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Analyzing the Impact of Academic Environment and Mentorship on the Research Ability of Master's Students in Chemistry

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Abstract: This paper examines the impact of academic environment and mentorship on the research ability of master's students in chemistry. A structured survey was conducted among students and faculty at several institutions to evaluate how different elements of the academic setting, including laboratory resources, faculty support, and peer interactions, affect research outcomes. Additionally, the role of mentorship in developing research skills was explored, focusing on mentor-mentee relationships, guidance quality, and the frequency of interactions. The results indicate that a supportive academic environment and effective mentorship significantly enhance research capabilities. High-quality resources, a collaborative atmosphere, and active mentorship contribute to better research performance and skill development. This study provides valuable insights for educational institutions seeking to optimize their support systems to foster advanced research skills in chemistry students.

Keywords: Academic Environment; Mentorship; Research Ability; Chemistry Master's Students; Educational Support

1. INTRODUCTION

In the realm of graduate education, particularly within the field of chemistry, the research ability of master's students is a crucial determinant of academic and professional success. The academic environment and mentorship are two pivotal factors influencing this ability. An optimal academic climate, characterized by state-of-the-art laboratory facilities, supportive peers, and collaborative opportunities, can significantly enhance students' research capabilities. Similarly, effective mentorship provides essential guidance, fosters critical thinking, and helps navigate the complexities of research endeavors. (Ertmer, P. A., & Newby, T. J.,2018) This study aims to analyze how these elements—academic environment and mentorship—affect the research proficiency of master's students in chemistry. The study seeks to identify key aspects contributing to a more effective research experience by investigating the interplay between these factors. Understanding these dynamics can offer valuable insights for educational institutions striving to enhance their support structures and ultimately improve research outcomes for graduate students. The findings will also shed light on how strategic improvements in academic and mentorship practices can better prepare students for successful careers in scientific research. (Johnson, W. B.2016)

2. LITERATURE REVIEW

The research ability of master's students, particularly in the field of chemistry, is a subject of growing interest in educational research. Several studies have highlighted the importance of a conducive academic environment in fostering research skills. (Boud, D., & Brew, A. 2018) A well-resourced academic setting, including access to advanced laboratory equipment, comprehensive library resources, and a collaborative atmosphere, has significantly impacted students' research outcomes. For example, studies have demonstrated that students with access to modern laboratories and collaborative research opportunities are more likely to develop critical research skills and produce high-quality research. Furthermore, the role of peer interactions within the academic environment cannot be overlooked, as collaborative learning and peer support have been linked to enhanced problem-solving abilities and innovative thinking in research contexts. (Cresswell, J. W., & Creswell, J. D. 2020)

Mentorship has also been extensively studied as a key factor in developing research ability. Effective mentorship involves not only providing technical guidance but also offering emotional support, career advice, and fostering a sense of academic identity. Research indicates that students who receive consistent, high-quality mentorship are more likely to develop strong research skills, publish their work, and pursue academic careers. The mentor-mentee relationship is particularly crucial in the sciences, where the complexity of research often requires close guidance and ongoing feedback. Several studies have emphasized the positive impact of mentorship on research productivity and student satisfaction, suggesting that mentors play a vital role in shaping the research trajectories of their students.

In chemistry education, integrating these two elements—academic environment and mentorship—creates a framework that can either enhance or hinder research development. While some studies have explored these factors independently, there is a growing recognition of the need to examine their combined impact on research ability. (Lave, J., & Wenger, E. 2017). This review highlights that while academic

environment and mentorship are critical, their effectiveness is often interdependent. For instance, even the most advanced laboratory resources may not fully benefit students without the proper mentorship to guide their use. Conversely, strong mentorship can sometimes compensate for a less optimal academic environment, but there are limits to what mentorship alone can achieve. (Wenger, E. 2018)

This literature review underscores the importance of a holistic approach to improving research ability, considering the physical and intellectual environments in which students operate. The existing body of research suggests that optimizing both the academic environment and mentorship practices is essential for cultivating the next generation of chemists who are technically proficient, innovative, and independent researchers. However, there is a gap in the literature regarding how these factors specifically interact in chemistry at the master's level, pointing to the need for further research that this study aims to address.

3. METHODOLOGY

This study employs a mixed-methods research design to analyze the impact of academic environment and mentorship on the research ability of master's students in chemistry. The research was conducted across several universities offering graduate programs in chemistry to ensure a diverse and representative sample. The study combines quantitative surveys with qualitative interviews to comprehensively understand the factors influencing research ability.

The quantitative component involved a structured survey distributed to master's students in chemistry programs. The survey included questions designed to measure various aspects of the academic environment, such as the availability of laboratory resources, access to research materials, and opportunities for collaboration with peers and faculty. It also assessed the quality of mentorship by evaluating the frequency and quality of interactions between students and their mentors and the perceived support in both academic and career development. The survey responses were analyzed using statistical methods to identify correlations between these factors and the students' self-assessed research abilities.

To complement the quantitative data, qualitative interviews were conducted with a select group of students and faculty members. These interviews aimed to explore in greater depth how specific elements of the academic environment and mentorship practices influence the research process. The interviews provided insights into students' personal experiences, including challenges faced and strategies employed to overcome them. Faculty interviews offered perspectives on the role of mentorship in fostering research skills and the importance of institutional support in creating a conducive research environment.

Data analysis involved a triangulation approach, where findings from the quantitative surveys were cross-referenced with insights from the qualitative interviews to validate the results. The statistical analysis helped to identify critical factors within the academic environment and mentorship that significantly impact research ability. At the same time, the qualitative data provided context and a deeper understanding of these relationships.

This methodology ensures a robust and holistic examination of the research question, allowing for a nuanced understanding of how the academic environment and mentorship contribute to developing research skills in chemistry master's students. The combination of quantitative and qualitative approaches enables the study to capture the measurable impacts and the experiential aspects of research training in this field.

4. RESULTS

The results of this study reveal a significant relationship between the academic environment, mentorship quality, and the research ability of master's students in chemistry. The quantitative data indicates that students who reported access to well-resourced laboratories, comprehensive research materials, and a collaborative academic atmosphere exhibited higher levels of research proficiency. These findings align with recent theories in educational research, such as Vygotsky's Social Constructivist Theory, which emphasizes the role of social interaction and collaborative learning in cognitive development. The study's findings suggest that an enriched academic environment, where students engage with peers and faculty in meaningful ways, fosters the critical thinking and problem-solving skills essential for successful research.

Furthermore, the quality of mentorship emerged as a critical factor influencing research ability. Students who experienced regular, constructive interactions with their mentors demonstrated greater confidence in their research skills and were likelier to engage in complex research projects. This supports the findings of recent studies, such as those based on Bandura's Social Learning Theory, which highlights the importance of modeling and guided practice in skill acquisition. Mentors who provided technical guidance and emotional and career support were found to enhance their mentees' research abilities significantly. These mentors effectively acted as role models, helping students navigate research challenges and encouraging them to take intellectual risks.

The study also uncovered the interdependence between the academic environment and mentorship. While a supportive educational environment alone positively influenced research outcomes, its impact was significantly amplified when coupled with high-quality mentorship. This finding resonates with the Theory of Situated Learning, which posits that learning occurs most effectively within a community of practice. In this context, the chemistry research environment, supported by mentorship, acts as a community where students learn by participating in shared practices, receiving feedback, and gradually assuming more responsibility in research activities.

Qualitative data from student interviews reinforced these quantitative findings, with many students emphasizing the transformative effect of solid mentorship in their research journey. Faculty interviews further highlighted the importance of institutional support in creating an environment conducive to effective mentorship, including providing adequate time for mentors to engage with students and fostering a culture of collaboration.

Overall, the results underscore the critical role of both the academic environment and mentorship in shaping the research abilities of master's students in chemistry. These findings suggest that institutions aiming to enhance the research proficiency of their students should focus on creating a well-resourced, collaborative academic environment and fostering robust and supportive mentorship relationships. By doing so, they can significantly contribute to the development of skilled, confident researchers in the field of chemistry.

5. DISCUSSION

The findings of this study highlight the profound impact that both academic environment and mentorship have on the research abilities of master's students in chemistry. The results corroborate and extend recent educational theories, offering valuable insights into how these factors interact to shape the research competencies of graduate students.

The strong correlation between a well-resourced academic environment and enhanced research ability supports the application of Vygotsky's Social Constructivist Theory within the context of graduate education. (Daniels, H. 2016) This theory, which emphasizes the importance of social interactions and cultural tools in cognitive development, provides a framework for understanding how access to advanced laboratories, collaborative spaces, and rich academic resources can stimulate intellectual growth and research skills. In line with Vygotsky's perspective, the study's findings suggest that students immersed in a resource-rich academic environment are more likely to engage in higher-order thinking and complex problem-solving, which are crucial for successful research.

Mentorship quality also emerged as a critical determinant of research success, aligning with Bandura's Social Learning Theory, which posits that learning occurs through observation, imitation, and modeling. (Schunk, D. H. 2012)The study demonstrates that influential mentors impart technical knowledge and model the attitudes and behaviors necessary for research excellence. These findings underscore the importance of mentorship for transmitting research culture and practices, which is essential for developing students' research identities and capabilities. Moreover, mentors who provide psychological support and career guidance help students navigate research challenges, fostering resilience and persistence—traits increasingly recognized as vital for research success in contemporary educational theory.

The interaction between academic environment and mentorship also aligns with the Theory of Situated Learning, which emphasizes learning as a process of participation in a community of practice. This theory is particularly relevant in graduate chemistry programs, where research skills are often developed through active participation in research groups and projects. The study's results suggest that students are more likely to acquire and refine the complex skills necessary for independent research when they are embedded in a supportive academic community with strong mentorship. This synergy between environment and mentorship creates fertile ground for developing the next generation of technically proficient chemists capable of innovative and independent research.

However, the study also highlights the variability in students' experiences, pointing to areas where institutional improvements could be made. Some students reported gaps in mentorship or access to resources, which hindered their research progress. This variability suggests that while mentorship and a supportive academic environment are broadly beneficial, their effectiveness can be influenced by institutional policies, the availability of resources, and the mentor's commitment. These findings align with the theory of Transformative Learning, which suggests that significant learning and personal growth occur when students are supported in critically reflecting on their experiences. Institutions that foster reflective practices and provide consistent, high-quality mentorship will likely see the most significant gains in student research ability.

In conclusion, this study reinforces the critical role of both academic environment and mentorship in shaping the research abilities of master's students in chemistry. The findings offer a nuanced understanding of how these factors influence research success by integrating recent educational theories. (Mezirow, J., & Associates. 2000). Institutions seeking to enhance their graduate programs should focus on creating resource-rich, collaborative environments and supporting mentorship practices that model research excellence and provide comprehensive support to students. This holistic approach will improve research outcomes and prepare students for successful careers in scientific research.

6. CONCLUSION

This study has provided a comprehensive analysis of the impact of academic environment and mentorship on the research abilities of master's students in chemistry. The findings emphasize these factors' critical role in fostering research competence, highlighting the need for institutions to carefully consider how they structure and support their academic and mentoring frameworks.

Drawing on Vygotsky's Social Constructivist Theory, the study demonstrates that a resource-rich academic environment, characterized by advanced laboratories, access to extensive research materials, and opportunities for collaboration, significantly enhances students' research abilities. These findings suggest that students thrive in environments where they can engage with complex research tasks and collaborate with peers and faculty, thereby developing the critical thinking and problem-solving skills essential for advanced research.

The study also underscores the importance of mentorship, supported by Bandura's Social Learning Theory. Influential mentors serve as guides and role models, offering technical expertise and emotional support crucial for student development. When done effectively, mentorship helps students internalize research practices, build confidence, and overcome challenges, ultimately leading to greater research productivity and quality.

Furthermore, the study's findings align with the Theory of Situated Learning, illustrating that the interplay between a supportive academic environment and high-quality mentorship creates a community of practice where students can actively participate and grow as researchers. This synergy

improves research outcomes and prepares students for the demands of professional scientific research, making them more adept at independent inquiry and innovation. (Kuh, G. D. 2009)

In conclusion, the research highlights the necessity for educational institutions to cultivate a conducive academic environment and a robust mentorship culture. These elements are not merely supportive but are fundamental to developing strong research capabilities in master's students. As educational theories from the past decade suggest, learning and skill acquisition are deeply embedded in the social and environmental contexts in which students operate. Therefore, institutions that prioritize these aspects are likely to produce graduates who are proficient in their research skills and well-prepared to contribute meaningfully to the field of chemistry.

This study advocates for a holistic approach to chemistry graduate education, where environmental and interpersonal factors are optimized to support student success. Future research could explore strategies for enhancing these areas, contributing to a deeper understanding of how to best equip the next generation of researchers in this critical field.

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Research on the Integration of Confucian Ethical and Moral Views into Ideological and Political Education in Vocational Colleges

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Abstract: As an essential component of traditional culture, Pre-Qin Confucian ethical and moral views hold significant educational value for contemporary ideological and political education in vocational colleges. This paper delves into the specific connotations and contemporary educational values of Pre-Qin Confucian ethics, analyzing the current state of ideological and political education in vocational colleges. It proposes paths for integrating these ethical views into students' ideological and political education, such as dual-classroom models and online Confucian cultural platforms, emphasizing their practical significance.

Keywords: Pre-Qin Confucianism; Ethical and Moral Views; Ideological and Political Education; Higher vocational school; culture

1. INTRODUCTION

Chinese traditional culture, profound and long-standing, is a valuable spiritual heritage of the Chinese nation. Confucianism, as the core of traditional Chinese culture, has been the official ideology and cultural symbol since the Han dynasty, spreading widely and influencing globally. The ethical and moral views of Pre-Qin Confucianism originated in ancient ethical theories, becoming significant norms and tools in Chinese feudal society. These views are considered the foundation of Chinese moral thought, profoundly impacting feudal political systems and moral education.

In the context of modernization and globalization, the integration of traditional culture with modern educational systems has become a pressing issue. Vocational colleges, key institutions for training technical and skilled talents, face challenges in ideological and political education, including monotonous course content, rigid educational forms, and low student engagement, leading to unsatisfactory educational outcomes. Incorporating Pre-Qin Confucian ethical views into vocational ideological and political education enriches educational content, enhances its appeal and effectiveness, and improves students' moral and cultural cultivation. This approach not only inherits and promotes traditional Chinese culture but also innovates vocational education amidst modernization and globalization. By merging these elements, students can develop both technical skills and comprehensive moral and cultural qualities, better adapting to societal needs.

2. The Content and Contemporary Value of Pre-Qin Confucian Ethical and Moral Views

2.1 Core Content of Pre-Qin Confucian Ethical and Moral Views

Confucianism, a major representative of traditional Chinese thought, was founded by Confucius in the late Spring and Autumn period, becoming one of the main schools during the Hundred Schools of Thought era. Confucius emphasized "Ren" (benevolence), advocating virtuous governance, moral rule, and the use of "Li" (ritual) as behavioral norms and "Zhongyong" (the Doctrine of the Mean) as moral principles. These theories laid the foundation for Pre-Qin Confucianism. Mencius expanded on Confucius' ideas, asserting the innate goodness of human nature and emphasizing benevolent governance and respect for public opinion. Xunzi, however, believed in the inherent evil of human nature, advocating for the maintenance of social order through rituals and laws, emphasizing "Lifelike Law." This paper primarily discusses the theories of Confucius, Mencius, and Xunzi. As Xiong Shili noted, "Chinese academic thought should trace back to late Zhou, where Confucianism is orthodox, and Confucius is the great ancestor of Confucianism."

2.2 Main Characteristics of Pre-Qin Confucian Ethical and Moral Views

Pre-Qin Confucian ethical views have shown strong vitality through millennia, primarily characterized by their political functionality and inheritability. Firstly, their political nature emphasizes serving politics through ethics and morals. Confucian thought advocates governance by virtue, maintaining social order and long-term stability through moral education and rituals. Confucius believed that morality is the foundation of politics, with rulers exemplifying virtue to influence the populace, promoting a "rule by virtue" ideal. Mencius further developed this idea with his "benevolent governance" concept, emphasizing rulers' care for people's welfare, leading to the belief that "those who win the people's hearts win the world." Xunzi advocated for combining rituals and laws to achieve social harmony and stability. Despite different slogans, they all stressed the political function of ethics and morality.

Secondly, the inheritability of Pre-Qin Confucian ethical views extends their core values' influence beyond their era. Confucius' "rule by virtue" and "universal love and kindness" principles, Mencius' "great man spirit" emphasizing integrity and moral ideals, and Xunzi's methods for moral education still hold universal significance today, providing valuable insights for contemporary moral education and social governance.

2.3 The Educational Functions of Pre-Qin Confucian Ethical and Moral Views

The ethical and moral views of Pre-Qin Confucianism are an important part of ancient Chinese thought and culture. Their rich concepts and methods of moral education have significant reference value for modern education, especially in ideological and political education, patriotic education, and civic moral education. Pre-Qin Confucianism emphasizes the primacy of moral education and the unity of knowledge and action. Through moral cultivation and practice, it helps students achieve comprehensive development, shape the spirit of a true gentleman, and promote the construction of socialist spiritual civilization.

In terms of educational content, Pre-Qin Confucianism emphasizes patriotism, advocating that both rulers and the people should prioritize national interests and maintain national unity and stability. Confucius' concept of "cultivating oneself, regulating the family, governing the state, and bringing peace to the world" highlights the close relationship between personal moral cultivation and state governance. This can guide students to establish a correct view of the country and a sense of social responsibility, fostering patriotism and a spirit of dedication. In civic moral education, Pre-Qin Confucianism advocates "morality first," and also believes that moral, intellectual, physical, and aesthetic education should develop in a coordinated manner. Mencius' "spirit of a true gentleman" emphasizes that individuals should have firm beliefs and noble moral ideals, inspiring people to constantly pursue progress and self-improvement. Modern education can draw on this thought to focus on cultivating students' comprehensive qualities, promoting their overall development in various aspects.

The unity of knowledge and action is an important feature of Confucian ethics. Confucius emphasized that learning is not just about accumulating knowledge but also about applying knowledge in practice to achieve the unity of knowledge and action. Zengzi also stressed improving moral cultivation through reflection. This idea has practical value in modern education, guiding students to put moral concepts into action and enhancing their moral cultivation through actual behavior.

In addition, Pre-Qin Confucianism proposed a systematic set of methods for moral cultivation and practice, which are of great significance to the education of both teachers and students in higher education institutions. For example, Zengzi advocated "reflecting on oneself thrice a day," Confucius emphasized "seeing the good in others and thinking of equaling them; seeing the bad in others and examining oneself," and "learning without thinking is labor lost; thinking without learning is perilous," Mencius promoted "seeking within oneself," and Xunzi believed that "a gentleman who is broadly learned and daily examines himself will be clear in knowledge and free from faults in action." Besides these moral concepts, Pre-Qin Confucianism also proposed interpersonal principles such as the Doctrine of the Mean, Mencius' idea of "respecting the elderly as one's own elders and caring for others' children as one's own," the "spirit of a true gentleman" from Mencius, and Xunzi's "emphasizing rituals and valuing the law." Pre-Qin Confucianism's emphasis on the pursuit of sagehood, upright character, prioritizing righteousness over personal gain, and the traditional virtues of selflessness has profoundly influenced the shaping of the excellent spiritual character of the Chinese nation.

Drawing on the ethical and moral views of Pre-Qin Confucianism can enhance the level of moral education in modern education and provide valuable ideological resources for cultivating young people with noble moral qualities and a sense of social responsibility in the new era.

3. The Current Lack of Integration of Pre-Qin Confucian Ethical and Moral Views in Ideological and Political Education in Vocational Colleges

As an important part of traditional culture, the ethical and moral views of Pre-Qin Confucianism are a valuable spiritual wealth of the Chinese nation. They not only provided a theoretical basis for moral education and the political system in ancient feudal society but also have important implications for modern ideological and political education. However, the current ideological and political education in vocational colleges is insufficient in integrating Pre-Qin Confucian ethical and moral views and needs further exploration and application to enhance educational effectiveness and students' moral literacy.

In the curriculum system of ideological and political education in vocational colleges, the arrangement for traditional Confucian culture, especially Pre-Qin Confucian ethical and moral views, is not systematic or scientific enough. The current curriculum, although covering some traditional cultural content, mainly offers it as an elective overview, lacking in-depth special studies and systematic teaching arrangements. The ideological and political education in vocational colleges primarily relies on Marxist ideological and political education theories and modern Western ethical theories, with insufficient emphasis on traditional Confucian culture. This leads to students' inability to fully understand the contemporary significance of Confucian ethical and moral views in modern society.

Moreover, the ideological and political education in vocational colleges often focuses on theoretical inculcation while neglecting the practical application of traditional moral education. Traditional Confucian culture emphasizes the unity of knowledge and action, combining learning with practice. However, the current ideological and political education remains mostly theoretical, lacking specific practical elements. This results in students being unable to apply the moral knowledge they have learned to real-life situations, lacking effective solutions and moral judgment abilities when facing actual moral issues.

Additionally, the knowledge level and traditional cultural literacy of teachers need improvement. In vocational colleges, teachers engaged in ideological and political education have often received more training in Marxist ideological and political education, with insufficient understanding and mastery of traditional Confucian culture. This limitation in teachers' knowledge directly affects the quality of teaching

Confucian ethical and moral views in ideological and political education. Teachers cannot deeply explore the essence of Confucian ethical and moral views in their lectures, nor can they guide students to fully understand and apply traditional moral thought.

4. Pathways for Integrating Pre-Qin Confucian Ethical and Moral Views into Ideological and Political Education in Vocational Colleges

4.1 Developing a Dual-Classroom Model for Ideological and Political Education

The ethical and moral views of Pre-Qin Confucianism are the important foundations of traditional Chinese thought. Integrating them into the ideological and political education in colleges can open up new directions for this field. In theoretical classrooms, ideological and political education theories should be combined with the ethical and moral views of Pre-Qin Confucianism. The theoretical courses of ideological and political education are the main platforms for students to receive and learn, which are also crucial periods for forming students' worldviews and values. Therefore, the textbooks for ideological and political courses should be based on students' ideological conditions, incorporating local traditional cultural resources, absorbing the essence of Confucian ethical and moral views, and compiling unique school-based textbooks to supplement existing materials and ensure their content keeps pace with the times. Additionally, Chinese traditional culture should be closely integrated with Marxist theory, enriching and supplementing Marxist theory with the essence of Confucian culture. This not only increases the depth and breadth of theoretical courses but also enhances students' cultural confidence and moral cultivation through the edification of traditional culture, promoting their comprehensive development.

Moreover, a "dual-classroom" approach should be used to promote ideological and political education, referring to the combination of traditional classroom teaching (the first classroom) and extracurricular teaching (the second classroom). The first classroom, as the main platform for ideological and political education, can fully utilize the main channel role of Marxist ideological and political education courses, integrating traditional Confucian culture into the teaching content in a targeted manner. Specific measures include introducing Confucian classics such as "The Analects" and "Mencius" into the ideological and political theory courses, systematically explaining the core concepts of Confucian ethical and moral views, and enhancing students' cultural identity and moral cultivation. The second classroom can host a variety of traditional Confucian cultural activities, such as special lectures on Confucian culture, the establishment of Confucian study groups, and recitation competitions of Confucian classics, to stimulate students' interest and enthusiasm for traditional culture. This dual-classroom model not only helps deepen theoretical teaching but also enhances students' participation and sense of identity in ideological and political education through practical activities, thereby improving the effectiveness and appeal of ideological and political education.

4.2 Creating a Positive Educational Environment in Colleges

Creating a positive educational environment in colleges has an important impact on students' character formation. Pre-Qin Confucianism long recognized the importance of the environment for learners. Confucius emphasized the importance of a benevolent environment in "The Analects," and the story of Mencius' mother moving three times to find a suitable environment for her son's education has become a well-known anecdote. Xunzi also pointed out that "a plant growing among hemp becomes straight without being supported; white sand mixed with black mud becomes black." These viewpoints illustrate the significant influence of the environment on individual moral cultivation from different perspectives.

First, colleges should focus on creating a strong Confucian cultural atmosphere on campus. They can set up displays of Confucian classic quotes in public areas, host lectures and exhibitions on Confucian culture, and establish statues of Confucian sages such as Confucius and Mencius on campus, creating special areas for Confucian culture. These measures can not only enhance students' identification with Confucian culture but also improve their moral cultivation. Second, the construction of material culture should be strengthened. The material conditions of the campus environment directly affect students' learning and living. Colleges should invest in improving teaching facilities and living conditions, providing a good learning environment and comfortable living environment. For example, constructing well-equipped libraries, modern laboratories, and comfortable dormitories to create an environment conducive to the overall development of students. Third, colleges should focus on improving the moral education level of teachers through regular training and further education to enhance their ideological and political literacy and moral education capabilities. For instance, organizing teachers to participate in special training on Confucian culture to understand its essence and incorporate it into their teaching practices.

For example, organizing teachers to participate in special training on Confucian culture to understand its essence and incorporate it into their teaching practices. Additionally, establishing moral education awards to recognize teachers who excel in moral education can motivate teachers to focus on moral education in their daily teaching. "The educational environment in colleges is a significant institutional outcome of the school’s values. To optimize the moral education environment, colleges themselves have a lot of work to do."

4.3 Emphasizing Online Platforms for Ideological and Political Education in Colleges

Since Confucius proposed the teaching principle of "teaching students according to their aptitude," this concept has been widely adopted by educators throughout history and is extensively applied in modern education. Confucius' teaching methods emphasize selecting different teaching strategies based on each student's uniqueness, focusing on personalized education. On this basis, Mencius proposed the principle of "teaching in multiple ways." He stated in "Mencius • Gongsun Chou II": "There are many ways of teaching. What I reject is teaching that does not teach." Mencius believed that there are various ways to instruct people, preferring non-verbal teaching methods.

In today's era of prevalent online media, college students use the internet daily to obtain information. The internet significantly influences students' thoughts, morality, and values. Colleges can establish online platforms for ideological and political education by setting up specialized websites, where ideological and political educators edit content centered

around themes of ideological and political education in colleges. By comprehensively understanding students' thoughts from multiple angles, these platforms can conduct education on ideals, beliefs, and the core socialist values, promoting the excellent traditional Chinese culture and improving students' comprehensive qualities. Colleges can also use online platforms to promote Confucian culture, leveraging the convenience and speed of online media to innovate the form and content of traditional ideological and political courses. This facilitates the organic combination of online ideological and political work with classroom teaching, encouraging college students to deeply study and understand traditional Confucian culture.

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Comparative Analysis of DenseNet Architectures for Lung Cancer Classification Using Histopathologic Images

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Abstract: Lung cancer continues to be one of the most lethal cancers globally, with early and accurate diagnosis being pivotal for improving patient outcomes. This study investigates the effectiveness of three DenseNet architectures namely DenseNet121, DenseNet169, and DenseNet201 in the classification of lung cancer using histopathologic images from the LC25000 dataset, with a specific focus on 15,000 lung images. Comprehensive evaluations were conducted to compare the performance of these models. The results reveal that DenseNet201 achieves superior performance with an accuracy of 99.23%, surpassing DenseNet169 and DenseNet121. This high level of accuracy underscores the potential of DenseNet201 for integration into clinical workflows, offering a robust tool for the early detection and diagnosis of lung cancer. Our findings suggest that deeper DenseNet architectures are particularly well-suited for this task, providing a significant advancement in the use of deep learning for medical image analysis.

Keywords: Lung Cancer Classification, DenseNet Architectures, Histopathological Images, Deep Learning, Medical Imaging

1. INTRODUCTION

Lung cancer remains a leading cause of cancer-related mortality worldwide, accounting for approximately 18% of all cancer deaths. The primary risk factor is tobacco smoking, contributing to the majority of cases. Despite advancements in treatment, lung cancer prognosis remains poor due to late-stage diagnosis. Early detection is critical for improving survival rates and treatment outcomes (Hochhegger et al., 2022; Hatuwal & Thapa, 2020). Histopathologic examination is a crucial method for diagnosing and classifying lung cancer. Traditionally, this process relies on pathologists manually examining tissue slides under a microscope, which is both time-consuming and subject to variability. Digital pathology and artificial intelligence (AI), particularly deep learning, have the potential to revolutionize this field by automating image analysis and providing consistent and accurate results (Gao et al., 2021; Šarić et al., 2019).

Deep learning, especially convolutional neural networks (CNNs), has shown exceptional performance in image classification tasks. CNNs automatically learn and extract features from raw images, making them ideal for complex pattern recognition. In medical imaging, deep learning models can enhance diagnostic accuracy and reduce the workload of pathologists. Studies have demonstrated the potential of deep learning in diagnosing various cancers, including lung cancer (Goodfellow et al., 2016; LeCun et al., 2015). Esteva et al. (2017) successfully applied deep learning to classify skin cancer with accuracy comparable to dermatologists. Similarly, Wang et al. (2018) developed a CNN model to classify lung cancer subtypes from histopathologic images, achieving promising results. These models not only provide accurate diagnoses but also help identify specific histological patterns and molecular markers associated with different lung cancer types.

1.1 DenseNet Architectures

Densely Connected Convolutional Networks (DenseNet) represent a significant advancement in deep learning architectures. Introduced by Huang et al. (2017), DenseNet connects each layer to every other layer, promoting feature reuse and improving gradient flow. This dense connectivity addresses the vanishing gradient problem, enabling the training of deeper models effectively. DenseNet architectures are particularly suited for medical image analysis due to their efficient parameter usage and superior performance (Gao et al., 2021; Šarić et al., 2019). DenseNet121, DenseNet169, and DenseNet201 are variants of this architecture, differing in the number of layers. DenseNet121 comprises 121 layers, DenseNet169 has 169 layers, and DenseNet201 includes 201 layers. The increased depth allows these models to capture complex features, potentially enhancing classification performance. Previous studies have validated the efficacy of DenseNet models in medical imaging tasks such as breast cancer detection and lung nodule classification (Huang et al., 2017).

Detecting lung cancer through histopathologic images involves classifying tissue samples to identify malignant cells. Traditional methods rely on pathologists' expertise to manually interpret these images, which can be time-consuming and prone to variability. Deep learning models offer an automated, standardized approach, reducing pathologists' workload and potentially increasing diagnostic accuracy (Hatuwal & Thapa, 2020). Several studies have explored deep learning for lung cancer detection. Hatuwal and Thapa (2020) used a CNN-based method for detecting lung cancer in histopathologic images, achieving high accuracy. Mohalder et al. (2021) developed a deep learning approach to predict lung cancer from histopathologic images, showcasing AI's potential. These models accurately classify different lung cancer types, including adenocarcinoma, squamous cell carcinoma, and small cell lung carcinoma (Günaydin et al., 2019; Mehmood et al., 2022).

This study aims to evaluate and compare the performance of three DenseNet architectures namely DenseNet121, DenseNet169, and DenseNet201 in classifying lung cancer from histopathologic images using the LC25000 dataset, focusing on 15,000 lung images. The dataset is split into training, validation, and test sets to ensure robust evaluation. Standard data preprocessing techniques, including resizing, normalization, and data augmentation, are applied to enhance model performance and generalization. Evaluation metrics include accuracy, loss, precision, recall, F1-score, and confusion matrices, providing a comprehensive assessment of

each model's classification capabilities. By analyzing the results, we aim to identify the most effective DenseNet architecture for lung cancer detection and discuss its potential for clinical application.

2. LITERATURE SURVEY

The application of deep learning in medical imaging has significantly transformed the field, offering robust tools for the automatic analysis and classification of medical images. Convolutional neural networks (CNNs), a subset of deep learning, have proven particularly effective in extracting hierarchical features from raw images, which is essential for complex pattern recognition tasks such as disease detection and diagnosis. These models have shown superior performance in various medical imaging applications, including the detection of lung cancer (Gao et al., 2021; Šarić et al., 2019). Esteva et al. (2017) successfully applied deep learning to classify skin cancer with an accuracy comparable to that of dermatologists. Similarly, demonstrated the potential of deep learning in predicting mutations from histopathology images of lung adenocarcinoma, squamous cell carcinoma, and normal lung tissue, highlighting the model's ability to provide accurate diagnoses and identify specific histological patterns and molecular markers associated with different types of lung cancer.

Densely Connected Convolutional Networks (DenseNet) have been a significant advancement in CNN architecture, introduced by Huang et al. (2017). DenseNet is characterized by its dense connectivity pattern, where each layer receives input from all preceding layers and passes its feature maps to all subsequent layers. This architecture promotes feature reuse and mitigates the vanishing gradient problem, enabling the training of very deep networks (Hochhegger et al., 2022). DenseNet architectures, such as DenseNet121, DenseNet169, and DenseNet201, have been particularly effective in medical image analysis. These models differ primarily in the number of layers and have been validated in various studies for their robustness and high accuracy in complex classification tasks. For example, Mehmood et al. (2022) applied DenseNet for malignancy detection in lung and colon histopathology images, demonstrating its potential for accurate and efficient image classification. Lung cancer detection using histopathologic images involves classifying tissue samples to identify malignant cells. Traditional methods rely heavily on the expertise of pathologists, which can lead to variability and potential diagnostic errors. Deep learning models offer an automated approach, providing consistent and accurate classifications (Mohalder et al., 2021, Bushara et al. 2024).

Several studies have highlighted the potential of deep learning in lung cancer detection. Hatuwal and Thapa (2020) used CNNs for the classification of lung cancer from histopathologic images, achieving high accuracy. These models have been effective in distinguishing between various types of lung cancer, including adenocarcinoma, squamous cell carcinoma, and small cell lung carcinoma. In addition to classification, deep learning models have also been used to predict molecular subtypes and treatment responses.. Comparative studies are crucial for understanding the performance of different deep learning architectures. Šarić et al. (2019) compared various CNN-based methods for lung cancer detection in whole slide histopathology images, highlighting the advantages and limitations of each approach. Such studies provide valuable benchmarks and guide the selection of appropriate models for specific tasks AR et al. (2022).

DenseNet variants, such as DenseNet121, DenseNet169, and DenseNet201, have been extensively evaluated in comparative studies. These models differ in the number of layers and their capacity to learn complex patterns from the data. Gao et al. (2021) and Mehmood et al. (2022) have shown that deeper DenseNet models generally perform better in terms of accuracy and robustness, although they may require more computational resources. Recent advancements in deep learning techniques have further improved the accuracy and efficiency of lung cancer detection. For instance, Nazir et al. (2021) discussed the use of self-supervised learning techniques for medical imaging data, which have been shown to enhance model performance. Similarly, Li et al. (2020) developed a framework for automatic lung nodule detection using multi-resolution CT screening images, demonstrating significant improvements in detection accuracy. Moreover, the integration of multimodal data, including genomic and clinical data, with imaging data has shown promise in providing comprehensive diagnostic insights. Studies by Sun et al. (2020) and Xu et al. (2020) have explored the use of multi-view and multimodal deep learning approaches for lung cancer detection, highlighting the potential for more accurate and holistic diagnostic models.

3. MATERIALS AND METHODS

3.1 Dataset

The LC25000 dataset Aitazaz et al. (2023), specifically focusing on 15,000 histopathologic images related to lung cancer, was utilized for this study. This dataset, which includes a diverse array of histopathologic images, serves as a robust foundation for training and evaluating deep learning models in medical imaging. The lung cancer subset provided sufficient data to train and test the performance of various DenseNet architectures. The sample images are represented in Figure1.

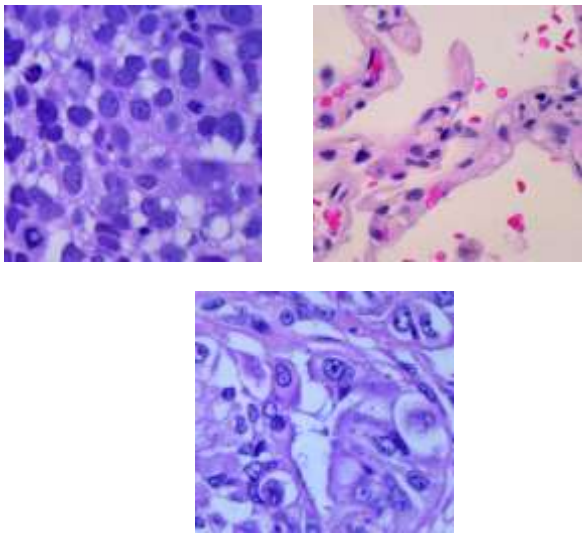

Figure 1: Sample Images from LC25000 datasets. a) Squamous Cell Carcinoma, b) Normal, and c) Adenocarcinoma

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3.2 Data Preprocessing

To prepare the dataset for training, several preprocessing steps were undertaken. The dataset was split into training, validation, and test sets to ensure robust model evaluation. Each image was resized to 224x224 pixels, a standard input size for convolutional neural networks (CNNs). Pixel values were normalized to a range of 0 to 1, facilitating faster convergence during training. Data augmentation techniques, including rotations, flips, and zooms, were applied to the training set to enhance model generalization and prevent overfitting (Simonyan & Zisserman, 2015; Szegedy et al., 2015).

3.3 Model Architectures

Three DenseNet architectures were evaluated: DenseNet121, DenseNet169, and DenseNet201. These architectures differ primarily in their depth and number of layers:

- DenseNet121: This model comprises 121 layers and is the shallowest of the three, balancing performance and computational efficiency.
- DenseNet169: With 169 layers, this model offers a middle ground between complexity and performance.
- DenseNet201: The deepest model with 201 layers, it is designed to capture intricate patterns in the data, albeit with increased computational demands.

Each model was initialized with weights pre-trained on the ImageNet dataset, leveraging transfer learning to improve performance and reduce training time (Huang et al., 2017; Russakovsky et al., 2015.

Figure 2 shows the structure of the proposed DenseNet model for classifying lung cancer. The model starts with an input layer that processes images sized 224x224 pixels with three color channels (RGB). This input layer is followed by three DenseNet blocks, which contain convolutional layers that help extract detailed features from the images. After these blocks, a Global Average Pooling layer reduces the size of the feature maps into a single vector for each map. This vector is then passed to a fully connected layer with 4096 units, allowing the model to learn complex patterns in the data. A dropout layer with a rate of 0.5 is added to prevent overfitting by randomly turning off some neurons during training. Finally, the output layer uses a softmax function to classify the image into one of the lung cancer categories.

3.4 Training Procedure

The models were trained using the Adam optimizer, chosen for its adaptive learning rate capabilities, making it well-suited for complex optimization problems. The categorical

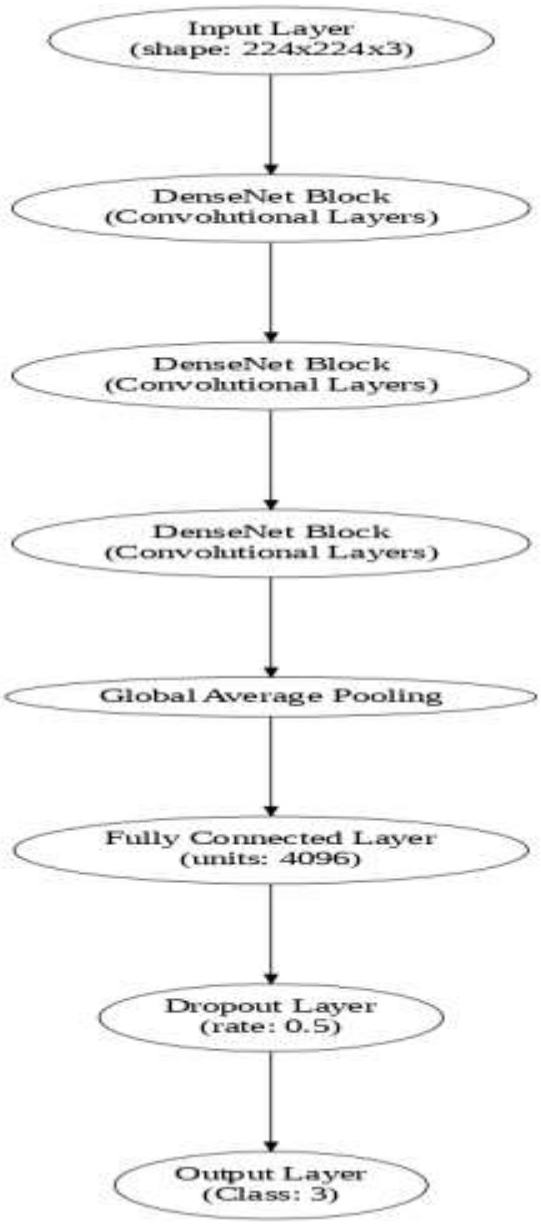

Figure 2: Proposed Densenet Model Architecture for Lung Cancer Classification

crossentropy loss function was employed, appropriate for multi-class classification tasks. Training was conducted with a batch size of 32 over 50 epochs. Early stopping and model checkpointing techniques were used to save the best-performing model and prevent overfitting, based on validation loss (Kingma & Ba, 2015).

3.5 Evaluation Metrics

To comprehensively assess the models, the following metrics were used:

- Accuracy: Measures the proportion of correctly classified instances.

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- Precision: The ratio of true positive predictions to the total predicted positives, reflecting the model's precision in identifying positive cases.
- Recall: The ratio of true positive predictions to all actual positives, indicating the model's sensitivity.
- F1-score: The harmonic mean of precision and recall, providing a balanced measure of the model's performance.
- Confusion Matrix: A detailed performance summary showing true positives, true negatives, false positives, and false negatives.

4. RESULTS AND DISCUSSIONS

In this section, we analyze how well three DenseNet models, namely DenseNet121, DenseNet169, and DenseNet201 performed in classifying lung cancer using the LC 25000 dataset, which includes 15,000 lung images. We used Precision, Recall, F1-Score, and Accuracy to measure how accurately each model identified three different classes of lung cancer Squamous Cell Carcinoma, Normal, and Adenocarcinoma named as Class 1, Class 2, and Class 3 respectively. These metrics help us understand how well the models can distinguish between different types of lung cancer. DenseNet models are known for their ability to handle complex image data by efficiently using all the information in the network, which is especially useful in medical imaging. We carefully evaluated each model's performance to see which one worked best for lung cancer classification. The following discussion compares the results from each model, highlighting important findings and insights. This comparison helps us determine which DenseNet model is most effective for accurate and reliable lung cancer diagnosis, contributing to better automated tools for medical professionals.

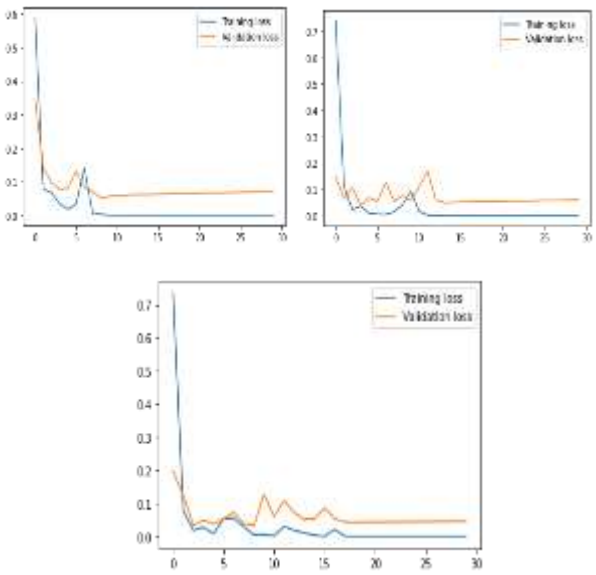

Figure 3: Training and Validation Losses of a) DenseNet121, b) DenseNet169, and c)DenseNet201

Figure 3 illustrates the training and validation losses for the DenseNet121, DenseNet169, and DenseNet201 models. In Figure 3a, DenseNet121 shows a consistent decrease in training loss, with minor fluctuations observed in the validation loss, indicating effective learning with occasional overfitting tendencies. Figure 3b presents DenseNet169, where both training and validation losses exhibit a steady decline with fewer fluctuations compared to DenseNet121, suggesting superior generalization and stability. Figure 3c displays DenseNet201, which demonstrates a smooth and continuous reduction in both training and validation losses, underscoring the model's robust learning capabilities and excellent generalization to unseen data.

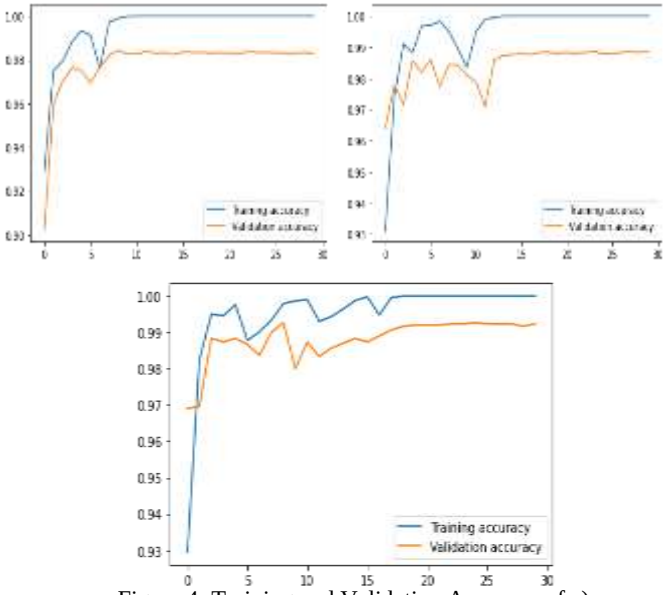

Figure 4: Training and Validation Accuracy of a) DenseNet121, b) DenseNet169, and c) DenseNet201

Figure 4 depicts the training and validation accuracy for the DenseNet121, DenseNet169, and DenseNet201 models. Figure 4a shows DenseNet121 achieving high training accuracy, accompanied by slight oscillations in validation accuracy, indicative of effective learning but some overfitting. Figure 4b illustrates DenseNet169, where both training and validation accuracies increase steadily, with fewer oscillations, reflecting enhanced robustness and generalization compared to DenseNet121.

Figure 4c presents DenseNet201, which exhibits a smooth and continuous increase in both training and validation accuracies, maintaining stability and demonstrating strong generalization capabilities. Collectively, the results indicate that DenseNet169 and DenseNet201 outperform DenseNet121 in terms of stability and generalization, making them more suitable for the lung cancer classification task. Figure 5 displays the confusion matrices for the DenseNet121, DenseNet169, and DenseNet201 models, providing a detailed breakdown of their classification performance across three classes. Figure 5a for DenseNet121 shows mostly accurate predictions but includes some misclassifications, indicating areas for improvement in precision and recall. Figure 5b for

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DenseNet169 highlights improved performance with fewer misclassifications, reflecting higher accuracy and better generalization. Figure 5c for DenseNet201 demonstrates the best classification capabilities, with the highest number of correct predictions and the fewest misclassifications among the three models, underscoring its robustness and reliability in lung cancer classification.

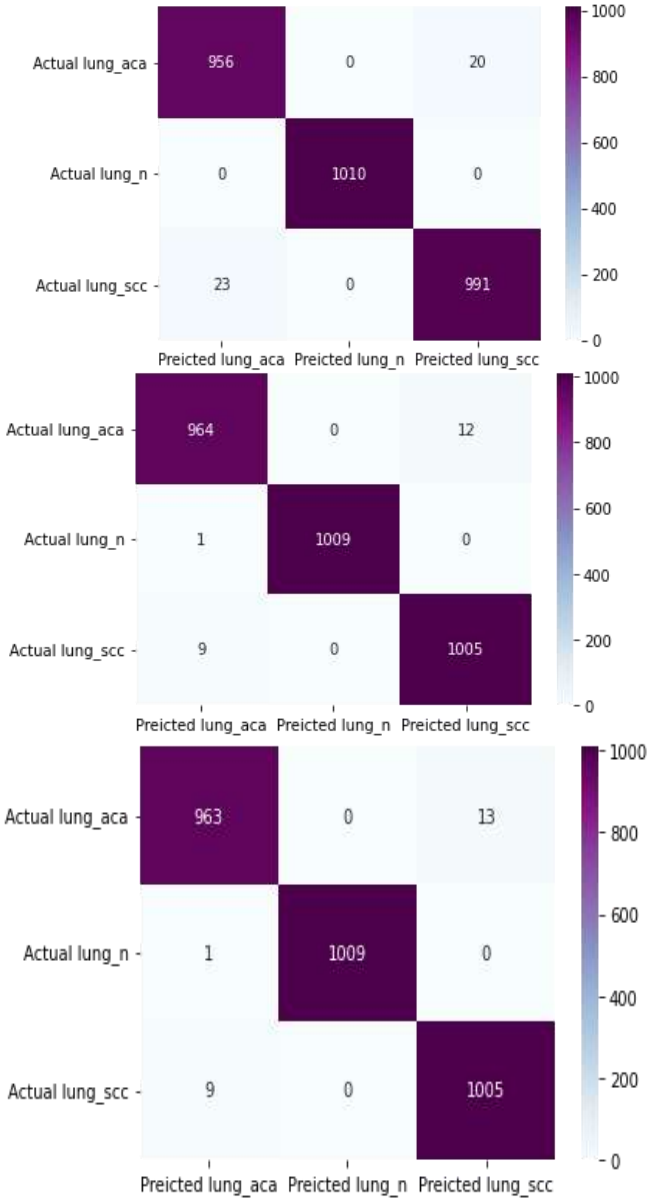

Figure 5 : Confusion Matrices of a) DenseNet121, b) DenseNet169, and c)DenseNet201

The comparative analysis of DenseNet121, DenseNet169, and DenseNet201 architectures for lung cancer classification reveals nuanced performance variations, emphasizing the efficacy of DenseNet169. DenseNet169 achieved the highest accuracy and F1-scores, particularly excelling in Class 1 and Class 3, with precision values of 0.9877 and 0.9911, respectively, and recall values of 0.9907 and 0.9882, respectively is presented in Table 1.

Table 1: Performance Comparison of Three Proposed DenseNet Models

Model	Precision	Recall	F1-Score	Accuracy
DenseNet121 (Class 1)	0.9795	0.9765	0.978	0.9838
DenseNet121 (Class 2)	1.0	1.0	1.0	1.0
DenseNet121 (Class 3)	0.9773	0.9802	0.9788	0.9838
DenseNet169 (Class 1)	0.9877	0.9907	0.9892	0.9934
DenseNet169 (Class 2)	0.999	1.0	0.9995	0.9995
DenseNet169 (Class 3)	0.9911	0.9882	0.9897	0.9949
DenseNet201 (Class 1)	0.9867	0.9907	0.9887	0.9931
DenseNet201 (Class 2)	0.999	1.0	0.9995	0.9995
DenseNet201 (Class 3)	0.9911	0.9872	0.9891	0.9947

The marginally superior performance of DenseNet169 suggests that it effectively balances model complexity and capacity to capture intricate data patterns. DenseNet201, while comparable, exhibits slightly lower recall in Class 3, indicating that additional network depth does not necessarily translate to proportional performance gains. DenseNet121, though robust, is slightly outperformed by the deeper architectures, underscoring the advantage of increased depth in specific classification contexts. All three DenseNet architectures demonstrate high precision and recall for Class 2, with values approaching unity, signifying exceptional reliability in identifying this class. This near-perfect performance highlights the capability of these models to handle clearly defined patterns within the dataset. The study's findings advocate for the continued use and exploration of DenseNet architectures in medical imaging, particularly for tasks requiring high diagnostic accuracy such as lung cancer classification. The observed performance metrics underscore the potential of DenseNet-based models to enhance clinical decision-making, leading to improved diagnostic accuracy and patient outcomes through precise and reliable classification of histopathological images.

5. CONCLUSION

In this study, we evaluated the performance of three DenseNet architectures—DenseNet121, DenseNet169, and DenseNet201—for lung cancer classification using the LC 25000 dataset, focusing on 15,000 lung histopathological images. The models were assessed using key metrics such as Precision, Recall, F1-Score, and Accuracy. Our results demonstrate that all three DenseNet models performed exceptionally well, with DenseNet169 showing the best overall performance, particularly in terms of accuracy and F1-Score across all classes. DenseNet201 also performed comparably, while DenseNet121, although slightly behind the other two, still delivered robust classification results. These findings underscore the effectiveness of DenseNet

architectures in medical image analysis, specifically for lung cancer detection.

Future work can explore integrating advanced data augmentation techniques and transfer learning from other medical imaging datasets to further enhance model performance. Additionally, expanding the dataset and investigating other state-of-the-art architectures, such as EfficientNet or Vision Transformers, could provide deeper insights and improve generalisation

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Factors Affecting the Listening Skill of Non-Native English Speakers

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Abstract: This study examines the extent of influence of the identified factors to the listening skills of non-native English speakers. Listening comprehension is a critical skill for effective communication, yet non-native speakers often encounter significant difficulties, specially when exposed to a variety of English accents. Data were collected through a survey questionnaire to non-native English speakers from diverse. The findings show that Motivation and having positive attitude towards learning English; Regular exposure to English through media, conversations, and formal education; and Supportive and resource-rich learning environment that facilitates better listening practice improvement significantly affects the listening skills of our respondents. Furthermore, the study emphasizes the positive attitude of our learners towards learning English is a crucial role in listening effectiveness and the quality of the listening environment, including the level of background noise, and clarity of audio significantly influences the listening skills of non-native English speakers in improving listening skills. Recommendations were drawn in this study, to incorporate diverse, interesting and relevant listening materials into curriculum that cater to students' interests and real world. Invest in or upgrade multimedia language labs where students can regularly engage with English media in a focused setting. Equip these labs with complete materials. Ensure that resources are regularly updated to keep content and relevant engaging.

This research highlights the necessity for tailored instructional strategies to address the specific needs of non-native speakers in mastering listening skills,

Keywords: Listening; Listening Skills; Listening Comprehension; Comprehension; Non-Native Speakers

1. INTRODUCTION

Listening comprehension is a critical skill in language acquisition, serving as the foundation for effective communication. For non-native English speakers, mastering this skill poses significant challenges, influenced by a myriad of factors such as accents and speech rates. These challenges are not merely linguistic but also cognitive, as listeners must decode, process and interpret spoken language in real time. Understanding the nature of these challenges is essential for developing effective teaching strategies and tools that can aid non-native speakers in improving their listening comprehension abilities.

According to Rost (2009), listening helps us to understand the world around us and is one of the necessary elements in creating successful communication. Listening is a vital primary stage of language acquisition. If students do not listen or learn to listen well, then the latter stages of the complex pattern of language acquisition within a productive framework in the communicative classroom will be difficult said by Rintaningrum (2018).

According to Hamouda (2013) listening skill is an important element in obtaining understandable input. Hamouda (2013) expressed that listening comprehension provides the appropriate situations for the acquisition and expansion of other language skills while Rost (2002) expressed that the development of listening is related to the attainment of proficiency in speaking. He continued that listening is the most important skill in language learning because it is the most widely used language skill in normal daily life.

Pourhosein Gilakjani and Ahmadi (2011) said that listening plays a significant role in the communication process. Therefore; it is obvious that listening is very important for the lives of everyone since it is used as a means of learning at all phases of instruction.

Holden (2004) viewed listening comprehension as a complicated activity that needs mental exertion to ensure understanding. Furthermore, the author argued that listeners have to listen passively and then produce what they have comprehended. Thus, listening is vital and necessary not only as a receptive language skill but also as a tool required for the development of spoken language ability as mentioned by Namaziandost et. al., (2018).

Accents both native and non-native, play a substantial role in listening comprehension difficulties. Non-native speakers are often exposed to variety of English accents, which can vary significantly in pronunciation, intonation, and rhythm.

Accordingly, Tokumoto and Shibata (2011) investigated L2 English users' introspection by bringing their attention to and having them evaluate their own accents. They compared the evaluative responses from college students in three Asian countries: Japan, South Korea, and Malaysia. The results showed the distinctive perception of their own English varieties. They concluded that the emphasis in English instruction and socio-historical factors in each country appear to influence L2 English speakers' construction of attitudes toward a target language.

Familiarity with a specific accent can enhance comprehension, whereas unfamiliar accents can hinder understanding. Additionally, the prevalence of non-native English accents due to the global nature of English as a lingua franca, adds another layer of complexity. As stated by

Gilakjani and Ahmadi (2011), unfamiliar listening topics may also hamper students' listening comprehension.

Furthermore, according to Thomson (2003), the listeners are active in the process of listening comprehension, not passive. In this regard, Jinhong (2011) argued that listening comprehension is not only "a process-oriented activity in which listeners need to deal with the input actively step by step" but also "a creative activity [that] listeners construct or assign meanings based on the given information or their experience and background knowledge".

Chang's (2011) small-scale research project focused on improved listening fluency through reading while listening to audio books. Chang (2011) states that reading while listening (RWL) was chosen as a method for the study due to the fact that it can be used with participants with low listening proficiency. It can also increase exposure to aural input and can be completed as a self-study exercise. Chang (2011) mentions that this may be useful for teachers dealing with time constraints in the classroom.

Chang (2011) explains the difference between listening while reading (LWR) and reading while listening (RWL). In the former, reading is the main function, which is helped along by aural input-the listening- to encourage a faster and more fluid reading pace. Whereas, the main aim of RWL is listening comprehension. The aural input, whether that is in the form of conversations, movies or lectures is there to support listening comprehension. Osada 2001 and Vandergrift 2007 (cited in Chang, 2011) claim that RWL helps learners develop a number of skills including "auditory discrimination and word recognition, get used to the spoken rate, rhythm and natural flow of language, and understand chunks of texts."

Given the importance of listening comprehension in language proficiency, it is crucial to explore these challenges in depth. This research aims to examine the extent of influence of the identified factors to the listening skills of non-native English speakers. By examining the extent of influence of the underlying factors that contribute to these factors affecting their Listening skills, we can develop targeted educational strategies and technological tools to enhance listening skills among non-native speakers. Ultimately improving listening comprehension will facilitate better communication and integration in English-speaking environments, promoting greater linguistic and cultural understanding.

In this paper, identified factors of Non-native English speakers concerning their Listening Skills were reviewed. The researcher defined the terms listening, listening comprehension, mentioned the reasons for listening and stated the importance of listening.

1.1 Research Design and Methodology

The researcher used Quantitative- Descriptive method of research. The researcher used this method to gather information in order to achieve the objective of the study which aimed to provide factors affecting the listening skills of non-native English speakers

1.2 Population and Locale of the study

The population of this study are the Grade 12 Senior High School students from Lingsat Integrated School. A total number of 96 students responded. Thirty-six (36) from Grade 12 Escoda, Thirty (30) from Grade 12 Magbanua and Thirty (30) from Grade 12 Gomez.

1.3 Sampling Determination

The researcher used the Slovin's Formula in determining the sample size of the study. The total number of Grade 12 Senior High School students in Lingsat Integrated School were 126, using the Slovin's Formula 96 respondents were determined. Stratified sampling was used to determine the number of each subgroup.

1.4 Data Instrument

The instrument used for data gathering of the study is in a form of Survey questionnaire. The survey questionnaire consists of ten (10) identified factors made by the researcher. The researcher conducted a reliability test of the survey and found a **Cronbach coefficient of 0.91.** The tool used a five-point Likert scale with responses such as "Highly Influential, Very Influential, Moderately Influential, Least Influential and Not Influential. The positive items in the scale scored in the form of 5,4,3,2,1 and the negative items will be scored reversely. While the highest point that will be obtained from the instrument will be accepted as factors affecting the listening comprehension of non-native English speakers.

1.5 Data Gathering Procedure

The researcher asked permission from the respondents through a letter sent through messenger to conduct a survey questionnaire regarding the Factors affecting the listening skills of Non-native English speakers. The questionnaires were sent via Google Form for them to answer, after explaining the nature and scope of the study. All the respondents were willing to participate in the research. After collecting all the answers, the researcher started to treat the data.

1.6 Treatment of Data

The researcher used Weighted Mean to analyze the data. It was used to measure the response of Non-native English speakers to the identified factors affecting their Listening Skills. To provide the quantitative analysis to the computed mean for each item, the 5-point Likert scale was used.

Table 1. Factors affecting the Listening Skills Five Point Likert Scale

Rating	Mean Interval	Description	Interpretation
5	4.00-4.99	**HIGHLY INFLUENTIAL**	Dominant influence to the listening skills of non-native English speaker.
4	3.00-3.99	**VERY INFLUENTIAL**	Significant influence to the listening skills of non-native English speaker.
3	2.00-2.99	**MODERATELY INFLUENTIAL**	Moderate influence to the listening skills of non-native English speaker. It holds a balanced

			authority, capable of swaying certain influence but not dominant
2	1.00-1.99	**LEAST INFLUENTIAL**	Minimal influence to the listening skills of non-native English speaker. It may influence minor aspects but not critical ones.
1	0.00-0.99	**NOT INFLUENTIAL**	Has no influence to the listening skills of non-native English speaker. It is completely disregarded.

2. RESULTS, CONCLUSION, RECOMMENDATION

Table 2. Factors Affecting the Listening Skills of Non-Native English Speakers Analysis

Statement	Mean	Extent of Influence
Motivated and have positive attitude towards learning English	4.26	HIGHLY INFLUENTIAL
Regular exposure to English through media, conversations, and formal education.	4.15	HIGHLY INFLUENTIAL
Supportive and resource-rich learning environment that facilitates better listening practice improvement.	4.14	HIGHLY INFLUENTIAL
Understanding the sounds of English and how they combine especially in distinguishing similar-sounding words.	4.10	HIGHLY INFLUENTIAL
Active and consistent practice, such as listening to English podcasts, watching English TV shows or movies, and engaging in conversations.	4.06	HIGHLY INFLUENTIAL
Effective teaching methods that include interactive listening activities and the use of diverse audio materials.	4.06	HIGHLY INFLUENTIAL
Proficiency in grammar, vocabulary, and pronunciation	4.00	HIGHLY INFLUENTIAL
Cognitive abilities like memory, attention, and processing speed.	3.79	VERY INFLUENTIAL
Anxiety and Confidence Levels	3.78	VERY INFLUENTIAL
Familiarity with cultural context of English-speaking countries	3.77	VERY INFLUENTIAL
General Weighted Average	**4.01**	**HIGHLY INFLUENTIAL**

2.1 Narrative Discussion

Overall, a general weighted mean of 4.01 was generated from the results of the survey questionnaire gathered which indicates that the factors reported were highly influential affecting the listening skills of the non-native English speakers. This is a promising indication that majority of the identified factors were impactful to our respondents. The top three (3) factors affecting the listening skills of our respondents were provided.

2.1.1 Motivated and have positive attitude towards learning English

Motivation and positive attitude towards learning English is the number one factor that affects the Listening skills of non- native English speakers, which garnered 4.26 generated mean. It is crucial for developing strong listening skills for our respondents. Motivated learners are more likely to practice frequently, connect deeply with the content, and actively seek for opportunities to utilize the language. Higher levels of ease and fluency in the language may result from this. The students are more likely to retain knowledge and use it in practical contexts when you have a sincere interest in studying.

According to Azmi Bingol, Celik, Yidliz, and Tugrul Mart (2014), when listening texts contain known words it would be very easy for students to them. If students know the meaning of words this can arouse their interest and motivation and can have a positive impact on the students' listening comprehension ability. A lot of words have more than one meaning and if they are not used appropriately in their appropriate contexts students will get confused.

Hasan (2000) indicated that unfamiliar words, difficult grammatical structures, and the length of the spoken passages are the most important factors that cause problems for learners' listening comprehension. He continued that clarity, lack of interest, and the demand for complete answers to listening comprehension questions are the serious difficulties of students' listening comprehension

2.1.2 Regular exposure to English through media, conversations, and formal education

Regular exposure to English through media, conversations, and formal education helps listeners become accustomed to different ways of speaking, resulting to 4. 15 generated mean. This improves their ability to understand spoken English in different contexts and by different speakers.

According to Huang's (2004) study "many foreign learners have difficulties in understanding different accents, because they have got used to the accent of their own teachers and they are usually 'surprised and dismayed when they find they have difficulty understanding someone else.'" Huang's (2004) study focuses on Chinese students' difficulty in lecture comprehension at an American University. Huang (2004) noted that the students perceived their American professors' speech to be rapid as they were unaccustomed to the natural

speed of English of a native English speaker. Although this particular study focuses on Chinese students, I'm certain that Japanese students also experience similar listening comprehension problems, speaking from first hand classroom experience

Hayati and Momedi's research (2011) of analyzing listening comprehension results from participants who watched short video episodes using English subtitles, Persian subtitles and no subtitles is one that is worth replicating and exploring further. The participants watching the episodes with English subtitles had the highest scores on the listening comprehension, which supported their hypothesis that videos with English subtitles would lead to improved listening comprehension.

Some researchers Hulstijin, Field and Vandergrift (cited in Ching et al 2014) believe that the most beneficial form of listening is without subtitles as this allows students to notice various features of spoken language such as reduced forms and elisions mentioned earlier in this research paper.

In a recent study, Emerick (2019) explored the beliefs of language teachers regarding explicit teaching and use of authentic materials in L2 listening instruction. The participants were L2 teachers of eight universities in the United States. To collect the data, both a questionnaire and semi -structured interviews were conducted. The results revealed that teachers considered explicit listening instruction necessary for L2 learning. Moreover, the majority of teachers found authentic listening materials as essential and effective for L2 learners.

2.1.3 Supportive and resource-rich learning environment that facilitates better listening practice improvement.

A supportive and resource-rich environment is important in developing listening skills which garnered 4.14 generated mean because it creates the right conditions for effective learning and comprehension like the quality of sound system can impact the comprehending of learners' listening (Azmi Bingol, Celik, Yidliz, & Tugrul Mart, 2014).

2.2 Conclusion

A listener's interest in the topic and motivation to listen has the highest weighted mean in this study, the higher motivation often leads to more active engagement, better concentration, and improved comprehension followed by Media exposure, which often introduces listeners to a wide range of vocabulary that helps listeners become more familiar with everyday language and understand spoken English more naturally and finally, A resource rich environment provides diverse listening materials, catering to different learning styles and levels. This helps learners practice and improve their listening skills in engaging ways.

2.3 Recommendation

Incorporate diverse, interesting, and relevant listening materials into curriculum that cater to student's interests and real world. Invest in or upgrade multimedia language labs where students can regularly engage with English media in a focused setting. Equip these labs with complete materials. Ensure that resources are regularly updated to keep content relevant and engaging

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