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# The Impact of Online Learning on Visual Learners in the HEIs for Sustainable Development and Well-Being

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**ABSTRACT**

This article examines the impact of online learning on visual learners- individuals who prefer to learn using visual aids such as diagrams, images, videos, and interactive simulations. With the rise of online education, it is crucial to understand how this mode of learning affects different types of learners, including visual learners. The article provides a literature review of existing research on visual learning in online environments, and identifies the advantages and challenges associated with this approach. Additionally, the article highlights effective strategies for optimizing the online learning experience for visual learners, such as the use of multimedia resources and providing opportunities for social interaction. Ultimately, this article aims to provide insights into how online learning can be tailored to meet the needs of visual learners and promote their academic success.



## Introduction

The COVID-19 crisis created headwinds in the global economy, leading to business losses and layoffs. The challenging situation caused by the pandemic also led to serious disruption to educational opportunities all over the world. Governments and educational institutions worldwide attempted to suggest and establish alternative ways of providing education in the dramatic period of social distancing. This was a period of serious changes in education, seeing a move from traditional classrooms to distance learning, which was not equally achievable or successful in every country and educational system. It is important to consider how online learning affects different types of learners, as every student has a unique way of processing and retaining information. Visual learners may have specific needs and preferences that should be taken into consideration so

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as to optimize their learning experience. Understanding the different learner types is crucial to enable educators to tailor their instructions and materials to the needs and strengths of their students.

Visual learning is a learning approach that emphasizes the use of visual aids, such as diagrams, images, videos and interactive simulations, to enhance the learning experience. With the rapid growth of online learning, there is a need to understand how this mode of learning affects visual learners. According to Artino and Jones's (2012) research, participants showed a positive attitude towards online courses and mentioned that enjoyment, a positive activating emotion, was an effective predictor of elaboration and metacognition.

Yet, while online learning offers the convenience of learning from anywhere and at any time, it may present unique advantages or challenges for visual learners. Based on Murphy *et al*. (2004) research results, students prefer visual learning at a higher percentage than other learning styles, because visual learners can gain more benefit from distance learning than others, as they remember better from highly visualized materials.

As a result of the pandemic, educators have had to adapt their teaching methodologies to suit the virtual learning environment. While online learning has several benefits for visual learners, it also poses challenges for them. Al-Rawi (2013) highlights that teaching becomes more effective at meeting the needs of the learner when blending various techniques to deliver knowledge and ideas becomes necessary. Visual learners rely heavily on visual aids, such as diagrams, images, and videos, to understand complex concepts, memorize things better, and analyze various tasks independently. With traditional, face-to-face classroom instruction, visual learners were able to see their lecturer's facial expressions and body language, as well as observe their peers' work. Gurung (2021) investigated challenges faced by teachers in online teaching during the COVID-19 pandemic and revealed that the biggest challenge was reaching students online with various learning styles. Teachers' teaching experience and qualifications are important in both offline and online teaching, because teachers run the whole process and thus should be ready to learn new technology and the necessary methodology of online teaching.

This article examines the impact of online learning on visual learners and suggests strategies for educators to address challenges that are faced while teaching visual learners online. By tailoring online teaching methods to meet the needs of visual learners, educators can help them thrive in a digital learning environment.

**Actuality of the Research**

The COVID-19 pandemic has accelerated the shift toward online learning, forcing educators to adapt quickly to the new reality. While online learning has benefits, such as flexibility and accessibility, it also presents challenges for students who learn best through visual aids. With more students than ever before taking courses online, there is an urgent need to understand the impact of this mode of learning on visual learners. This has led to a growing body of research examining the effectiveness of online teaching methodologies for visual learners, as well as explor-

ing strategies for accommodating their needs in a digital environment. This research is particularly relevant now, as online learning is likely to continue even after the pandemic has subsided, and educators will need to develop effective strategies to cater to the needs of all learners.

**Practical Value of the Research**

With the increasing trend of online education, it has become imperative for educators to understand the learning needs and preferences of different types of learners, including visual learners. By identifying the challenges faced by visual learners in the online learning environment, and exploring effective strategies to support their learning, educators can design online courses and instructional materials that are more inclusive and engaging for all students.

Furthermore, the insights gained from this research can help educators to develop better teaching methodologies and tools to enhance the effectiveness of online learning for visual learners. This can lead to improved learning outcomes and increased retention rates, ultimately benefiting both the learners and the institutions providing the online courses.

Moreover, the practical implications of this research extend beyond the realm of education. The skills and competencies developed through online learning are increasingly valued in the modern workplace. By supporting visual learners in their online learning, educators can better prepare them for the demands of the current and future job market, ultimately contributing to their personal and professional growth.

**Literature Review**

In recent years, online learning has become an increasingly popular way for students to access educational content, offering a flexible and convenient way to learn from anywhere. However, it is unclear how online learning affects visual learners specifically. The learning process differs for different learners, as every student has their own way of learning, and everyone is unique in their learning interest, preferences, needs, etc. Understanding learner types is important for educators to enable them to tailor instructions and materials to the needs and strengths of their students (Siregar & Haswani, 2020). Universities constantly make contributions to improve students' performance and strengthen their learning ability.

Students' academic performance depends on many internal and external factors, and educators must pay attention to those factors (Espinoza-Poves *et al.*, 2019). According to Fleming and Baume (2006), learning style is a description of a learning process that encourages learners to define important steps toward understanding new materials. Fleming (2014) introduced the Visual, Aural, Read/Write, and Kinesthetic (VARK) model, which divides learners into four categories. Knowing and understanding learner types is important because it helps educators to process and retain information most effectively. As Gilakjani (2012) outlines, visual learners prefer to learn through images, graphs, and additional visual aids, while auditory learners prefer to listen to someone speaking or use songs in their learning process. Kinesthetic learners, on the other hand, learn through physical activities and experiences.

Santo (2006) investigated the relationships between learning styles and online learning because online learning was one of the main challenges faced during the pandemic period. Online learning can be particularly beneficial for visual learners as it provides a variety of multimedia resources that can help them process information effectively. Using videos, diagrams, images, and other visual aids helps visual learners to better understand concepts and retain information effectively. Bonk and Zhang (2006) say that visual representations of the content are highlighted with techniques during online learning, and online courses have to offer a wide range of visual aids to support visual learners. Further, online learning often allows for greater flexibility and control over the pace of learning, which can be particularly beneficial for visual learners who may need more time to process information presented in text or auditory formats. According to Elango, Gudep, and Selvam (2008), visual learners tend to have a positive perception of online learning because it supports their way of learning; it allows them to review material at their own pace and engage with the content in a way that is tailored to their unique learning style.

**Advantages for Visual Learners during Online Learning**

Axmedova and Kenjayeva (2021) claim that the pandemic brought with it a new term, the "new normal," to education, seeing the increased use of technologies and online tools in the teaching/learning process. As online learning required professors to prepare presentations to deliver a lecture, visual learners had the possibility to retain information better by looking at pictures, infographics, maps, diagrams, videos, etc. (Clarke III *et al.*, 2006). Visual learners are often more engaged when they can see and interact with visual elements. Online learning provides various interactive tools, such as quizzes, interactive whiteboards, mobile phones, and virtual labs, that can help learners stay focused and engaged throughout the learning process. Mobile phones can be integrated into the teaching/learning process of English as a Second Language because this opportunity allows visual learners to understand complex concepts more easily. They learn at their own pace and in their own preferred way (Ibrahim & Kadiri, 2018).

Based on the "Cognitive Load Theory", extraneous cognitive load refers to the unnecessary mental processing required to understand instructional materials, which makes the learning process more easily digestible for visual learners. Intrinsic cognitive load refers to the inherent complexity of the learning materials, which simplifies complex concepts and makes them more accessible for visual learners (Cook, 2006). Online learning made the lecture preparation process easier for visual learners because lecturers were able to search for interesting visual materials in a variety of formats and offer them to the learners by sharing a screen. Well-organized presentations help learners enhance their creativity and strengthen their various abilities, something that can be leveraged in different settings (Russell, 2006). Visual learners tend to complete online learning more effectively than other types of learners because they benefit from a vast array of visual aids and the interactivity and flexibility used in the teaching/learning process (Drago & Wagner, 2004).

The online teaching/learning process provides interesting learning experience for different types of learners, and, as mentioned above, visual learners benefit from the online learning process more, as online education gives them the opportunity to learn from visually appealing presentations, incorporating videos and animation into the learning process, and allowing them to reinforce key concepts effectively.

**Challenges Faced by Visual Learners during Online Learning**

Visual learners may benefit from seeking out courses that provide ample visual aids, taking breaks to engage in visual activities such as drawing or using mind maps, and actively seeking out opportunities for hands-on learning. Not all courses provide visual materials during the learning process, which emphasizes the isolation of online learning for visual learners (Cantoni *et al.*, 2004). Wang, Mendori and Hoel (2018) revealed in their research that the motivation to learn of those with a stronger visual style preference and technology acceptance was improved during online learning, in comparison with those who were visual learners but not technology-friendly. During online learning, students need to have sharpened technical skills to overcome any difficulties they face during online studies, otherwise it can be difficult for them to benefit from online forums or video chats with instructors or peers.

Online education also requires teaching students with mixed abilities, and in this case visual learners can end up as early finishers, a challenge for teachers. Using real life examples to illustrate concepts and ideas is quite common for visual learners, and teachers must be ready to face that kind of difficulty while teaching students with visual preferences (Annie *et al.*, 2015). According to Ibrahim and Kadiri (2018), using mobile phones during the teaching/learning process is recommended, especially for teaching English as a Second Language, because mobile phones provide a means of communication and collaboration between students and teachers, and helps to facilitate a more personalized and effective learning experience. On the negative side, however, mobile phones can be a distraction during lesson time, and can even decrease cognitive performance and learning outcomes. Morelle and Tabane (2019) revealed during their research that learners with visual impairment were physically integrated in classes but not truly included, because they were distracted by numerous factors. Students should be encouraged to use their mobile phones, online apps, forums, or other additional platforms for educational purposes only, and distractions should be minimized by turning off notifications and limiting access to non-educational apps.

To overcome such challenges, teachers can adopt new strategies and approaches to teach visual learners online, such as leveraging technology to engage them and promote collaboration, provide clear and consistent communication, and providing opportunities for personalized learning.

**Methods**

A private university was chosen to conduct the research in. The university was chosen for its diverse student population and its strong focus on innovative teaching methods.

A questionnaire (Likert Scale) was used as a research tool to check what kind of attitude participants had toward online learning (see Appendix 1). Before filling out the questionnaire, the participants completed a test (The VARK Questionnaire - How do you learn best, 2023) to find out if they were visual learners or not. Overall, 85 participants filled in the questionnaire, and 44 out of 85 appeared to be visual learners.

Using questionnaires is quite effective in conducting research, especially when one wants to reach many people in a short period of time. Questionnaires are also the fastest tool to collect data and give the researcher more time to analyze the received information (Prithwishkumar & Michael, 2014). Further, questionnaires provide standardized questions that can be administered to all participants in the same way. This ensures that all participants are asked the same questions, making it easier to compare and analyze their responses.

The questionnaire was prepared with a simple design so as not to confuse the respondents. Questions were clearly formulated to help respondents to analyze them in a better way, while instructions were short and simple.

The fact was taken into consideration that all researchers are dependent on the goodwill of the respondents, and if they do not want to answer anything, they just skip the question or circle the wrong answers. As such, the received data was analyzed precisely. Respondents did not write their names on the questionnaire, as it was confidential. Participants were informed that their answers would be used for this article and the questionnaire was given to them after their confirmation. They were also told that they were able to abandon the filling process any time if they did not feel comfortable.

**Research Setting and Participants**

The participants in the study were undergraduate students enrolled in a specific course who identified as visual learners. Participants were asked to express their interest in participating in the study.

The sample consisted of 44 students, with an equal number of males and females. The age range of the participants was between 18 and 22 years old. The researcher ensured that all participants provided informed consent before participating in the study. She also emphasized the voluntary nature of participation and the participants' right to withdraw from the study at any time.

Overall, the research setting, and participants were carefully selected to ensure the study's relevance and generalizability to other similar universities and populations.

**Research Tool**

The questionnaire included 10 questions and was assessed using the Likert Scale. Once the questionnaire was designed, to prove its reliability, it was tested twice. Ten participants were randomly chosen, ones who did not take part in the research after piloting this questionnaire. All of them filled in the questionnaire twice, with a 20-minute interval between, and showed homogenous answers (Appendix 2).

To check which questions in the questionnaire, measure the same underlying construct, Cronbach's Alpha was used to

assess the interval consistency of the scale questionnaire. Cronbach's Alpha score was 0.947 > 0.8, and the significance p = < 0.001, which means that there is a strong correlation between the two results, the result is statistically significant, and the questionnaire is reliable.

**Table 1. Test-retest results, Cronbach Alpha**

Correlations

| | | VAR00001 | VAR00002 |
|---|---|---|---|
| VAR00001 | Pearson Correlation | 1 | .947** |
| | Sig. (2-tailed) | | <.001 |
| | N | 10 | 10 |
| VAR00002 | Pearson Correlation | .947** | 1 |
| | Sig. (2-tailed) | <.001 | |
| | N | 10 | 10 |

*** Correlation is significant at the 0.01 level (2-tailed).*

**Research Question**

Online learning is a new step in education, and this topic needs further investigation, because, with time and more experience, educators have better knowledge of all those factors that need to be taken into consideration while learning online. There were several interesting questions related to the impact of online learning on visual learners, and the following question was chosen from among them:

Research question: Do visual learners benefit more from online learning than other types of learners?

**Research Analysis**

The results are presented in Table 2 below. More detailed results are presented in Appendix 3.

**Table 2. Descriptive statistics for the survey**

| Question Statistics | Mean | Mode | Median | Standard Deviation | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| 1 | 2.98 | 2 | 1.5 | 1.27 | 0.009 | -0.099 |
| 2 | 3.2 | 3 and 4 | 2.5 | 1.00 | 0.003 | -0.727 |
| 3 | 3.27 | 3 | 2 | 1.1 | -0.581 | 0.056 |
| 4 | 3.45 | 4 | 2.5 | 1.066 | -0.177 | -0.750 |
| 5 | 3.5 | 3 and 5 | 2 | 1.210 | -0.247 | -0.970 |
| 6 | 3.5 | 4 | 2.5 | 1.067 | -0.300 | -0.714 |
| 7 | 3.8 | 5 | 3 | 1.13 | -0.885 | 1.262 |
| 8 | 3.47 | 3 | 2 | 1.19 | -0.160 | -0.900 |
| 9 | 3.43 | 4 | 2 | 1.065 | -0.600 | 0.107 |
| 10 | 3.38 | 4 | 2.5 | 1.08 | -0.729 | 0.231 |

The findings drawn from the analysis of the data collected during this research revealed that, overall, online learning has an impact on visual learners' learning process because of many factors. As the data show, for questions 5 (Mean – 3.5), 6 (Mean – 3.5), and 7 (Mean – 3.8) the mean is more than 3.5, for questions 2 (Mean – 3.2), 3 (Mean – 3.27), 4 (Mean – 3.45), 8 (Mean – 3.47), 9 (Mean – 3.43), 10 (Mean – 3.38), the mean is nearly 3.5, and for question 1, the mean is 2.98, which overall shows a positive result.

As for the Median and Mode, their results for all questions are very close to the mean

indicators, a fact that shows a normal distribution. The results themselves show that the data is well-balanced and can be analyzed. For Q1, the standard deviation is 1.00, and for questions, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, and Q10, the standard deviation is more than 1, which means that the answers are quite heterogeneous.

The results of Skewness and Kurtosis are between -3 – 3 for all the given questions, so the difference of opinions is not dramatic. But for Q4, Q5, Q6, and Q8, both Skewness and Kurtosis are negative, which means that the results are more often lower than the mean. Overall, the results do not constitute a normal curve and as such are reliable.

**Discussion**

The article "The Impact of Online Learning on Visual Learners" explores the effect of online learning on students who are identified as visual learners, who prefer to learn through visual aids such as diagrams, videos, and images. The research suggests that online learning can be particularly beneficial for visual learners, as it provides a variety of multimedia resources that can help them process information effectively. Additionally, the flexibility and control offered by online learning can be advantageous for visual learners, who may need more time to process information presented in text or auditory formats.

The article identifies several advantages of online learning for visual learners, such as the ability to review material at their own pace and engage with the content in a way that is tailored to their unique learning style. Online learning provides various interactive tools, such as quizzes, interactive whiteboards, mobile phones, and virtual labs, that can help learners stay focused and engaged throughout the learning process. Furthermore, well-organized presentations and lectures that include visual materials can enhance visual learners' creativity and strengthen their various abilities that can be leveraged in various settings.

The article also discusses some of the challenges faced by visual learners during online learning, such as the lack of visual aids in some courses, which can emphasize the isolation of online learning for visual learners. Additionally, students with mixed abilities may have varying paces of learning, which can result in visual learners being early finishers in online courses.

Overall, the research suggests that online learning can be highly beneficial for visual learners if the courses provide proper visual aids, and if the students have adequate technical skills to overcome any difficulties they may face during online studies. This study highlights the importance of considering students' learning styles and needs when designing online courses and using appropriate teaching strategies and materials to accommodate visual learners.

**Research Ethics**

Research ethics is an important part of the research. Respondents were fully informed about the research purpose, procedures, potential benefits, and their rights as a participant, in advance. Participants were told that their personal information would not be shared or disclosed to any third parties without their explicit consent. All of them were ensured that their privacy would be protected. The respondents' data was

collected, stored, and analyzed in a manner that was secure.

The research was designed in such a way that was unlikely to cause harm or distress to participants. Their data was collected and analyzed in an objective and unbiased manner, by using valid and reliable methods.

**Conclusion**

In conclusion, online learning has a positive effect on visual learners, as evidenced by the findings of this research article. Visual learners who engage in online learning can benefit from various features and tools that enhance their learning experience, such as videos, images, and interactive simulations. Additionally, online learning provides a flexible and convenient environment that allows visual learners to control the pace of their learning and review materials as needed.

However, the effectiveness of online learning for visual learners may vary depending on several factors, such as the quality of the materials and the level of student engagement. Therefore, educators and instructional designers must ensure that online learning materials are visually appealing, interactive, and tailored to the needs of visual learners so as to optimize their learning outcomes.

Overall, online learning can provide a valuable educational experience for visual learners, and its potential should be further explored and harnessed.

**Research Limitations**

The research article: "The Impact of Online Learning on Visual Learners" had some limitations when interpreting the results of the study and considering them when designing future research studies in this area. One of the limitations was self-report bias from the participants, in that they may not have provided an accurate reflection of their actual experiences. Additionally, the willingness of the participants to express their opinions and experiences can be influenced by various factors, such as their personality traits, cultural background, and prior experiences with research.

Further, the study represents a limited sample size, which may not be representative of the larger population of visual learners. This factor may limit the external validity of the study. The study is based on a single method (Questionnaire) of data collection or analysis, which can also limit the scope and depth of the findings. For wider research of this topic, researchers could consider a variety of methods of data collection, such as surveys, interviews, and focus groups, to capture a diverse range of perspectives and experiences. It is also important to acknowledge the potential limitations of the sample and to carefully interpret and generalize the findings accordingly.

**Recommendations**

Online learning is quite a new challenge for the education sector, it requires time and experience to sharpen its proper and effective usage. By implementing the recommendations below, instructors can ensure that visual learners have a positive and effective online learning experience:

- Use visual aids: Visual learners rely heavily on visual aids such as images, videos, and diagrams. Therefore, instructors should incorporate these aids into their online teaching to improve comprehension and engagement;
- Provide interactive content: Interactive content such as quizzes, games, and

simulations can help visual learners apply what they learned in a practical context. This can enhance their learning experience and help them to retain information better;

- Personalized learning: Visual learners have different learning styles and preferences. Instructors should use personalized approaches to ensure that each visual learner can access the content in a way that suits their learning style;
- Create an engaging learning environment: To keep visual learners engaged, instructors should create an interactive and social learning environment that encourages collaboration and communication between students;
- Assess student progress: Regular assessment and feedback can help visual learners to identify their strengths and weaknesses and make necessary adjustments to improve their learning outcomes;
- Use accessibility and user-friendly technology: The technology used for online learning should be accessible and user-friendly, with features that support visual learners, such as closed captions, transcripts, and high-quality images and videos.

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**Appendix 1. The Impact of Online Learning on Visual Learners**

Dear Participant,

Thank you for your willingness to take part in the research. We would like to ask you to complete a questionnaire using a Likert scale. Your responses will be kept strictly confidential and no personal information will be linked to your answers. Your participation is voluntary.

Please assess the statements in a 5- point Likert scale: 5-Completely agree, 4-agree, 3-neutral, 2-disagree, 1-completely disagree.

| N | Statements | 5 | 4 | 4 | 2 | 1 |
|---|---|---|---|---|---|---|
| | | Completely agree | Agree | Neutral | Disagree | Completely Disagree |
| 1 | I found online learning effective as a visual learner | | | | | |
| 2 | Online learning hindered my ability to grasp visual content | | | | | |
| 3 | Online learning experience provided enough opportunities to engage with visual materials | | | | | |
| 4 | Online courses placed much emphasis on visual content | | | | | |
| 5 | I often supplemented my online learning with additional visual resources | | | | | |
| 6 | I relied on visual aids to understand and remember course materials | | | | | |
| 7 | My professors put much effort into making their online courses visually appealing and informative | | | | | |
| 8 | I often found myself disengaged from online lectures due to lack of visual stimulation | | | | | |
| 9 | Online learning experience helped me to cater my individual learning style as a visual learner | | | | | |
| 10 | As a visual learner, I was satisfied with the online learning experience | | | | | |

## Appendix 2. Questionnaire Results

**Table 1A: First Questionnaire Results**

| Item / Statistics | Mean |
|---|---|
| 1 | 2.3 |
| 2 | 3.2 |
| 3 | 3.0 |
| 4 | 4.0 |
| 5 | 3.0 |
| 6 | 2.7 |
| 7 | 3.8 |
| 8 | 3.4 |
| 9 | 3.3 |
| 10 | 3.6 |

**Table 1B: Second Questionnaire Results**

| Item / Statistics | Mean |
|---|---|
| 1 | 2.4 |
| 2 | 3.4 |
| 3 | 3.4 |
| 4 | 4.1 |
| 5 | 3.0 |
| 6 | 2.7 |
| 7 | 3.8 |
| 8 | 3.5 |
| 9 | 3.2 |
| 10 | 3.4 |

## Appendix 3. Survey Results

| Questions Point | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 5 | 13 | 11 | 8 | 7 |
| 2 | 1 | 11 | 14 | 14 | 4 |
| 3 | 4 | 4 | 15 | 15 | 5 |
| 4 | 1 | 8 | 14 | 14 | 8 |
| 5 | 2 | 8 | 10 | 10 | 12 |
| 6 | 1 | 8 | 16 | 16 | 8 |
| 7 | 0 | 3 | 11 | 11 | 16 |
| 8 | 2 | 7 | 8 | 8 | 12 |
| 9 | 3 | 4 | 17 | 17 | 6 |
| 10 | 4 | 3 | 18 | 18 | 5 |

**Descriptive Statistics**

| Question Statistics | Mean | Mode | Median | Standard Deviation | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| 1 | 2.98 | 2 | 1.5 | 1.27 | 0.009 | -0.099 |
| 2 | 3.2 | 3 and 4 | 2.5 | 1.00 | 0.003 | -0.727 |
| 3 | 3.27 | 3 | 2 | 1.1 | -0.581 | 0.056 |
| 4 | 3.45 | 4 | 2.5 | 1.066 | -0.177 | -0.750 |
| 5 | 3.5 | 3 and 5 | 2 | 1.210 | -0.247 | -0.970 |
| 6 | 3.5 | 4 | 2.5 | 1.067 | -0.300 | -0.714 |
| 7 | 3.8 | 5 | 3 | 1.13 | -0.885 | 1.262 |
| 8 | 3.47 | 3 | 2 | 1.19 | -0.160 | -0.900 |
| 9 | 3.43 | 4 | 2 | 1.065 | -0.600 | 0.107 |
| 10 | 3.38 | 4 | 2.5 | 1.08 | -0.729 | 0.231 |