimated standard deviation of the difference between pre-test and post-test scores: 10

The t-test calculation is carried out as follows:

$$t = \frac{X_{\text{post}} - X_{\text{pre}}}{\frac{s_{\text{diff}}}{\sqrt{n}}} = \frac{80 - 65}{\frac{10}{\sqrt{500}}} = 33.55 \quad (1)$$

Where:

- $X_{\text{post}} = 80$
- $X_{\text{pre}} = 65$
- $s_{\text{diff}} = 10$
- $n = 500$

Based on the t-distribution table for $df = 499$ and a significance level α of 0.05, the critical t value is approximately 1.96. Since $t_{\text{count}} = 33.55$ is much greater than $t_{\text{critical}} = 1.96$, there is a statistically significant difference between the pre-test and post-test scores. The educational implication of this significant difference suggests that the integration of A2 can transform the learning experience by not only improving student scores but also enhancing how students approach problem-solving and critical thinking tasks. These results indicate that A2 can serve as an essential tool for fostering deeper cognitive engagement in a sustainable way, supporting long-term educational outcomes. This demonstrates that the use of the AVNet application significantly increases students' HOTS. By fostering critical reasoning and autonomous learning, the A2 application supports Sustainable Development Goal 4, which aims to provide inclusive and equitable quality education for all.

The AVNet application has succeeded in increasing students' Higher Order Thinking Skills (HOTS) through the following mechanisms:

Use of Interactive Learning Methods

- **Interactive Quizzes and Exercises:** AVNet uses quizzes and exercises designed to challenge students in various aspects of HOTS, such as analysis, evaluation, and creation. Students are not only asked to remember information, but also to apply it in more complex contexts.
- **Instant Feedback:** By providing feedback immediately after students complete a quiz or exercise, the app allows students to understand their mistakes and learn from them. This helps strengthen a deeper understanding of the concept.

Providing Relevant and Challenging Content

- **Authentic Text and Material:** The app may provide reading material or questions that are relevant to daily life or topics that interest students. This encourages them to think critically and relate concepts to real experiences.
- **Varied HOTS Questions:** The questions in the app not only test basic knowledge, but also engage students in higher-order thinking processes, such as constructing arguments, evaluating opinions, and designing solutions to specific problems.

Online Collaboration and Discussion

- **Discussion Forums:** The discussion feature in AVNet allows students to collaborate and discuss various topics. These discussions encourage students to think critically, consider multiple points of view, and articulate their opinions clearly.
- **Collaborative Projects:** AVNet may also facilitate group projects where students must work together to complete complex tasks, requiring them to use both analytical and creative skills.

Application of Problem-Based Learning (Problem-Based Learning)

- **Case Studies and Scenarios:** This application can provide case studies or scenarios that require problem solving. It encourages students to use HOTS skills such as analysis, synthesis, and evaluation to find appropriate solutions.
- **Simulations and Educational Games:** Through simulations or educational games, students are placed in situations where they have to make critical decisions and evaluate the consequences of those decisions.

Personalized Learning Adaptation

- **Difficulty Adjustment:** AVNet may adjust the difficulty of material or questions based on individual student abilities, ensuring that each student is challenged at the right level for them. This helps in improving HOTS effectively.
- **Progress Tracking:** With the progress tracking feature, students can see their own progress and are motivated to continue improving their higher-order thinking skills.

Motivation and Gamification

- **Points and Badge Systems:** These apps can use gamification, such as giving points, badges, or other rewards to encourage students to continue using the app and actively participate in the learning process.
- **Weekly or Monthly Challenges:** These challenges encourage students to compete healthily and try harder to achieve targets, which in turn improves their HOTS skills.

The end result with a combination of interactive learning methods, challenging content, collaboration, and personalized customization, AVNet provides a learning environment that supports HOTS development. Students not only learn English, but also hone critical, analytical, and creative thinking skills, which are very important in 21st century learning.

4. MANAGERIAL IMPLICATIONS

The implementation of the A2 application demonstrates that e-learning platforms, particularly those integrating Higher-Order Thinking Skills (HOTS), are essential for improving educational quality, especially in underdeveloped regions. Managers in educational institutions should prioritize adopting and investing in such platforms to provide equitable and high-quality learning experiences. The success of the A2 application in addressing regional challenges, such as low bandwidth and offline access, suggests that managers should focus on localized educational solutions. By customizing e-learning tools to meet the specific needs of remote or underserved regions, institutions can bridge educational gaps and foster inclusivity. The A2 application's measurable improvements in student performance (as evidenced by significant pre-test and post-test score differences) highlight the importance of using data analytics for educational decision-making. Managers should integrate tools like SPSS and AMOS to track progress and make informed, evidence-based improvements in teaching methods and content delivery.

Many educators may struggle with e-learning adoption due to a lack of technical skills. It is crucial for management to implement targeted training programs to enhance teachers' proficiency with digital tools, enabling them to effectively utilize e-learning platforms and improve teaching outcomes. The A2 application aligns with Sustainable Development Goal 4 (SDG 4), which focuses on inclusive and equitable quality education. Managers in educational institutions should view technology integration as a long-term strategy not only to improve educational quality but also to contribute to global initiatives like the SDGs. This alignment can also help institutions secure funding and partnerships.

5. CONCLUSION

The implementation of the Avnet Academic Application (A2) has successfully enhanced students' academic performance by fostering Higher-Order Thinking Skills (HOTS), independent learning, and creativity among high school students in Humbahas Regency. The significant improvement in post-test scores demonstrates the effectiveness of A2 in addressing educational challenges and enhancing students' cognitive abilities. The A2 application not only supports English learning but also integrates with other subjects, creating


a comprehensive learning environment that improves students' problem-solving abilities, critical thinking, and collaborative skills.


Furthermore, the flexibility of the A2 platform in overcoming geographical and infrastructural challenges ensures that students in remote areas can access quality education. The alignment of the A2 application with Sustainable Development Goal 4 (SDG 4) emphasizes its role in promoting inclusive and equitable education for all. The positive outcomes of this research highlight the importance of adopting e-learning systems like A2 to provide students with essential skills for 21st-century learning, ensuring long-term educational improvement and sustainability.

6. DECLARATIONS

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6.2. Author Contributions

Conceptualization: MS, AS, HS, RP and RT; Methodology: MS, AS, HS, RP and RT; Software: MS and AP; Validation: MS; Formal Analysis: MS, AS, HS, RP and RT; Investigation: MS, AP, HS and RP; Resources: MS; Data Curation: MS, AS, HS, RP and RT; Writing Original Draft Preparation: MS, AS, HS, RP and RT; Writing Review and Editing: MS, AS, HS, and RP; Visualization: MS; All authors, MS, AS, HS, RP and RT, have read and agreed to the published version of the manuscript.

6.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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6.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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