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## **Innovated Expandable Office Table with Led Strips: Imperative usage for Technology Students**

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***Abstract:** This study presents an innovative, ergonomically designed office table specifically for technology students. Equipped with LED strips for optimal lighting, the table allows for expansion as needed, providing flexibility and efficient space utilization. The primary objective is to enhance the functionality, aesthetics, and ergonomic comfort of an innovative office table, making it more suited to the needs of tech-savvy students. The research methodology includes designing an ergonomic prototype, testing its functionality, and gathering feedback and satisfaction from a sample of technology students and instructors. To select the sample, the researchers used a convenience selection method, choosing participants based on their convenient accessibility and proximity to the researcher. The selection of participants was based on their convenient availability and close proximity to the researcher. The ergonomic design aims to improve posture, reduce back pain, and increase comfort during long study hours. Potential findings could suggest that this table not only enhances study conditions and improves space usage, but also significantly increases user comfort and productivity due to its ergonomic feature. In conclusion, this research, using convenience sampling,*

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*aims to provide a more conducive and ergonomically comfortable study environment for technology students, with significant implications for future office furniture design.*

**Key words:** *Innovated office table, expandable, LED strips, ergonomic design, technology students.*

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## 1. Introduction

In the contemporary landscape of office environments, the quest for ergonomic, adaptable, and technologically integrated furniture solutions has become paramount. The advent of digital workspaces and the evolving nature of collaborative endeavors demand innovative designs that cater to dynamic work settings (Meyer, 2010). In response to this demand, the conception of an innovative expandable office table with LED strips emerges as a promising solution, poised to redefine the modern office experience. This research delves into the multifaceted dimensions of such a creation, exploring its design principles, functional advantages, technological integration, ergonomic considerations, and implications for enhancing productivity and well-being in the workplace.

The evolution of office furniture reflects broader shifts in work culture, technology, and design philosophies (Alin Jr et al., 2024). Traditional static desks have gradually given way to more flexible and adaptive configurations, mirroring the agile nature of contemporary work dynamics. The integration of ergonomic principles has been a central focus, aiming to promote employee health and comfort while fostering creativity and productivity (Taosa et al., 2024). Against this backdrop, the emergence of an innovative expandable office table signifies a paradigm shift, signaling a departure from conventional office setups towards more versatile and user-centric solutions.

The Innovated Expandable Office Table is a synthesis of innovative design principles and functional advantages. Its expandable nature allows for seamless adaptation to varying spatial requirements, catering to diverse office layouts and collaborative needs (Arcadio et al., 2023). The use of LED strips not only enhances aesthetic appeal but also serves practical purposes such as task lighting, ambient illumination, and mood setting customization. Furthermore, the integration of smart features enables intuitive control and automation, empowering users to personalize their workspace environment according to preferences and workflow demands.

The innovative expandable office table embodies a holistic approach through the fusion of technology and ergonomics. Advanced sensor technologies, connectivity options, and intelligent controls converge to create a synergistic ecosystem that optimizes the user experience and operational efficiency (Bendanillo, 2023). Moreover, meticulous attention to ergonomic considerations ensures that the table promotes proper posture, reduces strain-related injuries, and fosters a health-conscious work environment. By seamlessly integrating technology with ergonomic design principles, the table transcends its utilitarian function to become a catalyst for enhanced well-being and performance in the workplace (Bendanillo et al., 2023).

While it is true that many workplace industries in this modern world continue to evolve in response to changing demands and societal trends, the innovative expandable office table emerges as a transformative element with far-reaching implications for productivity and well-being. Its adaptability, functionality, and technological prowess not only facilitate collaborative endeavors and task efficiency, but also contribute to employee satisfaction, engagement, and the overall quality of work

life (Bendanillo et al., 2023). By embracing innovation in office furniture design, organizations can cultivate a conducive environment that nurtures creativity, fosters collaboration, and empowers individuals to thrive in the digital age.

To sum up, the Innovated Expandable Office Table with LED Strips represents a bold leap forward in re-imagining the modern office landscape. Through a synthesis of innovative design, advanced technology, and ergonomic principles, it embodies the ethos of adaptability, functionality, and user-centricity, promising to redefine the way we work, collaborate, and interact within contemporary office environments. As this research unfolds, it seeks to unravel the transformative potential embedded within this innovative creation and shed light on its implications for shaping the future of work.

## 2. Related Literature

As the field of education changes, the incorporation of technology becomes more and more important in molding how students learn and getting them ready to compete on a global scale. This study delves into a comprehensive review of literature focusing on product innovations and their significant role in leveraging technology to benefit students, particularly in enhancing global competitiveness at CTU Pinamungajan Campus.

Holmén et al. (2007) introduce the concept of “innovative opportunities” as a means to better comprehend and elucidate processes of economic transformation. They ground their interpretation of opportunities in the context of business innovation, highlighting the significance of perception and uncertainty in decision-making during innovation processes. Drawing on Schumpeterian perspectives of economic transformation, innovative opportunities encompass various elements within the processes through which actors identify, act upon, and realize new combinations of resources and market needs to capitalize on their future economic potential. To help us understand these processes better, the proposed way of thinking about innovative opportunities includes three main parts: (1) economic value, (2) resource mobilization, and (3) appropriability. This perspective on opportunities surpasses the existing literature on the subject. The authors conclude by discussing how this perspective on innovative opportunities alters our existing understanding of innovation activities and industrial dynamics, as well as identifying new avenues for further research.

According to Trigkas et al. (2012), it is important to introduce innovation into the production process through investments in technological equipment. In general, an improvement in innovation performance leads to an increase in sales. The effectiveness of the innovation system is considered satisfactory when most companies successfully implement innovation inputs. However, there is room for further enhancement in areas such as research and development (R&D), staff training, and the dissemination of innovation. Analyzing the innovation system at the sector level within a region can contribute to the development of more effective policies and decision-making processes that prioritize innovation.

The main function of table lamps is to provide light. People frequently place table lamps elsewhere in the house, if not on the bedside tables themselves. They are responsible for nocturnal luminosity, as well as providing reading light. The current world is a place for new product design and development, innovation, and assessment. The more quickly the world moves, the more change occurs in the design industry. The product is no longer the result of the manufacturer's decisions. In the early stages of product development, customer satisfaction is critical. Table lights have a detailed history dating back over a century; the British engineer George Carwardine is credited as the inventor of this type of lighting. Carwardine worked as a car suspension designer until 1929, when he decided to leave his profession to pursue an idea he had a few years prior. Bell Labs' Daryl Chapin, Calvin Fuller, and

Gerald Pearson developed the silicon photovoltaic (PV) cell, which successfully converted solar energy into electricity to power everyday electrical devices in 1954. According to the light outlet, solar energy and light are both renewable resources.

Solar energy is inherently renewable, making it an environmentally beneficial energy source that can meet our power requirements without any detrimental consequences, such as the release of greenhouse gases. The sun will always rise, so there's no need to be concerned about running out of light. Installing solar lights at your home or company can ensure that your property is constantly well-lit. This limitless energy source will never run out. Electricity and other limited resources aren't in the same category. After installing your solar-powered lights, you can rest assured that your house or office will always have adequate lighting, regardless of environmental changes. Boothroyd's book suggests that addressing production and assembly challenges from the outset of the design process is crucial for achieving good design. Many studies have guided the evolution of table lamp design. At first, there was little variation in the design, but the main element was just lights.

According to the study of Branowski et al. (2020), a systematic approach to designing new fasteners for wood-based boards used in frameless furniture can lead to innovative solutions. The study identified the requirements from the perspectives of furniture users, manufacturers, and fastener manufacturers. Based on these criteria, we developed seven fastener concepts with innovative features. We then created and evaluated prototypes using a comprehensive method. The paper aims to provide a detailed explanation of the design process and its potential benefits for product performance. We came to two main conclusions: all mechanical furniture fasteners include anchoring and drive subsystems, and the number of design solutions for these subsystems is limited. Fasteners commonly use only four anchoring methods and two drive methods, despite the wide range of options available on the market.

This conceptual article explores the concept of "prospective ergonomics" in the context of innovation, design thinking, and design processes. Design thinking is a strategy that fosters innovative solutions by emphasizing observation, collaboration, interpretation, visualization, rapid prototyping, and business analysis. This approach has a significant impact on innovation and business strategy. The goal of this project is to create a road map for innovation that involves consumers, designers, and business professionals in an integrated process. We can apply this road map to the design of products, services, and businesses. The article lays out a theoretical framework for innovation that is based on rationalist-historicist and empirical-idealistic perspectives, as well as models of design reasoning. It also discusses existing methods and introduces new ones (Liem & Brangier, 2012).

Zhang and Joines (2017) proposed a multidisciplinary model that combines user-centered design (UCD) and the theory of innovation problem solving (TRIZ) to enhance user satisfaction and facilitate rapid innovation in the development of new ergonomic products. This model focuses on the early stages of design and introduces eight evolutionary patterns for innovative design. The integrated model consists of three steps. The first step uses three dimensions of ergonomic needs, integrated with UCD, to identify comprehensive user needs (UNs). We establish the relative importance of UNs using a 5-point linear numeric rating scale. We assess the internal consistency and reliability of UNs using Cronbach's alpha statistic. We determine the final UNs and their priorities. The second step involves selecting the Eight Patterns of Evolution from TRIZ to generate design ideas that align with the UN's priorities. The third step involves combining the design ideas with ergonomic design principles to generate innovative design alternatives. We conducted a case study to demonstrate the viability of a proposed model and design approach for an electric mobility device. Overall, this model aims to improve user satisfaction and promote rapid innovation by integrating UCD and TRIZ methodologies in the early stages of ergonomic product development.

According to Hou Yip Cheng (2021), a 2016 study focused on the integration of a pneumatic adjustable system into a table for height adjustment and tilting of the table top. The table incorporates a drawer as an additional function. The tabletop attaches the pneumatic cylinder, which generates a lifting force from the air inside to support and stabilize the table. The user is required to push a button to activate the control valve of the pneumatic systems to raise or lower the table height. Another study explored the creation of a convertible table that combines several desired furniture items into a compacted form. The challenge in this design is the linkages among the furniture units, which require the joints to occupy a small space in the compacted form but still function well in the expanded form. Flipping its surface transforms the convertible table into a bed. An additional platform attached to the bed can be tilted to facilitate its transformation into a table.

A study on consumer attitudes toward furniture designs found that consumers seriously value lightweight attributes in their assessment of furniture quality. Light-weight carbon fiber has been used in the fabrication of furniture items that weigh as little as 300 g but are still able to support a person's weight. A modular product design provides a large range of advantages in addressing the influence of product architecture on product lifecycle phases. For example, it reduces development costs, promotes environmental friendliness, enables mass customization, and improves work efficiency. Modular design allows for the separation of a product into multiple parts, enabling it to fulfill several primary functions.

Astonkar and Kherde proposed a modular capsule-shaped concept that can be broken into several parts to render the functions of a table and chair. Such a design reduces storage space while also making space for other products or activities. Ergonomics has become one of the areas of focus in the design industry, as it entails the study of human-machine interactions, fatigue, and discomfort in product design. A study on school furniture suggested that body discomforts are prevalent around the back, neck, elbow, and thigh regions. Given this situation, considering ergonomics in furniture design is critical to reducing bodily discomforts such as back pain and preventing the development of musculoskeletal disorders.

### **3. The Importance of the Study**

The study of the innovative expandable office table with LED strips holds significant importance for students, faculty, and the Cebu Technological University-Pinamungajan Campus. For students, it offers a valuable opportunity to engage with innovative design principles, technological integration, and ergonomic considerations, enhancing their academic experience and preparing them for real-world challenges. Faculty and staff members benefit from its ergonomic design and technological features, fostering a comfortable and efficient workspace that can potentially reduce strain-related injuries and enhance productivity. Moreover, the adoption of such innovative furniture solutions reflects the university's commitment to technological advancements and a culture of innovation, providing a modern and progressive learning and working environment. This study not only facilitates practical applications but also opens avenues for further research and development within the university community, contributing to the advancement of knowledge in design, technology, and workplace ergonomics.

Table 1: General Information on Demographic Profile of the Participants

Indicators	Frequency	Percentage (%)
Age		
(19-22)	84	76
(23-27)	23	21
(28-36)	3	3
Gender		
(Female)	83	75
(Male)	27	25

The table presents a detailed analysis of the respondents' demographics, categorized by age groups and gender. We recruited a total of 112 individuals from the larger group under study. In this sample, there were multiple clearly defined age categories represented. Out of the total number of participants (84 individuals), the majority were between the ages of 19 and 22. Subsequently, there were a total of twenty-three (23) participants, all of whom were between the ages of twenty-three and twenty-seven (23-27) years old. Finally, the study included three participants who were between the ages of twenty-eight and thirty-six (28–36) years old. In addition, the study's gender breakdown indicated that 83 respondents identified as female, while 27 identified as male. Segmenting the respondent pool based on gender offers further information about its composition.

#### 4. Research Methodology

The research on the innovative expandable office table with LED strips at the Cebu Technological University Pinamungajan Campus employed a mixed-methods approach, incorporating qualitative and quantitative methods. The study, which was conducted among Bachelor of Industrial Technology with a Major in Interior Design Technology (BIT-IDT) students, aimed to comprehensively explore the topic. The campus, located in Barangay Pandacan, Pinamungajan, Cebu, provided the setting for the research, accommodating a growing student population of 149 BIT-IDT students. A total of 110 1st, 2nd, and 3rd year students, along with two BIT-IDT instructors, participated as respondents, selected through convenience sampling.

We conducted in-person interviews with the teachers and distributed questionnaires to collect qualitative data. The interviews and questionnaires focused on gathering their ideas, perceptions, and preferences regarding the revolutionary office table. The questionnaire comprised seven questions designed to gather structured feedback on identified research problems. Meanwhile, an online platform, Google Form, gathered quantitative data from the 110 selected students using a questionnaire containing ten questions using a 4-point Likert scale. This mixed-methods approach aimed to capture diverse perspectives on the user experience, ergonomic benefits, and satisfaction with the table's functionality.

The research procedure involved obtaining permission from the campus director, explaining the study's objectives to potential participants, and seeking their consent. We then distributed the questionnaires, had the respondents complete them, and collected them for analysis. We subsequently tallied and analyzed the collected data to draw meaningful conclusions.

#### 4.1 Data Analysis

The researchers utilized thematic analysis on the gathered qualitative data to discover repeating themes, patterns, and insights, therefore yielding important qualitative insights about the impact and

usefulness of the table. We employed statistical techniques, including weighted mean scores, to examine the quantitative data and gain quantitative insights into the faculty members' views on the effectiveness, usefulness, and ergonomics of the table. The study seeks to provide a comprehensive understanding of the Innovated Expandable Office Table by integrating findings from three distinct data sources: qualitative, quantitative, and contextual. This will facilitate the identification of empirical instances that substantiate the theoretical advantages of the table, highlight any potential limitations, and investigate how these limitations may impact its utility and efficacy. By utilizing the findings from both qualitative and quantitative assessments, we proposed design, implementation, and future research pathways for the novel expanding office table equipped with LED strips.

This study meticulously crafted the questionnaire, comprising five inquiries. The questions incorporated in the questionnaire were as follows:

1. How satisfied are users with the overall design and aesthetics of the innovative expandable office table with LED strips?
2. How satisfied are users with the storage capacity and organization features provided by the innovative table design?
3. What are users' perspectives on using the innovative table that has improved comfort and productivity in terms of ergonomic design?
4. What does the user think about the enhanced table in terms of its:
  - a) its quality,
  - b) durability, and
  - c) longevity
5. What are the users' perceptions of the innovative table's marketability?
6. How do users describe the LED strips or lighting solution?
7. As perceived by the respondents, what is their level of satisfaction of the respondents with the innovative design with LED strip in terms of:
  - 7.1 aesthetic,
  - 7.2 versatility, usability, durability
  - 7.3 comfort,
  - 7.4 satisfaction?
8. Is there a significant relationship between the respondent's perceptions and the innovative design of expandable office table with LED strip?

The researchers collaborated with experts to refine our research questions. Their guidance ensured clarity and validity. We analyzed data using thematic analysis to uncover themes among third-year college students regarding product innovation through instructional technology. Statistical tools, like weighted mean scores, gauge the effectiveness and impact of instructional technology.

## 5. Results and Discussions

The Data presentation, analysis, and interpretation are crucial for assessing the effectiveness and influence of research efforts. In this chapter, we delve into the data gathered regarding the "Innovated

Extendable Office Table with LED Strips: Imperative Usage for Technology Students.” Through meticulous examination and interpretation, we aim to elucidate the insights garnered from respondents and stakeholders involved in the study. This comprehensive analysis encompasses demographic breakdowns, thematic analyses, and direct quotations, shedding light on crucial aspects such as design suitability, aesthetic appeal, functionality, ergonomics, technology integration, customization options, overall satisfaction, storage efficiency, and organization features.

Table 2. The satisfaction of users with the overall design and aesthetics of the innovative expandable office table with LED strips.

Themes	Codes	<i>f</i>	%
<b>Functionality</b>	Meets users' practical needs and requirements in terms of usability	99	90
	Having a quality of materials used	108	98
	Compatibility with smart devices, and intuitive controls	105	95
<b>Aesthetic Appeal</b>	Assessing visual attractiveness and appeal.	100	91
	LED strips should be seamlessly integrated into the design of the table	103	94
	Color, brightness, and programmability of the LED strips	105	95
<b>Ergonomics</b>	Ensures comfort for users	106	96
	Adequate support for different postures		97
	Ensures readability and reduce eye strain	107	95
	Ensuring that designs mitigate potential ergonomic hazards	105	94
	Promotes user safety and comfort	104	
		108	98
<b>Overall Satisfaction</b>	Gauging users' overall satisfaction and perceived value of the innovative expandable office table with LED strips.	105	95
	Considering factors like noise, temperature, and humidity in design environments	109	99

The table's data provides insights into users' satisfaction with various aspects of an innovative expandable office table equipped with LED strips. In terms of functionality, the majority of users, comprising 90%, expressed satisfaction with how the table meets their practical needs, the quality of materials used (108 users, 98%), and its compatibility with smart devices along with intuitive controls (105 users, 95%). Moving on to aesthetic appeal, which evaluates the visual attractiveness and integration of LED strips into the table's design, approximately 95% of users were satisfied with factors such as color, brightness, and programmability of the LED strips. Despite the seamless integration of the LED strips, only 91% of users found the integration visually appealing. As for ergonomics, which focuses on ensuring user comfort and safety, a notable majority of users expressed satisfaction with factors such as adequate support for different postures (105 users, 95%), readability to reduce eye strain, and mitigating potential ergonomic hazards. Finally, when considering overall



satisfaction, including environmental considerations (e.g., noise, temperature, and humidity), around 95% of users were satisfied with the table's performance and perceived value. This data suggests that while the table generally meets users' functional and ergonomic needs well, there may be some room for improvement in enhancing the visual appeal of the LED integration for an even more satisfying user experience.

Table 3. The satisfaction of users with the storage capacity and organization features provided by the innovative table design.

Themes	Codes	<i>f</i>	%
<b>Storage Efficiency</b>	Users' contentment with how well the table's storage solutions accommodate various items	99	90
	Accommodate different types of items users may want to store	105	95
	Access the stored items	107	97
	Users keep their belongings tidy and easily accessible	104	94
<b>Accessibility</b>	Users' satisfaction with the ease of reaching stored items within the table's design.	106	96
	Enhance accessibility of sliding drawers or compartments	104	94
	Ensure users can reach their items without difficulty or discomfort	103	93
<b>Space Optimization</b>	Users' satisfaction with how efficiently the table utilizes available space for storage.	100	91
	Accommodate various items such as books, documents, gadgets, or other belongings	107	97
<b>Durability of Storage Components</b>	Users' perceptions of the storage compartments' longevity and robustness.	109	99

The table provides insights into user satisfaction with an innovative table design's storage capacity and organization features across four main themes: storage efficiency, accessibility, space optimization, and storage component durability. It reveals a positive perception among users regarding the functionality and effectiveness of the table's storage solutions. Users express contentment with the accommodation of various items, accessibility of stored belongings, efficient utilization of space, and durability of storage compartments. These findings suggest that the innovative table design effectively meets users' needs and preferences, offering them a convenient and organized storage solution. Overall, the data indicates a high level of satisfaction with the storage capacity and organization features provided by the innovative table design, reflecting its success in addressing users' expectations and requirements.

Table 4. Faculty as users' perspective in using the innovative table that has improved comfort and productivity in terms of ergonomic design.

Themes	Codes	f	%
<b>Comfort Evaluation</b>	Users' assessment of the table's ergonomic features in terms of comfort during usage	107	97
	Assess how comfortable users find the table in terms of seating position	105	95
<b>Impact on Efficiency</b>	Users' assessment of the table's ergonomic features in terms of comfort during usage.	102	93
<b>Flexibility and Adaptability</b>	Users' overall contentment with the ergonomic design and its influence on their experience.	104	95
<b>Long-term Advantages</b>	Users' preferences for ergonomic features that can be adjusted to suit different body types and preferences	103	94

The table provides insights into faculty members' perspectives on using an innovative table designed to enhance comfort and productivity through ergonomic features. It focuses on several themes related to ergonomic design and its impact on users' experiences.

Firstly, under the theme of comfort evaluation, the data indicates that the majority of faculty members (107 respondents) find the table comfortable in terms of seating position, with slightly fewer respondents expressing comfort in subsequent codes. This suggests a generally positive assessment of the table's ergonomic features in terms of providing a comfortable working environment.

Secondly, the impact on efficiency theme suggests that a significant proportion of faculty members (102 respondents) view the table's ergonomic features positively in terms of enhancing comfort during usage, with 93% expressing satisfaction. This indicates that the ergonomic design contributes positively to their efficiency and overall experience while using the table.

The flexibility and adaptability theme reveals that a substantial number of faculty members (104 respondents) are content with the ergonomic design's flexibility and adaptability, with 95% expressing satisfaction. This suggests that the table's ability to accommodate different body types and preferences is well-received among users, further enhancing their comfort and productivity.

Finally, the long-term advantages topic reveals that a significant majority of faculty members (103 respondents) have a preference for ergonomic elements that may be customized to accommodate various body types and preferences. Furthermore, 94% of the respondents expressed their contentment with such characteristics. This highlights the importance of customizable ergonomic solutions in ensuring long-term comfort and usability for users.

Overall, the data suggests a positive reception among faculty members towards the innovative table's ergonomic design, with the majority expressing satisfaction with its comfort, efficiency, flexibility, and long-term advantages. These findings indicate that the table has successfully improved comfort and productivity for faculty members, aligning with the objectives of ergonomic design principles.

Table 5. User's point of view towards the innovative table to its quality, durability, and longevity.

Themes	Codes	f	%
<b>Construction and Materials</b>	Users provide perceptions on the table's build quality and the materials used in its production	103	93
	Assessing material's strength, resistance to damage, and ability to endure different conditions.	108	98
<b>Design and Appearance</b>	Users comment on the table's visual appeal, discussing its aesthetic qualities and how well its design aligns with modern styles or preferences.	104	94
<b>Practicality and Functionality</b>	Users evaluate how well the table serves its intended purpose, considering factors such as ease of use, practicality, and adaptability to different settings.	108	98
<b>Long-Term Performance</b>	Users share their expectations and experiences regarding the table's longevity and durability, reflecting on its ability to maintain quality over time and withstand regular use.	106	96
<b>Value Proposition</b>	Users weigh the table's price against its perceived quality and durability, determining whether it offers good value for money.	105	95

The table provides valuable insights into users' perspectives regarding an innovative table's quality, durability, and longevity across several themes. Firstly, under the Construction and Materials theme, users assess the table's build quality and the materials used in its production. The data indicates that a significant portion of users perceive the materials to be strong, resistant to damage, and capable of enduring different conditions, reflecting positively on the table's overall quality and durability.

Secondly, under the design and appearance theme, users comment on the table's visual appeal and aesthetic qualities. A majority of respondents (104, 94%) find the table visually appealing, suggesting that its design aligns well with modern styles and preferences, further enhancing its perceived quality.

The practicality and functionality theme reveals that users generally evaluate the table's ability to serve its intended purpose. The majority of respondents (108, 98%) find the table practical and functional, indicating that it is easy to use and adaptable to different settings, contributing to its perceived value and longevity.

Under the long-term performance theme, users share their expectations and experiences regarding the table's durability and longevity. The data suggests that a substantial number of respondents (106, 96%) have positive expectations regarding the table's ability to maintain quality over time and withstand regular use, reinforcing its perceived value and longevity.

Lastly, under the value proposition theme, users consider whether the table offers good value for money. The majority of respondents (105, 95%) perceive the table to be good value, indicating that its perceived quality and durability justify its price, further enhancing its appeal and longevity.

Overall, the data suggests a positive perception among users regarding the innovative table's quality, durability, and longevity. Users appreciate its sturdy construction, appealing design, practical functionality, and perceived value, indicating confidence in its ability to withstand long-term use and provide a satisfactory user experience.

Table 6. Users Perceptions about the marketability of the innovative table.

Themes	Codes	f	%
<b>Distinctive Attributes</b>	Users might see the table as marketable due to its unique and innovative characteristics that distinguish it from competitors.	102	93
	Having better specific features like design, functionality, or materials as key selling points.	105	95
<b>Target Audience Attraction</b>	Users may evaluate the table's marketability based on its appeal to specific demographics, such as students, young professionals, or urban dwellers.	108	98
	Table's features align well with the needs and preferences of these groups.	104	94
<b>Value Proposition</b>	Users might assess the table's marketability by weighing its perceived value against its price, quality, and benefits.	107	97
	Favorable perceptions of its value for money could enhance its marketability, as users see it as offering desirable features at a competitive cost.	108	98
<b>Brand Reputation</b>	Users could consider the reputation and trustworthiness of the brand or manufacturer when evaluating the table's marketability.	105	95
	A strong brand presence and positive brand image could bolster its marketability, as users tend to trust and choose products from reputable companies.	107	97
<b>Market Trends and Demand</b>	Users might analyze prevailing market trends and demand for similar products to assess the innovative table's potential marketability.	104	94
	If there's a growing interest in multifunctional furniture or space-saving solutions, users may see the table as well-suited to capitalize on these trends.	108	98
<b>User Feedback and</b>	Users may take into account the impact of	109	99

<b>Reviews</b>	word-of-mouth recommendations and online reviews on the table's marketability. Positive endorsements and reviews from current users could elevate its reputation and attract interest from potential buyers.	105	95
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The table provides valuable insights into users' perceptions regarding the marketability of an innovative table, considering various themes. Firstly, under the Distinctive Attributes theme, users recognize the table's unique and innovative characteristics as key selling points. The data indicates that a significant portion of users perceive the table to have better-specific features like design, functionality, or materials, which could contribute to its marketability by setting it apart from competitors.

Secondly, under the Target Audience Attraction theme, users evaluate the table's appeal to specific demographics. The majority of respondents believe that the table's features align well with the needs and preferences of target groups such as students, young professionals, or urban dwellers, indicating its potential to attract a niche market segment.

The value proposition theme reveals that users assess the table's marketability by weighing its perceived value against its price, quality, and benefits. A significant number of respondents perceive the table to offer favorable value for money, enhancing its marketability by offering desirable features at a competitive cost.

Under the Brand Reputation theme, when assessing the marketability of a table, users take into account the brand or manufacturer's reputation and trustworthiness. The data shown in this field suggests that a considerable portion of respondents view a strong brand presence and positive brand image as factors that could bolster the table's marketability, as users tend to trust and choose products from reputable companies.

Moreover, under the Market Trends and Demand theme, users analyze prevailing market trends and demand for similar products to assess the innovative table's potential marketability. The data indicates that users perceive the table as well-suited to capitalize on growing interest in multifunctional furniture or space-saving solutions, indicating its alignment with current market trends and demands.

Lastly, under the User Feedback and Reviews theme, users consider the impact of word-of-mouth recommendations and online reviews on the table's marketability. The majority of respondents believe that positive endorsements and reviews from current users could elevate its reputation and attract interest from potential buyers, further enhancing its marketability.

Overall, the data suggests that users perceive the innovative table as having strong market potential due to its distinctive attributes, alignment with target audience needs, favourable value proposition, reputable brand presence, alignment with market trends, and positive user feedback. These factors collectively contribute to its perceived marketability, indicating promising prospects for its success in the marketplace.

Table 7. User’s descriptions the LED strips or lighting solution

<b>Themes</b>	<b>Codes</b>	<b><i>f</i></b>	<b><i>%</i></b>
<b>Atmosphere and Feel</b>	Users may talk about how LED strips or lighting solutions contribute to setting different moods and vibes within a space.	105	95

	Adaptability of the lighting, allowing for different ambiance options like lively, serene, or cozy.	107	97
<b>Tailoring to Preferences</b>	Users might emphasize the ability to personalize LED strips or lighting solutions according to individual tastes.	106	96
	Having features such as colour-changing capabilities, adjustable brightness, and programmable settings	105	95
<b>Practical Uses</b>	Users may discuss the practical applications of LED strips or lighting solutions in various settings, such as home décor, accent lighting, task illumination, or entertainment purposes.	105	95
	Lighting improves visibility, enhances aesthetics, and adds functionality to specific areas or activities.	109	99
<b>Energy Efficiency and Eco-Friendliness</b>	Users might highlight the energy-saving benefits and sustainability aspects of LED strips or lighting solutions compared to traditional lighting methods.	108	98
	Reduced power consumption, longer lifespan, and environmentally friendly characteristics as notable advantages.	106	96

The table presents users' perspectives on LED strips or lighting solutions across several themes, offering valuable insights into their experiences and perceptions. Firstly, under the atmosphere and feel theme, users discuss how LED strips or lighting solutions contribute to setting different moods and vibes within a space. The data suggests that a significant number of users appreciate the adaptability of the lighting, which allows for creating various ambiance options such as lively, serene, or cozy, enhancing the overall atmosphere.

Secondly, under the tailoring to preferences theme, users emphasize the ability to personalize LED strips or lighting solutions according to individual tastes. The majority of respondent's value features such as color-changing capabilities, adjustable brightness, and programmable settings, which allow them to customize the lighting to suit their specific preferences and needs.

According to the practical uses theme, users appreciate the practical applications of LED strips or lighting solutions in a variety of settings, including home décor, accent lighting, task illumination, and entertainment purposes. A significant number of respondents recognize the lighting's ability to improve visibility, enhance aesthetics, and add functionality to specific areas or activities, making it a versatile and valuable solution.

Under the energy efficiency and eco-friendliness theme, users highlight the energy-saving benefits and sustainability aspects of LED strips or lighting solutions compared to traditional lighting methods. The data indicates that users perceive reduced power consumption, a longer lifespan, and environmentally friendly characteristics as notable advantages of LED lighting solutions, contributing to their overall appeal and adoption.

Overall, the data suggests that users highly value LED strips or lighting solutions for their ability to create diverse atmospheres, tailor them to individual preferences, serve practical purposes in various settings, and offer energy-efficient and eco-friendly alternatives. These findings indicate a positive perception and widespread acceptance of LED lighting solutions among users, reflecting their versatility, functionality, and environmental benefits.

Table 8: Level of satisfaction of students with the aesthetic of the innovative table

Indicators	VHS	HS	S	LS	NS	M	SD	VD
	5	4	3	2	1			
<i>Provide ample space for studying, writing, or using electronic devices</i>	4.85	4.75	4.75	4.65	4.55	4.71	0.11	VHS
<i>Align with current design trends or preferences</i>	4.65	4.55	4.65	4.65	4.55	4.61	0.05	VHS
<i>Table design utilizes space, especially in environments where space is limited</i>	4.75	4.65	4.55	4.55	4.65	4.63	0.08	VHS
<i>Table innovative design incorporates innovative features or technology that enhance the student experience</i>	4.75	4.75	4.55	4.55	4.65	4.65	0.10	VHS
<i>Total:</i>	4.75	4.66	4.63	4.60	4.60	4.65	0.09	VHS
<i>Interpretation:</i>	<b>VERY HIGHLY SATISFIED</b>							

Legend:

M	MEAN	1.50	2.49	LS	Less Satisfied
%	Percentage	1.00	1.49	NS	Not Satisfied
VD	Verbal Description				
4.50	5.00	VHS	Very Highly Satisfied		
3.50	4.49	HS	Highly Satisfied		
2.50	3.49	S	Satisfied		

The table provides a comprehensive overview of students' satisfaction with an innovative table's design and aesthetics, offering valuable insights into their perceptions and preferences. Across various indicators, students express a high level of satisfaction, with ratings consistently falling within the Very Highly Satisfied (VHS) range.

Firstly, students rate the table highly, with a mean score of 4.71, indicating that they are very highly satisfied with the provision of ample space for studying, writing, or using electronic devices.

Secondly, students appreciate that the table design aligns with current design trends or preferences, with a mean score of 4.61, further indicating a very high level of satisfaction with the table's aesthetics.

Moreover, students highly value the table's utilization of space, particularly in environments where space is limited, as evidenced by a mean score of 4.63. This suggests that they find the table's design efficient and practical, contributing to their overall satisfaction.

Additionally, students recognize and appreciate the innovative features or technology incorporated into the table's design, enhancing their student experience. Students are extremely satisfied with these innovative aspects of the table, with a mean score of 4.65.

Overall, the total mean score of 4.65 further reinforces students' very high level of satisfaction with the design and aesthetics of the innovative table. This interpretation indicates that students are extremely pleased with the table's design, its alignment with current trends, its efficient use of space, and its incorporation of innovative features and technology. These findings suggest that the innovative table design effectively meets students' needs and preferences, enhancing their overall satisfaction and experience.

Table 9: Level of acceptability in terms of versatility, usability, durability and quality of the innovative table

Indicators	VHA	HA	A	LA	NA	M	SD	VD
	5	4	3	2	1			
<i>Usability of innovative table</i>	4.75	4.65	4.65	4.55	4.60	4.64	0.07	VHS
<i>Durability and quality of materials used</i>	4.85	4.75	4.55	4.65	4.65	4.69	0.11	VHS
<i>Versatility of innovative table</i>	4.85	4.85	4.70	4.70	4.75	4.77	0.06	VHS
<i>Total:</i>	4.77	4.75	4.63	4.63	4.67	4.70	0.08	VHS
<i>Interpretation:</i>	<b>VERY HIGHLY ACCEPTABLE</b>							

Legend:

	M	MEAN	1.50	2.49	LA	Less Acceptable
	%	Percentage	1.00	1.49	NA	Not Acceptable
	VD	Verbal Description				
4.50	5.00	VHA	Very Highly Acceptable			
3.50	4.49	HA	Highly Acceptable			
2.50	3.49	A	Acceptable			

The table provides a comprehensive assessment of an innovative table's level of acceptability in terms of versatility, usability, durability, and quality, offering valuable insights into its effectiveness and



suitability for users. Across all indicators, the innovative table receives highly favorable ratings, falling within the Very Highly Acceptable (VHA) range.

First, in terms of usability, users rate the table highly, with a mean score of 4.64, indicating very high acceptability. This suggests that users find the table easy and convenient to use, contributing to their overall satisfaction with its functionality.

Secondly, users express a very high level of satisfaction with the durability and quality of materials used in the table's construction, with a mean score of 4.69. This indicates that users perceive the table to be robust and well-made, enhancing its longevity and reliability.

Moreover, users highly value the versatility of the innovative table, as evidenced by a mean score of 4.77. This suggests that users appreciate the table's ability to adapt to various needs and settings, making it a versatile and adaptable solution for different environments.

Overall, the total mean score of 4.70 further reinforces the innovative table's very high level of acceptability across all indicators. This interpretation indicates that users highly value the table's versatility, usability, durability, and quality, finding it to be extremely effective and suitable for their needs. These findings suggest that the innovative table successfully meets users' expectations and preferences, enhancing their overall satisfaction and experience.

Table 10: The level of comfort of an innovative table as perceived by the students

Indicators	VHS	HS	S	LS	NS	M	SD	VD
	5	4	3	2	1			
<i>comfortable height for users to work</i>	4.65	4.55	4.60	4.65	4.70	4.63	0.06	VHS
<i>accommodates the intended number of users comfortably</i>	4.65	4.65	4.70	4.55	4.55	4.62	0.07	VHS
<i>enhance comfort and safety, preventing users from accidentally bumping into sharp edges</i>	4.75	4.65	4.60	4.60	4.55	4.63	0.08	VHS
<i>Total:</i>	4.69	4.62	4.63	4.60	4.60	4.63	0.07	VHS
<i>Interpretation:</i>	<b>VERY HIGHLY SATISFIED</b>							

Legend:

M	MEAN	1.50	2.49	LS	Less Satisfied
%	Percentage	1.00	1.49	NS	Not Satisfied
VD	Verbal Description				
4.50	5.00	VHS	Very Highly Satisfied		
3.50	4.49	HS	Highly Satisfied		
2.50	3.49	S	Satisfied		

The table offers a comprehensive evaluation of the level of comfort and ergonomics of an innovative table as perceived by students, providing valuable insights into their experiences and preferences.

Across all indicators, students express a very high level of satisfaction, with ratings consistently falling within the Very Highly Satisfied (VHS) range.

Firstly, regarding the comfortable height for users to work, students rate the table highly, with a mean score of 4.63, indicating very high satisfaction. This suggests that students find the table's height conducive to comfortable working conditions, contributing to their overall satisfaction with its ergonomics.

Secondly, students highly appreciate the table's ability to accommodate the intended number of users comfortably, as evidenced by a mean score of 4.62. This indicates that students find the table spacious enough to accommodate multiple users without compromising on comfort, further enhancing their overall satisfaction.

Moreover, students value the table's ability to enhance comfort and safety by preventing users from accidentally bumping into sharp edges, with a mean score of 4.63. This suggests that students perceive the table to be well-designed and safe to use, contributing to their overall satisfaction with its ergonomics.

Overall, the total mean score of 4.63 further reinforces students' very high level of satisfaction with the comfort and ergonomics of the innovative table. This interpretation indicates that students find the table to be extremely comfortable, spacious, and safe, making it a highly recommended choice for their needs. These findings suggest that the innovative table successfully meets students' expectations and preferences, enhancing their overall satisfaction and comfort during use.

Table 11: The level of satisfaction derived from the innovative expandable office table with LED strip is worthy of recommendation

Indicators	VHS	HS	S	LS	NS	M	SD	VD
	5	4	3	2	1			
<i>Examine the overall build quality and materials used in the table's construction</i>	4.85	4.75	4.55	4.65	4.65	4.69	0.11	VHS
<i>Provide adequate lighting for various tasks</i>	4.75	4.70	4.65	4.55	4.65	4.66	0.07	VHS
<i>User-friendly assembly process and low maintenance requirements</i>	4.75	4.65	4.55	4.65	4.60	4.64	0.07	VHS
<i>Total:</i>	4.78	4.70	4.58	4.62	4.63	4.66	0.08	VHS
<i>Interpretation:</i>	<b>VERY HIGHLY SATISFIED</b>							

Legend:

M	MEAN	1.50	2.49	LS	Less Satisfied
%	Percentage	1.00	1.49	NS	Not Satisfied

DOI: <https://doi.org/10.5281/zenodo.11242104>

		VD	Verbal Description
4.50	5.00	VHS	Very Highly Satisfied
3.50	4.49	HS	Highly Satisfied
2.50	3.49	S	Satisfied

The table provides a comprehensive evaluation of the level of satisfaction from an innovative expandable office table with LED strip lighting, offering valuable insights into users' experiences and perceptions. Across all indicators, users express a very high level of satisfaction, with ratings consistently falling within the Very Highly Satisfied (VHS) range.

Firstly, users rate the table highly in terms of overall build quality and materials used in its construction, with a mean score of 4.69, indicating very high satisfaction. This suggests that users perceive the table to be well-made and durable, contributing to their overall satisfaction with its construction.

Secondly, users greatly appreciate the table's ability to provide adequate lighting for various tasks, as evidenced by a mean score of 4.66. This indicates that users find the LED strip lighting system to be effective and suitable for their needs, enhancing their overall satisfaction with the table's functionality.

Moreover, users value the table's user-friendly assembly process and low maintenance requirements, with a mean score of 4.64. This suggests that users find the table easy to assemble and maintain, further contributing to their overall satisfaction and positive experience.

Overall, the total mean score of 4.66 further reinforces users' very high level of satisfaction with the innovative expandable office table with LED strip lighting. This interpretation indicates that users find the table to be extremely effective, functional, and worthy of recommendation. These findings suggest that the innovative table successfully meets users' expectations and preferences, enhancing their overall satisfaction and making it a highly recommended choice for office use.

**Significant difference on the level of acceptability of the innovative expandable office table with LED strip**

The test of significant mean difference between the respondents on the level of acceptability of the innovative expandable office table with LED strip presented in table 12.

Table 12  
SIGNIFICANT DIFFERENCE  
N=110

Group	n	df	$\bar{x}$	S	Computed t-value	Decision
Interior Design Technology (IDT) students	65	108	4.65	0.36	0.6610 < 1.9827	Accept H0
Instructors/ Professors/ Experts	45		4.70	0.43	Computed t is < than the table value of t	
Tested @ 5% level of Significant						

The information in Table 12 shows the test results for the significant mean difference between two groups of respondents: Interior Design Technology (IDT) students and instructors, professors, and experts; they were asked to rate how acceptable they thought the new expandable office table with LED strip was.

For the IDT student group, with a sample size ( $n$ ) of 65, the mean ( $\bar{x}$ ) level of acceptability is calculated to be 4.65, with a standard deviation ( $S$ ) of 0.36. Conversely, the 45 respondents in the Instructors/Professors/Experts group report a mean level of acceptability of 4.70, accompanied by a standard deviation of 0.43.

Using the provided formula, we computed the  $t$ -value and found it to be 0.6610. We compare this computed  $t$ -value with the tabulated  $t$ -value, 1.9827, at a 5% level of significance with 108 degrees of freedom ( $df$ ). The calculated  $t$ -value is smaller than the tabulated  $t$ -value, indicating no significant difference in acceptance levels between the two groups regarding the expandable office table with LED strip.

Therefore, based on the comparison, the decision is to accept the null hypothesis ( $H_0$ ), suggesting that there is no significant difference in the level of acceptability of the innovative table between IDT students and instructors, professors, or experts. This implies that both groups perceive the table similarly, indicating a consistent level of acceptability across different respondent categories.

## 6. Summary of Findings

The study highlights that technology students benefit from well-lit, adaptable workstations equipped with adjustable desks and innovative extendable tables featuring LED strips. This setup enhances their well-being, productivity, and posture. Movable desks and well-lit workstations are essential, with LED strip lights being easy to install, energy-efficient, and adaptable. The previous study by Postell (2012), which argued that tables as furniture contribute to the ambiance and style of interior spaces by providing people with necessary equipment that complements and completes these spaces, corroborated this research. The extendable table is space-efficient, folding when not in use and expanding when needed, providing a bright, functional workspace. Additionally, the LED strips offer customizable lighting for different tasks, further improving the workspace's utility and appearance.

While this study evaluates further user satisfaction with the “Innovated Extendable Office Table with LED Strips” through various dimensions, including design, functionality, ergonomics, storage efficiency, and aesthetic appeal, users reported high satisfaction with the table's design and aesthetic appeal, particularly highlighting its modern style and the quality of materials used. Users also appreciated the table's compatibility with smart devices and its intuitive controls, which reflect its advanced functionality. Ergonomically, the table received positive feedback from faculty members, who noted its comfort in different seating positions, support for various postures, and reduced eye strain. Similarly, Taifa et al. (2021) supported this claim by affirming that the design gains practical credibility through the implementation of these systematic procedures. We anticipate that the ergonomic user's desk will decrease the occurrence of musculoskeletal disorders, neck issues, back discomfort, and hip pressure upon completion of the manufacturing process.

Users also expressed high satisfaction with the table's storage capacity and organizational features, noting that it effectively utilized space to accommodate various items and provided robust storage solutions. Users praised the LED strips for their practical applications, which included task illumination and aesthetic enhancement. Additionally, users valued the energy efficiency and eco-friendliness of the LED lighting, appreciating its long lifespan and reduced power consumption. Similarly, according to Apipuchayakul (2019), LED is environmentally friendly, and LED users rate the product more highly based on their own experience with its efficiency compared to those who have not encountered its energy-saving capabilities. Users rated the table's overall build quality and materials very highly, praising its user-friendly assembly process and low maintenance requirements, which enhanced its practicality.

Students rated their satisfaction with the table's design and aesthetics as "very satisfied" across various indicators, including ample space for studying and using electronic devices, alignment with current design trends, efficient utilization of space in limited environments, and the incorporation of innovative features and technology. They also rated the table highly for comfort and ergonomics, noting the comfortable height for working, the ability to accommodate multiple users, and design features that enhance comfort and prevent accidental injuries.

Users expressed a very high level of satisfaction with the overall build quality, adequate lighting provided by the LED strips, and the ease of assembly and maintenance. They perceived the table as well-constructed and durable, found the LED lighting effective for various tasks, and appreciated the straightforward assembly and low maintenance requirements. Desolda et al. (2017), who opined that users preferred this system most across all satisfaction dimensions (results achieved, durability, and effectiveness), similarly supported this study. Users also positively perceived the table's marketability, identifying its unique and innovative characteristics as key selling points. Users noted the table's appeal to specific demographics, such as students and young professionals, and believed it provided good value for money, supported by positive feedback and reviews.

A test of the significant mean difference between Interior Design Technology students and instructors, professors, or experts showed that there was no significant difference in how acceptable the new table was. This suggests that users of all types had positive experiences with it. In conclusion, the "Innovated Extendable Office Table with LED Strips" successfully meets the diverse needs and preferences of technology students and faculty members. The table's design, functionality, ergonomic features, storage solutions, and LED lighting have all contributed to high levels of user satisfaction. The findings indicate that the table is well-received in terms of practicality, comfort, and aesthetic appeal, making it a highly recommended choice for both educational and professional settings.

## 7. Conclusion and Recommendations

The innovative expandable office table with LED strips for imperative usage for technology students is an essential tool because it provides several advantages that boost efficiency, improve comfort, and support collaborative work. The table's integrated LED lighting, which is energy-efficient and adjustable, promotes both individual work and group exploration, enabling users to customize the lighting to suit their preferences. The table's adaptability, durability, and portability make it appropriate for a variety of settings, including technology labs, libraries, and offices.

Additionally, LED strips frequently provide a range of programmable light options, including warm and cool color settings, enabling users to choose the light that best suits their needs and providing a flexible, energy-efficient, and customizable workspace that enhances productivity and comfort. Thanks to light settings that prioritize comfort and personal aesthetic appeal, LED strips and other design components have transformed remote work environments into enjoyable and productive spaces.

Therefore, to develop an innovative office table with built-in technology, begin by analyzing the current market for similar products. Assess their functionality, design, price point, and target audience to understand the competitive landscape and position your product effectively. Next, engage with technology students through surveys or interviews to understand their needs, focusing on ergonomics, connectivity, storage, and usability, and tailor your design for enhanced user satisfaction. Dive into the technical details of LED strips and expandable mechanisms, considering power consumption, brightness, color options, durability, installation ease, and safety, to select the best components.

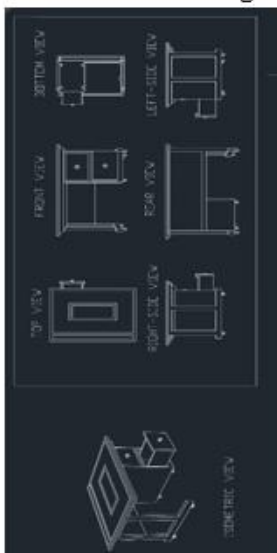
Emphasize a modern, sleek design that appeals to technology students by incorporating minimalist aesthetics, clean lines, and innovative materials, ensuring visual appeal and functionality. Conduct a cost analysis to balance quality and affordability, exploring cost-saving measures like efficient production, bulk purchasing, and strategic sourcing.

To attract environmentally conscious consumers, integrate sustainability by using eco-friendly materials, energy-efficient technologies, and designs that allow for disassembly and recyclability. Finally, develop prototypes and conduct thorough testing with technology students to gather feedback on ergonomics, functionality, durability, and user experience, refining your design based on this feedback to ensure optimal performance before market launch.

**DOCUMENTATION AND THE OUTPUT OF THE STUDY**



**Auto CAD 2D Design**



**SketchUP 3D Design**



**Isometric View**



**TOP VIEW**





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