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Future of VTO for Indian Fashion Retail

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Abstract

Considering a worldview of the global fashion sector, Indian Fashion industry is still at the initial stage of growth. Traditionally, India is an exporter of the textile and garment, but the domestic consumption is also higher (Approx $109 billion). Owing to its diverse ethnicity, the variety of costumes used at different parts is also very huge. This domestic demand is fulfilled by garment stores which are widespread across the country and having 90% of market share. The industry has shifted from traditional offline shopping to a dynamic online experience. With the advent of technology, the e-commerce market has also increased at CAGR of 25% and expected to reach to $35 billion by 2028. Use of technology in terms of Virtual Try-On has also help to improvise the customer experience. In this paper, an effort was made to understand the current situation of technology applications in Indian garment retail sector as well as the future of such technologies and the customer perception toward the adoption in the offline retail. A survey analysis found out the important factors consumers consider for the use of such technology and these factors will be useful for the Indian retailers who want to virtual implement try-on systems.

Keywords: Indian Fashion, Virtual Try-On, AR, VR, customer preferences

1. INTRODUCTION

Technology, particularly digitalization, is rapidly advancing in all sectors, be it healthcare, safety & security, transportation services etc. and fashion & retail sector is not untouched. Traditionally, Indian garment retail is dominated by the brick-&-mortar stores, which has almost 90% share. With the population of 140 billion, this is a huge domestic market which is also diverse in preferences of garments. The choices are based on the liking of colour, texture, fabric characteristics, price points etc. Most of Indian consumers purchase garments on the certain special occasions like birthdays, festivals and weddings etc. and hence show lot of variations in the demand patterns. During these events, there is a huge rush in the stores. A process of purchase which involves the trying the fit and look of garment makes it a time-taking activity.

Such a long process can be reduced by the technological intervention in the garment selection. Past few years has witnessed the involvement of digitalisation in fashion through the transformation from traditional mode of shopping to a dynamic and engaging mode where smart trial rooms are available in the store to give the unique experience to customers. Currently, a brand Azorte is offering such smart trial room in India, where customers can scan the bar code of the garment to see the product details on the screen. It also has option of room light change, interactive panel where other options are visible to customers and customers can request to the salespeople to bring the garment to the trial room. This is new level of experience to the Indian consumers who mostly enjoyed the touch and feel of garment before making a buying decision.

Recently, various new technologies are resurfacing in the industry, Augmented reality (AR) and Virtual reality (VR) being some of them. With the help of Artificial Intelligence (AI), these technologies are expected to take user

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experience to the next level in which the customer can see how the garment will look on the body on the screen without actually trying them on. Such technology is widely used by many brands for their online shopping formats for jewellery, sunglasses, and other fashion accessories, but their presence in the offline store is very less. Retails brands in India are looking forward for creating such experience in their stores, but there is a need to do a feasibility study for the same. As the cost of implementation is very high (up to US$150000), it is important to gauge the retailers' likeliness to adopt a Virtual Try-On technology.

2. OBJECTIVES

The objectives of this research are:

- To understand the current state of digitalization in the garment retail sector of India
- To determine consumer attitudes towards the future of digital fashion

3. RESEARCH METHODOLOGY

In secondary data collection, using the currently available resources like, websites, research journal, company publications etc, information was gathered to find out the current level of the use of technology in the retail sector of the fashion industry.

Primary survey was conducted on convenience and judgemental sampling method in the area of Mumbai and Navi Mumbai Region. This area was selected as the respondents are aware about the concepts of fast fashion and frequent online shoppers. The responses were collected through questionnaire with the objective to understand the perception of the consumers towards the use of technology in trial rooms of the garment store. A total of 220 (99 male & 121 female) responses were collected during a 3 months period (October 2024 to December 2024) and analysed through excel to understand the customer attitude. An efforts was made to maintain even distribution of respondents from different age groups (20 to 60 years) to avoid biasness.

In order to understand the issues with the industry, an in-depth telephonic interviews were conducted with senior level managers of the garment retail sector. Their views were consolidated as the challenges for implementation of VTO in retail stores.

4. LITERATURE REVIEW

4.1 Need for digital fashion

In line with the increase in the population and the consumption pattern, the demand for textile & clothing is increasing continuously, it being one of the primary needs of human. Consumers choose and utilize goods and services shaped by cultural, societal, and economic influences, alongside personal preferences, values, and motivations. Globalization and technological progress have influenced consumer behavior, particularly within the fashion sector. Fashion consumption is a continuous process influenced by changing trends and it is significantly impacted by digital solutions. The fashion business has transitioned from gradually altering clothes to rapidly produced garments, and thus the concept of fast fashion has emerged. Digital fashion may offer a compelling visual depiction to enhance the purchasing experience. It can also assist in systematically determining the precise availability of inventory at retail establishments, together with a diverse array of items. It is efficient and time-saving, facilitating a seamless shopping experience that streamlines the purchasing process.

4.2 Rise of online shopping platforms

Fashion brands and companies are investing in their online presence as the world becomes increasingly digitalized. Websites, virtual fashion shows, mobile applications, and online showrooms are gaining popularity due to the digitalization of the fashion industry. Digitalization is evident in the manufacturing sector, where digital fabrication, 3D printing, and engraving have already been implemented. Initially, the digitalization of fashion was ineffective; however, with time, its significance became widely recognized, but with the advent of online shopping it gained momentum. Nobile, Noris, Kalbaska & Cantoni (2021) mentioned that the influence of digital technologies on fashion results in the emergence of online publications, user-generated contents, blogs, and social media; retail options are accessible on both mobile and desktop platforms; large-scale production is transitioning to on-demand and customized manufacturing as consumers articulate their preferences. The visual presentation of styling a garment or coordinating it with other attire for distinct occasions improves the consumer's shopping experience.

In the era of fast fashion, consumers are influenced by the social media and they are convinced that online shopping will help them browse through various styles and brands without leaving their homes. Social media significantly influences consumer engagement with fashion trends, rendering it increasingly centered on digital platforms. It also high online engagement with brands, discount offered, changed the way how consumers buy the product. (Menon, Bhagat and Iqbal, 2020). Also, Salice & Lunghi (2014) states that, online retail has addressed the issue of stylist availability, as established styles and AI operate continuously on digital retail platforms. The issue of size and measurements has been addressed with the implementation of size charts for each garment offered on online shopping platforms. Consumers must take their body measurements and compare them with the size chart to resolve fitting issues with the garment. Individual consumer suggestions and comments facilitate the establishment of a trustworthy relationship between the brand and the consumer.

4.3 Technological advancement in shopping practices

Augmented reality was invented in the 1950s, but its integration into fashion began in the 1990s. Subsequently, its development is continuous and is anticipated to achieve significant popularity in the future. McQuillan, H. (2020) studies the impact of augmented reality on consumer behavior and its implications for sustainability. While augmented reality in user experience can engage consumers and foster brand loyalty, its success and influence mostly hinge on consumer approval. The response may vary depending on consumers' purchase motivations. Augmented reality can enhance the purchasing experience for clients seeking fulfillment. It indicates that younger generations exhibit greater enjoyment and acceptance compared to older generations, attributable to technological advancements. This suggests that technological support in user experience is insufficient and should be integrated with traditional shopping experiences to enhance inclusivity.

A study by Samuel & Senith (2022), focuses on Augmented Reality (AR) and consumer psychology, as well as AR in mobile applications, particularly in online fashion retail. Research undertaken in 2020 indicate that over fifty percent of mobile consumers utilize some type of augmented reality while engaging in online shopping. Comprehension of the operational principles of AR must be explicit. Augmented reality engages consumer psychology to enhance the purchasing experience, particularly through virtual try-on applications. It enhances consumer purchasing decisions by providing specific options for size, fit, and color, thereby fostering a sense of contentment without compromise, which results in a resolute choice. It effectively attracts consumers by offering comprehensive facts, emphasizing accuracy in measurement and overall appearance, which are significant concerns for many during online purchases. This also plays a crucial part in generating and enhancing consumer interest in the goods, aiding the brand in fostering a sense of connection about the experience of the product post-acquisition, despite the absence of the physical item. The brand employs the richness of sensory perception to augment the experience.

The implementation of augmented reality in mobile applications has the potential to be transformative. Online apps possess constraints, preventing users from personally interacting with the products, hence generating doubt regarding the product. Augmented Reality (AR) can be very beneficial by offering a Virtual Try-On service, allowing individuals to visualize how clothing will appear on themselves through visual representation. Moreover, internet retailers offer a vast array of products, and augmented reality facilitates the assessment of a larger selection, which may subsequently be refined based on consumer preferences with clearly defined information for straightforward solutions. It is essential for consumers' decision-making process. Additionally, it assists brands in gathering data about consumer purchasing behavior, which may be utilized for future enhancements. Augmented reality can transform the conventional online purchasing experience and introduce a novel dimension.

In the initial stages of online shopping customers got the convenience, but it misses out on the important aspect of trying out the product. This leads to emergence of the technology of Virtual Try-On. Many companies have invested in the AI technology to take the benefit of digitalisation. Now a days, this technology is extensively used by many brands like, Lenskart, Carretlane, Myntra etc, which are majorly into the non-garment fashion accessories product. A study (Nayak, Suhan, Nayak, Spulbar, Birau & Gull,2021) indicates that the influence of Virtual Try-Ons (VTO) on e-commerce and the determinants affecting consumers purchasing decisions in online shopping.

The factors are as follows:

Confidence in product fit: The Virtual Try-On (VTO) feature allows users to visualize how the product fits on self-representing models, thereby instilling confidence in consumers that the product will also be aesthetically pleasing on them. Consequently, it enhances the intention to purchase.

Hedonic and utilitarian value: Virtual Try-On (VTO) presents an engaging and enjoyable shopping experience, thereby attracting diverse consumers and enhancing purchase intention.

Self-congruity: The virtual model may be perceived as consistent with the individual in reality, so fostering a greater sense of connection and heightened interest. Consequently, it can be inferred that VTO is an excellent instrument for improving the whole purchasing experience of consumers. Furthermore, it assists online shops in attracting a greater number of consumers, which was relatively diminished before to the implementation of VTO. Virtual try-on experiences, augmented reality purchasing, and interactive fashion shows exemplify how technology has enriched the customer's engagement with fashion. These technologies provide not only entertainment but also a more engaging and pleasurable shopping experience.

Augmented reality technology presents the following opportunities:

1. Improved Comfort and Convenience: Augmented Reality allows clients to visually "try on" different garments without actual fittings, providing exceptional comfort.
2. Enhanced Product Accessibility: Through the utilization of augmented reality, businesses can showcase a wider array of products than is feasible within the confines of conventional retail space.
3. Efficient and Effortless Exploration: AR technology significantly decreases the time and effort needed for shopping.
4. Tailored Recommendations and Professional Guidance: AR technology enables retailers to provide customized suggestions and expert counsel to consumers.
5. Queue Management and Accelerated Service: Conventional shopping frequently entails enduring lengthy lineups, especially at peak periods or in proximity to fitting rooms. Augmented Reality mitigates this annoyance by enabling customers to virtually perceive and pick preferred items, hence decreasing wait times and assuring a flawless shopping experience. This not only elevates client contentment but also augments operational efficiency for companies.

In the domain of augmented reality, safeguarding security emerges as a critical issue. To mitigate these concerns, businesses must emphasize the protection of customer data and facilitate the integration of augmented reality technologies, thereby cultivating trust and confidence among consumers.

To maintain a competitive edge, merchants are seeking methods to acquire customer data and achieve a comprehensive understanding of customers across many channels; augmented reality may serve as an effective tool for this purpose. Nevertheless, the examination of the research reveals that the majority of the constraints pertain to privacy and security concerns. Such constraints may be surmounted over time as research on the integration of augmented reality is duplicated and enhanced.

4.4 Virtual fitting rooms

Augmented Reality (AR) and Virtual Reality (VR) are technologies augmented by artificial intelligence (AI). These are further categorized into Virtual Try-On Mirror and Virtual Fitting Room. Devices implemented in retail establishments designed to offer customers an efficient alternative for trying on clothing are referred to as virtual fitting rooms or virtual try-on mirrors. Virtual fitting rooms encompass various types like image-based trials, 2D modelling, 3D modelling, and magic mirror. The notion of a virtual fitting room pertains to a visual depiction of a product on oneself without actual trial, facilitating comprehension of the product's appearance in near reality. A virtual fitting room enables consumers to select various clothing by clicking buttons on one screen, while the corresponding garment is displayed in a 2D image format on another screen, allowing viewers to visualize themselves wearing the selected item for a static experience. This exemplifies fundamental architecture, while contemporary businesses are exploring advanced architecture. The additional features incorporated into the virtual fitting room encompass image sharpness, a genuine sensation of garment fitting, and interactive area with digital screens. Numerous organizations are utilizing Microsoft Kinect-based augmented reality fitting rooms. These fitting rooms utilize artificial intelligence; hence, they require personal information to function effectively. However, this may result in privacy concerns and impact the right to privacy.

Särmäkari, N. (2021) stated that previously, with the advent of VTO in online purchasing, users were able to utilize personalized avatars. Currently, technological advancements have integrated augmented reality into virtual try-on, enabling individuals to test products on their AI-generated avatars. With the objective to determine the efficacy of the AR - VTO tool compared to human models, the use of human models for product presentations on internet platforms is regarded as an effective strategy, as it enables buyers to identify with models that possess comparable body types and styles. This may enable consumers to connect with it, thus fostering favorable purchasing responses.

Currently, Virtual Try-On (VTO) in contemporary online retailing has enabled shoppers to virtually try on clothing using the concept of virtual fitting rooms. Augmented Reality (AR) facilitates the creation of a three-dimensional

virtual fitting room, allowing individuals to visualize products on their own bodies. The introduction of VTO technology has enhanced the overall online shopping experience for consumers, allowing them to try things as they would in traditional locations. Augmented reality technology may significantly enhance the value and perception of the brand among users and engage them more effectively. The primary distinction has been created by smart/digital mirrors and virtual fitting rooms.

Smart mirrors can provide a representation of how a customer would appear in a different clothing without the need for physical try-ons. Smart Fitting Room accurately recognizes the specific items a customer puts into the fitting room and subsequently displays the available colors, models, and sizes directly in the store. Retailers aiming to solidify client loyalty in the contemporary digital economy must provide customer-centric purchasing experiences. Virtual fitting rooms have evolved as an innovative option in online buying, connecting the digital and physical retail experiences. These virtual venues provide a seamless integration of technology and convenience, enabling shoppers to virtually try on apparel and accessories from the comfort of their homes. Digital fashion, encompassing virtual try-ons, can benefit firms by decreasing the operational costs associated with in-store sales. It aids in brand advertising and image development while enhancing store stock capacity without necessitating physical expansion.

Research by Plotkina &Saurel (2019) reveals its limitations through a poll of consumer perspectives on VTO tools. The results indicate that while the concept of VTO intrigued them, its implementation did not meet their expectations. The poll respondents indicated that their AR representation was of poor quality. It failed to provide an authentic real-life experience for them. They anticipated more comprehensive information regarding the products via the technology. Digitalization has revolutionized the fashion retail experience, as internet purchasing has surged in popularity due to its convenience, yet physical locations provide personal service and tangible interaction. A study in retailing indicates that some buyers conduct product research prior to purchase, while others exhibit impulsive buying behaviour. Certain clients hesitate to make online purchases due to insufficient product information and poor knowledge about the items. The report indicates that retailers failing to use technology may become obsolete. The incorporation of augmented reality in retail establishments offers a significant opportunity to enhance comfort, convenience, and engagement for retailers and consumers alike.

5. FINDINGS AND ANALYSIS

5.1 Customer perspective

A respondents behaviour with respect to online buying with the help of the VTO is studied to understand the feasibility of this AR technology. Out of total 220 respondents, 100% are the offline shoppers while 64% have done at least one e-commerce transaction in last 3 months.

Out of total respondents, 31% of the respondents have used the VTO in online shopping and the distribution is 38% female as compared to 23% of males. Maximum users of VTO are females (50%) from the age group of 20-30 years. The females respondents are using VTO for the purchase of the jewellery, cosmetics and sunglasses on online platforms like Nykaa, Myntra, Lakme, LensKart etc. In order to understand the usability of such virtual try on platforms, feedback from the users of VTO were taken on the Likert scale. (5 indicates highly agree).

Table 1: Likert scale average rating

Responses about use of VTO	**Avg. Score/5**
VTO helped me in taking better decision	4.5
It helped me in saving time	4.8
I get better understanding of the look of the product	4
I find it convenient to use	3.5
I get the perfect fit after trying VTO	3.5
I would like to experience the same in offline stores before purchase	4
I am concerned about the privacy in stores with respect to VTO	3.7

The above table indicates that, virtual try-on is a great tool as it provides the convenience of home purchase and it gives some indication of how the product will look in the body helping them to make buying decision. But they also

showed some concerns about its use. When Asked about the issues during the use of VTO, the reason were listed as below:

Table 2: Current issues with VTO (Online)

Issues with VTO (Online)	**No. of respondents**
Colour/shine mismatch	43.5%
Missing touch & feel	85.5%
Fitting issue after purchase	58%
Glitch in VTO	21.7%

Out of the users, 85.5% says that they missed the touch & feel of the product while trying the VTO on the websites, This indicates that Indian consumers are still at an early stage of the exploration. Also, 58% confirmed that they have issues with the fitting of the product, indicating that the either the companies are not using the standard size chart or customers are not able to find out their correct size. Other reasons were mismatch of colour & shine of actual product and glitches in the technology.

All these result into the high percentages of returns which impacts the profitability of e-comm companies. These issues can be solved by the introduction of VTO in the offline store. Respondents rating of 4 out of 5 for the checking a product in store indicates that the consumers are willing to experience the technology in the physical stores. It will help to have 360^0 view of the product along with the touch and feel. This can also solve the issue of improper fitting and colour variations.

Currently few garment retail stores have Smart-Trial rooms, where the garment is equipped with the e-tag which can read the garment details like size, fit and colour and show the garment on the digital screen. It also gives suggestions of the similar styles and the available pairing options. The “bring to me” feature will notify the salesperson to bring the requested product to the customer in the trial room. All these features are really beneficial to the buyer, but the respondents of the survey also showed concerns about the security and breach of private data for the virtual try-on for the garments in the store.

Even though the consumers are interested in trying out the new technology and expecting the retailers to introduce the same in the stores, an interaction with company officials from various garment brands indicates that the virtual try-on technology is still not feasible in their stores because of certain issues like high cost of implementation, non-availability of skilled manpower, data management, privacy and security issues of consumers as well as lack of awareness among the users.

5.2 Industry perspective

After having detailed discussion with the retail professional handling the store operations, it is clear that retailers have some reservations about the implementation of the VTO. They have emphasised on the following issues:

- Shoppers have sufficient time: In India, it is observed that the shopping for garments is an activity, which consumers enjoy. They may visit multiple stores and compare the prices, pattern & styles before making the final purchase. Hence investing in a capital for the advanced technology may not be the high return proposition.
- Cost of implementation is high: For more advanced technology, the cost of implementation is quite high. Currently the application available for the commercial use is only limited to the 2D images. This application is in very nascent stage and cost of the one device alone is around 2.5 lakhs, the cost of software and the yearly licensing fee is additional. A store may need multiple such devises which leads to significant impact on the profitability of the store.
- Requirement of the skilled manpower: Understanding of Augmented Reality, machine learning algorithm, creating and maintaining a huge amount of images (2D and/or 3D) requires significant technological skill. Making a virtual avatar involves the process of high quality photography and videography of garment worn by the mannequin or the model, processing it for different sizes and styles in correct resolution. Different human postures required to be added after understanding the human anatomy. Such data is to be created for each garment and stored in the cloud database for the use. Also, this data has to be updated for each season

Despite the higher cost of implementation, the Industry representatives are still hopeful for the availability of the technology at the lower cost, as it is beneficial at various levels.

- It can form a part of the digital marketing strategy

- Conversion rate will be higher as customer will spend more time in trying the product fitting
- Reduction in the return rates as customer is buying after comparison
- Availability of such features will increase the loyalty of customer and hence there will be repeat purchases. It can form deeper bond with customers

6. CONCLUSION

Indian consumers are very well adopting to the online purchase, thanks to the technological advancement. The growth is significant in the fashion and accessory sections which is driven by the millennials over last few years. Young adults do not hesitate to buy product online after going through the images, description of products and customer reviews. The online purchase frequency is increased due to the Virtual Try-on technology, used by few online retailers.

The research reveals that digitalization (virtual try-on) is presently in its nascent stage in the Indian markets. Significant innovation is required in this domain to enhance its prevalence through brands and its appeal to the general populace.

The other aspect of the research focuses on consumers' perceptions and expectations regarding virtual try-on technology, revealing that a minimal number of individuals have encountered this innovation. Consumers who have experienced this technology in online shopping expressed dissatisfaction with certain features, attributable to its current developmental phase. These include inaccuracies in colour representation, subpar fittings, and inferiority compared to physical shopping experiences, among others. Mitigating these problems by technology advancements, improved product representation, and superior user interface design may boost the efficacy and consumer happiness of Virtual Try-On experiences.

The application of virtual try-on technology in Indian offline garment sector is significantly constrained by technological limitations, as well the privacy & security issue, nonetheless, smart fitting rooms are available in some stores. With two-thirds of Indian population under the age of 35 years, there is a huge opportunity for the retailers to introduce the VTO in the physical stores. Companies investing in or currently employing VTO technology may consider these insights to improve their products and tackle prevalent difficulties, hence enhancing the overall user experience and boosting adoption rates.

References

[1] Tekila Harley Nobile, Alice Noris, Nadzeya Kalbaska & Lorenzo Cantoni (2021) A review of digital fashion research: before and beyond communication and marketing, *International Journal of Fashion Design, Technology and Education*, 14:3, 293-301, DOI:10.1080/17543266.2021.1931476

[2] Särmäkari, N. (2021). "Digital fashion" on its way from niche to the new norm *Aliabieva* (Ed.) https://doi.org/10.1080/17543266.2021.1931476

[3] Menon, A., Bhagat, S., & Iqbal, D. (2020). The Impact of Augmented Reality in Fashion Retail Stores in India: Opportunities and Challenges. *IOSR Journal Of Business And Management* (IOSR-JBM), 22(7), 61-67

[4] Mazzucotelli Salice, S., Lunghi, C., Digital fashion: seduction or innovation?, *Paper, in Proceedings of GFC2014 "Re-thinking & Reworking Global Fashion",* (Gent (Belgium), 19-21 November 2014), Fast Forward Innovation, Gaia 2015: 1-21 [http://hdl.handle.net/10807/79649]

[5] Samuel A & Senith S (2022), Augmented Reality In Fashion Retail Industry, *International Journal of Education, Modern Management, Applied Science & Social Science* (IJEMMASSS) ISSN : 2581-9925, Volume 04, No. 02(I), April - June, 2022, pp.68-76

[6] Smitha Nayak, Mendon Suhan, Raveendranath Nayak, Cristi Spulbar, Ramona Birau & Sangam Mahesh Gull (2022) Antecedents to purchase intention in virtual market space in India: an empirical investigation, *Cogent Business & Management*, 9:1, 2003502, DOI: 10.1080/23311975.2021.2003502

[7] Plotkina, Daria & Saurel, Hélène. (2020). Show me the real world: reactions of American female consumers to more realistic and diverse human models in e-commerce. *Journal of Marketing Theory and Practice*. 29. 1-20. 10.1080/10696679.2020.1824121.

[8] McQuillan, H. (2020). Digital 3D design as a tool for augmenting zero-waste fashion design practice. *International Journal of Fashion Design, Technology and Education*, 13(1), 89–100. DOI:1080/17543266.2020.1737248

[9] https://royalwaste.com/how-much-waste-does-the-fashion-industry-produce/#:~:text=As%20of%202023%2C%20the%20fashion,contributions%2C%20which%20exacerbates%20environmental%20issues.

[10] https://timesofindia.indiatimes.com/blogs/voices/from-virtual-try-on-to-immersive-shopping-how-the-metaverse-is-revolutionizing-retail/?source=app&frmapp=yes38

[11] https://www.fibre2fashion.com/news/e-commerce-fashion-industry/india-s-online-fashion-market-to-grow-to-35-bn-by-fy28-at-25-cagr-289970-newsdetails.htm

[12] https://www.statista.com/outlook/cmo/apparel/india

[13] https://www.reactivereality.com/virtual-try-on

Digital Dreams Unleashed: How Social Media Catalyzes Passion, Creativity, and Role Models for E-Entrepreneurship

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Abstract

Entrepreneurship has gained significant attention in both research and practice over the past two decades. With the rapid advancement of information and communication technologies, electronic entrepreneurship (e-entrepreneurship) has emerged as a growing field of interest. Social media platforms have reshaped market dynamics by facilitating new forms of social interaction, enabling the exchange of information, knowledge, and ethical values relevant to business activities. Grounded in social cognition theory, this study examines how entrepreneurial passion, role models, and self-perceived creativity influence e-entrepreneurial intentions. Additionally, it explores whether social media usage strengthens the positive effects of these factors on entrepreneurial intentions. The proposed model was tested using Partial Least Squares Structural Equation Modeling (PLS-SEM) based on data collected from 354 university students. The findings confirm that entrepreneurial passion, role models, and self-perceived creativity significantly impact e-entrepreneurial intentions. Moreover, the positive effects of entrepreneurial passion and self-perceived creativity on e-entrepreneurial intentions are more pronounced among individuals who plan to leverage social media in their future business ventures. These insights provide valuable implications for aspiring entrepreneurs seeking opportunities in the digital economy.

Keywords: E-entrepreneurship; Entrepreneurial passion, Entrepreneurial intention, creativity, social media

1. INTRODUCTION

Entrepreneurship is a key driver of economic growth and job creation, widely recognized as a tool for reducing poverty and improving quality of life [1]. With the rise of accelerators and incubators, interest in entrepreneurship has surged globally, fostering innovation and new business models. Entrepreneurs, by seizing market opportunities, mobilize resources to establish ventures despite uncertainty and risk [2].

While prior research has explored entrepreneurship across various disciplines, electronic entrepreneurship (e-entrepreneurship) remains underexamined [3]. As a sub-domain of entrepreneurship, it relies on digital platforms, online business models, and data networks, differentiating it from traditional business operations. E-entrepreneurship

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enables entrepreneurs to launch ventures with minimal physical interactions, leveraging digital tools such as e-commerce websites, social media, and online marketplaces [4]. By integrating digital technologies, it not only creates new business models but also transforms existing ones, driving digital innovation and sustainable economic growth [5].

Innovation plays a crucial role in entrepreneurship, yet the link between technological advancement and entrepreneurial activity has not been thoroughly analyzed. Although researchers have debated the relationship between innovation and entrepreneurship, responsible innovation—guided by ethical, sustainable, and regulatory considerations—is increasingly relevant. Entrepreneurs engage in a continuous, iterative process involving data collection, concept development, and product/service implementation. Collaboration and sustainability underpin this process, ensuring adaptability to evolving market needs and emerging opportunities [6].

This study examines the key antecedents of e-entrepreneurial intention, specifically entrepreneurial passion, role models, and self-perceived creativity. Entrepreneurial passion enhances confidence in business success and sharpens opportunity recognition [7]. Role models serve as sources of inspiration, influencing aspiring entrepreneurs' aspirations and knowledge acquisition [8]. Self-perceived creativity reflects an individual's confidence in generating novel ideas, a fundamental trait for entrepreneurship [9].

Additionally, social media plays a pivotal role in entrepreneurship by facilitating access to information, networks, and business opportunities. Emerging digital platforms have reshaped online behaviors, altering how young entrepreneurs conceptualize and launch businesses. This research investigates both the direct impact of entrepreneurial passion, role models, and self-perceived creativity on e-entrepreneurial intention and the moderating role of social media in these relationships. Specifically, it explores whether young entrepreneurs perceive social media as a viable tool for launching digital ventures.

The remainder of this paper presents the theoretical framework and hypotheses, followed by the research methodology based on a sample of Iraqi university students. The analysis and findings are then discussed, concluding with research implications, limitations, and future directions.

2. THEORETICAL BACKGROUND AND HYPOTHESES

Our research model is based on social cognitive theory, which explains human actions as the result of interactions between behavioral, cognitive, and environmental factors [10]. Behavioral influences include skills and practice [11], while cognitive factors encompass prior experiences and assumptions about outcomes. Environmental factors, such as culture and communication strategies, also shape behavior, though their impact varies.

Entrepreneurship is crucial for economic growth, introducing innovation while generating jobs and wealth [12, 13]. Entrepreneurs establish profitable ventures, engage in strategic decision-making, and drive societal shifts [14, 15]. The field has been explored across sociology [16, 17], economics [18, 19], innovation [20], e-commerce [21], and management [22]. However, E-entrepreneurship, which is a subcategory focused on digital business models [23, 24], remains underexplored in developing economies. This study addresses this gap by examining e-entrepreneurship in an emerging Asian economy. Figure 1 illustrates the proposed research framework, further detailed in the next sections.

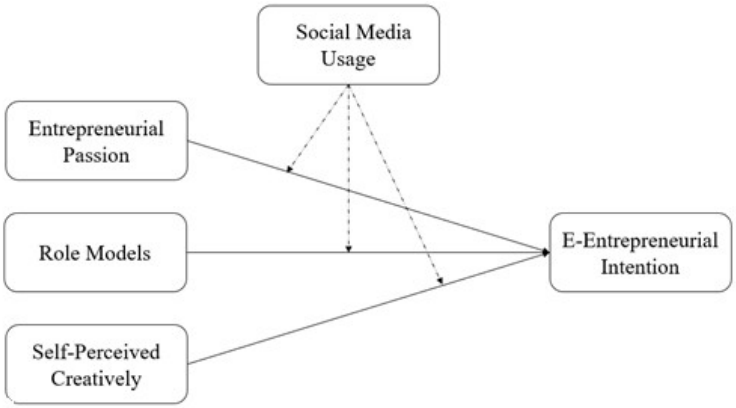

Fig. 1. Research Model

2.1 Entrepreneurial Passion and E-Entrepreneurial Intention

Entrepreneurial passion is a strong inclination toward activities individuals find meaningful, investing significant time and energy [25]. It involves intense positive emotions linked to entrepreneurial identity [26], fostering perseverance despite challenges [26, 27]. Passion enhances confidence in risk-taking and manifests cognitively [28], fueling motivation and entrepreneurial engagement [29]. Passion consists of intense feelings and identity significance, reinforcing entrepreneurial intent [26]. Accordingly, the following hypothesis is proposed:

H-1. Entrepreneurial passion is positively related to e-entrepreneurial intention.

2.2 Entrepreneurial Role Models and E-Entrepreneurial Intention

Role models influence career choices, shaping identity through social comparison [8, 30]. They emerge from various spheres—work, family, or peers [31]—helping individuals develop their ideal self [32]. Entrepreneurial role models offer inspiration and practical insights, reinforcing the social cognitive theory, where behavior results from environmental, cognitive, and behavioral interactions [10]. Accordingly, the following hypothesis is proposed:

H-2. Entrepreneurial role model is positively related to e-entrepreneurial intention.

2.3 Entrepreneurial Self-Perceived Creativity and E-Entrepreneurial Intention

Self-perceived creativity reflects confidence in generating innovative ideas [9] and has been linked in previous literature to entrepreneurship [33, 34]. In this sense, individuals who see themselves as creative are more likely to pursue entrepreneurship. Observational learning, social interactions, and family influence can enhance creativity [35], supporting a positive link between creativity and entrepreneurial intent [29, 36]. Accordingly, the following hypothesis is proposed:

H-3. Entrepreneurial self-perceived creativity is positively related to e-entrepreneurial intention.

2.4 Role of Social Media Usage

Social media has transformed market interactions, providing access to networks, marketing tools, and entrepreneurial insights [37]. Previous studies indicate that the use of social media fosters engagement, customer relations, and brand influence [38]. Entrepreneurs use social media to find role models, enhance passion, and boost creativity [37, 39]. By offering real-time connections with experts and business examples, social media supports entrepreneurial intention. Accordingly, the following hypotheses are proposed:

H-4a. Social media usage moderates the influence of entrepreneurial passion on e-entrepreneurial intention.

H-4b. Social media usage moderates the influence of entrepreneurial role models on e-entrepreneurial intention.

H-4c. Social media usage moderates the influence of entrepreneurial self-perceived creativity on e-entrepreneurial intention.

3. METHODOLOGY

3.1. Sample and Procedures

Data were gathered from business students who completed entrepreneurship courses at the top 10 Iraqi business schools. The process involved a pilot study followed by a questionnaire survey. Twelve participants (four academics, eight students) helped refine the questionnaire, and their responses were excluded from the final dataset. After university approvals, staff distributed the survey from February to May 2020. Of 400 questionnaires, 365 were returned, with 354 valid cases. The sample consisted of 67.4% men and 33.56% women, mostly second- and third-year students (57.5%). Respondents were primarily aged 25–29 (26.3%), 18–24 (20.6%), and 30–39 (11.6%), with 71.2% having prior business experience.

3.2. Measurement

Survey items were adapted from prior research and pretested with 12 scholars and students. To ensure clarity, the English survey was translated into Arabic and back-translated per Brislin's (1980) method [40]. Responses were rated on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Entrepreneurial passion was measured using Karimi (2020) [41]. Entrepreneurial role models were assessed via Obschonka et al. (2011) [42], examining parents' and relatives' self-employment. Entrepreneurial self-perceived creativity used six items from DiLiello and Houghton (2008) [43]. Social media usage was measured with Park et al. (2017) [44], and e-entrepreneurial intention followed Lai and To (2020) [3]. Gender, age, academic year, and entrepreneurial experience were control variables [45].

4. DATA ANALYSIS

Partial least squares (PLS) structural equation modeling (SEM) was used to test validity, reliability, and hypotheses. Bootstrap t-statistics were generated with 5,000 subsamples [46].

4.1. Common Method Bias

To mitigate common method bias (CMB), respondents were assured of anonymity and that no right or wrong answers existed. Two post-data collection methods assessed CMB: (1) the marker variable approach using 'cognitive rigidity' which confirmed no significant bias [47] and (2) a full collinearity test [48] where the highest VIF was 2.141, below the 3.3 threshold. These tests indicate CMB was not a major concern.

4.2. Measurement Model Evaluation

Before testing the proposed model, it is necessary to verify the reliability and validity of the measurement model. Convergent validity of the scales is contingent on the fulfillment of three criteria [46, 49]: (1) all indicator loadings should exceed 0.707 (2) composite reliabilities (CR) should exceed 0.7; and (3) the average variance extracted (AVE) for each construct should exceed 0.5. As presented in table 1, all the indicator loadings are above the recommended threshold, whereas the CR values and AVE range from 0.784 to 0.962 and from 0.658 to 0.810, respectively. All three conditions for convergent validity thus hold.

Table 1. Measurement Model, Item Loadings, Construct Reliability and Convergent Validity

Constructs	Items	Loading (> 0.5)	CA (> 0.7)	CR (> 0.7)	AVE (> 0.5)
Entrepreneurial Passion	ENP1	0.736			
	ENP2	0.780			
	ENP3	0.754	0.891	0.962	0.658
	ENP4	0.810			
	ENP5	0.735			
Entrepreneurial Self-Perceived Creativity	ESC1	0.710			
	ESC2	0.846			
	ESC3	0.785			
	ESC4	0.811	0.789	0.912	0.772
	ESC5	0.789			
	ESC6	0.756			
Social Media Usage	SMU1	0.882			
	SMU2	0.863			
	SMU3	0.804	0.784	0.896	0.789
	SMU4	0.787			
	SMU5	0.789			
E-Entrepreneurial Intention	E-EI1	0.898			
	E-EI2	0.905			
	E-EI3	0.911	0.809	0.911	0.810
	E-EI4	0.894			
	E-EI5	0.875			
Cognitive Rigidity*	COR1	0.701			
(Marker Variable)	COR2	0.725	0.778	0.854	0.641
	COR3	0.800			

To evaluate discriminant validity, Fornell and Larker (1981) [49] suggest that the square root of the AVE of a latent variable should be greater than the correlations between the rest of the latent variables. The square root of the AVE for each construct is greater than the correlations between the variables that form the construct. Furthermore, the heterotrait-monotrait ratio (HTMT) was used to assess the discriminant validity of constructs [50]. All the HTMT values are below the threshold value of 0.85 and the 95% confidence intervals do not include the value of 1 [50]. Hence, the discriminant validity of the research model is confirmed.

4.3. Model Explanatory Power Evaluation and PLS-predict Assessment

The model's explanatory power was assessed using R-square, Q-square, and PLS-predict [51]. The R-square for e-entrepreneurship intention was 0.503, with Q-square > 0 (0.218), indicating moderate to substantial predictive power [46].

Compared to the linear regression model (LRM), the PLS SEM had lower root mean square error (RMSE) and mean absolute error (MAE), but higher Q-square values, confirming improved predictive performance. Thus, the model demonstrates strong explanatory power [51].

5. RESULTS

This paper performs PLS SEM for hypothesis testing. To test the statistical significance of the path coefficients, the PLS analysis used 5,000 subsamples to generate bootstrap t-statistics with n–1 degrees of freedom, where (n) is

the number of subsamples [46]. Figure 2 and table 2 display the results of hypotheses H1 to H3, with their respective standardized path coefficients. Hypotheses H1, H2 and H3 found support (H1: β= 0.158, t = 3.228 and p < 0.001; H2: β= 0.151, t = 3.209, and p < 0.001; H3: β= 0.108, t = 2.185, and p < 0.029). These results show that entrepreneurial passion, entrepreneurial role model and entrepreneurial self-perceived creativity have a positive effect on e-entrepreneurial intention.

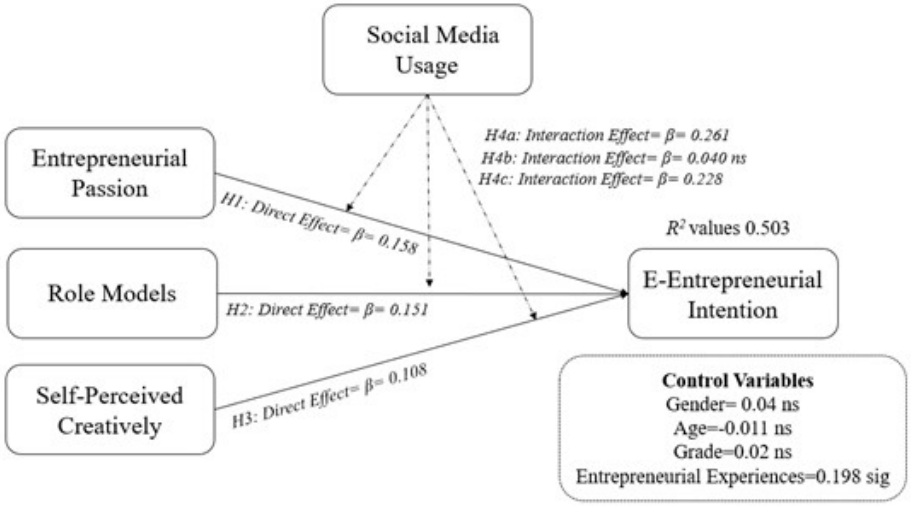

Fig. 2. Research Model: Hypotheses Testing

Table 2. Structural Path Analysis: Direct Effect

Hypothesis	Direct Effect	Std Beta	Std Error	t-value	p-value
H1	Entrepreneurial Passion→E-Entrepreneurial Intention	0.158	0.049	3.228	0.001
H2	Entrepreneurial Role Model→E-Entrepreneurial Intention	0.151	0.047	3.209	0.001
H3	Entrepreneurial Self-Perceived Creativity→E Entrepreneurial Intention	0.108	0.049	2.185	0.029

Furthermore, this investigation tested whether social media usage moderates the relationships between the independent variables (i.e., entrepreneurial passion, entrepreneurial role model and entrepreneurial self-perceived creativity) and the dependent variable (e-entrepreneurial intention). As such, the results of the moderation analysis for the three interactions were as follows (see table 3):

a) The first relationship between entrepreneurial passion and social media usage toward e-entrepreneurial intention confirmed a significant interaction (β= 0.261, t= 2.838, and p < 0.002). Hence, H4a is supported.

b) The second relationship between entrepreneurial role model and social media usage toward e-entrepreneurial intention revealed an insignificant interaction (β= 0.040, t= 0.489, and p < 0.313). Therefore, H4b is not supported.

c) The third relationship between entrepreneurial self-perceived creativity and social media usage toward e-entrepreneurial intention showed a significant interaction (β= 0.228, t= 3.452, and p < 0.000). Therefore, H4c is confirmed.

Table 3. Structural Path Analysis: Interaction Effect.

Hypothesis	Interaction Effect.	Std Beta	Std Error	t-value	p-value	Decision
H4a	EP×SMU→ E-Entrepreneurial Intention	0.261	0.092	2.838	0.002	Supported
H4b	ERM×SMU→ E-Entrepreneurial Intention	0.040	0.081	0.489	0.313	Not Supported
H4c	ESPC×SMU→ E-Entrepreneurial Intention	0.228	0.066	3.452	0.000	Supported

As shown in Figure 3, the positive relationship between entrepreneurial passion and e-entrepreneurship intention is stronger when the use of social media is high. Similarly, as presented in Figure 4, a high social media usage value strengthens the positive relationship between entrepreneurial self-perceived creativity and e-entrepreneurship intention. Therefore, both interactions are supported.

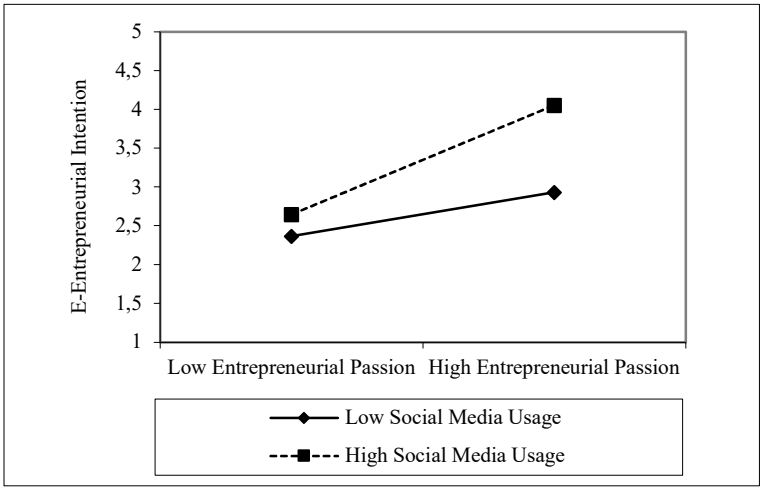

Fig. 3. Entrepreneurial Passion X Social Media Usage interaction on the E-Entrepreneurial Intention

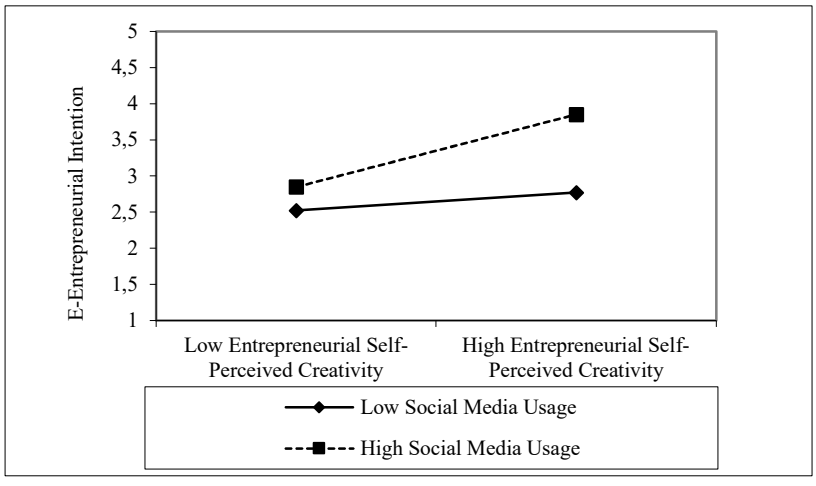

Fig. 4. Entrepreneurial Self-Perceived Creativity X Social Media Usage interaction on the E-Entrepreneurial Intention

6. DISCUSSION

This study, based on social cognition theory, explores the antecedents of e-entrepreneurial intention and the moderating role of social media usage. It examines how entrepreneurial passion, role models, and self-perceived creativity influence e-entrepreneurial intention, while analyzing social media usage as a moderator. Findings show that entrepreneurial passion is a key driver of e-entrepreneurial intention. The influence of role models on entrepreneurial intention aligns with recent studies [7, 8]. Self-perceived creativity, influenced by factors like motivation and experience [9], also positively impacts e-entrepreneurial intention [52].

Social media usage strengthens the positive relationship between entrepreneurial passion, self-perceived creativity, and e-entrepreneurial intention. However, the interaction between role models and social media was not supported, possibly because social media limits direct interaction with idealized role models [53, 54]. Despite this, social media helps entrepreneurs identify new opportunities and communicate effectively, supporting the digital business creation process [3, 39].

7. IMPLICATIONS

This research has practical implications. Entrepreneurial passion, role models, and self-perceived creativity enhance e-entrepreneurial intention, making e-entrepreneurship more popular. University teachers are encouraged to promote e-entrepreneurship by improving traditional business models [5]. Government policies supporting entrepreneurship could boost students' entrepreneurial passion [55]. Role models, particularly open-minded ones, positively affect e-entrepreneurial intention. Therefore, policies fostering supportive entrepreneurial cultures are crucial.

Self-perceived creativity is a key factor in e-entrepreneurial intention, suggesting the need for curricula focused on creativity and innovation [36]. Social media usage enhances entrepreneurial passion and self-perceived creativity, helping entrepreneurs start digital businesses. Platforms can also aid in marketing and competitor research [44]. Additionally, responsible innovation is vital for sustainable digital businesses.

8. CONCLUSIONS

This study contributes to entrepreneurship literature by analyzing entrepreneurial passion, role models, and self-perceived creativity on e-entrepreneurial intention. It also examines the moderating role of social media usage in an emerging economy. Results show that these factors positively affect e-entrepreneurial intention, with social media enhancing these relationships.

Future research should consider longitudinal studies to track how these factors evolve over time. Data from multiple respondents would also enrich findings, as would exploring additional factors like culture, leadership, and government support. The results of the study may apply to other similar Asian countries, but future studies could use a broader international sample for a more comprehensive view.

References

[1] Tehseen, S., Khalid, S., Rather, R. A., Qureshi, Z. H. & Halbusi, H. A. (2020). HRM practices for knowledge management and retail firms' performances: a comparative study among Malay and Chinese firms. *International Journal of Entrepreneurship*, *24*(1), 1-7.

[2] Falahat, M., Soto-Acosta, P. & Ramayah, T. (2022). Analysing the importance of international knowledge, orientation, networking, commitment as entrepreneurial culture and market orientation in gaining competitive advantage and international performance. *International Marketing Review*, 39(3), 463-481.

[3] Lai, L. S. & To, W. M. (2020). E-Entrepreneurial intention among young Chinese adults. *Asian Journal of Technology Innovation*, *28*(1), 119-137.

[4] Alnoor, A., Al-Abrrow, H., Al Halbusi, H., Khaw, K.W., Chew, X., Al-Maatoq, M. and Alharbi, R.K. (2022). Uncovering the antecedents of trust in social commerce: an application of the non-linear artificial neural network approach. Competitiveness Review, 32 (3), 492-523.

[5] Soto-Acosta, P. (2020). COVID-19 pandemic: Shifting digital transformation to a high-speed gear. *Information Systems Management*, 37(4), 260-266.

[6] Bahena-Álvarez, I. L., Cordón-Pozo, E., & Delgado-Cruz, A. (2019). Social entrepreneurship in the conduct of responsible innovation: Analysis cluster in Mexican SMEs. *Sustainability*, *11*(13), 3714.

[7] Hou, F., Su, Y., Lu, M. & Qi, M. (2019). Model of the Entrepreneurial Intention of University Students in the Pearl River Delta of China. *Frontiers in psychology*, *10,* 916.

[8] Nowiński, W. & Haddoud, M. Y. (2019). The role of inspiring role models in enhancing entrepreneurial intention. *Journal of Business Research*, *96*, 183-193.

[9] Laguía, A., Moriano, J. A. & Gorgievski, M. J. (2019). A psychosocial study of self-perceived creativity and entrepreneurial intentions in a sample of university students. *Thinking Skills and Creativity*, *31*, 44-57.
[10] Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*(1), 1-26.
[11] Colomo-Palacios, R., Casado-Lumbreras, C., Soto-Acosta, P., García-Peñalvo, F. J., & Tovar-Caro, E. (2013). Competence gaps in software personnel: A multi-organizational study. *Computers in Human Behavior*, *29*(2), 456-461.
[12] Beynon, M. J., Jones, P. & Pickernell, D. (2018). Entrepreneurial climate and self-perceptions about entrepreneurship: a country comparison using fsQCA with dual outcomes. *Journal of Business Research*, *89*, 418-428.
[13] Hunt, R. A. & Lerner, D. A. (2018). Entrepreneurial action as human action: Sometimes judgment-driven, sometimes not. *Journal of Business Venturing Insights*, *10*, e00102.
[14] Cuervo, Á., Ribeiro, D. & Roig, S. (2007). Entrepreneurship: concepts, theory and perspective. Introduction. In Entrepreneurship (pp. 1-20). Springer, Berlin, Heidelberg.
[15] Fischer, D., Mauer, R. and Brettel, M. (2018). Regulatory focus theory and sustainable entrepreneurship. *International Journal of Entrepreneurial Behavior & Research*, *24*(2), 408-428.
[16] Thornton, P. H. (1999). The sociology of entrepreneurship. *Annual Review of Sociology*, *25*(1), 19-46.
[17] Baron, J. & Hannan, M. (2021). The economic sociology of organizational entrepreneurship: Lessons from the Stanford Project on Emerging Companies. In *The economic sociology of capitalism* (pp. 168-203). Princeton University Press.
[18] Acs, Z. J., Estrin, S., Mickiewicz, T. & Szerb, L. (2018). Entrepreneurship, institutional economics, and economic growth: an ecosystem perspective. *Small Business Economics*, *51*(2), 501-514.
[19] Prasetyo, P. E. & Kistanti, N. R. (2020). Human capital, institutional economics and entrepreneurship as a driver for quality & sustainable economic growth. *Entrepreneurship and Sustainability Issues*, *7*(4), 2575.
[20] Bouncken, R., Ratzmann, M., Barwinski, R. & Kraus, S. (2020). Coworking spaces: Empowerment for entrepreneurship and innovation in the digital and sharing economy. *Journal of Business Research*, *114*, 102-110.
[21] Shemi, A.P. and Procter, C. (2018). E-commerce and entrepreneurship in SMEs: case of myBot. *Journal of Small Business and Enterprise Development*, 25(3), 501-520.
[22] Magnani, G. & Zucchella, A. (2018). Uncertainty in entrepreneurship and management studies: a systematic literature review. *International Journal of Business and Management*, *13*(3), 98.
[23] Matlay, H. (2004). E-entrepreneurship and small e-business development: towards a comparative research agenda. *Journal of Small Business and Enterprise Development*, *11*(3), 408-414.
[24] Balachandran, V. & Sakthivelan, M. S. (2013). Impact of information technology on entrepreneurship (e-entrepreneurship). *Journal of Business Management & Social Sciences Research*, *2*(2), 51-56.
[25] Vallerand, R. J., Blanchard, C., Mageau, G. A., Koestner, R., Ratelle, C., Léonard, M., ... & Marsolais, J. (2003). Les passions de l'ame: on obsessive and harmonious passion. *Journal of Personality and Social Psychology*, *85*(4), 756.
[26] Cardon, M. S., Gregoire, D. A., Stevens, C. E. & Patel, P. C. (2013). Measuring entrepreneurial passion: Conceptual foundations and scale validation. *Journal of business venturing*, *28*(3), 373-396.
[27] Biraglia, A. & Kadile, V. (2017). The role of entrepreneurial passion and creativity in developing entrepreneurial intentions: Insights from American homebrewers. *Journal of Small Business Management*, *55*(1), 170-188.
[28] Ko, W. W., Liu, G., Wan Yusoff, W. T. & Che Mat, C. R. (2019). Social entrepreneurial passion and social innovation performance. *Nonprofit and Voluntary Sector Quarterly*, *48*(4), 759-783.
[29] Liu, H. C., Liang, C., Chang, C. C., Ip, C. Y. & Liang, C. T. (2020). Optimizing Personality Traits and Entrepreneurial Creativity to Boost the Precursors of Social Entrepreneurial Intentions: Five Studies in Taiwan. *Journal of Social Service Research*, *47*(1), 10-32.
[30] Zapkau, F. B., Schwens, C., Steinmetz, H. & Kabst, R. (2015). Disentangling the effect of prior entrepreneurial exposure on entrepreneurial intention. *Journal of Business Research*, *68*(3), 639-653.
[31] Shirokova, G., Osiyevskyy, O. & Bogatyreva, K. (2016). Exploring the intention–behavior link in student entrepreneurship: Moderating effects of individual and environmental characteristics. *European Management Journal*, *34*(4), 386-399.
[32] Weinberg, F. J. (2019). How and when is role modeling effective? The influence of mentee professional identity on mentoring dynamics and personal learning outcomes. *Group & Organization Management*, *44*(2), 425-477.
[33] Zhao, H., Seibert, S. E. & Lumpkin, G. T. (2010). The relationship of personality to entrepreneurial intentions and performance: A meta-analytic review. *Journal of Management*, *36*(2), 381-404.
[34] Gielnik, M. M., Krämer, A. C., Kappel, B. & Frese, M. (2014). Antecedents of business opportunity identification and innovation: Investigating the interplay of information processing and information acquisition. *Applied Psychology*, *63*(2), 344-381.
[35] Ng, T. W., & Lucianetti, L. (2016). Within-individual increases in innovative behavior and creative, persuasion, and change self-efficacy over time: A social–cognitive theory perspective. *Journal of Applied Psychology*, *101*(1), 14.
[36] Kumar, R. & Shukla, S. (2019). Creativity, Proactive Personality and Entrepreneurial Intentions: Examining the Mediating Role of Entrepreneurial Self-efficacy. *Global Business Review*, 0972150919844395.
[37] Palacios-Marqués, D., Merigó, J. M., & Soto-Acosta, P. (2015). Online social networks as an enabler of innovation in organizations. *Management Decision*, *53*(9), 1906-1920.
[38] Gavino, M.C., Williams, D.E., Jacobson, D. and Smith, I. (2019). Latino entrepreneurs and social media adoption: personal and business social network platforms. *Management Research Review*, *42*(4), 469-494.
[39] Soto-Acosta, P., Popa, S., & Palacios-Marqués, D. (2017). Social web knowledge sharing and innovation performance in knowledge-intensive manufacturing SMEs. *The Journal of Technology Transfer*, 42(2), 425-440.
[40] Brislin, R. W. (1980). Translation and content analysis of oral and written materials. In H. C. Triandis & J. W. Berry (Eds.), Handbook of cross-cultural psychology: Methodology (pp. 389–444). Boston: Allyn & Bacon.
[41] Karimi, S. (2020). The role of entrepreneurial passion in the formation of students' entrepreneurial intentions. *Applied Economics*, *52*(3), 331-344.
[42] Obschonka, M., Silbereisen, R. K., and Schmitt-Rodermund, E. (2011). Successful entrepreneurship as developmental outcome a path model from a lifespan perspective of human development. *European Psychologist,* 1, 10–11.

[43] DiLiello, T. C. & Houghton, J. D. (2008). Creative potential and practised creativity: Identifying untapped creativity in organizations. *Creativity and Innovation Management*, *17*(1), 37-46.
[44] Park, J. Y., Sung, C. S. & Im, I. (2017). Does social media use influence entrepreneurial opportunity? A review of its moderating role. *Sustainability*, *9*(9), 1593.
[45] Becker, T. E. (2005). Potential problems in the statistical control of variables in organizational research: A qualitative analysis with recommendations. *Organizational Research Methods*, *8*(3), 274-289.
[46] Hair, J.F., Hult, G.T.M., Ringle, C., Sarstedt, M., (2017). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2d ed. London and Thousand Oaks, CA: Sage.
[47] Lindell, M. K. & Whitney, D. J. (2001). Accounting for common method variance in cross-sectional research designs. *Journal of Applied Psychology*, *86*(1), 114.
[48] Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of e-Collaboration, *11*(4), 1-10.
[49] Fornell, C. & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, *18*(1), 39-50.
[50] Henseler, J., Ringle, C. M. & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115-135.
[51] Hair, J., Risher, J., Sarstedt, M. and Ringle, C. (2019), When to use and how to report the results of PLS-SEM, *European Business Review*, *31*(1), 2-24.
[52] Cnossen, B., Loots, E. & van Witteloostuijn, A. (2019). Individual motivation among entrepreneurs in the creative and cultural industries: A self-determination perspective. *Creativity and Innovation Management*, *28*(3), 389-402.
[53] Wang, A. C., Kim, T. Y., Jiang, Y., & Tang, G. (2022). Employee proactive goal regulation and job performance: The role modeling and interacting effects of leader proactive goal regulation. *Human Relations, 75*(2), 373-400.
[54] Chaker, N. N., Nowlin, E. L., Pivonka, M. T., Itani, O. S., & Agnihotri, R. (2022). Inside sales social media use and its strategic implications for salesperson-customer digital engagement and performance. *Industrial Marketing Management*, *100*, 127-144.
[55] Batool, H., Rasheed, H., Malik, M. I. & Hussain, S. (2015). Application of partial least square in predicting e-entrepreneurial intention among business students: evidence from Pakistan. *Journal of Innovation and Entrepreneurship*, *4*(1), 1-16.

Using Blooket to Promote Student Vocabulary Learning

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Abstract

This study examined Blooket's capabilities as an educational game platform to teach business English vocabulary to Vietnamese groups of EFL students at universities. The investigation included thirty-seven non-English major students participating in a four-week session that combined different Blooket game formats for learning business vocabulary. The research utilized pre- and post-vocabulary evaluation results to discover the effects of Blooket on students' vocabulary learning. Testing performed before intervention yielded an average score of 57.11, while post-testing revealed 65.32 as the average, resulting in a substantial effect measurement of 1.807 ($p<0.001$). Blooket presents an effective solution to address vocabulary learning difficulties experienced by Vietnamese EFL learners by delivering target vocabulary through interactive and engaging learning environments. Through the game-based method, students shifted vocabulary learning from simple memory work into an interesting collaborative process, improving their comprehension and retention of business vocabulary. The research shows that employing game-based platforms in EFL vocabulary education significantly enhances the academic achievement of Vietnamese university students. More extensive studies should be conducted using bigger research samples and longer-duration evaluations to understand long-term memory retention effects in varied education environments fully.

Keywords: Blooket, game-based learning, vocabulary acquisition.

1. INTRODUCTION

Learning English vocabulary creates significant difficulties for Vietnamese university students involved in business English development (Vu & Peters, 2021). The English vocabulary acquisition methods at Vietnamese universities depend heavily on memorization and decontextualized tasks, but these methods fail to develop effective vocabulary retention and proper vocabulary usage (Nguyen, 2024). The vocabulary learning difficulties faced by Vietnamese students stem from language differences between English and Vietnamese, affecting word-formation systems and their semantic and collocational knowledge (Tran et al., 2024).

The receptive vocabulary skills of tertiary Vietnamese EFL students usually surpass their productive skills, although this weakness hinders their professional communication abilities (Vu & Peters, 2021). Educational game platforms were developed as potential solutions to address the challenges of enhancing vocabulary learning. Through its educational program and gaming features, Blooket presents a novel system for teaching vocabulary (Ha et al., 2024). Sartika et al.

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(2023) show that students gain language knowledge better when they see vocabulary through multiple encounters in game formats. The application of Blooket within Vietnamese university EFL classrooms presents a significant research void, especially for business English vocabulary education, even though Blooket provides beneficial outcomes in primary and secondary settings based on Sartika et al. (2023) and Zainuddin (2024). Ahmed (2022) reveals beneficial outcomes regarding EFL student learning from game-based instruction yet fails to show its specific results for Vietnamese university students. The study demands an exploration of Blooket's effectiveness among Vietnamese university EFL students to establish crucial instructional information for business English vocabulary in academic environments. The research aims to investigate how the use of Blooket influences students' vocabulary retention. Therefore, the research aims to address the research question:

- How do EFL students perceive the use of Blooket as a vocabulary learning tool?

2. LITERATURE REVIEW

2.1. Vocabulary acquisition in EFL contexts

Throughout history, studies of language education have shown diversified interest in the essential field of vocabulary development. Research evidence shows vocabulary knowledge serves as an essential foundation for both language learning and communicative abilities despite times when language teaching approaches failed to acknowledge its value. According to González-Fernández and Schmitt (2017), vocabulary is the fundamental starting point for beginner learners to construct their language proficiency, letting them share concepts while comprehending written information for meaningful dialogues. Language educators employ two primary approaches to vocabulary instruction: explicit and implicit, each offering distinct characteristics and advantages. The explicit method requires instructors to instruct vocabulary items through intentional word-focused teaching practice. Nezhad et al. (2015) demonstrated that this methodological combination consists of intentionally teaching word meanings and showing forms along with usage in definitions, translation context, and structured examination. The approach to implicit vocabulary teaching requires using target vocabulary inside real contexts where learners do not receive direct word-specific instruction. The proposed teaching method relies on authentic language consumption through reading or listening tasks and functional language practice, prioritizing message content rather than linguistic structure (Yaghoubi & Seyyedi, 2017). Research shows that explicit vocabulary methods lead to quicker and more solid vocabulary learning results in brief learning periods. Choo et al. (2012) prove that explicit vocabulary instruction produces better retention and enhanced knowledge than implicit teaching approaches. The research indicates that the best teaching approaches unite explicit and implicit exposure techniques because explicit methods reinforce targeted vocabulary. However, implicit teaching embeds new words effectively into meaningful language contexts. Education professionals distinguish two different vocabulary acquisition methods: intentional learning and incidental learning. Deliberate memorization techniques such as word lists combined with flashcards and mnemonic methods characterize intentional vocabulary learning because learners must actively focus on vocabulary retention (Ahmad, 2012). Incidental acquisition happens in language activities concentrating on functional communication rather than direct vocabulary learning because these activities primarily emphasize comprehension and communication (Hulstijn, 2003). A combination of explicit teaching and implicit approaches for vocabulary instruction, intentional learning methods, and incidental strategies receive research support today. Students achieve maximum vocabulary learning through dedicated vocabulary instruction with additional reading activities (Ahmadi, 2017).

Research on second language acquisition emphasizes vocabulary learning strategies because these strategies directly influence student proficiency development. The most efficient language learners adopt various vocabulary learning strategies and perform them more effectively than students who are less successful in language acquisition (Gu & Johnson, 1996). Learning vocabulary strategically results in better vocabulary development, more profound linguistic knowledge, and improved language abilities. According to Chamot (2014), vocabulary learning strategies fall into four primary types: cognitive strategies, which alter learning materials; metacognitive strategies, which plan and evaluate; and social and affective strategies. The method provides multiple levels of classification that match the processes of vocabulary acquisition, which demands the storage of information through strategic resource utilization within context-based mental processing. Through recent studies, Ghalebi et al. (2020) show that EFL learners show various strategic choices correlating with their proficiency level, learning situation, and individual learning styles. Advanced language learners use advanced semantic methods to learn, while less experienced students depend mainly on rote memorization methods since strategic development connects to language skill growth.

Learning English vocabulary presents substantial difficulties to Vietnamese students studying it as a second language because of linguistic interference, restricted access to real English environments, and their education methods and societal customs. Linguistic interference caused by the home language creates the most significant challenge for Vietnamese people who learn English as a foreign language. The research of Tran et al. (2024) examined L1 negative transfer impacts on Vietnamese English learners by showing vocabulary problems stemming from linguistic differences between English and Vietnamese. English language learners have the most difficulty with word formation systems, semantic boundaries, and collocational knowledge because these concepts show substantial differences when compared between the native language and English. The language differences between Vietnamese and English lead to education problems in vocabulary choice and word arrangements and the missing advanced meanings of English words. Vu and Peters (2021) found significant problems in the current methods used to teach vocabulary in Vietnamese educational institutions. The EFL educational experience in Vietnam lacks authentic usage instruction and depends heavily on memorization-based decontextualized learning methods. The researchers discovered insufficient teaching of collocations that blocks students from using their vocabulary effectively when speaking English. The pedagogical approaches prevent students from developing fluent vocabulary use, although they aid in building receptive vocabulary skills. According to Nguyen (2024), developing appropriate vocabulary is the main challenge for Vietnamese EFL learners attempting to achieve B1-level English proficiency. Research findings identified three major obstacles to vocabulary learning, including inadequate vocabulary learning strategies, insufficient authentic practice opportunities, and insufficient emphasis on understanding at depth.

2.2. Game-based learning in vocabulary acquisition

Game-based learning (GBL) proved to be an essential educational method for language instruction because it effectively improves vocabulary acquisition. Game mechanics used in learning activities combine cognitive benefits with attachment and social aspects, resulting in effective vocabulary acquisition. Students in GBL programs encounter vocabulary through meaningful inputs, which create multiple learning encounters that activate their cognitive processing. Using naturally occurring vocabulary in story-based digital games creates suitable learning environments that improve understanding and memory retention (Dondlinger, 2007). Using vocabulary repetition in relevant educational settings creates stronger memory connections due to the proven benefits of retrieval practice methods (Mohamed, 2018; Webb, 2007). Students who play enjoyable games gain enhanced motivation to learn while their language learning anxiety decreases. Ahmed (2022) researches EFL students who reacted positively to games for learning because this increased student motivation while simultaneously decreasing anxiety to establish effective learning settings. Through immediate feedback, learners can develop language independence and confidence in using new vocabulary within a protected environment through trial-and-error practice. Playing together in multiplayer team contexts allows students to participate in social discussions while building teamwork abilities to reach collective objectives. Students learn target language vocabulary through authentic communication when interacting with peers because it provides opportunities to develop receptive and productive language skills (Wired, 2021).

2.3. Blooket as a game-based learning platform

Blooket is a contemporary educational solution that connects educational content to interactive gaming functions to drive heightened student participation and educational success. Through this platform, educators develop question sets that students interact with using diverse games that enhance learning activity and understanding levels. Its adaptable design and straightforward interface make Blooket suitable for different educational scenery. Multiple encounters within engaging learning environments enable Blooket to achieve effective vocabulary learning. Through research, Sartika et al. (2023) establish that Blooket provides junior high school students with enhanced vocabulary understanding, leading to superior vocabulary memorization compared to traditional memorization methods, thanks to its interactive interface. The game-based features of Blooket create meaningful intersections with language learning cognitive concepts by letting students improve their vocabulary understanding (Zainuddin, 2024). Students become more motivated and less anxious when playing Blooket because it employs features such as point systems along with leaderboards and gameplay options. Blooket use by EFL students (Ahmed, 2022) brought improved motivation levels and decreased vocabulary acquisition nervousness. The games feature risk-free competitions that produce supportive learning spaces where students can learn effectively through active participation, irrespective of their mistakes. Students like Blooket for vocabulary learning

because they view it as enjoyable and effective (Tran & Dan, 2023). Blooket supports multiplayer features that bring learners into authentic social interactions with other students. Team gameplay in Blooket demands collective question-solving among players who work together to achieve mutual goals, strengthening both cooperative study approaches and real-world language usage. Nappe (2023) explains how Blooket uses teamwork functions and chat capabilities that mimic fundamental aspects of language education settings that strengthen language fluency and vocabulary memorization during verbal exchanges.

2.4. Research gaps

Available studies demonstrate important knowledge gaps about using Blooket as a vocabulary learning tool within Vietnamese university education. Research about Blooket usage from Vietnamese educational institutions in higher education classrooms remains scarce. Sartika et al. (2023) focus on junior high student vocabulary development using Blooket, yet there is little research about its application at the university level. Research identifies an essential gap because students at the undergraduate level have distinct learning styles, cognitive abilities, and motivational differences from school-age students. Scholarly research lacks appropriate evaluation of how students understand Blooket and other game-based learning platforms for vocabulary acquisition. Tran and Dan (2023) document positive student reactions toward Blooket vocabulary learning, but research investigating Vietnamese university students' collection of viewpoints about the platform remains insufficient. Research shows that student perception matters because game-based learning reaches its maximum potential when it increases motivation while diminishing anxiety levels (Ahmed, 2022). An acute gap exists in research regarding student perspectives on Blooket when used to solve vocabulary learning problems. Vietnamese students learning English as a foreign language encounter three main hindrances in their mastery of the English language: difficulties from their L1 language, problems with word formation, and an inadequate understanding of word placement together (Tran et al., 2024; Vu & Peters, 2021). The evaluation of what Blooket provides regarding specific learning challenges from students' perspectives remains unexplored through research.

3. METHODOLOGY

3.1. Research design

The research design adopts action research methodology according to the cyclical framework described by Kemmis and McTaggart (2000) that incorporates sequence stages of planning and acting to observe and reflect. This methodology served the researchers by creating systematic evaluation possibilities in authentic educational situations (Burns, 2010; Mertler, 2020). The research performed full action research cycles across twelve weeks to evaluate the intervention so that adjustments can be made constantly after each phase's evaluation results.

3.2. Setting

The research was conducted at a public Vietnamese university that has Hanoi and Nam Dinh campuses in semester one of the academic year 2024-2025, starting from August 2024 and lasting until January 2025. The research population comprises 37 non-English major students from the Engineering, Business Administration, Information Technology, and Accounting who must take English courses at CEFR levels A1 through B1. Students in their first and second year of study comprise most of the population, and they belong to the age range of 18-20 while having at least seven years of previous English learning experience; these students demonstrate weaknesses in both vocabulary retention and application.

3.3. Data collection instrument

The fundamental quantitative assessment method included pre- and post-vocabulary tests that generated standardized vocabulary advancement results. The vocabulary tests encompassed three dimensions: recognition, recall, and productive use, and contained selected items that covered every vocabulary objective from the program (Somjai & Soontornwipast, 2020). Different items were used between parallel tests to prevent testing effects, yet the structures matched each other, and reliability testing using Cronbach's alpha aims for a value higher than 0.70.

3.4. The procedure of the study

The program divided its execution into three cycles spanning twelve weeks, using vocabulary lessons from the Market Leader Pre-Intermediate textbook. The training curriculum was divided into three sections: Cycle 1 dealt with Brand and Travel vocabulary from Weeks 2 to 4. Cycle 2 taught Change and Organization material from Weeks 5 to 7 until Cycle 3 delivered Advertising and Money content during Weeks 8 to 10. Blooket provided multiple game experiences through Gold Quest, Factory, Crazy Kingdom, Racing, Battle Royale, Crypto Hack and Tower Defense, Café, and Fishing Frenzy during the intervention cycles. The assignments required students to develop Blooket question sets in Week 7 and collaborated for tournament organization in Week 10. Week 1 and Week 11 were spent for pre- and post-vocabulary tests; meanwhile the data analysis was conducted in Week 12.

3.5. Data analysis

The analysis was conducted using SPSS software version 25.0, which produced descriptive statistics containing mean scores, standard deviations, and frequency distributions, together with paired sample t-tests to assess whether pre-test and post-test results differ significantly. Cohen's d effect size analysis measured the practical importance of measured differences between the students' vocabulary capacity before and after the intervention with Blooket.

4. FINDINGS AND DISCUSSION

The assessment of pre-test and post-test results through statistical measures demonstrates Blooket's successful impact on vocabulary learning among students via Table 1. A paired samples t-test showed that vocabulary performance demonstrated a significant improvement after Blooket use since pre-test scores indicated 57.11, but post-test scores reached 65.32 ($t(36) = 10.992$, $p < 0.001$). Blooket resulted in an 8.22-point vocabulary knowledge improvement, which shows a statistically meaningful effect on Vietnamese university EFL students.

Blooket had a significant practical influence on vocabulary acquisition because the resulting Cohen's d effect size score of 1.807 demonstrates the educational platform's substantial and practical impact on student vocabulary learning outcomes. Sartika et al. (2023) supported the research results by demonstrating that secondary school students gained valuable vocabulary through Blooket usage. The current research investigates Blooket's efficacy in tertiary education in Vietnam by showing its effectiveness for EFL students at university who need distinct vocabulary acquisition support.

Table 1. Paired sample statistics of the students' vocabulary scoring before and after the intervention with Blooket.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Post	65,32	37	14,718	2,420
	Pre	57,11	37	15,018	2,469

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Post - Pre	8,216	4,547	0,748	6,700	9,732	10,992	36	0,000

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
Pair 1	Post - Pre	Cohen's d	4,547	1,807	1,276	2,328
		Hedges' correction	4,595	1,788	1,263	2,304

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Blooket delivers successful vocabulary learning through multiple vital characteristics that stem from its gameplay structure. The platform allows students to encounter target vocabulary several times through different games, which aligns with proven memory retention methods (Webb, 2007). The intervention exposed students to business English vocabulary through nine diverse game modes, enabling them to understand vocabulary items through different mental processes. The multiple ways students encountered vocabulary during the games probably enhanced their processing depth and vocabulary retention according to the test score improvement. Furthermore, Blooket addresses motivational vocabulary learning elements that may escape traditional teaching methods. Blooket game design attributes, including competition, instant feedback, and reward systems, form an active learning space that reduces vocabulary learning anxiety for students (Ahmed, 2022). The emotional connection students developed with Blooket seems to have motivated them to dedicate more effort to their business English vocabulary learning, positively affecting their retention and skill application. Students participated in Blooket activities because this platform converted vocabulary learning from routine memorization into interactive, collaborative sessions that kept students interested in their studies.

Participating in group activities through Blooket potentially resolved particular difficulties that Vietnamese EFL students encounter in their learning process. Students from Vietnam experience difficulty with English vocabulary and word relations because of the differences between their native language and English (Tran et al., 2024). The social gameplay of Blooket teams lets students discover meaning through real-world conversations while learning vocabulary in natural situations, thus helping them break down their language barriers. Student participation in question creation and tournament planning activities strengthened their vocabulary learning engagement while enabling them to become active participants in their educational development process.

The study data verifies that Blooket enhances vocabulary learning achievements; however, these results must be analyzed through the frameworks of vocabulary acquisition theories. The notable results agree with modern beliefs about effective vocabulary education, which integrates deliberate teaching practices with embedded approaches (Ahmadi, 2017). The platform Blooket uses structured vocabulary practice as its explicit component to deliver vocabulary development while students experience immersive game-based learning as its implicit component. Combining explicit and implicit teaching methodologies led to significant vocabulary improvement in this research.

5. CONCLUSION

Blooket proves effective in helping Vietnamese university EFL students achieve better vocabulary acquisition based on the evidence presented in the study. The study results show Blooket's successful impact on vocabulary test scores through significant improvement. This demonstrates that game-based learning is effective for tertiary-level Vietnamese students facing vocabulary learning challenges. The study verifies established concepts regarding successful vocabulary education because it demonstrates that explicit teaching methods pair well with contextualized learning experiences. Different game formats on Blooket allowed learners to engage with the vocabulary multiple times through distinct mental channels, leading to better storage of business English words. Blooket established an interactive social experience through its competitive features, reward systems, and instant feedback to provide a motivating learning environment that transformed vocabulary acquisition into an appealing social experience. Blooket games allowed learners to solve issues with semantic boundaries and collocational knowledge, which posed problems for Vietnamese EFL students. Blooket combines vocabulary education with game aspects to connect direct teaching approaches to context-based learning while offering valuable potential for EFL vocabulary acquisition in Vietnamese college classrooms.

Multiple constraints existed while studying this research due to its small subject number (N=37) and Vietnamese university focus. Because the investigation relied on limited data in Vietnam, researchers were limited in extending their findings beyond that particular learner population. The results may hold limited general applicability because the study participants were non-English major students whose CEFR levels ranged from A1 to B1 among a specific demographic group. The twelve-week intervention did not provide enough time to evaluate lasting vocabulary retention because it only showed immediate effects in the study. The research lacks data from delayed post-tests showing whether the acquired vocabulary knowledge persisted longer than the short intervention period. The research only analyzed Business English vocabulary, while this domain stands distinct from general English vocabulary usage and other subject-specific language groups. The lack of inclusion of a traditional vocabulary instruction receiving control group within the research design makes it challenging to distinctly identify the direct impact of Blooket on the learning environment. Student-reported data related to perception through interviews used for this study potentially suffered from social desirability bias because participants might have reported more favorable intervention experiences than they genuinely felt.

The results of this research produce essential implications regarding EFL vocabulary education in Vietnamese higher education institutions. The research findings challenge stand-alone memorization methods by proving that game-based systems produce successful vocabulary learning through interactive gameplay environments. Blooket represents a digital tool that Vietnamese university EFL programs should explore as an additional educational resource alongside conventional teaching method. Blooket delivers effective vocabulary instruction because it allows Vietnamese students to experience vocabulary multiple times in different language contexts while addressing their vocabulary learning deficiencies related to linguistic interference and poor collocational competence. The study produces strong evidence for a teaching method that utilizes explicit teaching along with implicit learning opportunities, thus indicating that EFL instructors should create vocabulary lessons that provide equal focus on direct instruction with contextual practice. The research data indicates that student engagement with classwork and their sense of motivation significantly impact vocabulary acquisition because educators need to create learning environments that promote the reduction of student anxiety together with increased participatory efforts. The results show that action research adds value to teaching practice guidance by recommending systematic assessment of innovative instructional techniques for Vietnamese EFL instructors in their educational environments.

Based on the findings and limitations of this study, several recommendations emerge for future research and pedagogical practice. Researchers should conduct longitudinal studies with delayed post-tests to assess the long-term retention of vocabulary learned through Blooket and similar platforms. Future investigations should incorporate larger, more diverse samples from multiple Vietnamese universities to enhance generalizability and include control groups to isolate better the effects of game-based learning from other instructional approaches. Researchers should also explore how different Blooket game formats affect various aspects of vocabulary knowledge, including form recognition, meaning recall, and productive use, to develop more targeted implementations. For practitioners, it is recommended to integrate Blooket as a complementary tool within a comprehensive vocabulary instruction approach rather than as a standalone solution. Teachers should carefully select game formats based on specific vocabulary learning objectives and student preferences and gradually increase student involvement in creating Blooket question sets to promote deeper engagement with vocabulary. Educational institutions should provide professional development opportunities for instructors to effectively implement game-based learning platforms in their classrooms, including technical training and

pedagogical guidance. Additionally, curriculum developers should consider incorporating game-based vocabulary learning activities into official EFL syllabus at Vietnamese universities, with clear guidelines for implementation and assessment. Finally, educational policymakers should allocate resources for technology infrastructure that supports digital game-based learning, ensuring that all students have equitable access to these innovative learning tools.

References

[1] Ahmadi, J. (2012). Intentional vs. incidental vocabulary learning. *ELT Research Journal, 1*(1), 71-79.

[2] Ahmed, S. (2022). Game-based learning: Reducing anxiety and enhancing motivation in language classrooms. *Journal of Language Teaching and Research*, 13(2), 356-368.

[3] Chamot, A. U. (2014). The role of learning strategies in second language acquisition. In G. Barkhuizen (Ed.), *Learner contributions to language learning* (pp. 25-43). Routledge.

[4] Choo, L. E. E. B., Lin, D. T. A., & Pandian, A. (2012). Language learning approaches: A review of research on explicit and implicit learning in vocabulary acquisition. *Procedia-Social and Behavioral Sciences, 55*, 852-860.

[5] Dondlinger, M. J. (2007). *Educational video game design: A review of the literature*. 4. In J. W. Rice (Ed.), Denton, Texas. http://www.eduquery.com/jaet

[6] Ghalebi, R., Sadighi, F., & Bagheri, M. S. (2020). Vocabulary learning strategies: A comparative study of EFL learners. *Cogent Psychology, 7*(1), 1824306. https://doi.org/10.1080/23311908.2020.1824306

[7] González-Fernández, B., & Schmitt, N. (2017). Vocabulary acquisition. In *The Routledge handbook of instructed second language acquisition* (pp. 280-298). Routledge.

[8] Gu, Y., & Johnson, R. K. (1996). Vocabulary learning strategies and language learning outcomes. *Language Learning, 46*(4), 643-679. https://doi.org/10.1111/j.1467-1770.1996.tb01355.x

[9] Ha, T. Y. N., Pham, T. H., Nguyen, N. L. D., & Pham, H. T. (2024). Applying Blooket to English teaching activities to make the lesson more interesting. *Journal of educational equipment: Education management, 1* (314), 106-109.

[10] Hulstijn, J. H. (2003). Incidental and intentional learning. In C. J. Doughty & M. H. Long (Eds.), *The handbook of second language acquisition* (pp. 349-381). Wiley-Blackwell.

[11] Mohamed, A. A. (2018). Exposure Frequency in L2 Vocabulary Acquisition: A Meta-Analysis of the Research. *Studies in Second Language Acquisition*, 40(3), 745–783. https://doi.org/10.1017/S0272263117000241

[12] Nappe, O. (2023). Is gamification a blessing or a curse? Teacher and student perspectives about the use of blooket in a high school classroom. *Master's Thesis*, State University of New York. https://soar.suny.edu/handle/20.500.12648/13973

[13] Nezhad, A. N., Moghali, M., & Soori, A. (2015). Explicit and implicit learning in vocabulary acquisition. *Journal of Education and E-Learning Research, 2*(3), 32-38.

[14] Nguyen, T. H. (2024). Challenges in implementing game-based learning in Vietnamese EFL classrooms. *TESOL Journal*, 15(1), 78-92.

[15] Sartika, K. D., Heriyawati, D. F., & Elflanto, S. (2023). The use of Blooket: A study of student's perception enhancing English vocabulary mastery. *Academic Journal of English Language and Education, 7*(2), 357-368.

[16] Somjai, S., & Soontornwipast, K. (2020). The integration of implicit and explicit vocabulary instruction, project-based learning, multimedia, and experiential learning to improve Thai EFL senior high school students' vurocabulary ability. *Arab World English Journal, Special Issue on CALL(6),* 171-190.

[17] Tran, L. T., & Dan, N. P. (2023). Student perceptions of game-based learning platforms in Vietnamese EFL classrooms. *International Journal of Game-Based Learning*, 13(3), 78-93.

[18] Tran, T. T., Quach, T. P. A., & Nguyen, T. D. T. (2024). Linguistic and cultural challenges in mastering English adverbials among Vietnamese young adults: A quantitative analysis. *Vietnam Journal of Educational Sciences, 3(1), 59-70.*

[19] Vu, D. V., & Peters, E. (2021). Vocabulary in English language learning, teaching, and testing in Vietnam: A review. *Education Sciences, 11*(9), 563. https://doi.org/10.3390/educsci11090563.

[20] Webb, S. (2007). The effects of repetition on vocabulary knowledge. *Applied Linguistics*, 28(1), 46–65. https://doi.org/10.1093/applin/aml048

[21] Wired. (2021). Playing Games Has Helped Humans Learn - and Survive. *Wired*. https://www.wired.com/story/games-play-evolution-social-connection

[22] Yaghoubi, S. T., & Seyyedi, F. (2017). The effect of explicit and implicit teaching vocabulary on Iranian EFL learners vocabulary. *Studies in English language and education, 4*(1), 15-25.

[23] Zainuddin, A. (2024). The effects of Blooket games on vocabulary retention among EFL students. *Teaching English with Technology*, *24*(1), 45-62.

The Importance of Academic Writing in Universities

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Abstract

This paper aims to highlight the importance of academic writing in university studies. The aim of the study is to identify and analyze the problems that students encounter in relation to academic writing during university studies. The study methodology is based on data collection, through the application of two classical research methods: quantitative and qualitative. The quantitative approach of the study was carried out through a questionnaire with 22 statements, focusing on the experiences that students have with academic writing. While the qualitative approach of the study was carried out through a focus group. The sampling of this study were students of the Faculty of Educational Sciences, "Aleksandër Xhuvani" University, Elbasan, Albania, at the Bachelor and Master study levels for primary and special education teachers. Based on the responses received, a number of problems were identified. Based on the identified problems, their ranking and ranking were made, and the relevant conclusions.

Keywords: Academic writing, university, student

1. INTRODUCTION

Academic writing in universities aims to provide students with basic knowledge of the ways and methods of writing academic papers, equipping them with the necessary tools to successfully cope with all the academic requirements of university studies, so that they learn to express themselves clearly, to organize their thoughts properly, encouraging critical thinking and scientific judgment. Since academic writing requires the use of language that aims for clarity, accuracy, conciseness, neutrality and coherence, it is necessary for it to be clear and accessible, even if the content presented is complex (Costes, 2020). Academic writing also plays a very important role, both in familiarizing students with the types of sources used in research work, and with the paths followed to collect all the necessary material that serves in writing academic papers, and in acquiring methods of analyzing and reading primary and secondary sources, in order to use them as best as possible during and after their studies.

2. MATERIALS AND METHODS

2.1 Academic writing competencies

Unlike other writing styles, academic writing follows a formal and structured logic. It requires clarity, precision, consistency, neutrality, conciseness, but above all, consistent language. It is worth noting that some of the features mentioned belong more to the sphere of specific social conventions of the academic world than to linguistics. (Testa, 2023). Academic writing in general requires the realization of a series of competencies, which we list below: The first competence is linguistic competence. Students often have problems in using the linguistic norms of writing

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(spelling, correct placement of punctuation marks). We usually see this when we correct students' written assignments.

- The second competence is related to the writing style: scientific texts have specific stylistic characteristics.
- The third competence is rhetorical competence, which implies systematicity in the work and logical argumentation of the drafted text.
- Finally, it is worth mentioning the competence of reading and perceiving. Scientific or academic texts do not serve to entertain or inspire. They are characterized by a critical perception. Validity, logical connection, argumentation and accuracy constitute the main requirements of academic writing. (Escorcia, 2012).

2.2 Writing problems

The greatest benefit of writing is our personal development as human beings. Writing helps us explore and, as a result, expand our ability to think, feel, and perceive. (Kane, 2010) Writing is often complicated for one reason or another. Writing, whether formal or informal, should generally not be considered a chore, but an art that needs to be cultivated (Bell et al., 2023). Constructing an academic document requires good knowledge of academic standards. Academic writing is a process that involves many partial processes, so it is a very complex activity. Often students do not receive information about the specific requirements of writing in their courses, they do not prepare for this activity, the problems are not identified and are not visible to them. Problems that arise most often during the writing process are related to logical thinking and structured argumentation, skills that students should have acquired during their years of study. The totality of the problems that arise turns academic writing into a demotivating process for many students. In particular, writing problems are seen as:

- beginning the writing process, finding and defining a useful/appropriate issue or topic, and presenting personal results regarding the issue addressed.
- difficulties with the perception of scientific literature related to the topic (including terminology)
- problems with motivation for a particular topic
- inability to develop a general idea about the text to be written
- problems with formulation, while a scientific text should preferably be written in concrete language, where all terms are clearly defined, avoiding misunderstandings (Eco, 2005). Academic writing is an expression of logic, which is a product of thinking. It translates knowledge and understanding of concepts into sentences and demonstrates the ability to express higher-level concepts, demonstrating the student's ability to:
- provide evidence to solve problems
- construct arguments and counterarguments
- engage in higher-level thinking
- express opinions based on sound analysis, synthesis, and evaluation of multiple sources (McMillan & Weyers, 2010)

One of the problems that arise after the beginning of the formulation phase is the revision of what has been written. The flow of writing often stalls, fragments of formulation disappear from memory, the formulation process has to be restarted. Thus, formulation becomes a struggle and writers have the feeling that they write too slowly and distrust in their personal writing ability increases. The fear of not being able to express themselves adequately and of being embarrassed by this can also influence this behavior. In general, students express that they have difficulties in drafting a coherent text, i.e. presenting the content of the text flawlessly and in an argumentative manner. These difficulties stem from various causes, starting with insufficient concept formation to formulation difficulties. Lack of knowledge of scientific norms and text models can lead in most cases to coherence problems. Emotional factors also play a significant role in the success of writing. Especially in long academic writings (e.g. course assignments) a positive attitude towards the topic is a fundamental condition for success. Conversely, a set of writing problems can lead to a lack of motivation and a lack of emotional connection to the subject of the paper.

2.3 The consequences of writing problems

Writing problems, as mentioned above, are numerous. They harm the cognitive and intellectual development of students. Writing is not an activity that will simply record something previously thought in writing. Writing has a more decisive function. Individuals who have experience in writing use the writing process to formulate/draft the requirements of the tasks more clearly, to achieve a deep understanding of the content of the written task.

One of the writing problems is also closely related to the way students approach their studies. Having problems in writing, students in most cases postpone their written tasks until the last minute. This often causes panic in them. As a result, personal problems can arise. Obstacles in writing lead to experiences of failure and feelings of incompetence, fear of failure and stress. Based on this, this study aims to identify and analyze the problems that students encounter regarding academic writing during university studies.
The main research questions of the study are:
1. Do students experience difficulties with academic writing during their university studies?
2. What are the difficulties that students face in academic writing?

2.4 Study Methodology

The collection or collection of data, to answer the research questions of the study, was done through the application of two classical methods of research and data collection: quantitative and qualitative. The quantitative approach of the study was carried out through questionnaires with students, through which data were collected, which were then used as a basis to identify and analyze the problems that students encounter, related to academic writing at the university. A questionnaire with 22 questions was designed and used with a focus on the experiences that students have with academic writing.

While the qualitative approach of the study was carried out through focus groups. Knowing that the role of the researcher in focus groups is very important, since through it the researcher creates the opportunity for each individual or group to express their opinion (Azemi, B & Bujari,R, 2013). In this study, focus group discussions were organized with three groups of students.

The data collected from the questionnaires were processed with the SPSS package, version 27. Data analysis consists of an interpretation of the results in percentages.

2.5 Population and Sampling

The population of this study from which the sample was selected is composed of students of the Faculty of Educational Sciences (FES), ″Aleksandër Xhuvani″ University, Elbasan, Albania. The sample consists of 70 students randomly selected from bachelor and master programs for primary and special education teachers. The years of study range from the first to the third year of bachelor and the first and second year of master studies.

2.6 Survey Questions

In this study, a questionnaire designed by the authors was used to identify the problems that students face in relation to academic writing at university.

Pilot Study: Initially, the questionnaires were piloted with 10 students. It was explained to the ten students that this questionnaire was still in the pilot phase, and the data would be used simply to see how the scales and measurements worked and to improve them.
The questionnaires were carefully reviewed and all suggestions given by the students were taken into consideration. The analysis that was done at this stage was Chronbach's alpha and it turned out that they were at acceptable levels. There was no need to remove any statements. Simply to revise the Albanian language of some of the statements. After some grammatical revisions were made and some spelling errors were corrected, the questionnaire was ready to be distributed to the final study sample.

3. RESULTS

Questionnaire reliability analysis

Overall, the questionnaire has a level of reliability (as seen in Table 1) above what is considered "minimally acceptable". The alpha of the questionnaire, which is composed of 22 statements, resulted in α=0.803, which means that it is at acceptable levels to continue with further analysis with these data.

Table 1. Reliability statistics.

Reliability statistics	
Cronbach's Alpha	No. of statements
.803	22

Demographic data

Gender distribution and age of participants

Demographic characteristics of students, including variables such as gender, age. Kampioni perfshiu N=70 student ku 87 % (N=61) ishin femra dhe 12 % (N=9) ishin meshkuj. (see table 2.)

Regarding the average age of students at FES was 20-21 years old, ranging from a minimum of 19 years old to a maximum of 25 years old. (see table 2.)

Table 2. Descriptive statistics (minimum, maximum, mean, standard deviation) for gender, age

Faculty of Educational Sciences (FES)		N	Minimum	Maximum	Mean	Standard Deviation
Students	Gender	70	1.00	2.00	1.3800	.49031
	Age	70	19.00	25.00	21.3400	9.27177

Frequency of identifying problems in academic writing

From the frequency of responses, it resulted that 84% (N=59) of students had difficulty in academic writing during the university study process. While 18.7% (N=11) of students did not have difficulty in academic writing at university. (see table 3).

Table 3. Frequency for the question "Do you have problems with designing a course assignment"

Problems with course assignment			Frequency	Percent	Valid percentages	Cumulative Percentage
Students	Valid	Yes	59	84.0	84.0	84.0
		No	11	18.7	18.7	100.0
		Total	70	100.0	100.0	

As shown in the table, the majority of students, translated into a percentage of 84%, in the Faculty of Educational Sciences have problems with academic writing. Answering the first research question of this study.

Focus Group

Another research question of this study was to identify what were the difficulties, the consequences related to academic writing problems during the learning process/tasks. Three focus groups were conducted with 24 students with 8 students for each group who reported having difficulties in academic writing. From the data processing, the following results were obtained:

- 21.9% of students interrupted the drafting of a course assignment; 78.1% of students did not have this experience.
- 67% were disappointed with the results of their efforts, 32% were satisfied with their results. This disappointment certainly affected the motivation of each student.
- 62.7% had the problem of not submitting a course assignment or work on time, 37.2% did not face this problem.
- 51.3% felt the lack of help in drafting a course assignment, 48.7% responded that they had professional help or advice from the subject lecturers.
- When asked whether students draft an initial division of the paper and then revise it again, it was noted that 38.7% answered yes. 61.3% did not have this problem.
- Since emotional factors also significantly affect the writing process, in our questionnaire we were also interested in the self-confidence that students have in relation to completing a task. 63.3% responded that

they were afraid of the requirements and did not believe that they would complete them in a timely manner. 36.7% wrote that they have confidence in themselves to achieve the given requirements.

- The phase of conceiving and drafting a task or writing is closely related to the phase of collecting the material or literature necessary to address a certain topic. 58.9% responded that they collect more material than necessary and then have problems with the selection and proper organization of the literature found. 41.1% do not have this problem.
- From the answers to the question of whether there are problems with finding sufficient literature and material, it was noted that 66.1% had such problems; for the remaining 33.8. % there was no such problem.
- An important characteristic of scientific and academic writing is intertextuality. For the realization of intertextuality in a scientific paper, the ability to summarize and process various texts necessary for the topic being addressed is essential. If this is not achieved, then the writing process is seriously damaged. To the question of which students have problems with summarizing scientific literature texts, 64.4% answered "yes" and 35.2% with "no"
- 56.4% of the surveyed students have difficulty with ranking and evaluating the various results of existing literature regarding a certain topic. 43.6% have not been confronted with this problem.
- Another important problem in academic writing is the content of the written text. Normally, the content is not directly related to the writing process but to the specific knowledge of each person in a certain field. However, no one can write on a certain topic if they have problems with the content. Therefore, another question in the questionnaire refers to the difficulties that students may have with understanding scientific content. 64.3% have problems understanding the content of scientific literature while 35.7% denied such a difficulty.
- In addition to other elements of academic writing, students must master the scientific style of writing. 50.5% have problems with the writing style.
- 41.5% answered that they master this skill well.

4. DISCUSSION

The main purpose of this empirical work is to list and rank the problems that students face in academic writing. Based on the responses received from the questionnaires and organized focus groups, this ranking is presented below:

1. Distrust, fear, timidity of not fulfilling the appropriate requirements in the writing process
2. Problems with collecting and organizing material
3. Disappointment with the results
4. Problems related to writing style
5. Problems related to the processing of scientific literature
6. Problems related to the ranking and evaluation of scientific literature
7. Failure to complete the assignment on time
8. Problems with the content
9. Lack of material/literature
10. Starting the work at the wrong time, confusion

A good part of the students mentioned other problems in the focus group discussions. Among them we can mention:

- problems related to the form of a scientific paper
- problems related to the lack of motivation to write
- problems related to the lack of professional advice or guidance from teachers or students with experience in academic writing.

Of course, we took these data seriously and that is why we are highlighting them in this article. Of course, their treatment requires further work and analysis in this field.

5. CONCLUSION

As can be seen from the above-mentioned issues, we conclude that over 80% of the surveyed students have problems with academic writing.

No differences are observed between the two genders regarding past problems.

In summary, the problems refer to difficulties related to:

- the structure of scientific papers

- finding and processing material and literature
- the scientific content and style of papers
- specific counseling of students, etc.

Based on what we said above, we think that higher education institutions (universities) should work more on counseling students in the field of academic writing, and we suggest that in addition to the course offered in higher education curricula, which provides knowledge of academic writing, there should also be special counseling centers in universities for the transmission of basic skills or competencies of academic writing.

References

[1] Escorcia D. 2012. Conceptions de l'ecriture a l'universite: Recherches en didactique, 123-126.
[2] Eco U. 2006. Si shkruhet një punim diplome. Shtëpia Botuese Dituria. 184.
[3] Thomas S. K. 2010. Oxford University Press. Botues Qendra për Arsim Demokratik (CDE), Tiranë,1‑4
[4] McMillan K, Weyers J 2010. How to write Essays & Assignments. Botues Qendra për Arsim Demokratik (CDE), Tiranë,6‑7
[5] Bell E, Bryman A, Kleinknecht 2023. Social Research Methods. Copyright Oxford University press Canada, 202, 366.
[6] Azemi,B, Bujari,R 2013. Bazat e kërkimit në edukim″ Botues Instituti Pedagogjik i Kosovës, Prishtinë, pp 25‑26.
[7] Costes A. 2020. Le style académique: comment le respecter? Available at: https://www.scribbr.fr/elements-linguistiques/style-academique [Access Date: 15.11.24]

Using a Learning Outcomes Focus to Develop the Education of Students with Special Educational Needs: Kuwait Case Study

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Abstract

This paper reports the findings of Kuwait case study, as part of the research grant project (No. CR20-19TM-01) funded by Kuwait Foundation for the Advancement of Sciences (KFAS). The Kuwait case study aimed to measure the differences between mathematics learning outcomes when employing a structured fifth-grade mathematics curriculum for students with learning disabilities (SLD) in Kuwait mainstream schools. A total sample of 30 SLD selected from three classrooms in two mainstream schools located in the Mubarak Alkabeer Educational District. SLD mathematics learning outcomes collected and analyzed using multiple methods of quantitative and qualitative research design. Results indicated that overall SLD mathematic learning outcomes was 91% achieved using AMLO (AMLO-system.com), some weaknesses noted in SLD mathematics learning outcomes related to the second unit of mathematics instruction that focused on the multiplication and division by whole and decimal numbers subject, and no significant differences found in SLD mathematics learning outcomes of three units of fifth-grade mathematics curriculum and between three classrooms in the two mainstream schools. We recommend a further future research using this learning outcomes approach, based on a wider sample of students in particular, to measure of the impact on SLD learning outcomes in the short and longer term.

Keywords: KFAS, Kuwait, SLD, AMLO

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Dyslexia, Diagnosis, and Disability Discourse: A Case Study of Academic Advisers in Higher Education

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Abstract

This paper reports on a case study of the ways in which dyslexia is discursively constructed in relation to higher education and the nature of support offered for students who have been assessed as having the condition. While there has been a shift in contemporary understanding away from considering dyslexia in terms of disability or deficit towards viewing it under the umbrella of neurodiversity, there is still some uncertainty in higher education about what this means in practical terms. Consequently, this study sought to examine some of the issues surrounding making reasonable adjustments for students with dyslexia. Interviews were conducted with academic advisers as part of a wider study on support for students with dyslexia at a UK university. The data was analyzed through utilizing a discursive psychology approach in which three key inter-related themes emerged: (i) diagnoses and dispositions in which dyslexia was externalized as a diagnosable condition versus the constructing it in internal dispositional terms related to student agency; (ii) dyslexia and deadlines in terms of adjustments made for coursework submissions and the tensions around support versus equitable treatment for all students; and (iii) reasonable adjustment and resources in which the advisers' discourse posed a contrast in terms of what is specified in students' support plans versus the 'reality' of associated resource pressures. This document gives formatting instructions for authors preparing papers for publication.

Keywords: dylexia, higher education, academic adviser, discourse

1. INTRODUCTION

Disability-related legislation in the United Kingdom (i.e., Equality Act, 2010) has set a legal requirement for educational institutions to make 'reasonable adjustments' for students disclosing specific learning difficulties (SpLD), including dyslexia. However, dyslexia can be considered a specific condition or as having subtypes and at present there is no universally accepted definition (Alexander-Passe, 2015: 204; Snowling et al. 2020). It is also the case that constructing a definition of dyslexia can produce tensions given the terms used for it can imply a 'problem condition'. For example, terms such as 'disability', 'impairment', 'deficit' and 'Specific Learning Difficulty', all imply some form condition that is apart from the norm. This kind of discursive construction can be seen as controversial and potentially leading to discrimination (Riddick, 2001). It has also been argued the discourse of disability sets up an oppositional line between abled and disabled thereby creating an ideology of inferiority (Bolt, 2014).

In educational terms, dyslexia can be defined in terms of capabilities and deficiencies, such as difficulties with literacy and reading. An example of this approach has been put forward by Pennington (2006) who has advocated a multiple deficit model in terms of the cognitive difficulties that accompanies the condition in terms of working

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memory, phonology, and speed of information processing. However, this kind of approach points to the standardization of ability and leaves individuals with dyslexia as being out of kilter with set norms. This can result in form of 'othering' in which disabilities are made apparent and academic skills are valued in terms of standard expectations for literacy. This can lead to a situation where individuals who have dyslexia perceive a degree of stigmatization where their abilities are considered as being of lesser value because they do not meet norms of literacy.

In sociological terms, Macdonald (2009) and Riddick (2012) have argued for countering the discourses of learning dysfunction and neurological disorder. A social model of dyslexia is based on the view that while disability exists, society is comprised of a diverse spectrum of human capabilities and that dyslexia is part of that neurodiversity. In adopting this view, the issue then becomes one how society places barriers and restrictions on what can be academically achieved by those with dyslexia. By acknowledging the prevalence of dyslexia, the issue then becomes one of accepting learning differences and understanding different skillsets. In this vein, students with dyslexia are treated are consulted about their education and support needs rather than being considered as passive recipients (Glassman & Patton, 2014). A strengths approach therefore considers discrepancies in educational provision in order to counter the notion of dyslexia as an academic deficit but rather a different way of working (Abbott-Jones, 2023: 5). This approach aligns well with the Universal Design for Learning (UDL) model which developed out of the view that those with physical disabilities could access public areas (Waitoller & King Thorius, 2016). The concept has since been applied to education with the view that a curriculum should be designed to take account of human variation in learning. It is not uncommon for students to face difficulties in their studies and support at one time or another (Griful-Freixenet et al., 2017; Griful-Freixenet et al., 2020; Keefer, 2017; Missingham, 2017; Richardson, 2021).

2. DYSLEXIA IN UK HIGHER EDUCATION

Students with SpLDs, including dyslexia, are less likely to enter higher education than those who are not categorized as such (Chatzitheochari & Platt, 2019). It is also the case that students with SpLDs who do enter higher education are less likely to complete their studies or gain a First or Upper Second award (Bolton & Lewis, 2023; Pumphrey, 2008). In a UK-wide study of data from 2007 – 2019 (Brunswick et al 2025) found that students with SpLDs were more likely to attend newer universities, and more likely to study on degree programmes such as creative arts and design, agriculture and architecture rather than areas such as law, languages, computer science, and mathematical sciences. The number of with declared SpLDs has increased year on year and represents approximately 6% of the student body. The authors conclude that this suggests that policy aimed at increasing diversity and inclusion have been successful.

Higher education students in the UK who have a diagnosis of SpLDs are usually able to apply for Disabled Students' Allowance, which funds non-medical support such as a laptop computer and specialist software. Students can also undertake a full Needs Assessment in which their higher education institution receives particular recommendations for putting in place 'reasonable adjustments', for example, alternative assessment formats, additional time for examinations, a support tutor, and coursework virtual or material notification stickers for markers indicating they have a SpLD. However, these measures may vary from student to student and therefore decisions on 'reasonable adjustments' may sometimes need to be tailored to an individual's needs. Most UK higher education institutions have in place a system of notifying departments and tutors of student support plans although setting these up can be challenging (Cameron et al. 2019). These plans only usually apply to students who have been formally diagnosed with a condition such as dyslexia and consequently those who have not declared their condition, remain undiagnosed, or do not meet the threshold have no formal support plans in place.

3. INVESTIGATIVE APPROACH

The investigation reported on in this paper is part of a wider case study examining the various discursive construction on dyslexia by students, support staff and academic advisers. It follows on from the work of Rolak et al. (2023) in adopting a value-driven perspective to the study of dyslexia in higher education. In examining these values, of particular interest is how academic advisory staff navigate the ideological dilemmas (Billig et al., 1988) posed by potential contradictory discourses in terms of expressions of equitable treatment for all students versus the view that those with dyslexia have special needs that require being treated as a distinct group. As is the case with the work of Rolak et al. (2023), I also draw upon the concept of a 'capability approach' (Sen, 1980, 1985, 1993), but in a different manner. My interest is in the ways in which this may act as mediating discourse through which the values of equitable versus distinct treatment are reconciled with one another.

Capabilities can be considered in terms of what students can do but these are facilitated or inhibited by opportunities made available to them. (van der Klink et al., 2016: 74) The enabling of students who are diagnosed with dyslexia to utilize their full capabilities and reach their academic potential, depends upon a range of individual and institutional factors (Pino & Mortari, 2014). The study investigated these issues through the lens of a discursive psychology perspective that sought to address the following research question in relation to academic advisers involved in the case study: How do academic advisers construct their discourse around their role in relation to dyslexic students reaching their academic potential?

4. DISCURSIVE PSYCHOLOGY AND DYSLEXIA

In order to address the question above, a Discursive Psychology (DP) was adopted. DP draws upon both social constructionism and conversation analysis (CA), (Sacks, 1992), (see Potter & Wetherell, 1987). Social constructionism provides DP with an epistemological grounding which see discourse a both constructive and constitutive of social reality (Potter & Hepburn, 2008). In the case of dyslexia, it considers how this category is reified as something in talk, text and images. DP takes this stance and uses the CA as a methodological approach to examines the ways in which talk is constructed in the course of interaction in order to accomplish discursive actions such as justifying, criticizing, rationalizing etc. In order to do this, DP is attuned to key features of talk such as the formulation of phrases, lexical choices, conversational turn-taking, and paralinguistic features.

However, an additional feature of DP is that is also concerned with variability and contradictions in discourse. These can be considered in two ways. First, it can show how in constructing their discourse, people perform different actions and that these can lead to variability. Second, it is also the case that in putting forward versions of matters, people must contend with ideological dilemmas (Billig et al., 1988) in which they may draw upon contradictory discourses. This kind of flexibility in analyzing discourse is useful in considering how dyslexia and the support offered for the condition are constructed in variable ways (c.f. Elliott & Grigorenko, 2014; Elliott, 2020). A DP approach also permits the analysis of dyslexia as constructed as category in conversation (dyslexia), as way of being (a dyslexic), and as a label applied to persons in terms of having a diagnosed condition (SpLD). Therefore, a DP approach attends to both rhetorical and linguistic features in order to understand how versions of dyslexia and academic the support offered are constructed in different ways. For example, by talking about dyslexia, versions may be constructed that weave together issues of disability, learning difficulties, equality, and difference and support in order to engage in different actions such as affirming, justifying, criticizing etc.

Dyslexia is often considered to be “hidden” disability or neurological difference. The ways of constructing it as such can lead to different ways of talking about it in terms of interpretative repertoires (Wetherell & Potter, 1988). These discursive patterns can be thought of as common ways of referring to dyslexia in terms of their constructive function using a limited set of discursive resources. This is important in showing how these resources are discursively deployed by drawing upon sometimes variable or contradictory repertoires. This can help shed light on how dyslexia is formulated in flexible ways, the terms drawn upon, and the discursive strategies used talk about it in the context of student support. Of particular interest was the ways in which capabilities are discussed in relation to students with dyslexia and how this is constructed within the meritocratic framework of higher education.

5. METHODOLOGY AND DATA ANALYSIS

As previously noted, the analysis reported on in this paper is part of a broader case study of dyslexia at a university in the UK. The main focus of this part of the work is on how academic advisers talk about the support offered to students with dyslexia rather than the institution or its policies on disabled students. These advisers can be considered as institutional linchpins in terms of liaising between staff and students with disabilities, as well as students and support services. This gives them a unique and critical role in ensuring that dyslexic students’ needs are met, and therefore they became a key focus for the study. Having said this, given that a case study approach has been adopted, no claims are being made for the generalizability of the investigation. The focus is squarely upon the nature of the discourse itself, and the discursive constructions used in discussing supporting dyslexic students. More specifically, the investigation is concerned with the tensions arising from discursively constructing these students as requiring support versus that of equitable treatment for all students, and the ways in which these views are reconciled in interview discussions. In other words, the focus of this part of the study was on the talk itself and how these discursive constructions were managed in situ. This approach enables a window onto the ways in which these discourses are

managed, and how support for dyslexic students is interpreted, contested, and framed within the notion of 'reasonable adjustment' in the terms of the Equality Act (2010).

Consequently, three academic advisers took part in semi-structured interviews with topics that covered how students with dyslexia are advised and the support they receive (e.g., referrals to support services regarding a diagnosis); issues surrounding the preparation and submission of coursework (e.g., essays, reports, exercises), and the reasonable adjustments made in teaching (e.g., putting lecture slides up early on the virtual learning network). The interviews were conducted online, lasted around 30–45 minutes, and transcripts was produced for each. These were produced in terms of readability rather than including micro-linguistic features prevalent in CA (e.g., time pauses, overlaps).

The transcripts were analyzed in three phases. First, each was read and reread in order to identify broad interpretative repertoires and ideological dilemmas. Having identified these, the data was coded for instances of each repertoire in order to determine how they were deployed. Second, a line-by-line analysis of these extracts was undertaken in which lexical features of talk were attended to, including: the use of hedges, contrast structures, active voicing, repeated phrases, and the overall action-orientation of discursive segments. Third, as patterns were identified in terms of discursive features, the interpretative repertoires were examined to see how they were deployed in variable and contrasting ways by rereading the transcripts to see how each was taken up.

6. FINDINGS

The findings are presented in terms of the broad interpretative repertoires that are apparent across the interview data and the ways in which these are weaved together in the advisers' discursive constructions. It can also be seen that these repertoires pointed to contradictions in seeking to reconcile support for dyslexic students with neoliberal notions of agency, meritocratic ideals of student achievement, and pitting support against the 'realities' of resource provision. These interpretative repertoires are comprised of particular lexical choices, figures of speech and other micro-linguistic features that are drawn attention to in the interpretative passages below.

6.1 Diagnoses and Dispositions

One interpretative repertoire that was apparent was that of referring to dyslexia as a condition. In this discourse dyslexia is externalized in terms of a condition that is diagnosed and that this then serves as the basis for student support.

> *Academic Adviser 1*
>
> *Some people don't want any help, but obviously some people do, especially if they've had it at school and things like that."*
> *So, they've kind of lived with that stigma for, you know, a number of years and it's only now it's sort of like as a student that's now been diagnosed.*

Note the equivocation in this discursive construction in terms of "some people don't want any help but obviously some people do". This sets up help-seeking as a matter of individual agency, a choice, rather than considering neurodiversity as a matter for the institution to attend to.

In the extract that follows there is also an apparent contradiction in the adviser's response on supporting students with dyslexia. Extract (i) exemplifies the role of advising students "to be tested" by contacting the academic services unit. This supportive discourse is, however, in contrast to extract (ii) from later in the interview. In the second extract the adviser refers to the students' "mindset" and about "overcoming" issues in the workplace. This focus on student agency is elaborated on further by referring to attempting to "get them to push forward" to strengthen their self-concept and "mentality".

> *Academic Adviser 2*
>
> *(i)*
> *I'm coming across students with dyslexia that perhaps have never been diagnosed with it.*

So as academic advisor, just to answer that question, what happens then is I suggest to the student that they obviously go through academic services and to be tested and things like that.

(ii)
And sometimes I think what we may need to be doing, maybe it's a bit of a mindset, because when you go into the world as a dyslexic person, you know that it's not easy either. And, it's how you're going to overcome some of that. When you're in a workplace and somebody asks you for something that, yeah, you know, that can be problematic. And so, what I'm trying to say is maybe we should be talking, engaging with dyslexic students in a way that, how do we get them to push forward?
Does that make sense?
Int: Mhmm
And try and see that sometimes using me as a crutch, if that makes sense. And I don't mean that in a very, I don't mean that in a malicious way whatsoever. But I think if you're going to come to university, there's other things as well. Like how do you strengthen your own concept about yourself? Yeah, your dyslexic and how you're going to deal with it in the world when you get employment. I just think maybe we should think about how do we help them, their mentality, does that make sense, in building up confidence for these students?

What is interesting in the exchange in extract (ii) is adviser's attempt to avoid the potential for these statements as being controversial or problematic in some way. The use of "does that make sense" twice and "if that makes sense" together with "I don't mean that in a malicious way whatsoever" point to the adviser seeking to avoid the potential for miscomprehension that the statements made could be taken as making a negative point about dyslexic students' in terms of "how they deal with it in the world" related to employment. The potential implication here is that dyslexic students need to assert themselves in a way that overcomes their condition when it comes to the world beyond the university. In other words, they have to not only use adaptive measures for their dyslexia but also must adapt themselves and their disposition.

In the following extract an adviser also draws upon constructing dyslexia as having to be diagnosed. However, this is treated as an act of persuasion in terms of posing students who are "struggling with things".

Academic Adviser 3

OK, so that's actually quite interesting because I had a really interesting conversation with a student in class a couple of weeks ago as well who'd been struggling with things. And generally, if it's something that I've spotted and often, you know, as things that we do spot for what could be diagnosed, I will just ask the student if they would like some support and I start them generally with a learner development service. And I will mention to learner development service when I do that, that I sense that something might not be right.
So, so, I mean, that's generally what I do is I say, you know, I wonder if you could do with some help on how you structure your rating and things like that and the hopes that I can get them to just engage with me at that point.
And then if they do engage with me at that point, then I think I, I often will say to them, do you think you might be dyslexic? You know, And then if we can get them to think that way, then I can say, okay, let's get you into advisory, let's see what we can do and let's get some support put in place for you.

6.2 Dyslexia and Deadlines

Another prominent theme is the discussions with the academic advisers was the issue of coursework deadlines for dyslexic students and what adjustments, if any, should be made. This raised some interesting points that centred on the need to ensure parity and fairness with other non-dyslexic students while at the same time ensuring reasonable adjustment for those students with the condition when submitting coursework. Therefore, an interpretative repertoire of due support was modified through appeals to the notion of meritocratic notions of fairness cross the student body ss a whole. The resulted in tentative answers in relation to extended the question of extended coursework deadlines for dyslexic students. In all cases the responses contained hedged statements (Holmes, 1990) where lexical units make the meaning fuzzier and in particular to shield a proposition from attribution to the speaker thereby making it more tentative (Prince, Frader and Bosk, 1982). As Brown and Levinson (2011) point out, these kinds of hedges are used to avoid disagreement; in this case committing to a view that may not align with university policy. In the case of

Academic Adviser 1 below the use of phrases such as “kind of”, “maybe not quite as strict”, “I suppose”, and “I don’t know” all have the effect of making the statements uttered less definitive in favour of extended submission dates for those with dyslexia. Thus, while some may have access to proofreading “they would still need to submit exactly the same deadline as everybody else.” The dilemma for these advisers is that they are members of academic staff and not support advocates. Given their academic role, they may be all too aware that fairness in assessment policy and practice is fundamental in the eyes of staff and the student body. Any potential deviation from this, in what may be perceived as a disproportionate measure that aids dyslexic students, would breach the principle of treating students equally when it comes to assessment.

Academic Adviser 1

But no, they would definitely need to submit their assignment on the deadline date the same as everybody else.
So it's just kind of taken that just not being quite as maybe strict as what you would be when you were maybe mark it.
But I suppose it depends on the kind of field of study as well, just how important it is.
You know, maybe in Law it would be something completely, it would need to be bang on sort of thing. I don't know.”
So they would basically, I mean, it's only a handful of students that do get this kind of proofreading.
That's something that is agreed separately.

But they would still need to submit exactly the same deadline as everybody else.

Adviser 2 draws upon a different approach to the question of potential variation in coursework deadlines for dyslexic students by giving an equivocal answer that does not address the issue but nonetheless indirectly argues in favour of no variation in coursework deadlines.

Academic Adviser 2

And what I think is interesting about that is, is that some students really push themselves not to be dyslexic, if that makes sense. They overcommit themselves to preparing their work, redrafting their work.
Whereas sometimes that we have other students that might just say “I'm dyslexic, so here it is and just accept it, right”.
So what I'm trying to say there is there's different types, there's different types of dyslexia, but there's different types of students that will say “I spent three weeks writing that essay because I was at my dictionary all the time and I was using this, and I was doing edits.”

The opening statement “what I find interesting about this” is a means of prefacing what could be potentially a controversial statement “that some students really push themselves not to be dyslexic”. The use of “if that make sense” as a hedge has been noted previously and, in the context of this statement, points to the problematic nature of claiming that dyslexic students can through their own agency and effort overcome the difficulties in submitting their coursework at the same time as other students. The second statement is not hedged in any way and makes the claim that other dyslexic students do not spend time redrafting their coursework. Note how this is put in the form of being spoken by a student as if quoting what has been said. This discursive construction is akin to a form of hypothetical active voicing (HAV) (Simmons & LeCouteur, 2011). In this case instead of constructing hypothetical future-orientated direct speech, it is formulated as if spoken by a hypothetical student on a previous occasion. This results in strengthening the claim some dyslexic students do not make an effort to extensively redraft their work to avoid grammatical and spelling errors. The adviser then proceeds with another hedge “so what I’m trying to say” before using another HAV “I spent three weeks writing that essay because I was at my dictionary all the time and I was using this and I was doing edits.” By beginning the response referring to students who “push themselves not to be dyslexic” and by ending on “I was at my dictionary all the time” as an extreme case formulation (Pomerantz, 2021) as way of legitimating the claim, the adviser indirectly makes the case for there being no variation in coursework deadlines for dyslexic students. Consequently, a discourse is advanced of dyslexic students as having to rely on their own agency and effort to ‘overcome’ the condition.

In extract (i) from Adviser 3 the same equivocal discursive construction is apparent in terms of referring to dyslexic students as "some people like to be treated as special case and some people don't". However, in extract (ii) the adviser goes onto point out that a "proofread version is not the one that's marked."

Academic Adviser 3

(i)
I mean, some people like to be treated as special case and some people don't. So it's very, very difficult to do that. I mean, and again, I say not all students are comfortable telling you that they're dyslexic, you know.

(ii)
I mean, things like well, when students have to get things proofread and it might take a bit of time for that for, for students to be able to get things proofread.
Int: Should that be built into the submission time for them? Should they get any extra submission time?
I mean, we have the extra week, you know, but the proofread version is not the one that's marked. I mean, it's only there just to, to make sure, you know, if there's something you're unsure of and you, you refer to it.

Again, the discursive construction involves discourse markers such as "I mean" and "you know" that function as hedges with the effect of softening the claims being made. This is particularly apparent when addressing the question of extra time for students to submit where the use of the collective "we" avoids directly addressing the question before pointing out that the later submitted proofread copy is "just there…. if there's something you're unsure of".

Taking the three academic advisers' comments together on the issue of extras time for coursework submission for students with dyslexia, it is evident that there is tension in the responses between constructing their discourse around supporting these particular students versus that of equitable treatment for all students. It is also the case that they did not offer personal opinion responses that would not be in alignment with the university's policy on coursework submission.

6.3 Reasonable Adjustment and Resources

The UK Equality Act (2010) makes clear that there must be reasonable adjustments made for those with disabilities in educational institutions. While this is a legal requirement there are issues at stake in terms of ensuring that such adjustments are also reasonable in terms of institutional resources. This tension between the requirement of the Act and the availability of institutional resources can be seen in the discursive constructions of the advisers. This is posed in terms of a contrast structure between what is specified in students' support plans versus the 'reality' of associated resource pressures. This is evident in the discursive construction of Academic Adviser 1 who, in addressing the question of making slides available early for dyslexic students first points to the support plan and then the 'reality' of lecturers who are constructing lecture slides as they go in delivering a new module.

Academic Adviser 1

Int: Do you, do you liaise with, with lecturing staff about say, putting slides up early or changes in background colour?
Adv: Yeah, again, that's part of the support plan, right.
So, to be honest, I, I would, I would only raise it with a, with a member of staff if this if they said look, you know, we're not getting these early.
Then you know, then I would ask, I mean, I'm not, you know, I'm not a boss of any of the, any of the members of staff, you know, but I can, I can nudge them gently and say look, this, you know, this student, and there's always a number of students, who've got the support plans that require slides early.
The problem is, of course, a lot of the time if it's a new module and things like that, they're only writing them, you know, the writing that week's lecture, you know, so it's hard. It's hard to get things in advance, or it can be.

The academic adviser begins by drawing upon a commonplace interpretative repertoire of pointing to 'official' support plans for dyslexic students and is affirmed by the use of "right" after stating this. However, the next segment of talk displays signs of hesitancy at following this through with lecturing staff and this is signalled in the opening

phrase “To be honest” followed with the disclaimer “I’m not their boss”. Note the repetitions of “I” and “I can” that signal a hesitancy to the claim to “nudge them gently” to follow the support plans. This claim is followed by a defence in terms of point to the “problem” of staff teaching a “new module” and “writing that week’s lecture”. This is strengthened by adding “it’s so hard” and “It’s hard to get things in advance, or it can be”. The net effect is to point to official policy but then offer in mitigation in terms of hard-pressed staff who are teaching new modules and preparing material shortly before delivery.

In the case of Academic Adviser 2, pointing to official policy in terms of support plans is also drawn upon in a similar manner and also in turning to offering a defence for slippages in following these due to workload.

Academic Adviser 2

Int: So, I mean, what about putting up slides early for them? Do you help anybody or advise on that?
Adv: Yeah, well, what I do is I usually chase up the lecturer. As you see, my role as academic advisor is to support the students [mentions a specific individual case].
And so, what I normally do is I become the go between yeah, and I might just contact the tutor right away. And just to remind them, maybe they’ve not looked at the support plan because, you know, we're up to our necks, right? And it never ends, right. So, my role was to be, I kind of go between just to give it a gentle nudge to the tutor to say right.

Note that the academic adviser begins by adopting an advocacy position for dyslexic students on the issue of lecture slides being made available in advance (“what I do is I usually chase up the lecturer”; “As you see my role as academic advisor is to support the students”). The inclusion of the phrase “As you see” acts as a marker to confirm the Adviser’s advocacy role. The next part of the response, as in the case of Adviser 1, acts a defence, by drawing on the collective “we” in terms of “we’re up to our necks; a colloquial expression implying an excessive workload. The Adviser then uses the same expression as previously encountered in terms of giving “a gentle nudge to the tutor”. The implication here is that this is a collegiate informal conversation about following support plans rather than any form of directive.

Finally, Academic Adviser 3 commented on the issue of recording lectures and early release for dyslexic students.

Academic Adviser 3

And if you're going to record lectures, I mean, you know, if they're serious about that, then there has to be proper things set up that, you know, staff again, are really busy, go in and then re-edit that lecture. I'm not making excuses just for lecturers, but you know, sometimes, you know, we've got to edit half the recordings and there's a million other things going on.

What is notable about this response, like the previous ones, is the defence offered on behalf of lecturing staff in terms of the time taken to edit recorded lectures. Note the use of the disclaimer “I’m not making excuses just for lecturers” there after follows the usual claim following this of what could be considered a controversial statement with an extreme case formulation for emphasis (“there’s a million other things going on.”)

7. DISCUSSION

The three themes identified in the analysis can be considered in terms of ideological dilemmas (Billig, 1988, see also Billig, 1991) in terms of the contrasts and contradictions that are made relevant by the academic advisers’ talk. The first theme of ‘diagnoses and dispositions’ laid bare the notion that dyslexia is a SpLD rooted in a neurological condition that needs to be diagnosed versus its unseen ‘in-the-head’ nature and the various ways in which students’ dispositions come into play in terms of (non-)disclosure, or in their efforts to ‘overcome’ its effects through persistence. The ‘dyslexia and deadlines’ theme made was apparent in terms of the construction of making a special case for such students versus the meritocratic notion that coursework deadlines need to be fair, and seen to be fair, for all students. Finally, the ‘reasonable adjustment and resources’ theme was apparent in terms of the dilemma between the enactment of student support plans by lecturers in terms of advance lectures slides and recordings being made available versus the ‘realities’ of time and resource constraints.

The analysis also revealed the discursive constructions through which these themes were instantiated through lexical choices and various micro-level features such as hedges, hypothetical active voicing, hesitations, and extreme case formulations. Edley and Wetherell (1997) have pointed to the utility of discursive psychology in connecting these

micro-level features of discourse with macro-level ideological concerns thereby creating an empirically grounded opportunity to show how definitions, policies, actions, and responses are constructed in terms of dilemmas, variations and contradictions. The advisers' talk, both in content and in structure (e.g., contrasting general policies with students' willingness to disclose their difficulties), indicates that there is a need to focus on individual differences in the ways in which dyslexia is manifested at the individual level as well as experiences of diagnoses.

The investigation also reveals what is lacking in terms of a focus on neurodiversity and capability. The analysis shows how dyslexia is constructed as a subject in interviews with the advisers, mostly in terms of a condition requiring diagnosis. When discussing students with dyslexia and their subjectivity, the responses given mostly focused on the students' disposition towards disclosing their condition or in terms of trying to overcome it through persistence. Nothing was mentioned in terms of a capability perspective by commenting on what students with dyslexia can achieve. In relation to these points, it is evident that as a descriptor dyslexia is considered in terms of being a disability through a deficiency-based lens.

8. CONCLUSION

Although this investigation is based on a small-scale case study, it has nonetheless provided a detailed examination of how academic advisers, who liaise with a university's support services, talk about students with dyslexia. The core aim was to explore how their talk constructed support for students with the condition. Given this focus, it is neither desirable or possible to generalize from the study in terms of other higher education institutions' policies and procedures. Having said this, the investigation offers a revelatory insight into ways of talking about students with the condition and the support they are offered, in terms of dilemmas faced in relation to the meritocratic notion of higher education. Given that dyslexia is often considered to be an unseen condition, the advisers' interview responses are revealing in the way that they focus on its neurological basis related to functioning as a higher education student and the concomitant discourse of 'disability' rather than as 'difference'. This is perhaps unsurprising in that, given their role, the advisers are aware of the need for 'reasonable adjustment' under the terms of the Equality Act (2010) and its enshrinement in their university's policy. However, the analysis points to the ways in which this is tempered by drawing upon an equivocal construction through the claim that "some students" require adjustments such as proofread coursework submission while "others" do not and try to overcome difficulties themselves.

The net effect of these discursive constructions is to undermine the idea of considering neurodiversity as part of the variation of the student body and that in doing so to 'normalize' the view that assistance with study in terms of dyslexia is part of a wider range of forms of support for students. This does not undermine the ingrained meritocratic view in higher education that students advance in their studies through their own abilities and efforts. Rather, it accepts that over the course of studying for a degree most students will require some form of support, whether informal through family and friends, or formal in terms of institutional support mechanisms. Studying at higher education level, or indeed any level for that matter, is not separate from how society constructs what is required for achievement. As well as the students' own agency and effort we should embrace the view that support is not an 'add-on' but rather a necessary aspect of what it required to 'come through' a degree and achieve the qualification. For some students this may be related to a 'one-off' event, but for others more repeated longer-term support may be required. Viewing student support in this way in terms of a spectrum of instances and needs, including different forms of neurodiversity, accepts human variation as well as the view that achievement does not simply rest on neoliberal notions of being responsible for oneself.

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References

[1] Abbott- Jones, A. (2023*) Cognitive and emotional study strategies for students with dyslexia in higher education.* Cambridge: Cambridge University Press.

[2] Alexander- Passe, N. (2015*) Dyslexia and mental health. Helping people identify by destructive behaviours and find positive ways to cope.* London: Jessica Kingsley.

[3] Billig, M., Condor, S., Edwards, D., Gane, M., Middleton, D., & Radley, A. (1988*). Ideological dilemmas: A social psychology of everyday thinking*. London: Sage Publications, Inc.
[4] Billig, M. (1991) *Ideology and opinions*. London: Sage
[5] Bolt, D. (2014) *Changing social attitudes towards disability: perspectives from historical, cultural and educational studies*. Abingdon: Routledge.
[6] Bolton, P., & Lewis, J. (2023). *Equality of access and outcomes in higher education in England*. The Commons Library.
[7] Brown, P., & Levinson, S. (2011). Politeness. *The Cambridge encyclopedia of the language sciences*, 635-636.
[8] Brunswick, N., Wilson, N. J., Kruger, I., Chamberlain, R., & McManus, I. C. (2025). The prevalence of Specific Learning Difficulties in Higher Education: A study of UK Universities across 12 academic years. *Journal of Learning Disabilities*, 58(3), 179-191.
[9] Cameron, H., Coleman, B., Hervey, T., Rahman, S., & Rostant, P. (2019). Equality law obligations in higher education: Reasonable adjustments under the Equality Act 2010 in assessment of students with unseen disabilities. *Legal Studies*, 39(2), 204-229.
[10] Chatzitheochari, S., & Platt, L. (2019). Disability differentials in educational attainment in England: Primary and secondary effects. *The British Journal of Sociology*, 70(2), 502-525.
[11] Edley, N., & Wetherell, M. (1997). Jockeying for position: The construction of masculine identities. *Discourse and Society*, 8(2), 203–217
[12] Elliott, J. G., & Grigorenko, E. L. (2014). *Cambridge studies in cognitive and perceptual development: The dyslexia debate*. Cambridge: Cambridge University Press.
[13] Elliott, J. G. (2020). It's time to be scientific about dyslexia. *Reading Research Quarterly*, 55 (S1), S61–S75
[14] Equality Act. (2010) *Part 2 Equality: key concepts. Chapter 1. Protected characteristics*. London: Stationary Office.
[15] Glassman, M. & Patton, R. (2014) Capability through participatory democracy: Sen, Freire, and Dewey. *Educational Philosophy and Theory*, 46(12), 1353–1365.
[16] Griful-Freixenet, J., Struyven, K., Verstichele, M., & Andries, C. (2017). Higher education students with disabilities speaking out: Perceived barriers and opportunities of the universal design for learning framework. *Disability & Society*, 32(10), 1627-1649.
[17] Griful-Freixenet, J., Struyven, K., Vantieghem, W., & Gheyssens, E. (2020). Exploring the interrelationship between Universal Design for Learning (UDL) and Differentiated Instruction (DI): A systematic review. *Educational Research Review*, 29, 100306.
[18] Holmes, J. (19900 Hedges and boosters in women's and men's speech. *Language and Communication*. 10 (3), 185-205.
[19] Keefer, N. (2017). The persistence of deficit thinking among social studies educators. *Journal of Social Studies Education Research*, 8(3), 50-75.
[20] Macdonald, S. (2009) Windows of reflection: conceptualising the social model of disability. *Dyslexia*, 15(4), 347–367.
[21] Missingham, B. D. (2017). Asset-based learning and the pedagogy of community development. *Community Development*, 48(3), 339-350.
[22] Pennington, B. (2006) From single to multiple deficit models of developmental disorders. *Cognition*, 101(2), 385–413.
[23] Pino, M., & Mortari, L. (2014). The inclusion of students with dyslexia in higher education: A systematic review using narrative synthesis. *Dyslexia*, 20, 346–369
[24] Potter, J., & Wetherell, M. (1987). *Discourse and social psychology: Beyond attitudes and behaviour*. London: Sage
[25] Potter, J., & Hepburn, A. (2008). Discursive constructionism. In J. A. Holstein & J. F. Gubrium (Eds.), *Handbook of constructionist research* (pp. 275–293). New York: Guildford Press.
[26] Pomerantz, A. *Asking and Telling in Conversation*. Oxford: Oxford University Press (2021). pp.183 – 194
[27] Prince, E. F., Frader, J., & Bosk, C. (1982). On hedging in physician-physician discourse. *Linguistics and the Professions*, 8(1), 83-97.
[28] Pumphrey, P. D. (2008). Moving towards inclusion? The first-degree results of students with and without disabilities in higher education in the UK: 1998–2005. *European Journal of Special Needs Education*, 23, 31–46.
[29] Richardson, G. (2021). Dyslexia in Higher Education. *Educational Research and Reviews*, 16(4), 125-135.
[30] Riddick, B. (2001) Dyslexia and inclusion: time for a social model of disability perspective? *International Studies in Sociology of Education*, 11, 223–236.
[31] Riddick, B. (2012) *Living with dyslexia: the social and emotional consequences*. London: Routledge.
[32] Rolak, M., Heerkens, Y. F., van Bakel, H. J., & van Der Klink, J. J. (2023). Factors contributing to realizing valuable goals of students with dyslexia in higher education. *Dyslexia*, 29(3), 199-216.
[33] Sacks, H. (1992). *Lectures on conversation*. Oxford, UK and Cambridge: Mass.: Blackwell
[34] Sen, A. K. (1980). Equality of what? In S. M. McMurrin (Ed.), *The Tanner lectures on human values* (pp. 195–220). Cambridge: Cambridge University Press.
[35] Sen, A. K. (1985). *Commodities and capabilities*. Amserdam: North-Holland Publishers.
[36] Sen, A. K. (1993). Capability and well-being. In M. Nussbaum & A. K. Sen (Eds.), *The quality of life*. Oxford: Oxford University Press.
[37] Simmons, K., & LeCouteur, A. (2011). 'Hypothetical active-voicing': Therapists 'modelling'of clients' future conversations in CBT interactions. *Journal of Pragmatics*, 43(13), 3177-3192.
[38] Snowling, M., Hulme, C. & Nation, K. (2020) Defining and understanding dyslexia: past, present and future. *Oxford Review of Education*, 46(4), 501–513
[39] van der Klink J.J.L., Bültmann U., Burdorf A, Schaufeli W.B., Zijlstra F.R.H., Abma F.I., Brouwer S., van der Wilt G.J. (2016) Sustainable employability—definition, conceptualization, and implications: a perspective based on the capability approach. *Scandinavian journal of work, environment & health*, 42 (1), 71-79.
[40] Waitoller, F. R., & King Thorius, K. A. (2016). Cross-pollinating culturally sustaining pedagogy and universal design for learning: Toward an inclusive pedagogy that accounts for dis/ability. *Harvard Educational Review*, 86(3), 366-389.
[41] Wetherell, M., & Potter, J. (1988). Discourse analysis and the identification of interpretive repertoires. In C. Antaki (Ed.), *Analysing everyday explanation: A casebook of methods*. Newbury Park, CA: Sage
[42] Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2000). The art of writing a scientific article. *Journal of Scientific Communications*, *163*, 51 - 59.

The Impact of Proactive Approach of the Organzation on Change React - Case Study Muncipality of Peja

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Abstract

The Municipality which forecast change have a proactive approach and are easier to manage them. This feedback or reaction often can transform into competitive advantage of Municipality. Proactivity enables the Municipality a look beyond the "limit" concept and the identification of factors which cause this change through this could take reaction plans to accept them, which are better for its functionality and to avoid or to downgrade the effect that have negative effect on function. Today the Municipality should have the concept: "Plane for change". This paper will answer two questions: How will the Municipality help proactive approach in identifying change? How much will the Municipality have the ability to manage these changes?

Keywords: change environment, organization, proactive approach, Municipality

1. INTRODUCTION

Change is an inevitable part of any Municipalities, especially because Municipalities operate in dynamic environments, making them face new situations. All of these situations required that plans be made to conform to the Municipality's objectives. The design of the plan requires the Municipality to have an approach that enables the Municipality to have an answer for each situation. One of the most successful approaches is the proactive approach because it enables Municipality to predict changes at the same time as the risks that give them a reflection of the differences they will face in the sequel. Where through the early identification of these changes, a "commodity" is created to build an effective large plan. The projects that have developed the proactive approach will have a greater impact on the environment and will be more easily adapted to the environment in which they act. Proactivity is the organizational opportunity to scan all the influential actors, which will play a decisive role in the success of the market in change.

2. LITERATURE REVIEW

Organizations change and adapt continuously to remain competitive (Balogun and Hope Hailey, 2008), and yet effective organizational change seems to be rare (By, 2005; Meaney and Pung, 2008). Recent statistics reveal that only one-third of organizational change efforts were considered successful by their leaders (Meaney and Pung, 2008; Beer and Nohria, 2000).Apparently, implementing successful change programs in organizations is quite

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problematic. The low success rates of change programs are often attributed to resistance to change on the part of employees (Ford et al., 2008). However, a more nuanced view on resistance to change and its determinants might be more appropriate (Piderit, 2000). Change processes are driven by several strategic considerations (Schilling and Steensma, 2001), including the need for more integrated ways of working (Rugman and Hodgetts, 2001), and the need to improve business performance (Balogun and Hope Hailey, 2008).These considerations typically result in structured change programs based on the assumption that change management consists of a (limited) set of interventions, which are regarded as objective, measurable and linearly manageable programs that can be realized in a relatively short time. However, scholars on resistance to change point out the need for research beyond top-down organizational change. Studies should pay attention to the dynamics of change processes (Jones et al., 2004; Dibella, 2007), and thereby contribute to the understanding of resistance, which is paramount to the high failure rate of change programs (Quinn and Dutton, 2005; 11 Di Virgilio and Ludema, 2009). In nowadays an important question is What Does It Mean to Be Proactive in Managing Changes? At the first must be clarified what proactive approach is. Proactivity has been examined from several different perspectives, including initially as an individual difference perspective (Bateman &Crant, 1993), followed by a behavioral perspective (Frese, Kring, Soose, & Zempel, 1996; Parker, Williams, & Turner, 2006), and, more recently, a goal process perspective (Bindl, Parker, Totterdell, & HaggerJohnson, 2012; Frese & Fay, 2001; Grant & Ashford, 2008). Regarding the individual difference perspective, Bateman and Crant (1993) proposed the concept of proactive personality to describe a person "who is relatively unconstrained by situational forces and who effects environmental change." These scholars indicated that "proactive people scan for opportunities, show initiative, take action, and persevere until they reach closure by bringing about change" (p.105). Supporting the validity of this individual difference approach, proactive personality has been shown to be different from big-five personality variables (Bateman & Crant, 1993; Major, Turner, & Fletcher, 2006) because it captures the dispositional tendency towards proactivity. Proactive personality has been widely examined as a predictor of different proactive behaviors, including job search behaviors (Brown, Cober, Kane, & Shalhoop, 2006); proactive work behaviors such as idea implementation, problem solving, innovation, and problem prevention (Parker et al., 2006; Thompson, 2005); and proactive strategic behaviors, including strategic scanning, issue selling credibility, and issue selling willingness (Parker & Collins, 2010). Two meta-analyses (Fuller & Marler, 2009; Thomas, Whitman, & Viswesvaran, 2010) support the importance of proactive personality as a strong dispositional predictor of various forms of proactive behavior. An alternative to focusing on the general tendency to be proactive is to consider proactivity as a way of behaving (e.g., Crant, 2000; Parker et al., 2006). From this perspective, proactive behavior is defined as "self-initiated and future-oriented action that aims to change and improve the situation or oneself" (Parker et al., 2006, p.636). This definition indicates three defining elements that are argued to underpin multiple forms of proactive behavior (voice, taking charge, proactive socialization, etc.): self-initiation, future-focus, and change-orientation (Frese & Fay, 2001; Parker et al., 2006). First, proactive behavior is self-initiated, which means that this behavior is enacted without being told to or without requiring an explicit instruction. Second, proactive behavior is future-focused, which means that this behavior aims to deal with anticipated problems or opportunities with a long-term focus. Third, proactive behavior is change-oriented, involving not just reacting to a situation but being prepared to change that situation or oneself in order to bring about a different future. From this behavioral perspective, the many forms of proactive behavior that have been investigated in distinct domains (e.g., careers, socialization, work performance) should be positively inter-related, even though they have often been studied in distinct literatures. Supporting this reasoning, Parker and Collins (2010) identified three higher-order categories of proactive behavior that all involve self-initiated, future-oriented, and change-oriented behaviors, but vary in the goals that are being pursued. The first category is proactive person-environment fit behavior, which includes proactive behaviors that aim to achieve a better fit between the person and the environment, such as feedback inquiry, feedback monitoring, job role negotiation, and career initiative. The second category is proactive work behavior, which includes behaviors that aim to improve the internal organizational environment, such as taking charge to bring about change, voice, innovation, and problem prevention. Finally, proactive strategic behavior includes proactive behaviors that aim to improve the fit of the organization with its wider environment, such as strategic scanning and issue selling. This integrative study shows that different forms of proactive behavior can be seen to share similar overarching goals, and therefore are likely to have antecedents and outcomes in common.

3. PROACTIVE BEHAVIOR

Managers everywhere are exhorted to "be proactive," and companies are urged to create their futures proactively. Most recently, Robert Kelley (1998) highlights initiative and other proactive behaviors as the keys that distinguish star performers from average performers. Proactive behavior is a particular form of motivated behavior at work (Bateman & Crant, 1993). As such, to develop a comprehensive understanding of the nature, antecedents, mechanisms, and consequences of proactivity, it is important to situate the concept in existing theory and research on work motivation. Below, we provide a brief historical review of how work motivation theory and research began with assumptions that employee behavior was passive and reactive, and slowly moved over time to acknowledge the active and proactive nature of employee behavior. In the 1960s, Swietlik (1968) sought to integrate the diverse views on personality structure presented by major theorists such as Allport, Freud, Maslow, and Murray under the rubric of ‘‘reacting personality’’ or ‘‘proactive A.M. Grant, S.J. Ashford / Research in Organizational Behavior 28 (2008).

4. ANALYSIS OF STATISTICAL AND RESULTS

To provide primary data are compiled questionnaires, which were filled in by all respondents. The questionnaires were distributed to businesses where each business responded to the questions that were prepared in a structured way. For this purpose, are designed questionnaire filled in as planned by 50 officials of different ages, gender and experience of working in various public and private enterprise. The technique used is direct interview, where questionnaires were completed based on managers’ individual statements. Questionnaire responses are mostly supported using IBM SPSS Statistics 20 program and Microsoft Office package 2013.
Thus, out of the 50 Officials, 7 are leadership positions in Municipality, 10 directors of directorates, 33 officials of different digesters in Municipality.

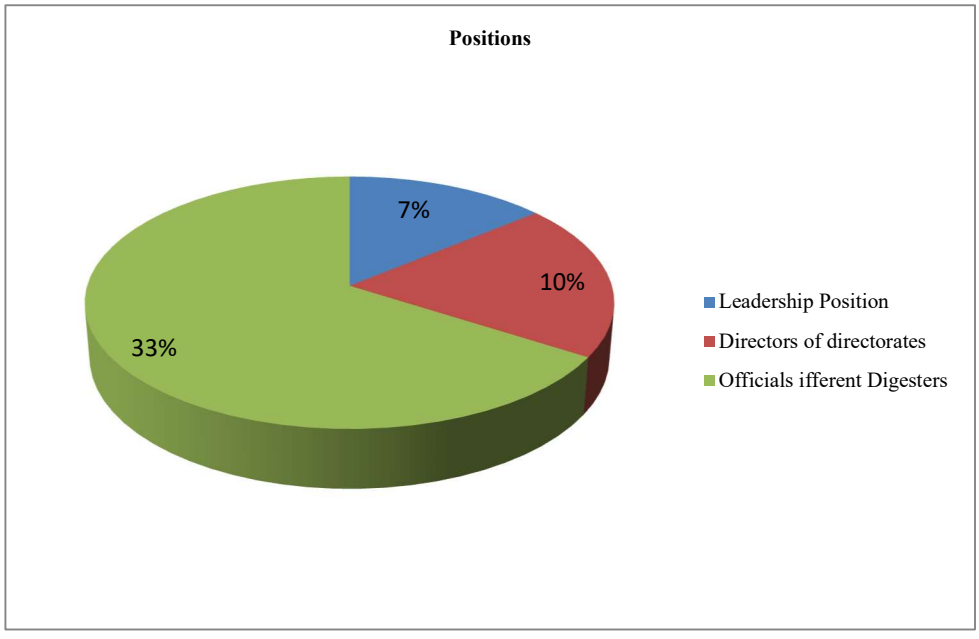

Fig. 1.1 The activity of the Municipality

5. ANALYSIS OF REGRESSION

Regression model can be used to study the relation between two or more variables and is called simple regression model (multiple) or linear model. R Square or R2 is the rate of variance and is explained as the report of Y explained by x. The value of R2 fluctuated between 0 and 1, as close to 1 this coefficient of determination it will be more determined while as close to 0 it is less determined. All this paper work the research issues identified and elaborated in the presentation of results and their discussion, are oriented and derive from these hypotheses:

H_0: The proactive approach does not affect the identification of changes in Municipality.
H_1: The proactive approach does affect the identification of changes in Municipality.
H_2: Identifying changes has an impact on the Municipality's functioning.

Table 1. R values of the evaluation of suitability for General model

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.958[a]	.918	.902	.266

a. Predictors: (Constant), Accepting change,
b. Using proactive approaches,
c. Frequency of change of environment

Table 2. The regression coefficients and their significance

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.740	.063		11.798	.000
	Accepting change?	.491	.122	1.378	4.021	.000
	Using proactive approaches?	.022	.046	.101	2.492	.025
	Frequency of change of environment?	.219	.092	.742	2.371	.022

1. Dependent Variable: Managing Changes.

Table 2.A regression is presented showing how significant these are. Here is the OSL ordinary smallest square. Managing Changes = 0.740 + 0.491 (Accepting change) + 0.022 (Using proactive approaches) + 0.219 (Frequency of change of environment)

Table 3. Correlation represents the degree of correlation between two or more variables that are intertwined with one another

Correlations

		Managing Changes	Functioning of the organization
Managing Changes	Pearson Correlation	1	.937**
	Sig. (2-tailed)		.000
	N	50	50
Functioning of the Municipality	Pearson Correlation	.937**	1
	Sig. (2-tailed)	.000	
	N	50	50

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

Based on the results we can see that the management of changes and the functioning of the Municipality significance in both shorts is 0,000, which is less than the 5% sign, and basically, we say that these variables have influence on each other.

6. THE TESTING OF HYPOTHESIS AND INTERPRETING THE RESEARCH QUESTIONS

Based on Table 1 and 2, all the variables were at a significance level of less than 5% which said that the proactive case influences the management of change.
H_0: The proactive approach does not affect the identification of changes in Municipality. - **Not accepted**
H_1: The proactive approach does affect the identification of changes in Municipality. - **Accepted**
Based on the results of ***Table 3*** we can see that the management of changes and the functioning of the organization significance in both shorts are 0,000, which is less than the 5% sign, and basically, we say that these variables have influence on each other.
H_2: Identifying changes has an impact on the Municipality's functioning. **– Accepted**

7. CONCLUSION

Based on the results, it became apparent that the importance of a proactive approach in identifying the situations with which the Municipality is facing is also great in drafting an action plan to provide an adequate response in accordance with its objective and objective, thus enabling the adoption of rational decisions. Municipality that has developed a proactive approach can easily provide survival in the treble. The functioning of the organization depends on the ability to manage the changes, so the Municipality that knows how to harmonize the *environment-changing-objectives* would define success. Globalization has produced variations that affect every organization today but "the victorious ones are those who are proactive".

8. RECOMMENDATIONS

1. Municipality every day of the match should develop the concept of proactive learning.
2. Municipality should take precautionary measures before they face the change.
3. Municipality should use proactive approaches that are consistent with objectives, because by identifying the changeover time apart from the positive side it has to approach it, the negative side trying to fit much we have a loss in substance.

References

[1] Balogun, J. and Hope Hailey, V. (2008), Exploring Strategic Change, Prentice Hall, London
[2] Bateman, T. S., &Crant, J. M. (1993).The proactive component of organizational behavior. Journal of Organizational Behavior, 14, 103–118.
[3] Beer, M. and Nohria, N. (2000), “Cracking the code of change”, Harvard Business Review, May/June, pp. 133-41.
[4] Di Virgilio, M.E. and Ludema, J.D. (2009), “Let’s talk: creating energy for action through strategic conversations”, Journal of Change Management, Vol. 9 No. 1, pp. 76-85.
[5] Ford, J.D., Ford, L.W. and D’Amelio, A. (2008), “Resistance to change: the rest of the story”, Academy of Management Review, Vol. 33 No. 2, pp. 362-77.
[6] Jones, E., Watson, B., Gardner, J. and Callois, C. (2004), “Organizational communication”, Journal of Communication, December, pp. 722-50.
[7] Meaney, M. and Pung, C. (2008), “McKinsey global results: creating organizational transformations”, The McKinsey Quarterly, August, pp. 1-7.
[8] Meaney, M. and Pung, C. (2008), “McKinsey global results: creating organizational transformations”, The McKinsey Quarterly, August, pp. 1-7.
[9] Piderit, S.K. (2000), “Rethinking resistance and recognizing ambivalence”, Academy of Management Review, Vol. 25 No. 4, pp. 783-94.
[10] Quinn, R.W. and Dutton, J.E. (2005), “Coordination as energy-in-conversation”, Academy of Management Review, Vol. 30 No. 1, pp. 36-57.
[11] R.E. Kelley, How to Be a Star at Work (New York: Times Books, 1998).
[12] Rugman, A. and Hodgetts, R. (2001), “The end of global strategy”, European Management Journal, Vol. 19 No. 4, pp. 332-44.
[13] Schilling, M.A. and Steensma, H.K. (2001), “The use of modular organizational forms”, Academy of Management Journal, Vol. 44, pp. 1149-68.
[14] Swietlik, E. (1968). The reacting or proactive personality? Studia Socjologiczne, 2, 209–218.

Vulnerable Stakeholders and Corporate Social Responsibility: A Conceptual Analysis

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Abstract

The European Commission recognized already in 2001 that corporate social responsibility (CSR) strategies send a strong signal about the overall approach of companies to a variety of social, environmental and economic pressures. In this spirit, CSR shall react also to new social challenges arising from the COVID-19 pandemic, the digital divide, environmental catastrophes, economic crises and migration trends, significantly affecting vulnerable stakeholders. The current paper aims to discover whether a general concept of vulnerability can support the more efficient inclusion of the needs of the most vulnerable stakeholders into CSR strategies with special regard to the protection of rights, and what kind of guidance do international and EU standards give for business actors. The synthetizing description encompasses recommendations and policy documents, relevant pieces of EU-legislation, the case-law of European fora as well as findings of the secondary literature. Thus, it intends to contribute to a conceptual framework in the context of CSR, which is sensitive to global challenges, social trends and individual vulnerability, and thus simultaneously promotes the respect for rule of law, human rights and economic development.

Keywords: corporate social responsibility, vulnerability, EU policies, global challenges, human rights

1. INTRODUCTION

The European Commission recognized already in 2001 that corporate social responsibility (hereinafter: CSR) strategies, understood as a response to a variety of social, environmental and economic pressures, send a signal to the stakeholders with whom market players interact, about the companies' commitment towards the standards of social development, environmental protection and respect of fundamental rights (European Commission, 2001, 3). These tendencies were given new impetus through the growing attention to the relationship of business and human rights as well as sustainability and environmental protection.

"*Business activity affects people's enjoyment of their human rights in various ways. Companies can have an impact – positively or negatively – on the rights of their employees and their customers, but also on the rights of workers in their supply chains. Business conduct can also have far-reaching consequences for communities and the environment in the vicinity of the business' operations.*" (FRA, 2020, 19). The EU Agency for Fundamental Rights (FRA) summarized this way the interconnection between business and human rights. Since the endorsement of the UN Guiding Principles on Business and Human Rights by the UN Human Rights Council in 2011, it has become generally recognised that "*preventing and remedying abuses or toleration of abuses by businesses is a joint responsibility of the private sector and public authorities*" (European Commission, 2019a, 3). The commentary to the UN Guiding Principles on Business and Human Rights states: "*The initial step in conducting human rights due diligence is to*

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identify and assess the nature of the actual and potential adverse human rights impacts with which a business enterprise may be involved. (…) In this process, business enterprises should pay special attention to any particular human rights impacts on individuals from groups or populations that may be at heightened risk of vulnerability or marginalization (…)." (UN, 2011, 19-20).

The commitment towards a better society, a healthier environment, compliance with international legal standards, promotion of sustainability, high level of cooperation, and transparency makes it necessary for companies to pay particular attention to the situation of the most vulnerable. This is especially crucial with regards to the new social challenges arising from the COVID-19 pandemic, the digital divide, environmental catastrophes, economic crises and migration trends, significantly affecting vulnerable stakeholders.

The current paper aims to discover, how the concept of vulnerability appears in the context of CSR, whether a general concept of vulnerability can support the more efficient inclusion of the needs of the most vulnerable stakeholders into CSR strategies with special regards to the protection of rights, and what kind of guidance do international and EU standards give for business actors.

2. BACKGROUND AND METHODOLOGY

The issue raised in this paper is strongly related to the constantly growing literature on CSR, business and human rights (hereinafter: BHR) and responsible business conduct, which encompasses policy documents, recommendations and statements (Council of the European Union, 2020; European Commission, 2019b; European Parliament, 2013; European Commission, 2011; Council of Europe, 2016), handbooks and secondary literature (FRA, 2020; Leopizzi, 2023; Hertz & Schulz, 2020. Schubert, 2020; Ruggie, 2020; Methven O'Brien, 2018, Černič, 2018; Idowu et al. 2013).

The application of the principles of CSR and BHR in different economic sectors or different policy areas (Gehrig, Iannino, & Unger, 2024; Monferrer Tirado, Vidal-Meliá, Cardiff & Quille, 2024; Vo, Nguyen, & Phan, 2024; Jędrzejowska-Schiffauer, et al. 2023; Šajn, 2021, Fasciglione, 2020; World Bank, 2018; OECD/FAO, 2016; IFC, 2012), comparatives studies of national solutions (Manchanda, Rahut, & Sonobe, 2024; Augenstein, Dawson, & Thielbörger, 2018; Assenza, 2024) and the analysis of the economic impact of CSR strategies, with special regard to consumer behaviour (Servera-Francés, & Piqueras-Tomás, 2019; Robayo-Avendaño, & Prato-García, 2024; Schiessl, Korelo, & Mussi Szabo Cherobim, 2022) are also in the focus of policy initiatives and scientific research.

In the following it is intended to give a definition of vulnerability that includes legal aspects related to the efficient enforcement of rights of the weaker parties and to describe the way, how it can be integrated into the CSR strategies and relevant policies.

The synthetizing description encompasses recommendations and policy documents, relevant pieces of EU-legislation, the case-law of European fora as well as findings of the secondary literature. Thus, it intends to contribute to a conceptual framework in the context of CSR, which is sensitive to global challenges, social trends and individual vulnerability, and thus simultaneously promotes the respect for rule of law, human rights and economic development.

3. THE CONCEPT OF VULNERABILITY

The starting point for the definition of the concept of vulnerability in the context of stakeholders of CSR strategies shall be a general formulation from the theoretical point of view. A possible example might be the definition, according to which "*[v]ulnerable groups and individuals refer to people who are often exposed to several risks and adverse impacts at once, are more sensitive to those risks and impacts, and/or have a weaker adaptive capacity for coping with and recovering from impacts, usually due to limited access to certain assets and/or resources*" (de Zeeuw & Reeman, 2024, 258). Although this definition describes the status of the vulnerable, the effects of this status – having relevance both from legal and economic perspective – are not mentioned in detail.

The European Union's most recent legislation, the corporate sustainability due diligence directive (CSDDD) refers in its preamble (33) to vulnerability emphasizing that "*taking account of specific contexts or intersecting factors, including among others, gender, age, race, ethnicity, class, caste, education, migration status, disability, as well as social and economic status, as part of a gender- and culturally responsive approach to due diligence, companies should pay special attention to any particular adverse impacts on individuals who may be at heightened risk due to marginalisation, vulnerability or other circumstances, individually or as members of certain groupings or communities (…)*" (European Parliament & Council, 2024a). So, the concept of "adverse impacts" appears also in this definition to describe the consequences of vulnerability. Other relevant pieces of EU legislation use the term of vulnerability without a detailed definition, or just refer to some element of the vulnerable status, primarily the financial need, age and disabilities (European Parliament & Council, 2024b; European Parliament & Council, 2024c; European

Parliament & Council, 2016). The question arises whether it would be possible to give more specific guidance to determine the status of vulnerable stakeholders, and thus to orientate the actions of the legislator and companies.

An overarching definition for vulnerability in the context of EU law is rather missing; we can give a non-exhaustive list of circumstances on the basis of the judgements of the Court of Justice of the European Union (hereinafter: CJEU) and the case-law of the European Court of Human Rights (hereinafter: ECtHR). Persons living with disabilities or being otherwise in specific health conditions, pregnant workers, persons belonging to minorities, asylum seekers, children, consumers and weaker parties in contractual relationships, people living in extreme material poverty, but even whole geographic areas threatened by major environmental harm are generally considered as vulnerable. The particular difficulties they face shall be addressed in legal, economic and social relations, their needs and special circumstances shall be considered in the relevant regulatory framework and in reaching decisions in particular cases. This requirement appears particularly as regards the access to services, rights as consumers, employment relations, protection against irreparable harm or damage and efficient participation in legal processes (CJEU, 2023, para 45; CJEU, 2019a, paras 35-37; CJEU, 2005, para 53; CJEU, 2020, para 189; CJEU, 2022a, para 49 and the case-law cited therein; CJEU, 2022b, para 43; CJEU, 2010, paras 58-62; ECtHR, 2021, §67; ECtHR, 2012, §75; ECtHR, 2017, §73; ECtHR, 2023, §37 and the case-law cited therein; CJEU, 2019b, para 93; CJEU, 2018, paras 104-108; ECtHR, 2024, §488; ECtHR, 2003, §52).

Although there are no criteria elaborated in legislation or jurisprudence for the identification of vulnerability (Pariotti, 2023, 1402), a definition can be formulated based on the list of vulnerable situations usually mentioned by judicial and political fora. Thus, I claim that vulnerable stakeholders are individuals or groups of individuals exposed to the actual danger of serious harm due to special circumstances, who – on their own – cannot compensate the difficulties resulting in substantive inequality to others and considerably threatening the efficient protection of their rights.

4. APPLYING A GENERAL CONCEPT OF VULNERABILITY IN THE CONTEXT OF CSR

Using a general concept of vulnerability in the context of CSR seems to be, at first sight, a rather unusual idea. One reason is that CSR was originally described as "*a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholder on a voluntary basis*" (European Commission, 2001, 6). The voluntary nature of these efforts inherently encompasses a wide room for manoeuvre for the companies concerned. Another reason is that, companies usually perceive vulnerability as a diversified category, which includes different situations based on factors such as capacity, resilience, health and life events, affecting people of a heterogeneous background (Monferrer Tirado, Vidal-Meliá, Cardiff & Quille, 2024, 1150). Thus, a uniform approach – applicable to all kinds of economic branches and all types of potential customer vulnerability – seems to be rather difficult to create.

However, based on the growing number of binding and non-binding legal standards regulating different aspects of CSR, "*the legal and moral responsibilities should be taken together as the bundle of obligations of businesses to effectively discharge their functions with accountability inevitably linked to moral responsibility, thus, underscoring the need for regulating CSR for accountability*" (Tamvada, 2020, 12). [It is not aim of the current paper to summarize the legal norms and standards regulating certain aspects of CSR with a view to completeness, but some relevant examples are: European Parliament & Council, 2024a; World Benchmarking Alliance, 2023; OECD, 2023; ISO 26000 guidance standard on social responsibility; European Commission, 2016.]

Furthermore, practical considerations also promote the use of a generalized concept of vulnerability in CSR practices. The four main fields, where the advantages might be evident are: a.) identification; b.) resilience; c.) engagement and d.) communication.

No detailed explanation is needed to underline that a general concept of vulnerability can support the proper identification of the particular groups concerned. While an exemplary list of the most vulnerable always contains a factor of uncertainty and eventuality, a general definition based on legal standards and theoretical foundations, can support a more precise identification.

It is also quite self-explanatory that a generalized approach towards the vulnerable groups affected by the CSR is useful in the stakeholder engagement process. This is particularly crucial in case of planning and decision-making concerning projects or other activities. A field, where the obligation for proper stakeholder engagement is not only of soft-law nature, but stems also from binding international laws (primarily the Aarhus Convention), are projects and plans having potential effect on the environment. The adequate identification of the groups affected by the companies' activities is decisive in this context as well. "*To ensure stakeholder engagement is meaningful and effective, it is*

important to ensure that it is timely, accessible, appropriate and safe for stakeholders, and to identify and remove potential barriers to engaging with stakeholders in positions of vulnerability or marginalisation" (OECD, 2025, 63).

Concerning resilience, the widespread digitalization boosted by the COVID-19 pandemic and the crucial issue of digital divide accompanying it, demonstrated the pressing need to adapt to newly arising forms of vulnerability in case of both legislators and companies. In latter context, while acknowledging the positive effects of digitalization as regards costs, timeliness and efficiency, it has become a major expectation that "*technology design should ensure the possible advantages of the use of ICT are not unevenly distributed*"(Fabri, 2021, 2), and the needs of vulnerable persons in accessing and managing the technology must be considered (OSCE/ODIHR, 2020, 28). For companies emphasizing social responsibility, the attitude towards digital divide is a field, where the proper understanding for the specific needs of the most vulnerable is a key in carrying out their services and development. [For further remarks about digital divide, see: Váradi, 2024.]

Finally, communication itself is unimaginable without the exact identification of the different groups of stakeholders, as it shall be a process of anticipating stakeholder expectations (Nielsen, 2013). Vulnerable groups shall be primary addressees of CSR strategies and communication; thus, the need for a proper definition of vulnerability arises in this context as well. A general definition, as suggested in this paper can support this process, leading to more a sophisticated outcome as the mere listing of potential groups of vulnerable stakeholders.

5. CONCLUSION

The current paper did not aim to discuss the exact role of the concept of vulnerability in the system of human rights protection (in this regard see further: Pariotti, 2023; Andorno, 2016; Godden-Rasul & Murray 2023) or to use a human rights-based approach to vulnerability. The aim was rather to establish a link between the obligation of companies to observe the social context of their functioning on the one side and the different forms of vulnerability affecting business relationships on the other.

After examining the relevant international and European standards, case law of European fora and secondary literature, it was established that it is possible to give such a definition to the concept of vulnerability that is applicable both in legal context and in the framework of corporate governance. This definition refers to individuals or groups of individuals exposed to the actual danger of serious harm due to special circumstances, who – on their own – cannot compensate the difficulties resulting in substantive inequality to others and considerably threatening the efficient protection of their rights.

Based on this approach, it could be possible to identify vulnerable groups in the framework of CSR in such a way, that integrates different forms of vulnerability, but that is not only sensitive to the most typical forms thereof. The approach based on a general definition is resilient to future social developments, e.g. it can support a proper balance between the need for digitalization and the elimination of digital divide or can react to the threats posed by environmental challenges, and it can enable a more meaningful stakeholder engagement. By applying a general concept to economic sectors and individual companies, a more overarching protection might be granted for the most vulnerable thus strengthening the role of CSR in the global economy, respect for human and environmental rights.

References

[1] Andorno, R. (2016). Is Vulnerability the Foundation of Human Rights? In A. Masferrer, E. García-Sánchez (eds.), *Human Dignity of the Vulnerable in the Age of Rights, Ius Gentium: Comparative Perspectives on Law and Justice* 55 (pp 257–272), Cham: Springer. DOI 10.1007/978-3-319-32693-1_11.

[2] Assenza, E. (2024). From international 'soft' law to national law: the UNGPs in domestic mandatory human rights due diligence legislation. *Revista Española de Empresas y Derechos Humanos*, nº2, enero 2024, 65-96.

[3] Augenstein, D., Dawson, M., & Thielbörger, P. (2018). The UNGPs in the European Union: The Open Coordination of Business and Human Rights? *Business and Human Rights Journal.* 3:(1), 1-22. doi:10.1017/bhj.2017.30

[4] Černič J. L. (2018). European Perspectives on the Business and Human Rights Treaty Initiative. In: J. Letnar Cernic & N. Carrillo-Santarelli (eds.). *The Future of Business and Human Rights: Theoretical and Practical Considerations for a UN Treaty*. (pp. 229-250) Brussels: Intersentia.

[5] CJEU (2023). *Opinion of Advocate General Medina of 21 September 2023 in Case C-299/22, M. D. v. 'Tez Tour' UAB.* [ECLI:EU:C:2023:696]

[6] CJEU (2022a). *Case C-279/20, Bundesrepublik Deutschland v. XC,* judgement of 1 August 2022. [ECLI:EU:C:2022:618]

[7] CJEU (2022b). *Case C-122/21, Get Fresh Cosmetics Limited v. Valstybinė vartotojų teisių apsaugos tarnyba,* judgement of 2 June 2022. [ECLI:EU:C:2022:421]

[8] CJEU (2020). *Case C-808/18, European Commission v. Hungary,* judgement of 17 December 2020. [ECLI:EU:C:2020:1029].

[9] CJEU (2019a). *Case C-544/18, Her Majesty's Revenue and Customs v. Henrika Dakneviciute,* judgement of 19 September 2019. [ECLI:EU:C:2019:761]

[10] CJEU (2019b). *Joined cases C-297/17, C-318/17, C-319/17 and C-438/17, Bashar Ibrahim and Others v Bundesrepublik Deutschland and Bundesrepublik Deutschland v Taus Magamadov*, judgment of 19 March 2019. [ECLI:EU:C:2019:219].
[11] CJEU (2018). *Opinion of Advovate General Wahl from 28 February 2018 in Case C-15/17, Bosphorus Queen Shipping Ltd Corp. v. Rajavartiolaitos*. [ECLI:EU:C:2018:123].
[12] CJEU (2010), *Joined Cases C-585/08 and C-144/09, Peter Pammer v Reederei Karl Schlüter GmbH & Co. KG (C-585/08) and Hotel Alpenhof GesmbH v Oliver Heller (C-144/09),* judgement of 7 December 2010 [ECLI:EU:C:2010:740].
[13] CJEU (2005). *Case C-105/03, Maria Pupino,* judgement of 16 June 2005. [ECLI:EU:C:2005:386].
[14] Council of Europe (2016). *Recommendation CM/Rec(2016)3 of the Committee of Ministers to Member States on human rights and business (Adopted by the Committee of Ministers on 2 March 2016 at the 1249th meeting of the Ministers' Deputies)*.
[15] Council of the European Union (2020). *Council Conclusions on the EU Action Plan on Human Rights and Democracy 2020-2024.* https://www.eeas.europa.eu/sites/default/files/eu_action_plan_on_human_rights_and_democracy_2020-2024.pdf
[16] ECtHR (2024). *Verein KlimaSeniorinnen Schweiz and Others v. Switzerland,* no. 53600/20, judgement of 9 April 2024.
[17] ECtHR (2023), *M.A. v. Italy,* no. 70583/17, judgement of 31 August 2023.
[18] ECtHR (2021). *Hasáliková v. Slovakia,* no. 39654/15, judgement of 24 June 2021.
[19] ECtHR (2017). *A.-M.V. v. Finland*, no. 53251/13, judgement of 23 March 2017.
[20] ECtHR (2012). *Aksu v. Turkey [GC]*, nos. 4149/04 and 41029/04, judgement of 15 March 2012.
[21] ECtHR (2003). *R.O. v. Poland*, no. 77597/01, judgement of 25 March 2003
[22] European Commission (2019a). *Commission Staff Working Document. Corporate Social Responsibility, Responsible Business Conduct, and Business & Human Rights: Overview of Progress*. SWD(2019) 143 final
[23] European Commission (2019b). *Reflection paper: A Sustainable Europe by 2030.* COM(2019)22.
[24] European Commission (2016). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*: *Next steps for a sustainable European future European action for sustainability*. COM(2016)739 final
[25] European Commission (2011). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A renewed EU strategy 2011-14 for Corporate Social Responsibility*. COM(2011)681 final
[26] European Commission (2001). *Green Paper: Promoting a European framework for Corporate Social Responsibility.* COM (2001) 366 final
[27] European Parliament (2013). *European Parliament resolution of 6 February 2013 on Corporate Social Responsibility: promoting society's interests and a route to sustainable and inclusive recovery.* 2012/2097(INI).
[28] European Parliament & Council (2024a). *Directive (EU) 2024/1760 of the European Parliament and of the Council of 13 June 2024 on corporate sustainability due diligence and amending Directive (EU) 2019/1937 and Regulation (EU) 2023/2859 (CSDDD)*. OJ L, 2024/1760, 5.7.2024.
[29] European Parliament & Council (2024b). *Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence and amending Regulations (EC) No 300/2008, (EU) No 167/2013, (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1139 and (EU) 2019/2144 and Directives 2014/90/EU, (EU) 2016/797 and (EU) 2020/1828*, OJ L, 2024/1689, 12.7.2024.
[30] European Parliament & Council (2024c). *Directive (EU) 2024/1385 of the European Parliament and of the Council of 14 May 2024 on combating violence against women and domestic violence*, OJ L, 2024/1385, 24.5.2024.
[31] European Parliament & Council (2016). *Directive (EU) 2016/1919 of the European Parliament and of the Council of 26 October 2016 on legal aid for suspects and accused persons in criminal proceedings and for requested persons in European arrest warrant proceedings*. OJ L 297, 4.11.2016.
[32] European Union Agency for Fundamental Rights (FRA) (2020). *Business and human rights – access to remedy*. Luxembourg: Publications Office of the European Union.
[33] Fabri, M. (2021). Will COVID-19 Accelerate Implementation of ICT in Courts? *International Journal for Court Administration* 12:(2). https://doi.org/10.36745/ijca.384.
[34] Fasciglione, M. (2020). Implementing 'Responsible Business Conduct' Approaches Under the UN Guiding Principles on Business and Human Rights at the Time of COVID-19. *European Papers*, 5:(3), 1435–1450. doi: 10.15166/2499-8249/404
[35] Gehrig, T., Iannino, M. C., & Unger, S. (2024). Social responsibility and bank resiliency, *Journal of Financial Stability*, 70, https://doi.org/10.1016/j.jfs.2023.101191
[36] Godden-Rasul, N., & Murray C. R. G. (2023). Accounts of vulnerability within positive human rights obligations. *International Journal of Law in Context*. 19:(4), 597-618. doi:10.1017/S1744552323000277
[37] Hertz, E., & Schulz, Y. (2020). *Entreprises et droit humains. Les limites de la bonne volonté*. Genève – Zurich: édition Seismo.
[38] Idowu, S.O., Capaldi, N., Zu, L., Gupta, A.D. (eds) (2013). *Encyclopedia of Corporate Social Responsibility*. Berlin – Heidelberg: Springer. https://doi.org/10.1007/978-3-642-28036-8_25
[39] International Finance Corporation (IFC) (2012). *Performance Standards on Environmental and Social Sustainability*. Washington, DC: International Finance Corporation. https://www.ifc.org/content/dam/ifc/doc/2010/2012-ifc-performance-standards-en.pdf
[40] Jędrzejowska-Schiffauer, I., Szoszkiewicz, Ł., Wilde-Ramsing, J., Booth, K., Barraud de Lagerie, P., & Faracik, B. (2023). Towards EU-wide Mandatory Human Rights and Environmental Due Diligence for Business: a Breakthrough in Europe and Beyond?. *Polish Yearbook of International Law* (pp 245–278) *42*. https://doi.org/10.24425/PYIL.2023.147178
[41] Leopizzi, R. (2023). Risk Management and CSR. In S. O. Idowu, R. Schmidpeter, N. Capaldi, L. Zu, M. Del Baldo, & R. Abreu (eds) *Encyclopedia of Sustainable Management*. (pp 2830–2836) Cham: Springer. https://doi.org/10.1007/978-3-031-25984-5_668
[42] Manchanda, S., Rahut, D. B., & Sonobe, T. (2024). *Exploring the Interlinkages Between Corporate Social Responsibility and the Sustainable Development Goals A Case Study of India.* Tokyo: Asian Development Bank Institute. https://doi.org/10.56506/GOHL1975
[43] Methven O'Brien, C. (2018). *Business and Human Rights. A handbook for legal practitioners*. Strasbourg: Council of Europe.

[44] Monferrer Tirado, D., Vidal-Meliá, L., Cardiff, J., & Quille, K. (2024). Vulnerable customers' perception of corporate social responsibility in the banking sector in a post-crisis context. *International Journal of Bank Marketing*. 42: (6), 1148-1177. https://doi.org/10.1108/IJBM-03-2023-0162

[45] Nielsen, A.E. (2013). CSR Communication. In S. O. Idowu, N. Capaldi, L. Zu, & A.D. Gupta (eds) *Encyclopedia of Corporate Social Responsibility* (pp 692–698). Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-28036-8_69

[46] OECD (2025). *Recommendation of the Council on Guidelines on Corporate Governance of State-Owned Enterprises*. OECD/LEGAL/0414.

[47] OECD (2023). *OECD Guidelines for Multinational Enterprises on Responsible Business Conduct*, Paris: OECD Publishing, https://doi.org/10.1787/81f92357-en.

[48] OECD/FAO (2016). *OECD-FAO Guidance for Responsible Agricultural Supply Chains*. Paris: OECD Publishing. http://dx.doi.org/10.1787/9789264251052-en

[49] OSCE/ODIHR. *The functioning of courts in the Covid-19 pandemic*. 2020. https://www.osce.org/odihr/469170.

[50] Pariotti, E. (2023). Vulnerability and Human Rights: Which Compatibility?. *International Journal for the Semiotics of Law* 36, 1401–1413. DOI: https://doi.org/10.1007/s11196-023-09977-y

[51] Robayo-Avendaño, A., & Prato-García, D. (2024). The value of corporate social responsibility practices in a world more concerned about sustainability: A literature review, *Revista UIS Ingenierías*, 23:(2), 71-90, doi: https://doi.org/10.18273/revuin.v23n2-2024005

[52] Ruggie, J. (2020). Entreprises et Droits de l'homme : vers un programme européen d'action commun. *RED*, 1:(1), 128-130. https://doi.org/10.3917/red.001.0128.

[53] Šajn (2021). *Vulnerable consumers*. European Parliamentary Research Service. https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/690619/EPRS_BRI(2021)690619_EN.pdf

[54] Schiessl, D., Korelo, J.C. and Mussi Szabo Cherobim, A.P. (2022). Corporate social responsibility and the impact on economic value added: the role of environmental innovation, *European Business Review*, 34:(3), 396-410. https://doi.org/10.1108/EBR-03-2021-0071

[55] Schubert, S. (2020). *Die Umsetzung der Leitprinzipien der Vereinten Nationen für Wirtschaft und Menschenrechte durch nationale Aktionspläne*. Berlin: Springer

[56] Servera-Francés, D., & Piqueras-Tomás, L. (2019). The effects of corporate social responsibility on consumer loyalty through consumer perceived value. *Economic Research-Ekonomska Istraživanja*, 32:(1), 66-84. https://doi.org/10.1080/1331677X.2018.1547202

[57] Tamvada, M. (2020). Corporate social responsibility and accountability: a new theoretical foundation for regulating CSR. *International Journal of Corporate Social Responsibility*. 5:(2). https://doi.org/10.1186/s40991-019-0045-8

[58] United Nations, Office of the United Nations High Commissioner for Human Rights (2011). *Guiding Principles on Business and Human Rights: Implementing the United Nations 'Protect, Respect and Remedy' Framework*. New York – Geneva: United Nations. https://www.ohchr.org/documents/publications/GuidingprinciplesBusinesshr_eN.pdf

[59] Váradi, Á. (2024) Remarks on access to justice and the digital divide from the aspect of procedural law. *Multidiszcipliniáris Tudományok.* 14 (3). 61-71.

[60] Vo, H., Nguyen, T., & Phan, H. V. (2024). Building a sustainable future: The role of corporate social responsibility in climate policy uncertainty management. *Finance Research Letters*, 60, https://doi.org/10.1016/j.frl.2023.104831.

[61] World Bank (2018). *ESS1: Assessment and Management of Social Risks and Impacts. Guidance Note for Borrowers*. Washington, DC: World Bank Group. https://documents1.worldbank.org/curated/en/142691530216729197/ESF-Guidance-Note-1-Assessment-and-Management-of-Environmental-and-Social-Risks-and-Impacts-English.pdf

[62] World Benchmarking Alliance (2023). *Corporate Human Rights Benchmark 2023.* https://assets.worldbenchmarkingalliance.org/app/uploads/2024/03/2023_Corporate_Human_Rights_Benchmark__Insights_Report_13Mar2024.pdf

[63] de Zeeuw, J., & Reeman, A. (2024). Chapter 17: Vulnerable people in the context of social impact assessment and management. In F. Vanclay & A. M. Esteves (eds.) *Handbook of Social Impact Assessment and Management* (pp 258–273). Cheltenham: Edward Elgar Publishing. https://doi.org/10.4337/9781802208870.00027

Digitalization in Tourism Management: Towards a Sustainable and Smart Transformation of the Sector

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Abstract

In a global context marked by accelerated digitalization and sustainable development challenges, the tourism sector is compelled to rethink its management models. This study explores how technological innovation and digital tools are profoundly transforming tourism management at the level of destinations, businesses, and public policies. Through theoretical analysis and international case studies (Barcelona, Singapore, Tokyo, Faroe Islands), this work highlights the contributions of digital tools such as artificial intelligence, augmented reality, and flow management platforms in improving the traveler experience, optimizing resource management, and strengthening the sustainability of tourism territories. The study also identifies the main challenges associated with this transformation (digital divide, cybersecurity, dependence on platforms), while offering recommendations for smart, inclusive, and sustainable tourism governance. It is intended for researchers, tourism professionals, public decision-makers, and innovators aiming to shape the tourism of tomorrow.

Keywords: Tourism innovation, Digital transformation, Smart destination, Tourism Information Systems (TIS), Digital platforms.

1. INTRODUCTION

Tourism, a major global economic sector, is undergoing a profound transformation driven by accelerated digitalization and the growing urgency of sustainable development. The convergence of technological innovation and environmental imperatives is compelling tourism stakeholders to rethink governance models, business strategies, and visitor engagement mechanisms. Technologies such as artificial intelligence (AI), augmented reality (AR), and digital platforms are reshaping the management of destinations, enterprises, and public policies. This article provides a critical analysis of the structural role played by digital transformation in the evolution of tourism management, supported by emblematic international case studies.

Problem Statement

Despite the rapid advancements in digital technology and sustained efforts toward more sustainable tourism practices, there is insufficient understanding of how digital transformation affects governance, equity, and sustainability in tourism destinations. Specifically, the challenge lies in integrating smart technologies such as AI, big data, and IoT into destination management while ensuring local autonomy, inclusivity, ethical oversight, and ecological stewardship. This gap raises a central question:

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How can tourism destinations effectively harness digitalization to become smart and sustainable without compromising local governance, social equity, or ethical responsibility?

Research Hypotheses

In response to this problem, the following hypotheses are formulated to guide empirical exploration:

H_1: Enhanced digital sovereignty, through the deployment of interoperable local platforms and open APIs, is positively associated with improved destination governance quality.

H_2: Digital inclusion interventions, such as rural digital hubs and accessible service design, will increase adoption of smart technologies by SMEs and rural tourism actors.

H_3: Co-creation mechanisms that engage residents via structured feedback platforms (e.g., Decidim) will be positively associated with the cultural relevance and public acceptance of digital tourism initiatives.

H_4: The integration of real-time sustainability KPIs (e.g. crowd density, carbon, waste data) into management systems is positively correlated with environmental performance indicators, such as over tourism reduction and energy usage efficiency.

H_5: Strong regulatory and ethical frameworks (e.g., GDPR compliance, and Data Trust structures) are positively associated with tourist trust and perceptions of fairness in platform-mediated services.

2. THEORETICAL AND CONCEPTUAL FRAMEWORK

2.1 Innovation and digitalization in tourism

Tourism innovation has evolved from being perceived as peripheral to becoming a central driver of competitiveness and transformation in the sector. Hjalager (2010) [1] categorizes tourism innovation into several types: product, process, managerial, organizational, and institutional, as well as innovations in marketing and experience design. These innovations aim to enhance value creation and improve the competitiveness of destinations and businesses.

Digitalization, on the other hand, refers to the integration of digital technologies across all components of the tourism value chain from information search and booking to consumption and post-travel engagement. According to Buhalis and Law (2008) [2], the diffusion of Information and Communication Technologies (ICTs) has fundamentally altered the dynamics of the tourism industry, enabling disintermediation, increased automation, and mass personalization.

One of the key contributions of digitalization is the development of **Tourism Information Systems (TIS)**, which enable real-time data collection, analysis, and decision-making. As noted by Gretzel et al. (2015) [3], digital transformation is not merely about digitizing existing services but about restructuring the ways in which tourism experiences are co-created among tourists, providers, and destinations.

Additionally, emerging technologies like artificial intelligence, big data analytics, blockchain, and immersive technologies (e.g., AR/VR) are reshaping both the supply and demand sides of tourism. Neuhofer, Buhalis, and Ladkin (2014) [4] emphasize that these technologies enhance the “experiential value” by offering context-aware, personalized, and interactive experiences.

1.2 Smart destinations and sustainability

A Smart Destination leverages interconnected tourism information systems, data analytics, and stakeholder engagement to foster sustainable development. Its foundation lies in the synergy between innovation, digital infrastructure, and inclusive governance. The model aims to optimize visitor experience while preserving local environments and cultures. The concept of **Smart Destinations** builds on the paradigm of Smart Cities, incorporating digital innovation into destination management to achieve sustainability, competitiveness, and improved visitor experiences. According to Boes, Buhalis, and Inversini (2016) [5], a smart destination functions as an ecosystem in which digital technologies, stakeholders, and governance systems interact dynamically.

The United Nations World Tourism Organization (UNWTO, 2019) defines a smart destination as "an innovative tourist destination, built on an advanced technological infrastructure, ensuring the sustainable development of the tourist area, accessible to all, that facilitates the interaction and integration of the visitor with the environment and enhances the quality of life of residents."[1]

This model rests on three foundational pillars:

- Technology: Use of IoT, mobile applications, big data, and smart sensors to gather insights and automate management.
- Inclusive Governance: Collaborative participation among stakeholders including local authorities, residents, businesses, and visitors.
- Sustainability: Efficient use of resources, reduction of environmental impacts, promotion of local culture and economies.

Destinations like Barcelona, Singapore, and Amsterdam have implemented smart solutions to manage tourist flows, prevent overcrowding, and promote sustainable mobility. For instance, data-driven systems have allowed cities to redirect visitors to less congested areas and time periods.

However, the concept of smart tourism has also faced criticism. Kitchin (2015) [6] warns against overly technocratic and surveillance-based applications that may neglect social justice and local empowerment. Greenfield (2013) [7]similarly argues that an over-reliance on data can obscure the complexity of urban — and by extension, tourism systems.

In a conclusion, innovation and digitalization have become strategic enablers of transformation in tourism. They offer powerful tools to enhance efficiency, experience, and sustainability. However, their successful implementation depends on inclusive governance models and ethical digital practices that align technological advancement with community well-being and environmental stewardship.

3. METHODOLOGY

This study adopts a qualitative, multi-method approach aimed at exploring the transformative impact of innovation and digitalization on tourism management from both theoretical and applied perspectives. This approach enables a rich, contextualized understanding of complex phenomena located at the intersection of technology, governance, and sustainability within the tourism sector.

3.1. Literature Review

The first stage of the research involved an extensive review of academic literature related to tourism innovation, digital transformation, and smart governance. Peer-reviewed articles, scholarly books, and policy documents were sourced from databases such as Scopus, Web of Science, and Google Scholar. The main themes explored include:

- Technological innovation in service industries
- Digital platforms and data governance in tourism
- Smart destinations and urban informatics
- Sustainable tourism and stakeholder participation

This theoretical foundation informed the development of the conceptual framework and served as the basis for comparative analysis.

[1] *The United Nations World Tourism Organization (UNWTO) is the specialized agency of the United Nations responsible for the promotion of responsible, sustainable, and universally accessible tourism. It serves as a global forum for tourism policy issues and a practical source of tourism know-how.*

3.2. Comparative Case Study Analysis

To examine practical applications and implications of digital transformation in the tourism sector, the study relies on a comparative analysis of four international destinations:

- **Barcelona (Spain):** An urban destination known for its smart city infrastructure and innovative tourism data systems.
- **Singapore:** A global innovation hub integrating digital technologies across all aspects of travel, from biometric border control to connected attractions.
- **Tokyo (Japan):** A technologically advanced destination that adapted its tourism practices using digital tools, notably following the COVID-19 pandemic and in preparation for major events such as the Olympic Games.
- **Faroe Islands:** A remote, nature-based destination leveraging digital technologies for environmental conservation and participatory tourism governance.

The case study methodology follows the explanatory case research principles defined by Yin (2018) [8], focusing on "how" and "why" questions related to digital and sustainable transformations. Each case was selected for its unique socio-technical context, ensuring diversity in terms of geography, scale, and digital maturity.

3.3. Expert Interviews

To deepen empirical insights, semi-structured interviews were conducted with tourism professionals, destination managers, digital platform providers, and technological innovators. A total of 12 interviews were carried out between January and April 2025. Participants were selected using purposive sampling to ensure relevance and expertise.

The interview guide addressed the following themes:

- Perceived benefits and risks of digitalization
- Impact on tourist experience and destination management
- Implementation challenges (infrastructure, data ethics, local acceptance)
- Vision of the tourism of tomorrow: smart, sustainable, inclusive

All interviews were recorded, transcribed, and thematically analyzed using NVivo software, following Braun & Clarke's (2006) approach[9]. Emerging patterns were triangulated with findings from the literature review and case studies to strengthen the validity and depth of the analysis. This triangulated methodology ensures a robust and holistic analysis balancing theoretical rigor with practical relevance. It also fosters cross-case learning and identification of common drivers or barriers to sustainable digital transformation in the tourism sector.

This article will primarily focus on the empirical approach, with an emphasis on the comparative analysis of case studies to identify common factors — both enablers and barriers — to sustainable digital transformation in the tourism sector.

4. INTERNATIONAL CASE STUDIES: SMART AND SUSTAINABLE TOURISM IN ACTION

This section presents four international case studies illustrating how innovation and digitalization are operationalized in tourism management. Each destination offers a unique sociotechnical model of "smart tourism" aligned with sustainability, resilience, and visitor experience.

4.1. Barcelona: Managing Tourist Flows Through Data

Barcelona has emerged as a leading smart tourism destination, driven by its integration of urban innovation and tourism policy. The Smart Tourism System (STS), developed in collaboration with the Barcelona City Council and local tech companies, leverages:

- AI-based predictive analytics to monitor visitor flows in real time
- Sensor networks in key areas (e.g. La Rambla, Gothic Quarter)
- Dynamic signage and mobile apps to redirect tourists to less crowded sites

This data-driven management helps:

- Reduce congestion by up to 21% in peak zones (Ajuntament de Barcelona, 2023)
- Improve quality of life for residents
- Support adaptive urban planning through feedback loops between tourism and mobility systems

Barcelona demonstrates that smart governance can directly address overtourism, a key sustainability challenge in global urban destinations.

4.2. Singapore: A Living Lab for Tourism Innovation

Singapore positions itself as a "living lab" for tourism technology. Through its **Singapore Tourism Analytics Network (STAN)** and public-private partnerships, the city-state integrates cutting-edge digital infrastructure into the travel journey:

- **Facial recognition** and automated immigration at Changi Airport
- **Augmented Reality (AR) experiences** at heritage sites (e.g., Chinatown AR tours)
- **IoT sensors** in hospitality and attractions to optimize energy and crowd management
- **Cashless ecosystems**, with 95% of tourism services integrated into e-payment platforms (STB, 2024)

According to the **Singapore Tourism Board**, this approach enhances both safety and cost-efficiency. Notably, visitor satisfaction rose to **93% in 2023**, and digital transformation reduced average processing time at immigration by **30%**.

4.3. Tokyo: Post-Pandemic Digital Innovation

The Tokyo Metropolitan Government responded to the COVID-19 crisis with accelerated digitalization. A combination of public health needs and preparation for the **Tokyo 2020 Olympic Games** catalyzed adoption of:

- Multilingual AI chatbots for tourist assistance
- **Contactless reservation systems** for museums, restaurants, and transit
- QR-code-based cultural guides for self-guided exploration
- **Environmental sensors** in Shinjuku Gyoen and Meiji Shrine to monitor carrying capacity and biodiversity

Post-pandemic, Tokyo's approach has evolved toward a **hybrid tourism model**, blending high-tech solutions with cultural preservation. Tourist return rates reached **80% of pre-pandemic levels by 2024**, with strong public support for digital services integrated with cultural heritage.

4.4. Faroe Islands: Digital Tools for Conservation and Participation

In contrast to urban smart cities, the **Faroe Islands** offer a model rooted in ecological stewardship and participatory governance. Their flagship initiative, **"Closed for Maintenance, Open for Voluntourism"**, blends digital and community-driven strategies:

- Online platforms coordinate visitor registration and volunteer conservation tasks
- Mobile apps guide visitors through fragile ecosystems, tracking movement and environmental impact
- Drones and GIS mapping help manage land use and erosion
- Seasonal restrictions are digitally enforced to reduce biodiversity stress

Despite receiving fewer tourists (ca. **130,000 in 2023**), the Faroe Islands have built a globally recognized brand for **regenerative tourism**. The model demonstrates how **low-tech, high-purpose digitalization** can empower small destinations to lead on sustainability.

Table 1. Comparative Insights

Destination	Key Innovation Focus	Primary Benefit	Sustainability Orientation
Barcelona	Real-time flow management	Reduced overcrowding	Urban resilience, resident well-being
Singapore	Seamless digital journey	Operational efficiency, safety	Smart infrastructure, energy savings

Destination	Key Innovation Focus	Primary Benefit	Sustainability Orientation
Tokyo	Post-COVID tech adoption	Recovered demand, accessibility	Health + heritage preservation
Faroe Islands	Participatory conservation	Visitor impact control	Ecosystem protection, local agency

These case studies illustrate the diverse pathways toward smart and sustainable tourism. While contexts differ, a common thread emerges: the strategic use of digital tools to align visitor management with long-term ecological and social goals.

Table 2. Comparison of performance in tourism innovation and sustainable governance[2]

Destination	Innovation Projects (est.)	Infra Score/100	Tourist Satisfaction	Local Participation
Barcelona	~120	~85	~89 %	~75 %
Singapore	~150	92	93 %	~68 %
Tokyo	~130	88	~90 %	~70 %
Faroe Islands	~35	73	~85 %	92 %

Indicators are estimated based on data reported in Smart City Index (IMD), governmental reports (STB, Barcelona Digital City) [10], and contextualized by academic analyses. Scores/percentages are illustrative for comparative interpretation.

According to our comparative case study data, Singapore leads in both the number of digital innovation projects (150) and smart infrastructure (92/100). However, the Faroe Islands stand out in terms of local stakeholder participation (92%), showcasing a model of community-based digital governance. Barcelona and Tokyo show balanced profiles with strong innovation implementation and high tourist satisfaction (around 90%).

5. CONTRIBUTIONS OF DIGITAL TECHNOLOGIES TO SUSTAINABLE TOURISM

5.1 Enhancing the Traveler Experience

Artificial Intelligence enables enhanced personalization, augmented reality enriches heritage interpretation, and mobile applications facilitate access to real-time information. It Augmented Reality (AR), and mobile applications revolutionize travel through personalization, engagement, and timely access:

AI Personalization: Machine learning systems analyze traveler preferences, historical behavior, and sustainability considerations to produce tailored itineraries, eco-friendly lodging, and optimized routesenhancing satisfaction and minimizing environmental impact [16]

Augmented Reality: AR mobile tools developed through user-centered design overlay contextual cultural or environmental information onto real-world heritage sites. Evaluations show significant improvement in tourist engagement and usability [17]

Mobile Ecosystems & Smart Assistants: Digital tourism platforms integrate real-time transit info, conversational AI, and sustainable tips. Chatbots and location-aware apps streamline logistics while nudging travelers toward responsible choices.

5.2 Resource Management Optimization

Big data, IoT, and AI enhance operational efficiency and evidence-based decision-making:

[2] *The data presented are estimates based on official reports, international databases, and sectoral analyses. For further details, see the sources listed in the bibliography.* [10] [11] [12] [13] [14] [15]

IoT & Big Data: Sensor networks capture occupancy, energy, and water usage in real time. Analytics guide dynamic adjustments for example, adaptive HVAC systems in hotels to reduce waste.

Predictive Management: AI models forecast for energy demand and weather patterns, enabling smoother operations and lower emissions.

Infrastructure Planning: Geo-spatial tourist flow data inform public transport scheduling, area decongestion strategies, and responsive resource allocation policies [18].

5.3 Strengthening Territorial Sustainability

Digital systems support broader environmental and socioeconomic goals:

Lowering Environmental Footprint: AI tools like Project Contrails guide flight navigation to cut aviation emissions; hotel utilities sync with weather and usage patterns to reduce energy use; waste-tracking systems have cut food waste by over 1,100 tonnes[19].

Distributing Tourist Flow: AI recommendation systems steer guests to under-visited areas, reducing overtourism and spreading economic benefit.

Fostering Local Consumption: Platforms promote eco-certified accommodations and locally owned venues, leveraging sustainability labels and community reviews.

6. RECOMMENDATIONS FOR SMART TOURISM GOVERNANCE

To ensure equitable, sustainable, and locally controlled digital tourism ecosystems, the following evidence-based strategies are recommended:

6.1 Digital Sovereignty

To preserve destination autonomy and prevent global tech companies from monopolizing tourism ecosystems, it is essential to develop interoperable local platforms. Leveraging open-source frameworks such as FIWARE now integrated with Prometheus-X to build sovereign data spaces enables modular, GDPR-compliant systems that align with national and EU digital strategies like the Digital Europe Programme. This approach ensures that local stakeholders govern tourism data flows rather than relinquishing control to external intermediaries[20] [21].

6.2 Digital Inclusion

Given that about 40 % of tourism-related businesses in the EU are micro-enterprises with limited digital capacity (Eurostat, 2024), it is critical to bridge digital and geographic disparities. Concrete actions include establishing “Digital Tourism Hubs” in underserved rural areas to provide training, mentorship, and peer-supported learning. Additionally, designing multilingual, low-digital-literacy user interfaces for booking and payment systems will ensure accessibility for all operators and visitors[22].

6.3 Co-creation

To combat the risk of "digital tourism gentrification" where technology solutions neglect or disrupt local culture it is important to involve communities directly in service design. This can be achieved by convening citizen assemblies using transparent democratic platforms like Decidim. Such participation ensures that digital tourism tools reflect cultural values, foster local ownership, and formalize continuous feedback loops between residents and destination managers publications[23].

6.4 Sustainability Indicators

Since responsive resource management relies on real-time data, tourism applications should embed live metrics such as crowd density, carbon emissions, and waste generation. Integrating urban IoT systems like crowd sensors, smart waste bins, and traffic monitoring via open APIs empowers destinations to make timely decisions. For example, Dubrovnik achieved a 22 % reduction in overtourism by deploying crowd-management sensors within its “Respect the City” initiative [24] .

6.5 Regulation & Ethics

To mitigate algorithmic bias and protect tourists' rights, a robust regulatory and ethical framework is essential in the tourism sector. This includes enforcing EU AI Act mandates such as bias assessments and transparency obligations for AI-powered recommendation engines and dynamic pricing systems. Furthermore, establishing Data Trusts will enable ethical data sharing, grounded in user consent, equitable value distribution, and compliance with GDPR principles [20] [21].

Table 3: Governance Pillars, Stakeholders, and Measures for Smart Tourism

Focus Area	Key Stakeholders	Governance Measure
Digital Sovereignty	DMOs, local gov, platforms	Federated platform architecture, , open API standards
Digital Inclusion	SMEs, rural communities, NGOs	Training programs, rural broadband, accessible service design
Co-creation	Residents, SMEs, local gov	Participatory design hubs, cooperatives, inclusive revenue models
Sustainability KPIs	DMOs, planners, tourists	Real-time monitoring (crowding, carbon), Tourism 4.0 data standards
Regulation & Ethics	EU institutions, legislators	Data protection laws, AI ethics codes, platform marketplace governance

This analysis underscores the interconnected nature of these governance pillars: technological architecture (sovereignty) must be complemented with education (inclusion), co-produced value (co-creation), performance monitoring (KPIs), and regulatory oversight (ethics)—forming a holistic strategy for sustainable and intelligent tourism[25].

7. CONCLUSION

This study demonstrates that digitalization and smart technologies are not mere additions to tourism management they are foundational enablers of sustainable, resilient, and inclusive destination governance. As evidenced by case studies from Barcelona, Singapore, Tokyo, and the Faroe Islands, digital tools like AI, AR, IoT, and big data significantly enhance traveler experiences, optimize resource use, and reinforce territorial sustainability.

However, the core insight is that technology alone does not "solve" sustainability challenges. According to recent analysis, destinations that embed digital innovations within inclusive governance frameworks achieve the greatest impact through stakeholder engagement, strategic planning, and sustainability integration. Yet persistent barriers, such as the digital divide, cybersecurity concerns, and over-reliance on global platforms, threaten to undermine these advances.

Looking forward, a holistic, governance-oriented approach is essential. Practically, this entails investing in digital sovereignty via open-source, interoperable systems; fostering digital inclusion through rural hubs and accessible design; facilitating co-creation with local actors; deploying real-time sustainability indicators (like crowd density or carbon tracking); and enforcing regulatory & ethical frameworks under GDPR and the EU AI Act.

As the TAAS project and other European initiatives confirm, digitalization can indeed support all three pillars of sustainability economic vitality, environmental preservation, and social equity—but only when integrated within forward-thinking policy and community-centered implementation. Furthermore, genuinely smart tourism requires constant monitoring, capacity-building, and adaptability to ensure that isolated technological innovations mature into systemic, equitable ecosystems.

In closing, the vision of Tourism 4.0 hinges on more than advanced tools: it depends on democratic governance, ethical design, data empowerment, and socio-ecological awareness. By situating innovation within this broader framework, tourism can become a powerful engine of sustainable development where technology amplifies human and environmental well-being, rather than replacing it.

References

[1] Hjalager, A. M. (2010). A review of innovation research in tourism. Tourism Management, 31(1), 1–12.
[2] Buhalis, D., & Law, R. (2008). Progress in information technology and tourism management: 20 years on and 10 years after the Internet. Tourism Management, 29(4), 609–623.
[3] Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: Foundations and developments. Electronic Markets, 25(3), 179–188.
[4] Neuhofer, B., Buhalis, D., & Ladkin, A. (2014). A typology of technology-enhanced tourism experiences. International Journal of Tourism Research, 16(4), 340–350.
[5] Boes, K., Buhalis, D., & Inversini, A. (2016). Smart tourism destinations: Ecosystems for tourism destination competitiveness. International Journal of Tourism Cities, 2(2), 108–124.
[6] Kitchin, R. (2015). The ethics of smart cities and urban science. Philosophical Transactions A, 374(2083).
[7] Greenfield, A. (2013). Against the smart city. Do projects.
[8] Yin, R. K. (2018). Case Study Research and Applications: Design and Methods (6th ed.). Thousand Oaks, CA: SAGE Publications.
[9] Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa.
[10] Ajuntament de Barcelona. (2023). Barcelona Digital City: Smart Tourism Strategy Report. Barcelona City Council. Retrieved from https://ajuntament.barcelona.cat/digital.
[11] Singapore Tourism Board. (2024). Annual Tourism Performance Report 2023. Retrieved from https://www.stb.gov.sg.
[12] IMD. (2024). Smart City Index 2024. IMD World Competitiveness Center & Singapore University of Technology and Design. Retrieved from https://www.imd.org.
[13] World Economic Forum. (2024). Travel & Tourism Development Index 2024. Geneva: WEF. Retrieved from https://www.weforum.org/reports.
[14] Tokyo Metropolitan Government. (2023). Tourism in Tokyo: Data and Trends. Retrieved from https://www.metro.tokyo.lg.jp.
[15] Visit Faroe Islands. (2023). Closed for Maintenance – Open for Voluntourism: Annual Impact Report. Tórshavn: Visit Faroe Islands. Retrieved from https://www.visitfaroeislands.com.
[16] El Archi, Y., Benbba, B., Kabil, M., & Dávid, L. D. (2023). Digital Technologies for Sustainable Tourism Destinations: State of the Art and Research Agenda. Administrative Sciences, 13(8), 184. https://doi.org/10.3390/admsci13080184.
[17] Chadha, P., et al. (2024). Unlocking sustainable tourism: A holistic examination of mobile applications' impact and evolution in travel experiences (2013–2023). https://doi.org/10.48550/arXiv.2001.11131.
[18] Shafiee, S., Ghatari, A. R., Hasanzadeh, A., & Jahanyan, S. (2019). Developing a model for sustainable smart tourism destinations: A systematic review. Tourism Management Perspectives, 31, 287-300.
[19] Zeqiri, A., Ben Youssef, A., & Maherzi Zahar, T. (2025). The Role of Digital Tourism Platforms in Advancing Sustainable Development Goals in the Industry 4.0 Era. Sustainability.
[20] Gretzel, U., & Jamal, T. B. (2020). Guiding principles for good governance of the smart destination. Travel and Tourism Research Association: Advancing Tourism Research Globally.
[21] Gozgor, G., Lau, C. K., Lin, Z., & Zeng, Y. (2022). The impact of digital governance on tourism development. Current Issues in Tourism, 25(19), 3149–3166.
[22] European Cluster Collaboration Platform. (2019). Digitalisation in Tourism: In-depth analysis of challenges and opportunities. Retrieved from https://clustercollaboration.eu.
[23] Yin, Y., Gao, J., & Pan, Y. (2024). What Impacts Tourists' Co-Creation Experiences in Smart Tourism Destinations? A Mixed Methods Research from Four Chinese Smart Tourism Destinations. Tourism and Hospitality, 5(4), 1327-1343. https://doi.org/10.3390/tourhosp5040074.
[24] E3S Web of Conferences. (2024). Smart Tourism Destinations: Governance and Resilience. https://doi.org/10.1051/e3sconf/202451101029.
[25] Zeng, B., Carter, R. W., & De Liso, N. (2024). Digital tourism and smart development: A state-of-the-art review. Sustainability, 16(23), 10382.

eTwinning Project “The Nobel Prizes and Our World”

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Abstract

The aim of the article is to inform about the methodology of creating project works on the example of the international eTwinning project "Nobel Prizes and Our World", implemented in the school year 2021/2022. The project connected students and teachers from five European countries to promote students' interest in science, work and life of Nobel laureates. The article describes the use of project-based learning as an opportunity for interdisciplinary teaching of school subjects. As part of the projects, students developed social, communication, language and digital skills. The final output was an e-book that provides information about the Nobel Prize, the lives, research and significance of the scientific works of Nobel laureates. This project has been awarded national and European quality labels, thus confirming its contribution to modern education based on cooperation, creativity and active learning. The methodology of its creation can be used by other teachers in solving such projects.

Keywords: eTwinning, project-based learning, Nobel Prize, international collaboration

1. INTRODUCTION

eTwinning is a European community of schools, teachers and students that offers an online platform for teachers and students of all types of schools to work together at national and international level. The eTwinning platform was officially established by the European Commission in March 2005. In 2022, eTwinning becomes part of the European School Education Platform (ESEP). The eTwinning Teacher Community has over 1 million members who meet online, collaborate with each other, form partnerships, discuss in online groups, get inspired, learn from each other or participate in professional development activities (eTwinning, 2022).

The basis of cooperation among students and among teachers and students is the joint solution of tasks through projects, which is based on the principles of project-based learning. Project-based learning is based on solving theoretical or practical problems based on the active work of the student. Emphasis is placed on the independent work of students, their own research and discovery, as opposed to the passive acquisition of ready-made knowledge. Project-based learning overcomes the shortcomings of traditional teaching such as isolation, detachment from practical life, mechanized teaching and low motivation of students. It helps to break down one-sided memory learning and reduces the degree of alienation of the subject matter from the interests of students, develops key competences of students, in the required content and scope at any level of school (Ganajová et al., 2010).

It is therefore not just a change in the form of teaching, but a fundamental transformation of its essence. Students are not passive recipients of information, but active participants in the long-term learning process. Project-based

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learning thus builds bridges between theoretical knowledge and real-life experience, thus contributing to a deeper understanding of the subject matter and meaningful acquisition of knowledge (Lechová, 2014). The basic features of project-based learning are expressed in Figure 1.

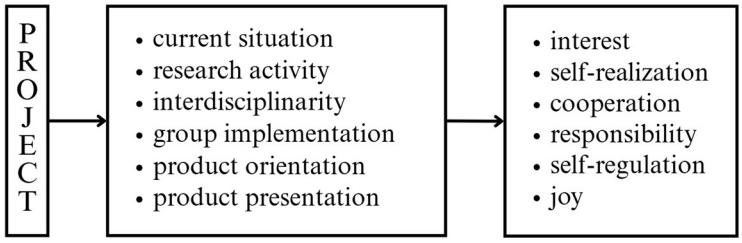

Fig. 1. Basic features of project-based learning and the relationship to the development of the student's personality (Kožuchová, 2010)

1.1. eTwinning as a platform for the implementation of project collaboration

The eTwinning platform allows for the implementation of project-based learning either as part of the classroom or as part of extracurricular activities. Students cooperate and collaborate on solved topics with peers from other countries, learn to share work, responsibility and the ability to respect the opinions of others. The solved projects often exceed the knowledge of individual subjects and students must study other subjects independently. The teacher can share his experience in an international community of teachers and other professionals in the field of education.

1.2. The role of the teacher in eTwinning projects

The teacher's role is to be a coordinator – he guides students in individual activities and helps them achieve the set goals. He becomes a manager, partner, helper or advisor to the student (Daniš, 2000). The teacher prepares the project, but at the same time creates space for students' participation in its planning – students can propose activities, tasks and forms of project outputs. This strengthens their motivation and sense of responsibility to work together.

1.3. The position of the student in eTwinning projects

An important part of the project's implementation is the active work of students. Students play a major role in acquiring their own knowledge, skills, solving tasks and creating common project outputs. The role of the student is shifted from the "recipient of information" to the "active assignee". Project-based learning uses the spontaneity and imagination of students. The student is forced to think, explore, discover, discuss and evaluate. Students take responsibility for their learning.

2. SAMPLE PROJECT WORK "NOBEL PRIZES AND OUR WORLD"

As an example of the implementation as well as the outputs of the project work, we present the international eTwinning project Nobel Prizes and Our World, which was solved in the school year 2021/2022.

The main objective of the project:

- To develop a positive attitude of students towards science, scientists and scientific work by getting to know Nobel Prize laureates, their life stories, research activities and the impact of their discoveries on various areas of life.

Sub-objectives:

- To bring the work of scientists closer to students and to emphasize its importance for the development of society.
- To acquaint students with the history of the Nobel Prize and to gain an overview of the contributions of individual laureates in various areas of science and social life.
- To point out the multidisciplinary character of scientific work, as well as the importance of various areas of human knowledge for the development of society.

- To develop international cooperation and communication between students through teamwork in a multicultural environment, including the development of language competences.

- To develop digital skills of teachers and students.

2.1. Countries involved in the project

Five teachers and 58 students from five countries were involved in the project (Table 1).

Table 1. Overview of the countries involved in the project "Nobel Prizes and Our World"

Country	Number of students	Type of school	Subject focus
Slovak Republic	19	Business Academy, bilingual study	Chemistry, ICT
Bosnia and Herzegovina	9	Grammar school	History
Serbia	7	Secondary Technical School	Mother tongue and literature
Croatia	11	Grammar school	Biology
Türkiye	12	Private science school and grammar school	English Language

2.2. Procedure of solving the project

2.2.1 Project approval and implementation

The proposer of the project was Mrs. Emina Music from the Mixed Grammar School Bušovaca in Bosnia and Herzegovina. After registration and submission of the project, the standard approval process began through the relevant National Support Organizations (NSOs) in each country. The project was gradually approved by the NSO in Bosnia and Herzegovina and the NSO in Slovakia, which is based at the University of Žilina in Žilina.

After approval, the project was registered on the ESEP (European School Education Platform), where a working space was created, the so-called TwinSpace (Nobel Prize and Our World, 2022). This online space served as the main environment for the implementation of all project activities. Thematically focused project pages were created here, where information about project tasks, project progress and deliverables were shared. At the same time, TwinSpace provided a space for interactive communication between all project partners, teachers and students, who shared their thoughts, ideas, solutions and results of common work.

2.2.2 Project activities

a) Getting to know the ESEP platform

At the beginning of the project, simpler activities were chosen to familiarize them with the work in the ESEP platform and in TwinSpace. Their goal was for students and teachers to orient themselves in the online environment in which the project was implemented.

Several methodological online meetings were organized for the teachers involved. During the meetings they jointly prepared the content of individual activities and planned their implementation. They focused on the methodology of project-based learning in international eTwinning projects, quality criteria, digital content creation and other topics related to project work.

b) Main project activities

The basic project activities were focused on learning about the topic of the Nobel Prize and its laureates. The following activities were carried out:

- Creation of a project logo - each partner school designed its own visual design of the project logo. A common online vote took place, in which the winning design, the common symbol of the project, was selected, see Fig. 1.

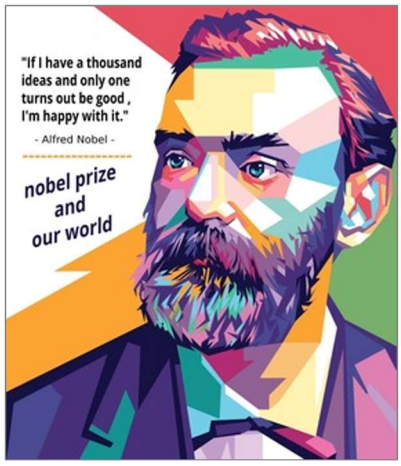

Fig. 2. Winning logo in the project "Nobel Prizes and Our World"

- Research and processing of information about the history of the Nobel Prize - first, students chose from 18 pre-assigned topics related to the Nobel Prize (Table 2), conducted research, and elaborated their findings. They focused on the history of the award, individual categories, interesting facts and important milestones. The students were divided into 18 national groups, each group containing 3 members. Each group chose one thematic area, which was then processed as a separate chapter of the e-book. When processing the topics, they used resources and materials collected on a common Padlet board. Each student group was assigned a teacher who acted as an expert advisor/consultant. Where necessary, he provided methodological assistance, guided the work of the students and ensured that the output was in line with the objectives of the project.

Table 2. Sample selected topics on the Nobel Prize and assignment of groups

Number	Topic	Group Cod	Teacher
1	Who is Alfred Nobel?	SVK4	Monika Poľanská
2	Nobel Prize for mathematics - why not?	HRV3	Antonela Dragobratovic
3	First Nobel Prize laureates in each category	SVK3	Monika Poľanská
4	Nobel Prizes in Economics	TUR2	Cagadas Orhn
5	Testament of Alfred Nobel	HRV2	Marija Veraja Tomic

- Important Nobel Prize laureates - in the second half of the project work, the students focused on specific Nobel Prize winners and the importance of their discoveries for the development of society. The students worked in groups of three, where each group chose one laureate, whose life and work they explored in detail. Also in this activity, the students worked with information available on a common virtual bulletin board. To process the output, they had a biographical card template (see, Fig. 3), which they filled in according to the assignment and then inserted into the chapter of the e-book. The resulting biographical cards contained: basic information about the laureate (name, country, year of awarding the prize), the scientific or social field in which he/she received the prize, a brief description of his/her discovery or research, the importance and impact of the work, interesting facts or inspiring moments from his/her life.

Fig. 3. Biographical card of Marie Curie-Sklodowska

- Creation of a common e-book - students jointly created a digital publication containing the outputs of their work (texts, pictures, presentations), which is dedicated to the Nobel Prize, individual laureates and their contribution to science and society.

c) Accompanying activities:

- Solving netiquette issues – students get acquainted with the rules of decent and safe communication on the Internet.
- Establishment of project rules – a common code of conduct and cooperation.
- Christmas and New Year's greetings – students sent each other electronic cards.

2.2.3 Project outputs

The main output of the project was a common e-book entitled *Nobel Prize and Our World*, see Fig. 4, in which all involved students from partner schools participated. The e-book is divided into three separate parts, which reflect the results of the key project activities:

- Project logo - in this part of the e-book, all designs and the winning logo are documented.
- Collection of information - contains outputs thematically focused on the history, structure and significance of the Nobel Prize.
- Nobel laureates – contains biographical cards of selected Nobel Prize winners from various fields.

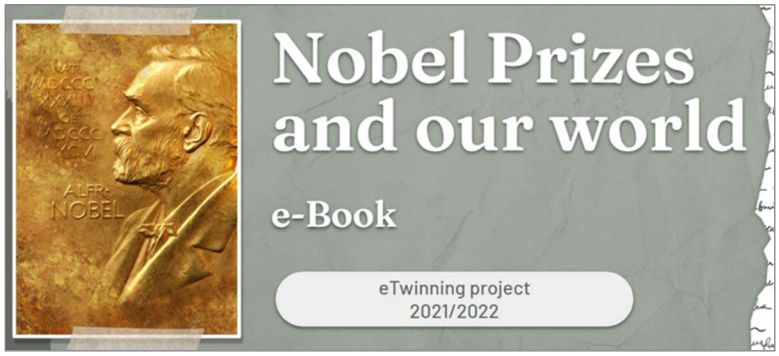

Fig. 4. The main output of the project, the e-book Nobel Prize and Our World

The Google Slides tool was used to create the e-book, which allowed multiple students to collaborate on one shared online document in real time. Once finished, the file was exported to PDF, which was used in the Book Creator application, which made it possible to turn the PDF into an interactive e-book with a page-flipping effect.

At the end of the project, all participants from partner schools met at common online meetings, during which individual student teams presented the results of their work. They presented the parts with which they contributed to the common output of the e-book *Nobel Prize and Our World*.

3. DIGITAL TECHNOLOGIES USED IN THE PROJECT

A wide range of digital technologies and online tools were used in the project, which significantly contributed to work efficiency, interactivity of teaching and international cooperation. In eTwinning projects, digital technologies play a key role – enriching the learning process, developing digital competences, fostering global collaboration and improving the quality of education.

Applications and platforms used:

- Padlet – in this application, students created a virtual bulletin board in which they shared information, links, images and videos related to the topic of the Nobel Prize and its laureates. Working with Padlet is simple, very intuitive and has enabled all participants to easily and clearly publish content (texts, internet resources, images, videos and others).

- Google Slides – used by the students to create the main output of the e-book project Nobel Prize and Our World. The students worked in a common template, to which they added content, while paying attention to the uniform format and visual arrangement of the resulting document.

- Google Forms – used by students to vote (when choosing a project logo) and to collect feedback from students during the individual phases of the project.

- Canva – a creative online tool that students used to create project logo designs. Canva made it easy to combine graphic elements and encouraged students' visual expression.

- TwinSpace – is a common project environment within the ESEP platform and its eTwinning part, where most of the collaboration took place. It was used for the exchange of information, planning activities, sharing outputs and discussion in groups. Teachers and students coordinated the work, communicated and reflected on the individual steps of the project.

4. PROJECT EVALUATION AND AWARDS

4.1. Forms of evaluation

During the evaluation of the project, several forms of evaluation were used, which allowed us to obtain feedback from students and teachers, continuously monitor progress and reflect on the quality of the implemented activities:

- Peer assessment – Students evaluated activities prepared by their classmates using online questionnaires, in which they voted on the quality of the outputs and at the same time verified the acquired knowledge about the project´s topic.

- Discussions on the TwinSpace forum – in the discussion space, students verbally expressed their opinions on the realization of the project, the quality of activities and satisfaction with the cooperation in teams. These reflections also included elements of self-evaluation, where the students expressed the degree of satisfaction with their own results in the project.

- Evaluation by the teacher – teachers carried out an ongoing evaluation in which they monitored the progress of the students, provided feedback and suggested improvements in the implementation of the activities. The aim was to achieve quality in accordance with the criteria set for successful eTwinning projects (Hrbáňová and Meszárosová, 2023).

- Interactive assessment methods – creative tools were also used for assessment, such as the Mentimeter application, where students used a word cloud to express their final perception of the

project through one keyword, see, Fig 5. This activity helped to make a final reflection on the project's content and overall experience.

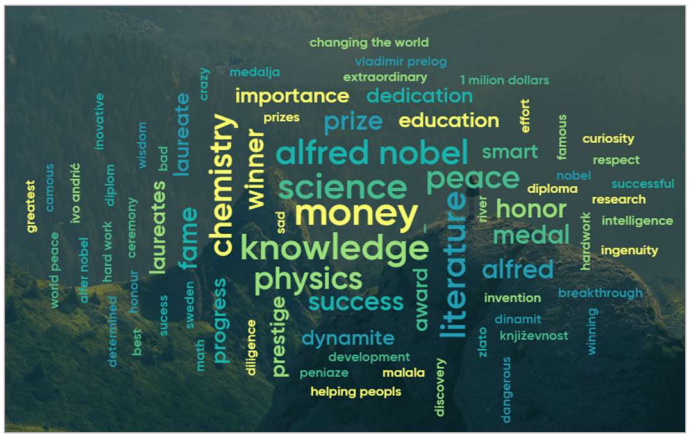

Fig. 5. A word cloud in which the students expressed their perception of the project through the keyword

4.2. Project Awards

eTwinning projects, that meet the high-quality criteria set by the European Commission, can receive the prestigious National Quality Label (NQL) and European Quality Label (EQL) awards. They recognise the work of all teachers and students involved in the implementation of the eTwinning project (European Prizes, 2022).

The Nobel Prize and Our World project received both National and European quality certificates, see, Fig. 6, in the four countries involved. In addition, it was included in the top 5 eTwinning projects implemented in the 2021/2022 school year in Serbia.

(a) (b)

Fig. 6. (a) first picture: National Certificate of Quality; (b) second picture: European Quality Label

5. CONCLUSIONS

The aim of the article was to present the implementation of the eTwinning project, to present its individual activities and outputs, to point out the digital tools and evaluation options used, and at the same time to highlight its potential in the context of contemporary education. Using the example *of the Nobel Prizes and Our World* project, we showed how to create a stimulating learning environment through international cooperation, digital technologies and the principles of project-based learning.

The findings confirm that eTwinning is not only an online platform, but also an active community of teachers and students that connects schools across Europe. Project-based learning in an eTwinning environment is an effective way to develop 21st century competences and a bridge between school education and the real world.

The main benefit of the project was not only the joint e-book as a specific output, but above all the process of cooperation itself, the students' experience with teamwork, cross-curricular linking and the application of theoretical

knowledge in practice. eTwinning is a tool that allows teaching to go beyond the traditional classroom and support the creation of a motivating and meaningful learning environment.

Acknowledgements

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References

[1] Danis, M. (2000). Project-based learning – A path to active learning. *Pedagogické rozhľady* 9, no. 1: 25–28.
[2] European School Education Platform. (2022). *eTwinning*. https://school-education.ec.europa.eu/en/etwinning (accessed April 30, 2025).
[3] European School Education Platform. (2022). *European Prizes*. https://school-education.ec.europa.eu/en/etwinning/european-prizes (accessed May 11, 2025).
[4] European School Education Platform. *Nobel Prizes and Our World*. https://school-education.ec.europa.eu/en/etwinning/projects/nobel-prizes-and-our-world/twinspace (accessed May 11, 2025).
[5] Ganajová, M., Kalafurová, J., Mullerová, V., & Siváková, M. (2010). *Project-based learning in chemistry*. Bratislava: State Pedagogical Institute.
[6] Hrbáňová, K., & Meszárosová, Z. (2023). *Step by Step Towards a Quality eTwinning Project*. Žilina: eTwinning Slovakia, University of Žilina. https://www.etwinning.sk/publikacie/krok-za-krokom-ku-kvalitnemu-etwinning-projektu.pdf (accessed May 11, 2025).
[7] Kožuchová, M., Pavelka, J., & Vargová, M. (2010). *Electronic Textbook of Technical Education Didactics*. Bratislava: Comenius University.
[8] Lechová, P. (2014). *Natural substances in project-based learning*. Dissertation thesis. Košice: Pavol Jozef Šafárik University.

The Semiconductor Industry and Its Economic, Political, and Social Impact in Mexico

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Abstract

The semiconductor industry has become a cornerstone of the digital economy and a crucial element in global technological progress. Mexico, thanks to its strategic location, trade agreements such as the USMCA, and a growing industrial base, is well-positioned to enhance its role in this value chain. This study examines the impact of the semiconductor industry on Mexico's economy, focusing on key aspects such as foreign direct investment, exports, job creation, and technological infrastructure. It also explores the theoretical, political, and economic frameworks supporting digital transformation, emphasizing the importance of human capital, innovation, and collaboration among academia, industry, and government. Additionally, the analysis highlights nearshoring as a historic opportunity for Mexico, facilitating the relocation of manufacturing plants closer to the North American market. By leveraging this trend, the country can attract significant investment and strengthen its industrial capabilities. Finally, the study outlines strategies to consolidate Mexico's leadership in the semiconductor sector, including the development of specialized talent, improvements in public policy, intellectual property protection, and the strengthening of international partnerships. The findings suggest that, with a comprehensive strategy, Mexico has the potential to become a key player in the global semiconductor industry, significantly contributing to economic growth and technological positioning.

Keywords: Semiconductors, Industry, Technologies, Economy, Politics

1. INTRODUCTION

In recent years, the technological industry has undergone significant transformations, with semiconductors standing out as a key driver of social and industrial change. These advancements have led to the emergence of new companies, jobs, professions, and innovative technological products that have profoundly influenced people's lives across the globe.

Semiconductors, the tiny chips that enable modern technology, play a crucial role in various applications. They ensure the safe operation of automobiles, support advanced medical and pharmaceutical equipment in saving lives, and empower military radar systems to detect threats efficiently.

The term *semiconductor* generally refers to materials that have the ability to both conduct and insulate electrical currents. However, in the technological context, it also applies to the highly sophisticated products manufactured from these materials, commonly known as "chips" or "electronic circuits."

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The long-term outlook for the semiconductor industry remains strong. As the world advances, the demand for high-performance semiconductors will continue to grow, powering everything from household appliances and autonomous vehicles to aircraft and artificial intelligence systems.

Semiconductors play an essential role in nearly all productive activities and daily life, solidifying their position as the *backbone* of the modern economy. Their continued development and integration into various industries will shape the future of technological innovation and global economic growth.

2. METHODOLOGY

This research adopts a qualitative and exploratory approach to comprehensively understand the factors influencing the development of the semiconductor industry in Mexico. Given the complexity and evolving nature of this sector, a methodological strategy based on scientific literature review was selected, focusing on academic, institutional, and governmental sources at both national and international levels.

The research process was structured into four sequential phases, aimed at building a systemic vision of the phenomenon:

- **Phase 1 – Theoretical, Political, and Social Framework Review:** Academic publications, institutional reports, and relevant public policies were collected and analyzed to establish the conceptual, political, and social foundations framing the semiconductor industry within the Mexican context.
- **Phase 2 – Historical Background Exploration:** A critical review of historical sources and specialized reports was conducted to identify key milestones and transformations that have shaped global technological evolution and their connection to Mexico.
- **Phase 3 – Economic Growth Analysis:** Economic databases, sectoral studies, and specialized literature were examined to describe the current and potential impact of the semiconductor industry on Mexico's development.
- **Phase 4 – International Trade Assessment:** Trade reports, international agreements, and analyses from organizations such as the OECD, the Mexican Ministry of Economy, and the Bank of Mexico were reviewed to understand the dynamics of exports, imports, and regional integration.

The collected information was analyzed through thematic coding, allowing the identification of recurring patterns, causal relationships, and gaps in existing literature. This qualitative approach facilitated the construction of contextualized interpretations aimed at generating informed strategic recommendations.

3. RESULTS

As a result of the study, strategic recommendations are proposed for the design of public policies, the strengthening of the business ecosystem, and the development of specialized talent, all of which are essential for positioning Mexico as a key player in the global semiconductor value chain.

3.1. Theoretical Framework

Solow (1956) argued that technological progress enhances production relations and drives economic productivity. Grossman and Helpman (1995) identified a positive relationship between international trade and technological learning, emphasizing the role of trade openness in facilitating technology transfer and strengthening intellectual property rights. Entrepreneurial acumen plays a critical role in innovation, as it enables the transformation of external knowledge into increased productivity and operational efficiency (Nelson & Winter, 1982).

From a policy perspective, basic economic theory characterizes technology as applied knowledge in production—encompassing information related to products, processes, and applications (Reddy & Liming, 1990). Markus and Tanis (2000) broaden this definition to include essential production-related information, while Afriyie (1988) describes technology as a subsystem integrating knowledge, technical support, and physical capital.

Economically, innovation involves product design improvements, the launch of new products, or the adoption of novel methods. These processes may be driven by industrial policies or market signals aimed at improving productivity and fostering economic growth. While neoclassical theory assumes firms operate under perfect competition and complete information, market failures frequently necessitate government intervention. Schumpeter (1997) proposed that innovation propels capitalist evolution through entrepreneurial efforts aimed at achieving scientific recognition. As such, innovation is positioned as a competitive asset intrinsically linked to firm-level initiatives (Jiménez, 2018).

3.2 Historical Background of the Semiconductor Industry in Mexico

Mexico's entry into the electronics industry dates to the 1960s, with the state of Jalisco emerging as a pioneer in hosting electronics firms. Companies such as Mexican Burroughs and Motorola de México commenced operations in 1968, facilitated by the PITEX program (Temporary Import Program for Export), which later evolved into the maquiladora regime (Sandoval, 2012). By the 1990s, Mexico had integrated into the international division of labor in the electronics and IT sectors. This integration supported the development of a new export-oriented electronics industry, centered on the manufacturing of end products like computers, peripheral devices, televisions, and telecommunications equipment, while also extending—albeit to a lesser degree—into semiconductor exports (Ordoñez, 2005).

3.3 Mexican economy in semiconductors

Mexico could experience accelerated growth in the semiconductor sector due to nearshoring (an outsourcing strategy in which a company transfers part of its production to third parties located in nearby countries with similar time zones). This strategy involves the construction of new plants and contributes to the country's economic growth. Within the framework of the USMCA, Mexico has been identified as having the opportunity to design, train, assemble, and package semiconductors.

3.3.1 Behavior of the electrical and electronic industry in Mexico

In Mexico, only 0.08% of economic units in the manufacturing sector are dedicated to semiconductor manufacturing. The electronics industry has experienced very favorable development over the past decade, transitioning from a domestic-oriented industry to a competitive industry whose production is primarily destined for export.

The electronics sector generates almost 0.2% of the national Gross Domestic Product and approximately 330,000 direct jobs. Between 2015 and 2022, cumulative Foreign Direct Investment in this sector reached more than $9 billion, and annual exports exceeded $85 billion (Concamin, 2024).

The products with the largest share of Mexican exports are audio, video, computers, cell phones, and measuring instruments, among others. Currently, the global market for this sector is estimated at approximately $537.028 billion USD, but in five years, it could reach $664.053 billion USD, representing a 4.34% Compound Annual Growth Rate (CAGR) growth rate per year.

In Mexico, more than 3,500 companies are involved in the electronics sector. In 2024, according to the Ministry of Economy, the electronics sector could grow between 2.5% and 3.5% (CLELAC, 2024).

Total trade (including international purchases and sales) of electrical and electronic equipment was US$223.357 billion. Figure 1 shows Mexico's sales and purchases of electrical and electronic equipment.

Total trade (including international purchases and sales) of electrical and electronic equipment was US$223.357 billion. Figure 1 shows Mexico's sales and purchases of electrical and electronic equipment. International trade exchange of purchases and sales of electrical and electronic equipment

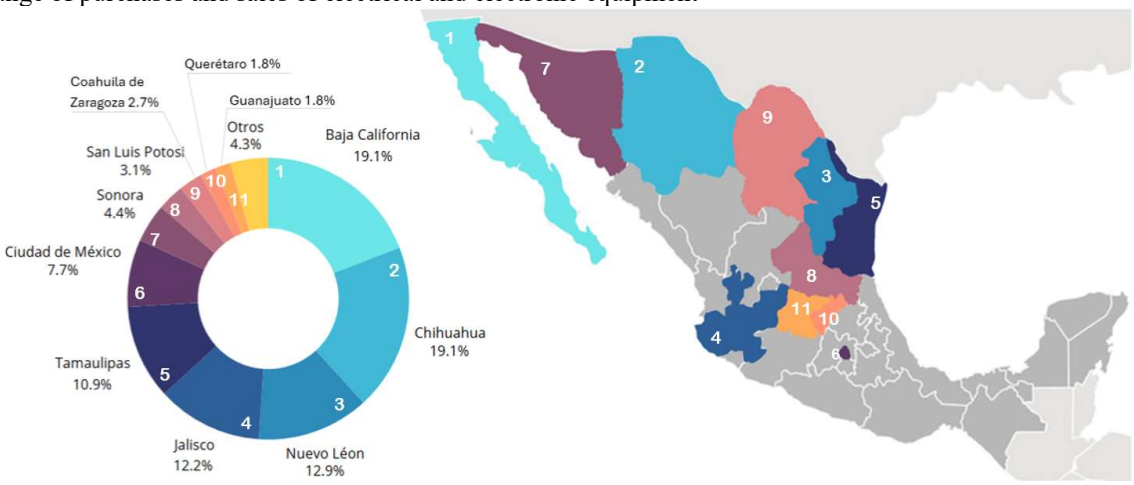

Fig. 1 International Sales by federal entity (2023), US$102,732 M (DATA México y del INEGI, 2023.)

Fig. 2 International sales by country (2023), US$102,723M (DATA México y del INEGI, 2023.)

It can be seen that the state of Baja California has the highest sales. Furthermore, the country with the largest sales of electrical and electronic equipment is the United States.

On the other hand, in 2023, the 10 federal entities with the largest international purchases of Electrical and Electronic equipment were those shown in Figure 3, with figures in millions of dollars and corresponding percentage.

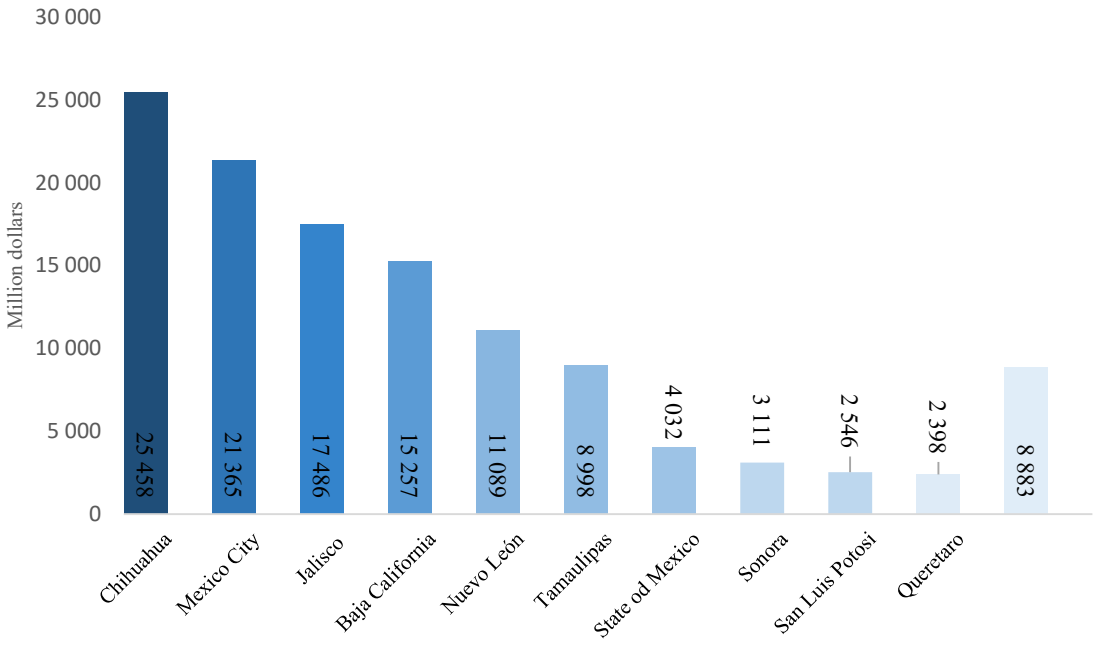

Fig. 3 Federal entities with the largest international purchases of electrical and electronic equipment (DATA México y del INEGI, 2023.)

We note that the state of Chihuahua, with $25.458 billion dollars, is the state that makes the largest international purchases of electrical and electronic equipment.

Table 1 shows the global market for electrical and electronic equipment. Mexico's share is highlighted in order to identify its contribution to the export and import market.

Table 1: Origins and commercial destinations of electrical and electronic equipment

Commercial origins of electrical and electronic equipment, 2022		Commercial destinations for electrical and electronic equipment, 2022	
Country	Commercial value	Country	Commercial value
China	$ 1,157.72 M	Estados Unidos	$ 459.73 M
Taiwán (República de China)	$ 314.59 M	China	$ 453.35 M
Corea del Sur	$ 248.81 M	Hong Kong	$ 345.85 M
Estados Unidos	$ 170.14 M	Alemania	$ 201.33 M
Vietnam	$ 169.22 M	Singapur	$ 139.16 M
Alemania	$ 163.87 M	Corea del Sur	$ 125.47 M
Malasia	$ 153.45 M	Taiwán (República de China)	$ 123.27 M
Japón	$ 149.39 M	Vietnam	$ 122.60 M
México	$ 102.24 M	Japón	$ 118.22 M
Singapur	$ 95.23 M	México	$ 107.41 M
Resto de Países	$ 826.51 M	Resto de Países	$ 1,354.78 M

It is observed that the commercial origin of electrical and electronic equipment is China, with $1,157.72 million dollars; while the commercial destination of this same equipment is the United States, with $459.73 million dollars, which is almost a third of what Mexico imports.

3.3.2 Manufacturing of electronic components in Mexico

The Gross Domestic Product (PIB) is the most widely used indicator to characterize the state of the economy and represents productive activity. It also measures the value of all goods and services produced and is the indicator used to determine a country's wealth. In the first quarter of 2024, the manufacturing industry recorded a GDP of $6.26 trillion pesos, indicating steady growth in the electronics sector.

Figure 4 shows net international trade, with international sales of Integrated Circuits and Controllers, Converters, Logic Circuits, and Amplifiers totaling US$82.5 million, while international purchases reached US$1,442 million. This results in a negative trade balance of minus US$1,360 million.

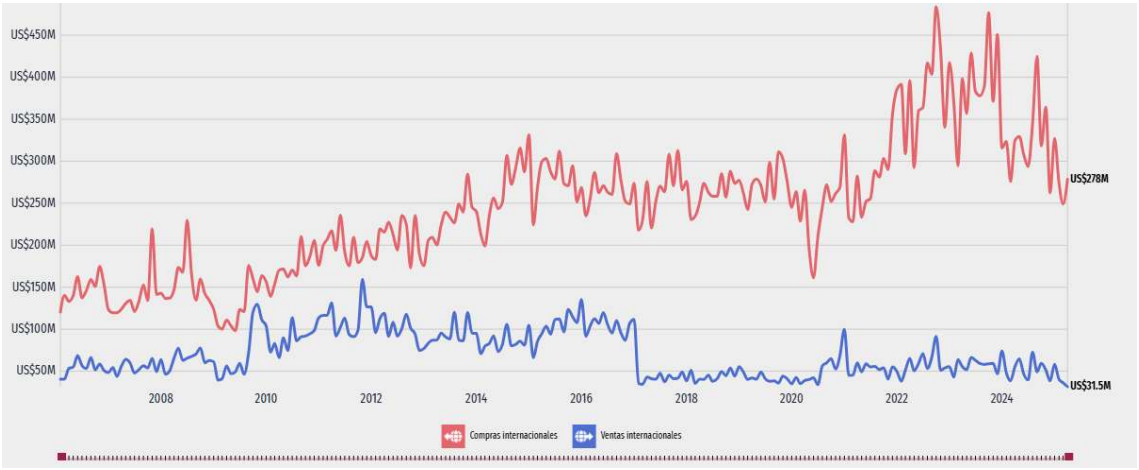

Fig 4. Net international trade in Integrated Electronic Circuits and Controllers, Converters, Logic Circuits, Amplifiers. (DATA México y del INEGI, 2023.)

The gap in international trade is very noticeable, this is because what Mexico buys is more than 17.5 times what it sells.

3.3.3 Foreign Direct Investment for the manufacture of electrical components

Foreign Direct Investment in Electrical Component Manufacturing

In addition to Foreign Direct Investment (FDI), from January to March 2024, FDI in Electronic Component Manufacturing amounted to US$90.4 million, distributed through intercompany accounts (US$73 million) and reinvested profits (US$17.4 million).

Historically (from January 1999 to March 2024), the states that have received the most FDI are Jalisco (US$3.75 billion), Baja California (US$2.87 billion), and Chihuahua (US$2.05 billion). Likewise, from 1999 to 2024, the

countries that contributed the most FDI were the United States (US$8.11 billion), Taiwan (US$2.02 billion), and South Korea (US$1.94 billion).

3.4 Economic Growth Analysis Linked to the Semiconductor Industry

Mexico holds a strategic opportunity to expand its role in the global semiconductor industry, driven by nearshoring trends, the USMCA (T-MEC), and a skilled labor force. Major firms such as Intel, Qualcomm, and Samsung have already established operations in the country, and the Mexican government has designated the sector as a national strategic priority.

The electronics sector accounts for approximately 2% of Mexico's GDP and employs over 330,000 people. Between 2015 and 2022, the sector attracted over USD 9 billion in foreign direct investment (FDI). In Q4 of 2023, Mexico's electronic equipment exports totaled USD 18.1 billion, with Baja California, Chihuahua, and Nuevo León as leading states in export activity.

In 2019, Mexico hosted 444 economic units focused on the production of electronic components, with Baja California, Jalisco, and Chihuahua leading in terms of output and revenue. As of Q1 2024, the manufacturing sector reported a GDP of MXN 6.26 trillion, reflecting sustained growth.

At the municipal level, the highest revenues in electronics were recorded in Zapopan (MXN 13.98 billion), Aguascalientes (MXN 13.59 billion), and Tijuana (MXN 13.17 billion). In terms of employment, Tijuana led with 56,900 workers, followed by Zapopan (42,600) and Ciudad Juárez (41,200).

During Q1 2024, FDI in the electronic component manufacturing sector reached USD 90.4 million. From 1999 to 2024, Jalisco (USD 3.75 billion), Baja California (USD 2.88 billion), and Chihuahua (USD 2.06 billion) were the top recipients. The principal investing countries were the United States (USD 8.12 billion), Taiwan (USD 2.02 billion), and South Korea (USD 1.94 billion).

3.5 Evaluation of Mexico's International Semiconductor Trade

In response to growing geopolitical tensions and China's dominance in semiconductor manufacturing, the United States unveiled a new policy to reduce reliance on East Asia, which currently accounts for 75% of global production. As part of this shift, Mexico has emerged as a key trade partner. In 2023, Mexico's total trade in diodes, transistors, and other semiconductor devices reached USD 5.31 billion.

International Semiconductor Trade in Mexico (2023).

International Semiconductor Sales

Table 2: Main exporting states and purchasing countries

Federal Entity	Sales (US$ millions)	Buyer Country	Amount (US$ millions)
Baja California	470	United States	602
Coahuila	52.9	China	18.3
Chihuahua	52.2	Thailand	9.99
México City	46.5	Brazil	8
Jalisco	32	Hong Kong	6.94
Total	**653.6**	**Total**	**645.23**

International Purchases of Semiconductors

Table 3. States with the largest imports and supplier countries

Entidad Federativa	Compras (US$ millones)	País Vendedor	Monto (US$ millones)
Baja California	1,464	China	1,613
Jalisco	844	Malaysia	850
Tamaulipas	787	Singapure	519
Chihuahua	537	Japan	341
Nuevo León	340	United States	257
Total	**3,972**	**Total**	**3,580**

Between January and March 2024, Mexico's semiconductor sector attracted $90.4 million in Foreign Direct Investment (FDI). This investment was allocated as follows: $73 million in intercompany transactions, $17.4 million in reinvested profits, and $0 million in new investments.

In Mexico, only 0.08% of economic units in the manufacturing sector are dedicated to semiconductor manufacturing¨

The electronics industry has experienced very favorable development over the past decade, transitioning from a domestic-oriented industry to a competitive industry whose production is primarily destined for export.

The electronics sector generates almost 0.2% of the national Gross Domestic Product and approximately 330,000 direct jobs. Between 2015 and 2022, cumulative Foreign Direct Investment in this sector reached more than $9 billion, and annual exports exceeded $85 billion (Concamin, 2024).

3.6 Incorporation into the semiconductor value chain

Mexico's participation in the electronics sector was achieved thanks to the introduction of the maquiladora system in the 1960s, the North American Free Trade Agreement in 1994, and the liberalization of trade in the sector's production chain in 2002. This sector has evolved due to the high global demand and its capacity to meet the needs of this market.

In Mexico, there are currently 26 public research centers and 20 universities and technological institutes that offer various electrical engineering and related fields. In the semiconductor sector, Mexico has 150 high-level researchers specializing in semiconductors and system structures. Mexico has been studying integrated circuits for 35 years (SE, 2022).

Table 3 shows that Mexico actively participates with chambers, associations and research centers dedicated to the electronics sector, among the most important are the following:

Table 4. States with the largest imports and supplier countries

Chamber, Associations or research center	Description
National Chamber of the Electronics, Telecommunications and Information Technology Industry (CANIETI)	It is responsible for achieving the competitive development of the Electronic Telecommunications and Information Technology Industry
National Institute of Astrophysics, Optics and Electronics (INAOE)	Center for research, technological development, and training of cutting-edge human resources, and certified quality, nationally and internationally, in the disciplines of astrophysics, optics, electronics, computer sciences, and areas Training of high-level researchers and the generation of cutting-edge scientific and technological knowledge in the areas of Bioelectronics, Communications, Solid State Electronics and Mechatronics
Center for Research in Advanced Materials (CIMAV)	Conduct scientific research, technological development, innovation, and human resource training with excellence in the areas of Materials, Energy, and the Environment, to help drive the country's sustainable development.
Center for Scientific Research and Higher Education of Ensenada, Baja California (CICESE).	Orientations offered: Instrumentation and Control, High Frequency Electronics and Telecommunications
Electronic Standardization and Certification, A.C. (NYCE)	National Standardization Organization (ONN) in the Electronics, Telecommunications, and Information Technology industry, which consolidated its leadership in conformity assessment for Mexican Official Standards (NOM) and Mexican Standards (NMX).
Center for Nanosciences and Micro and Nanotechnologies (CNMN) of the National Polytechnic Institute	Center for technological, scientific, and innovation services and development that generates value and growth in nanosciences and micro/nanotechnologies
Center for Nanosciences and Nanotechnologies (CNYC) of the National Autonomous University of Mexico.	Conduct scientific research in nanoscience and nanotechnology, generate basic knowledge and technological applications associated with new materials
Computing Research Center (CIC) – Microtechnology and Embedded Systems Laboratory (MICROSE).	It promotes innovation in Electronics and Communications, Embedded Systems, Computer Architecture, Multicore Architectures, Interconnection Networks, VLSI Design, RTL Design (FPGA), and MEMS Sensor Design and Microfabrication.

The table above shows that Mexico has the potential to promote the participation of the government, academia and industry to create a common front for the country to join the semiconductor value chain.

3.7 Semiconductor value chain

The semiconductor value chain has four central links: design, manufacturing, assembly and testing.

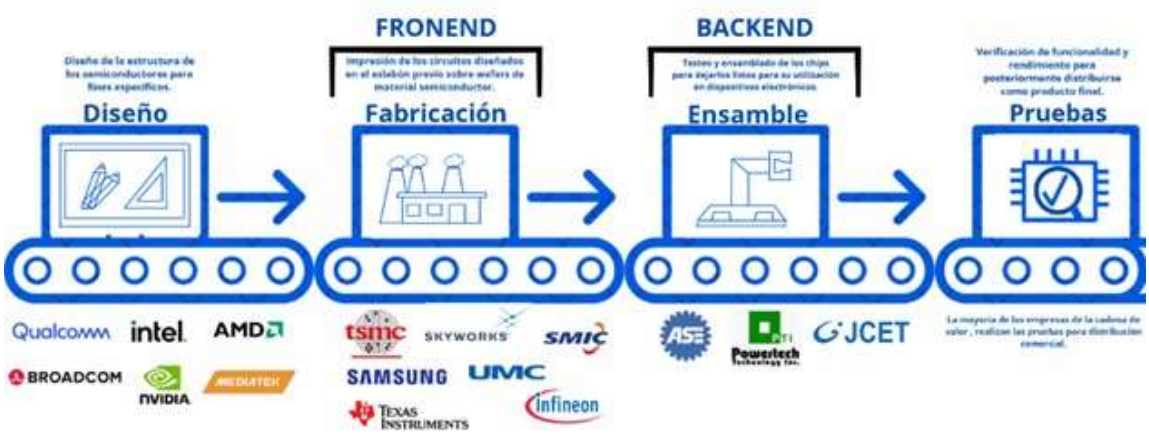

Fig 5. Stages of the semiconductor value chain

3.7.1 Semiconductor Design

In the design stage, the semiconductor structure is planned for specific purposes, such as electrical, thermal, and mechanical specifications for components. A mask is then created, which paves the way for circuit manufacturing. More than half of the research and development (R&D) expenditure is spent during this phase. Prominent design companies include Intel, Texas Instruments, Qualcomm, Nvidia, Broadcom, AMD, Mediatek, and others.

3.7.2 Semiconductor manufacturing (frontend)

This process begins with semiconductor materials called "wafers" or silicon wafers, on which materials are deposited. The circuit design is then printed using lithography between hundreds and thousands of times. The wafer is then cut into individual chips, the final product. Prominent manufacturing companies include TSMC, UMC, Samsung, Texas Instruments, SMIC, Global Foundries, and others.

3.7.3 Semiconductor Assembly (Backend)

Once the individual components have been obtained, they must be assembled into a single piece. This is the process of attaching the device to the board. Here, appropriate mounting methods must be chosen for the device, based on environmental conditions and performance requirements. For example, soldering, hermetic sealing, thermal management, shielding, and strain relief techniques must be used to prevent moisture, heat, radiation, and mechanical stress from affecting the device. Companies involved in assembly and testing include ASE, JCET, Amkort, Powertech, and TT.

3.7.4 Semiconductor testing

It is the process of verifying the functionality and performance of the device under different environmental conditions, thus certifying that the device complies with the specifications and standards of its application, for example, they must test the device to determine the temperature cycles, thermal shock, vibration, shock, pressure, humidity and radiation exposure, in addition, it must be characterized for parameters such as current and voltage curves, power dissipation, frequency response, noise and gain.

3.8 Semiconductor value chain in Mexico

There are companies that span the entire value chain (design, manufacturing, testing, packaging), but technological complexity has led companies to specialize in just one or two links in the value chain. Figure 8 shows the semiconductor companies operating in Mexico.

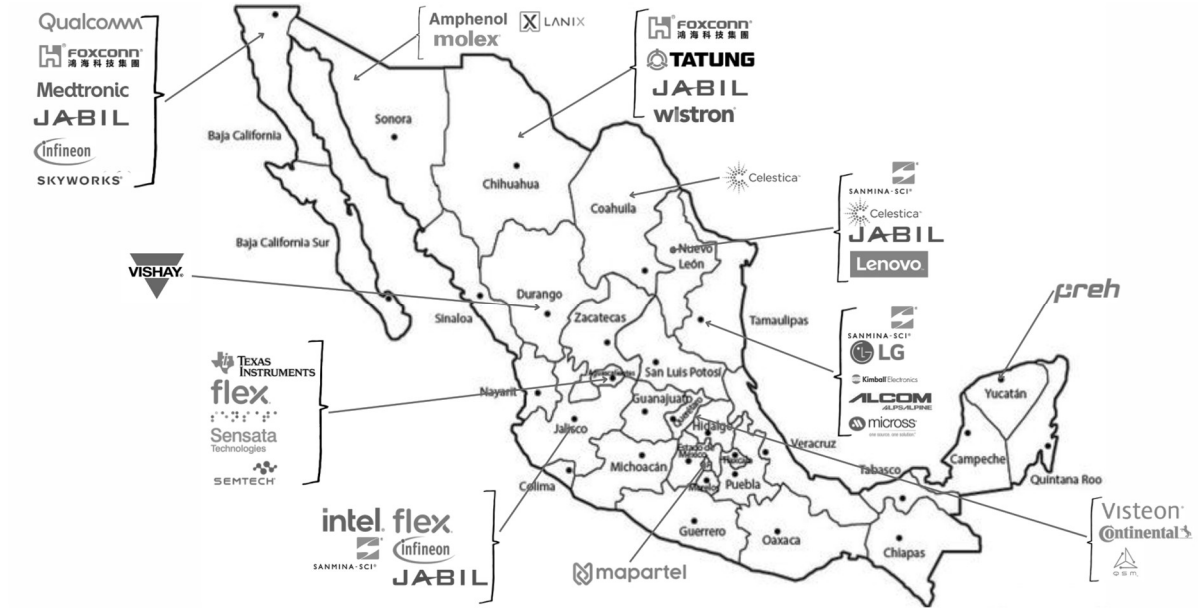

Fig 6. Companies established in Mexico that have one or more stages of the semiconductor value chain (design, manufacturing, characterization, encapsulation)

Companies with integrated production include Intel, Samsung, Micron, Texas Instruments, SK hvnix, Kioxia, Analog Devices, NXP, Infineon, ST, and Renesas.

3.9 Development of human talent in semiconductors

The federal government's Ministry of Economy is formalizing collaboration agreements for the transfer of innovation resources and the long-term training of highly specialized Mexican technology talent nationwide (SE, 2022).

The objective is to boost Mexico's leadership as a hub of innovation in the region and strengthen its role in the complex global semiconductor supply chain. This collaborative effort focuses on three pillars:

1. Develop the required talent in the institutions defined by the Ministry of Economy.
2. Increase the competitiveness of Mexican companies through the transfer of knowledge and best practices.
3. Promote global training programs in the semiconductor value chain.

Through an annual framework, whose points of agreement can be scaled based on identified needs and available resources, initiatives are expected to emerge that increase the availability of highly specialized local talent.

4. DISCUSSION

Mexico's participation in the global semiconductor value chain remains limited, restricting its technological and economic growth despite its favorable strategic conditions. This issue arises from the complex interaction of industrial, educational, political, and economic factors, requiring a systemic approach to identify integrated and sustainable solutions.

4.1 Mexico's Integration into the Semiconductor Value Chain

Mexico's electronics industry began in the 1960s, facilitated by the maquiladora model. Its integration accelerated with the North American Free Trade Agreement (NAFTA) in 1994 and the liberalization of the sector in 2002, progressively incorporating the country into the global semiconductor value chain.

Today, Mexico hosts an institutional ecosystem supporting sector development, including business chambers, research centers, and industry associations such as CANIETI, INAOE, CINVESTAV, CIMAV, CICESE, NYCE, CNMN-IPN, CIDESI, and CNYN-UNAM. These organizations provide expertise in research, standardization, innovation, and talent development.

4.2 Semiconductor Value Chain

The semiconductor value chain consists of three key segments:

- Design: A research and development (R&D)-intensive phase where functional circuit architectures are created. Leading companies: Intel, Qualcomm, Nvidia, AMD.
- Fabrication (Frontend): Silicon wafer processing using advanced lithography techniques. Major players: TSMC, Samsung, GlobalFoundries.
- Assembly and Testing (Backend): Includes packaging, mounting, and operational testing. Key firms: ASE, JCET, Amkor.

Some companies, such as Intel, Samsung, and Texas Instruments, maintain vertically integrated production chains, though specialization by segment remains the industry standard due to the sector's technological complexity.

4.3 Economic Impact

In 2021, Mexico's semiconductor-related exports totaled $9.024 billion, while imports amounted to $35.358 billion, resulting in a trade deficit of over $26 billion. However, semiconductor export growth (14% annually) exceeded import growth (5% annually), indicating a positive trend toward reducing the trade deficit.

Among the most relevant product segments are equipment, semiconductor devices, and passive components. Notably, passive components—although technologically less complex—yield a trade surplus favorable to Mexico.

4.4 Talent Development and International Cooperation

Mexico's Ministry of Economy has initiated agreements for technology transfer and specialized semiconductor workforce development, aiming to position Mexico as a regional hub for technological innovation. The strategy prioritizes three key areas:

1. Talent development through specialized education and training.
2. Business strengthening via knowledge transfer and innovation programs.
3. Global training initiatives to enhance Mexico's competitiveness in the international semiconductor market.

5. PROPOSED SOLUTIONS

Mexico must raise its awareness of the semiconductor market by training new talent, creating infrastructure, and supporting and providing incentives to facilitate semiconductor trade. Among the most important factors to address are the following:

5.1 Leadership in semiconductor programs

Implement policies and programs to provide investment credit for semiconductor design, manufacturing, and testing. Facilitate foreign direct investment so that companies in this sector can establish themselves in Mexico.

5.2 Strengthen National Technology

Implement a national strategy, supported by appropriate investments and in consultation with educational leaders and the private sector, to improve our education system, increase the number of Mexicans graduating in Science, Technology, Engineering, and Mathematics (STEM) fields, support academies and students pursuing microelectronics careers, and guarantee training and education opportunities to fill vacant positions. Reform Mexico's highly skilled immigration system to allow access to the world's best and brightest, including foreign students with graduate degrees in STEM fields. Secure funding to strengthen the semiconductor workforce at all levels.

The population in Mexico focused on STEM careers is the highest among OECD countries located in the Americas. Twenty-five percent of people between 25 and 64 years of age with higher education have this specialty. Furthermore, Mexico is among the seven OECD countries with the highest proportion of STEM graduates. Before countries like Chile, Canada, the United States, Poland and Spain.

5.3 Promote Free Trade and Protect Intellectual Property

Approve and modernize free trade agreements that eliminate market barriers, protect intellectual property, and allow for fair competition. Expand the Information Technology Agreement on customs duties and electronic transmissions.

5.4 Cooperate Closely with Like-Minded People

Align policies and regulations with like-minded allies, promoting growth, innovation, and supply chain resilience. National laboratories, universities, and businesses should work together to promote innovation; in other words, the gap between universities and semiconductor factories should be narrowed.

6. CONCLUSION

Mexico stands at a pivotal moment to position itself as a key player in the global semiconductor industry, driven by nearshoring strategies and the framework established under the USMCA. Although the country's current participation in semiconductor manufacturing remains limited, it holds a unique opportunity to expand its role through infrastructure development, talent training, and the implementation of supportive government policies.

Strategic leadership will be essential to ensure the effective implementation of initiatives such as the CHIPS and Science Act, as well as to generate investment incentives that strengthen the domestic semiconductor ecosystem. In parallel, enhancing education and training in STEM fields will be critical to developing a competitive and specialized workforce capable of driving technological innovation within the country.

International trade and the protection of intellectual property will serve as foundational pillars for industry growth, underscoring the importance of modern trade agreements and regulatory frameworks that promote fair competition in global markets. Furthermore, collaboration among universities, research laboratories, and industry partners will play a central role in advancing technological development and closing the gap between academic training and industrial needs.

With the right strategy in place—one that promotes investment, technological development, and international cooperation—Mexico has the potential to become a significant contributor to the global semiconductor value chain. The country’s geographic location, trade agreements, and emerging talent pool collectively position it as a strong candidate to lead the development of the semiconductor industry in Latin America.

References

[1] Afriyie, K. (1988). Políticas y factores que contribuyen a la transferencia de tecnología. A Technology Transfer Methodology for Developing Joint Production Strateies in Varying Systems, 81-95.
[2] Agustin Filipo, C. G. (Abril de 2022). México y la cadena de valor de los semiconductores . Obtenido de file:///C:/Users/SS/Downloads/Mexico-y-la-cadena-de-valor-de-los-semiconductores.-oportunidades-de-cara-al-nuevo-escenario-global%20(1)%20(1).pdf
[3] Concamin. (1 de 4 de 2024). mms-mexico.com. Obtenido de https://www.mms-mexico.com/articulos/productos-electronicos-de-consumo-sector-estrategico-para-mexico.
[4] Domínguez, M. C., & García-Vallejo, F. (2009). La sexta revolución tecnológica: El camino hacia la singularidad en el siglo XXI. La sexta revolución tecnológica: El camino hacia la singularidad en el siglo XXI, 8-21.
[5] Economía, S. d. (20 de Abril de 2022). La Secretaría de Economía e Intel apuestan por el fortalecimiento de la cadena de suministro de semiconductores en México. Obtenido de https://www.gob.mx/se/prensa/la-secretaria-de-economia-e-intel-apuestan-por-el-fortalecimiento-de-la-cadena-de-suministro-de-semiconductores-en-mexico?idiom=es-MX
[6] Escofet. (2020). Aprendizaje - servicio y tecnologías digitales: ¿una relación posible? Revista Iberoamericana de Educación a Distancia, 169-182.
[7] Escofet, A. (2020). Aprendizaje-servicio y tecnologías. Revista Iberoamericana de Educación a Distancia, 1-11.
[8] Guadarrama, V. H., & M., C. (2012). La industria electronica y la evolucion de la industria de software en dos regiones de México. México CEPAL.
[9] Horst, H., & Miller, D. (2015). Digital Anthropology. London: Berg Publishers.
[10] Jimenez, B. Y. (2018). Aproximación crítica a las principales teorías sobre el cambio tecnológico. Problemas del Desarrollo, 171-191.
[11] Markus, M. L., & Tanis, C. (2000). The Enterprise Sysrtem Experience, from Adoption to Sucess. Framing the Domais of It Research: Glimpsing the Future Through th Past, 172-207.
[12] Nelson, R. R., & Winter, S. G. (1982). An evolutionary theory of economic change. The Belknap Press of Harvard University Press, 1-12.
[13] Ordoñez. (2005). Empresas y cadenas de valor en la industria electrónica en México. Economia UNAM, 90-111.
[14] Reddy, M., & Liming, Z. (1990). Políticas y factores que contribuyena la transferencia de tecnología. The International technology Transfer, 285-307.
[15] Sandoval, E. (2012). El valle del silicio mexicano. ¿Un caso de ventaja competitiva en el pais? Universitaria Digital de Ciencias Sociales , 11.

[16] Schumpeter, J. (2013). Joseph Schumpeter y su influencia en la economía del cambio tecnológico. Debate Económico, Vol. 2, 142-161.
[17] Schumpeter, J. A. (1997). Teoría del desenvolvimiento económico: Una investigación sobre ganancias, capital, crédito, interés y ciclo económico . México DF: Segunda ed.
[18] Solow, R. (1956). El modelo de crecimiento de Solow. A contribution to the Theory of Economic Growth, 65-94.
[19] Vilain, M. A. (2012). Los Medios Masivos de Comunicación y su papel en la construcción y deconstrucción. Reflexiones, 189-199.

Parental Science Capital and Parents' Expectations for Children's STEM Careers: Evidence from 11 Countries

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Abstract

Science capital contributes to the differential development of achievement-related outcomes in science, technology, engineering, and mathematics (STEM). However, knowledge regarding this is argued to be derived from limited contexts and based primarily on students' self-reports. To address these limitations, the study examined the influence of parents' self-reported science capital—family member in STEM, parent scientific views, and parent scientific literacy—on their STEM career expectations for children in 11 countries. Using logistic regression analysis and controlling for the child's gender, math achievement, and socioeconomic status, the results indicated that all science capital variables were positively associated with parents' expectations across all countries. The largest effect sizes were observed for family member in STEM, followed by parent scientific views, and then parent scientific literacy. The study concludes with recommendations for raising STEM expectations through enhancing parental science capital, including fostering more positive attitudes towards the application of science in everyday life.

Keywords: Science capital, STEM, gender, career expectations

1. INTRODUCTION

The educational expectations of parents for children have an impact on their educational outcomes. It influences children's academic achievements and educational attainments (Briley et al., 2014; Lai et al., 2022; Lopez-Agudo et al., 2018; Lu et al., 2021) as well as overall school functioning, such as engagement with school activities (O'Donnell et al., 2022). Parents' educational expectations also influence the expectations that children hold for themselves (Kirk et al., 2011; Marcenaro-Gutierrez & Lopez-Agudo, 2017; Rimkute et al., 2012). Higher parental expectations, in particular, benefit children from disadvantaged backgrounds, such as minorities, by raising their educational and occupational expectations to those of their advantaged peers (Schmitt-Wilson, 2013), with long-term effects such as social mobility (Baker et al., 2014; Givord, 2020). Also, parental expectations influence parents' attitudes towards the education of children, such as financial planning, as parents with higher expectations are more likely to seek information about the cost of education and plan ahead of time to meet them (Lippman et al., 2008).

These associations between parental expectations and developmental outcomes in children are particularly observed because expectations are thought to be the most powerful determinants of educational outcomes when compared to other determinant variables that affect schooling outcomes (Jacob & Wilder, 2010; Lai et al., 2022; Roth & Salikutluk, 2012). Furthermore, the expectations of important socialisers such as parents, influence children's expectations by influencing their beliefs about the activities in which they can succeed and the subjective values they

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attach to those activities (Eccles et al., 1983; Wigfield & Eccles, 2000). Thus, parental expectations and aspirations are critical for improving children's academic and occupational attainments, including narrowing the attainment gaps that exist among different groups (such as boys and girls) in some fields, particularly science, technology, engineering, and mathematics (STEM).

Despite the importance of parents' expectations on developmental outcomes in children, there is limited research on what influences it, particularly from parents' perspectives and in STEM. This study contributes to filling this knowledge gap by investigating, in particular, the impact of parents' science capital on parents' STEM occupational expectations for children in 11 countries.

Science capital is a relatively new concept that has been shown to drive the differences in students' educational and occupational aspirations and expectations (Archer et al., 2014; Kutnick et al., 2018) and has been examined only in a few contexts outside the United Kingdom (Du & Wong, 2019). However, research has yet to show how parents' science capital affects their expectations and aspirations for their children. The study thus also contribute to expanding the contexts in which science capital is examined, by focusing on 11 countries representing geographically separate units with relatively disparate industrial, social, cultural, and economic orientations—all of which have varying effects on educational expectations, attitudes towards education, and overall educational outcomes. For example, compared to Western countries, most Asian countries have strong cultural norms that result in greater parental support, both financial and emotional, for male children compared to female children. This in turn leads to higher educational attainment for male children (Wong, 2013).

1.1. Science capital

Science capital provides a unique perspective on the discourse regarding the production of social advantages and disadvantages at the individual and national levels (Archer et al., 2015a) and it refers to the "various types of economic, social and cultural capital that specifically relate to science" (Archer et al., 2014, p. 5). Science capital was conceptualised and applied to students, particularly to understand why young people from some social groups do not participate in STEM after secondary school (Archer et al., 2015b). Within this context, Archer et al. (2014, 2015a) argued that the distribution of science capital along class lines is unequal, leading to the development of inequalities in STEM aspirations among children from different social classes. They contend that children from families with more science capital tend to aspire to more advanced scientific careers compared with their counterparts with less of it. They have access to more science-related resources at home, participate in more science-related extracurricular activities, and have parents and family contacts who may work in science fields. All of these advantages contribute to their developing STEM interests, the value they place on science qualifications, and, consequently, their higher aspirations and participation in STEM.

Although Archer et al. (2015b) posited that the concept of science capital may be applied to adults, current research on science capital still focuses on students, their participation in education, as well as the development of their STEM interests and aspirations (Cooper & Berry, 2020; Du & Wong, 2019; Godec et al., 2024; Kutnick et al., 2018; Moote et al., 2020), possibly because it was introduced to explain those phenomena among students (Archer et al., 2015a).

The current study contribute to science capital research in two important ways. First, it expands on the common approach of using students' self-reported data to understand the impact of science capital on STEM outcomes by linking parents' reports of their science capital to their expectations for their children's STEM occupational pursuits. Second, it has been observed that science capital research is UK-centric because it originated in the United Kingdom, with very few studies emanating from other jurisdictions around the world (Du & Wong, 2019). Our study of 11 countries aims to provide insight into how science capital operates in different cultures, socioeconomic, and political contexts, broadening the contexts in which science capital is studied.

The elevated status that STEM disciplines enjoy in societies and the strategic value that STEM qualifications have in the labour market demonstrate the "high symbolic and exchange value" that science capital commands globally (Archer et al., 2015a, p. 926). There is therefore a good reason to expect that families with more science capital, typically the middle class (Archer et al., 2014), will want their children to pursue STEM-related occupations. As a result, the study anticipates that parents' science capital would have significant and positive effects on their expectations for children.

1.2. Gender, socioeconomic status, and students' achievement

Though the study focuses on science capital, it also considers other variables—gender of the child, academic achievements, and parents' socioeconomic status—because of their impacts on expectations. Concerning higher educational enrolments, there are mixed results regarding parents' expectations for children. For example, whereas

some studies have found parents to expect more girls than boys to enrol in college (Dockery et al., 2022; Lippman et al., 2008), others show that the expectations of parents do not vary based on the gender of the child (Guo et al., 2018), particularly mothers' expectations (Wang & Chen, 2024). In specific study fields, it has been demonstrated that having a technician or trade profession increases the likelihood that a parent will expect a child to enrol in vocational educational training rather than pursue general programmes at university, regardless of the child's gender (Dockery et al., 2022). Also, parents are more likely to expect boys and not girls to pursue STEM subjects (Pacáková & Ježek, 2016). In countries with strong gender norms favouring boys, parents are more inclined to provide greater financial support to boys, leading to higher educational achievements (Wong, 2013). Consequently, differences in parental expectations regarding STEM fields for boys and girls are likely to be more noticeable in countries with strong gender norms, especially considering the probable higher cost associated with STEM education.

Parents' socioeconomic status influences their expectations for their children. The majority of studies, however, focus on general educational attainment, such as college enrolment, and the findings are mixed. For example, household income and financial assets positively influence parents' college educational expectations for their children (Zhan, 2006; Zhan & Sherraden, 2011). Also, parents with higher incomes are about twice as likely to expect their children to attend college than those with lower incomes (Smyth, 2020). However, some studies have found that parents in lower wealth and income quantiles have higher expectations for their children than those in higher quantiles (DeBacker & Routon, 2017). Also, household income (Dockery et al., 2022) and socioeconomic status (Koshy et al., 2019) have less predictive power on parents' expectations. Research is, however, scarce regarding how household income affects parents' expectations in specific fields, such as STEM. The study contributes to the knowledge about the STEM expectations of parents from different income brackets.

There is also a link between parents' expectations and the academic achievements of their children. For example, higher academic achievements are associated with higher parental expectations (Wang & Chen, 2024; Yamamoto & Holloway, 2010). However, there is limited knowledge regarding the impact of students' achievements on parents' expectations in specific disciplines, particularly in STEM. The reading abilities of children have been found to increase the likelihood of parents' expectations for them to pursue professional rather than skilled careers (Creed et al., 2007). Taskinen et al. (2016) found a positive correlation between parents' aspirations for their children's science careers and their achievements in science. The study expands on previous research by examining how students' achievements in math influence their parents' STEM occupational expectations for them.

2. DATA AND METHODS

The study used data from the 2022 Programme for International Student Assessment (PISA), which is publicly available at OECD (n.d.). Since 2000, PISA surveys have been conducted triennially to assess the learning abilities and skills of 15-year-olds, as well as a variety of behavioural traits in many countries (OECD, 2010). The surveys also include questionnaires for parents, which countries can choose to administer. While approximately 80 countries and economies participated in the 2022 PISA round, 17 countries administered the parent questionnaire. This study analysed data from 11 countries (Brazil, the Dominican Republic, Georgia, Germany, Hong Kong, Portugal, Croatia, Macao, Latvia, Panama, and Saudi Arabia). Costa Rica, Ireland, Korea, and Italy were excluded because they had no data on parents' reported income, which was used as an indicator of socioeconomic status in this study. Belgium and Colombia were excluded because the scale reliabilities for one of the derived variables in these countries—parent scientific literacy—was poor ($\alpha < 0.60$).

2.1. Dependent variable

Parents' STEM occupational expectations. This was a dichotomous variable derived from the following PISA question: *Do you expect your child will go into a <mathematics-related career>?* This was a yes/no question that was coded and used for analysis as follows: yes (1) and no (0). While the questionnaire used the term "mathematics-related careers", a preceding prompt guided parents to consider this as inclusive of all STEM fields, such as engineering and medicine. The study thus defines parents' STEM occupational expectations as parent's expectation that their child will have a STEM career.

2.2. Independent variables

2.2.1. Science capital

Archer et al.'s (2015a) framework guided the forms of science capital extracted from the PISA 2022 parent questionnaire (OECD, 2021). While Archer et al. proposed several broad forms of science capital, only three proxies

could be derived from the available questionnaire items in this study. As the variable names in the PISA 2022 questionnaire differ from those used by Archer et al., this study adapts and renames them to better reflect the conceptual categories proposed in the original framework. These include scientific literacy (referred to in this study as *parent scientific literacy*), broadly defined as scientific knowledge, skills, understanding of how science works, and the application of science-related abilities in everyday life. Other forms include science-related dispositions or preferences, referring to one's attitudes toward and views on specific science issues (*parent scientific views*), and knowing someone who works in a science-related field (*family member in STEM*). The names in parentheses are shortened labels adapted for use in this study.

Parent scientific literacy. Three items from the parent support scale were used as measures of parents' scientific literacy. They included:

Help my child with his/her mathematics homework.
Obtain mathematics materials (e.g. applications, software, study guides etc.) for my child.
Discuss with my child how mathematics can be applied in everyday life.

The scale assessed the support that a parent gives to a child at home, and these three items that were specific to mathematics (or science) were used (the scores ranged from 1- 5). The study assumes that the ability to engage in scientific discourse with children or support them on scientific matters indicates that a parent is scientifically literate. Higher scores also indicate higher science capital (*Scientific_Literacy*).

Scientific-related dispositions or preferences (parent scientific views). The four items that composed the PISA parent attitude towards mathematics scale were adapted. Sample items include:

It is important to have good mathematics knowledge and skills in order to get any good job in today's world.
It is an advantage in the job market to have good mathematics knowledge and skills.

The responses were scored from 1 (strongly agree) to 4 (strongly disagree). They were reverse-coded for higher values to represent higher parental science capital (*parent scientific views*). The items were designed to assess parents' views about the importance of mathematical knowledge (OECD, 2024).

Knowing someone who works in science (family member in STEM). Proxy question adapted from PISA:

Does anybody in your family (including you) work in a <mathematics-related career>?

This was a yes/no question that was coded and used for analysis as follows: yes (1) and (0).

Gender, socioeconomic status, and student achievements

Child's gender: This was coded as follows: male (0) and female (1)—male child was thus the reference group. The child's gender and own occupational expectations were based on the student questionnaire. A question measuring the annual incomes of households formed the basis of socioeconomic status. This was the only question in the parents' survey that assessed the socioeconomic status of parents. The responses included six ordered categories, with 1 and 6 being the lowest and highest income categories, respectively. Categories 4–6 were combined and coded high income (1), while categories 1–3 were combined and coded low income (0). Students' achievements in math (10 plausible values) in PISA 2022 were also included—the study assumes that parents are aware of the achievements of their children in math, which may inform their expectations.

Reliability estimates for parent scientific literacy and parent scientific views

The Parent Support scale in PISA 2022 comprised 14 items. For this study, only three of those items were adapted to construct a new variable—*parent scientific literacy*. Given this adaptation, it was important to assess the reliability of the construct for each country included in the analysis. Reliability estimates (Cronbach's alpha) for *parent scientific literacy* and *parent scientific views* are reported in Table 1. Two countries were excluded from further analyses due to low reliability for *parent scientific literacy* ($\alpha < .60$). Among the remaining countries, the reliability of this variable ranged from moderate ($\alpha > .60$)—as seen in Croatia and Portugal—to good ($\alpha > .80$) in several others. In contrast, the *parent scientific views* scale showed consistently good reliability ($\alpha > .80$) across all countries.

Table 1. reliability estimates for parent scientific literacy and parent scientific views across countries

	Parent scientific literacy	**Parent scientific views**
Country	Reliability alpha (α)	Reliability alpha (α)
Brazil	0.713	0.804
Croatia	0.682	0.848

Dominican Republic	0.767	0.875
Georgia	0.738	0.82
Germany	0.793	0.854
Hong Kong (China)	0.70	0.875
Latvia	0.72	0.85
Macao (China)	0.802	0.871
Panama	0.745	0.861
Portugal	0.666	0.833
Saudi Arabia	0.795	0.852

2.3. Analysis

A logistic regression analysis was used to determine the effects of the predictor variables on the outcome variable (STEM occupational expectations). Each of the 11 countries underwent a separate analysis. All analyses were conducted using the multiple imputation of missing data—*mitools*—(Lumley, 2022) and *survey* (Lumley, 2024) packages in the R environment (R Core Team, 2024). It is recommended that when including students' performance in any analysis, separate analyses be performed for each plausible value (in effect, ten separate analyses) and the average taken as the final result (OECD, 2009). This recommendation was implemented in this study because of the inclusion of math achievement. The survey weights provided in the dataset (W_FSTUWT) were used instead of the raw sample data. Missing values for derived variables were replaced by the row means for each variable. The science capital variables were standardised with a mean of zero and a standard deviation of one. This was to make it easier to interpret their coefficients and odds ratios.

The analyses were done in two steps. In the first step (Model 1), the effects of the three science capital variables on parents' expectations were examined. In the second step (Model 2), child's gender (female vs male), parents' socioeconomic status (high income vs low income) and child's achievement in math were added. This allowed for the assessment of the impacts of the science capital variables when other covariates are accounted for.

3. RESULTS

3.1. Descriptive statistics

The proportions and means of key variables are in Table 2. The results show that the proportions of parents expecting their children to have STEM jobs varied from country to country. The highest is about 76% in the Dominican Republic, 69% in Panama, 68% in Saudi Arabia, and 65% in Macao. The results also show proportion of parents who reported either having STEM jobs or having other family members with STEM jobs, exceed 50% in only two countries—the Dominican Republic and Panama. The proportion of parents in the high-income bracket exceeds 50% in only four countries (Croatia, Germany, Latvia, and Macao).

Table 2. Proportions and means of key variables

Country	**Family member in STEM (%)**	**Female child (ref: male child) (%)**	**High income (ref: low income) (%)**	**Parent expectations for the child (STEM career) (%)**	**Parent scientific views [Mean (SD)]**	**Parent scientific literacy [Mean (SD)]**
Brazil (n = 7,067)	43.71	51.39	20.6	39.36	0.2 (0.99)	0.08 (1.21)
Croatia (n = 4,153)	49.56	53.07	72.52	13.74	0.2 (1.08)	-0.17 (0.86)
Dominican Republic (n = 5,573)	67.54	53.63	30.13	76.06	0.38 (1.29)	0.69 (1.21)
Georgia (n = 4,402)	40.15	48.3	46.83	44.06	-0.18 (1.00)	0.31 (1.15)
Germany (n = 1,787)	27.87	48.52	85.08	44.31	-0.1 (0.97)	-0.49 (0.96)
Hong Kong (n = 4,206)	45.98	51.18	44.14	33.19	-0.48 (1.07)	-0.09 (0.90)
Latvia (n = 2,771)	43.77	52.32	54.57	33.58	-0.5 (1.11)	-0.26 (0.92)

Macao (n = 4,065)	39.72	48.98	67.8	65.33	0.10 (0.98)	-0.38 (1.00)
Panama (n = 2,403)	55.2	51.82	27.6	69.16	0.22 (1.27)	0.76 (1.19)
Portugal (n = 5,333)	48.33	50.4	25.83	51.52	0.17 (0.96)	-0.03 (1.03)
Saudi Arabia (n = 5,479)	46.06	53.43	15.87	67.6	0.25 (1.08)	0.55 (1.21)

Note. Parent scientific literacy and parent scientific views were standardized (z-scores) to have a mean of 0 and a standard deviation of 1.

Logistic regression analysis

For easier comparison of the logistic regression analysis results across countries, the odds ratios (OR) and confidence intervals are presented in plots; the estimated log-odd are and standard errors are in tables. The OR is obtained by exponentiating the estimated log odds. For statistical significance tests, an alpha value of .05 is used.

Model 1

The results for Model 1 are in Table 3 (estimated log-odds) and Figure 3 (odds ratios).

Table 3. Logistic regression estimates (log-odds) and standard errors for parents' science capital predicting parents STEM expectations for children across 11 countries.

	Intercept	**Parent scientific literacy**	**Parent scientific views**	**Family member in STEM**
Country	Estimate (*SE*)	Estimate (*SE*)	Estimate (*SE*)	Estimate (*SE*)
Brazil (n = 7,067)	-0.89 (0.04)	0.20 (0.02)	0.35 (0.03)	0.75 (0.05)
Croatia (n = 4,153)	-1.01 (0.07)	0.01 (0.05)	0.57 (0.04)	1.04 (0.07)
Dominican Republic (n = 5,573)	0.64 (0.07)	0.25 (0.03)	0.19 (0.03)	0.48 (0.08)
Georgia (n = 4,402)	-0.52 (0.05)	0.02 (0.04)	0.44 (0.04)	0.83 (0.07)
Germany (n = 1,787)	-2.42 (0.12)	-0.004 (0.09)	0.30 (0.07)	0.83 (0.15)
Hong Kong (n = 4,206)	-0.38 (0.04)	0.03 (0.04)	0.49 (0.04)	0.73 (0.08)
Latvia (n = 2,771)	-0.92 (0.07)	-0.02 (0.05)	0.61 (0.05)	0.95 (0.10)
Macao (n = 4,065)	0.38 (0.07)	0.12 (0.04)	0.59 (0.04)	0.80 (0.08)
Panama (n = 2,403)	0.53 (0.10)	0.18 (0.05)	0.26 (0.05)	0.21 (0.11)
Portugal (n = 5,333)	-0.43 (0.05)	0.04 (0.03)	0.60 (0.04)	0.82 (0.06)
Saudi Arabia (n = 5,479)	0.30 (0.05)	0.15 (0.03)	0.39 (0.03)	0.68 (0.07)

Note. Estimates represent log-odds; standard errors (SE) are in parentheses.

The results (Figure 1) show that the effects of *parent scientific views* in all countries are positive and statistically significant. The effects of having a family member in STEM are also positive and statistically significant in all but Panama. Finally, the effects of *parent scientific literacy* are positive and statistically significant in five countries.

A one-standard deviation increase in *parent scientific views* increases the odds of expectations the most in Latvia (83%, OR = 1.83), Portugal (82%, OR = 1.82), Macao (80%, OR = 1.80), and Croatia (77%, OR = 1.77). Having a family member with a STEM career more than doubles the odds of expectations in eight countries (Croatia: 183%, OR = 2.83; Latvia: 158%, OR = 2.58; Germany: 129%, OR = 2.29; Georgia: 128%, OR = 2.28; etc.). Finally, a one-standard deviation increase in *parent scientific literacy* increases the odds the most in the Dominican Republic (29%, OR = 1.29), Brazil (22%, OR = 1.22), and Panama (20%, OR = 1.20). The least positive effects are observed in Saudi Arabia (16%, OR = 1.16) and Macao (12%, OR = 1.12), while the effects in the remainder of countries are not statistically significant.

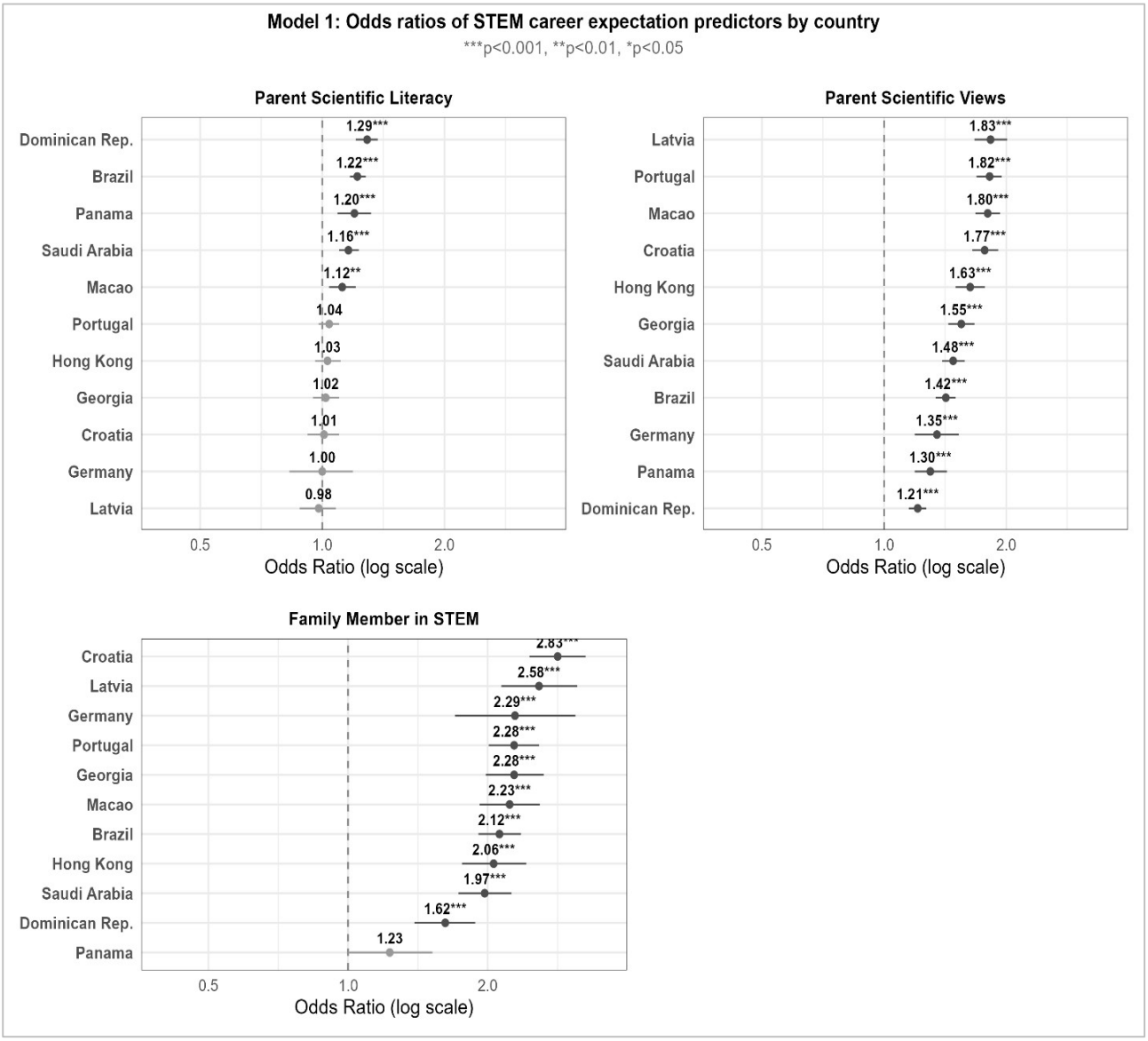

Figure 1. Forest plots of odds ratios of science capital variables (Model 1) on parents' STEM expectations for children in 11 countries. Data points to the right of the 'line of no effect' (OR = 1.00) indicate an increase in the odds of parents' STEM expectations (i.e., a positive relationship between expectations and the variable). Conversely, data points to the left suggest that a variable decreases the odds of STEM expectations (i.e., a negative relationship between expectations and the variable). Finally, data points line indicate that the variable does not affect STEM expectations.

Model 2

The results for Model 2 (estimated log-odds) are in Table 4 and Figure 3 odds ratios) below.

Table 4. Logistic regression estimates (log-odds) and standard errors for predictors of parents STEM expectations for children across 11 countries.

	Intercept	**Parent scientific literacy**	**Parent scientific views**	**Family member in STEM**	**Female child (ref: male child)**	**High income (ref: low income)**	**Math achievement**
Country	Estimate (*SE*)	Estimate (*SE*)	Estimate (*SE*)	Estimate (*SE*)	Estimate (*SE*)	Estimate (*SE*)	Estimate (*SE*)
Brazil (n = 7,067)	-2.28 (0.17)	0.24 (0.02)	0.36 (0.03)	0.68 (0.06)	-0.37 (0.06)	-0.36 (0.08)	0.004 (0.0004)

Croatia (n = 4,153)	-3.70	0.20	0.51	0.94	-0.36	-0.05	0.006
	(0.28)	(0.05)	(0.04)	(0.07)	(0.08)	(0.08)	(0.0006)
Dominican Republic (n =	0.96	0.25	0.19	0.54	-0.37	-0.25	0.0002
5,573)	(0.30)	(0.03)	(0.03)	(0.08)	(0.07)	(0.0)	(0.0009)
Georgia (n = 4,402)	-2.55	0.09	0.45	0.74	-0.74	0.16	0.006
	(0.22)	(0.04)	(0.04)	(0.08)	(0.08)	(0.08)	(0.0010
Germany (n = 1,787)	-3.28	0.11	0.27	0.82	-0.70	-0.37	0.003
	(0.51)	(0.10)	(0.07)	(0.16)	(0.15)	(0.16)	(0.001)
Hong Kong (n = 4,206)	-2.11	0.10	0.46	0.68	-0.50	-0.25	0.004
	(0.24)	(0.03)	(0.04)	(0.08)	(0.07)	(0.100	(0.000)
Latvia (n = 2,771)	-4.24	0.15	0.55	0.86	-0.55	-0.41	0.008
	(0.33)	(0.06)	(0.05)	(0.10)	(0.10)	(0.100	(0.0007)
Macao (n = 4,065)	-1.48	0.17	0.58	0.80	-0.56	-0.17	0.004
	(0.26)	(0.04)	(0.03)	(0.08)	(0.08)	(0.08)	(0.001)
Panama (n = 2,403)	0.36	0.17	0.25	0.37	-0.06	-0.69	0.001
	(0.36)	(0.05)	(0.04)	(0.12)	(0.12)	(0.14)	(0.001)
Portugal (n = 5,333)	-3.47	0.18	0.55	0.64	-0.48	-0.03	0.007
	(0.25)	(0.03)	(0.04)	(0.07)	(0.07)	(0.08)	(0.0005)
Saudi Arabia (n = 5,479)	-1.24	0.19	0.38	0.63	-0.13	-0.18	0.004
	(0.24)	(0.03)	(0.030	(0.07)	(0.08)	(0.09)	(0.001)

Note. Estimates represent log-odds; standard errors (SE) are in parentheses.

Science capital variables

Controlling for other covariates, the effects of parent scientific views on expectations remained positive across all countries. Having a family member in STEM was also positive and statistically significant in all countries—including Panama, which was not significant in Model 1. Parent scientific literacy became positive and statistically significant in all countries except Germany, marking a notable shift from the results in Model 1. Thus, after accounting for children's gender, parental socioeconomic status, and math achievement, the effects of the science capital variables on expectations generally strengthened. However, there were changes in effect sizes, which altered the relative ranking of countries in terms of the magnitude of these effects between Model 1 and Model 2.

As can be observed in Figure 2, for *parent scientific views*, a one-standard deviation increase now raises the odds the most in Macao (79%, OR = 1.79), Portugal and Latvia (73% each, OR = 1.73), Croatia (66%, OR = 1.66), Hong Kong (58%, OR = 1.58), and Georgia (56%, OR = 1.56). For *family member in STEM*, the effects remained strongest in Croatia (157%, OR = 2.57), Latvia (137%, OR = 2.37), and Germany (128%, OR = 2.28). The effect for *family member in STEM* is also now statistically significant in Panama (45%, OR = 1.45), though this represents the least effect for this variable. Finally, the effects for *parent scientific literacy* remained strongest in the Dominican Republic (28%, OR = 1.28) and Brazil (27%, OR = 1.27). The effects for *parent scientific literacy*, though not large, are also now positive and statistically significant in Georgia, Hong Kong, Latvia, Portugal and Croatia.

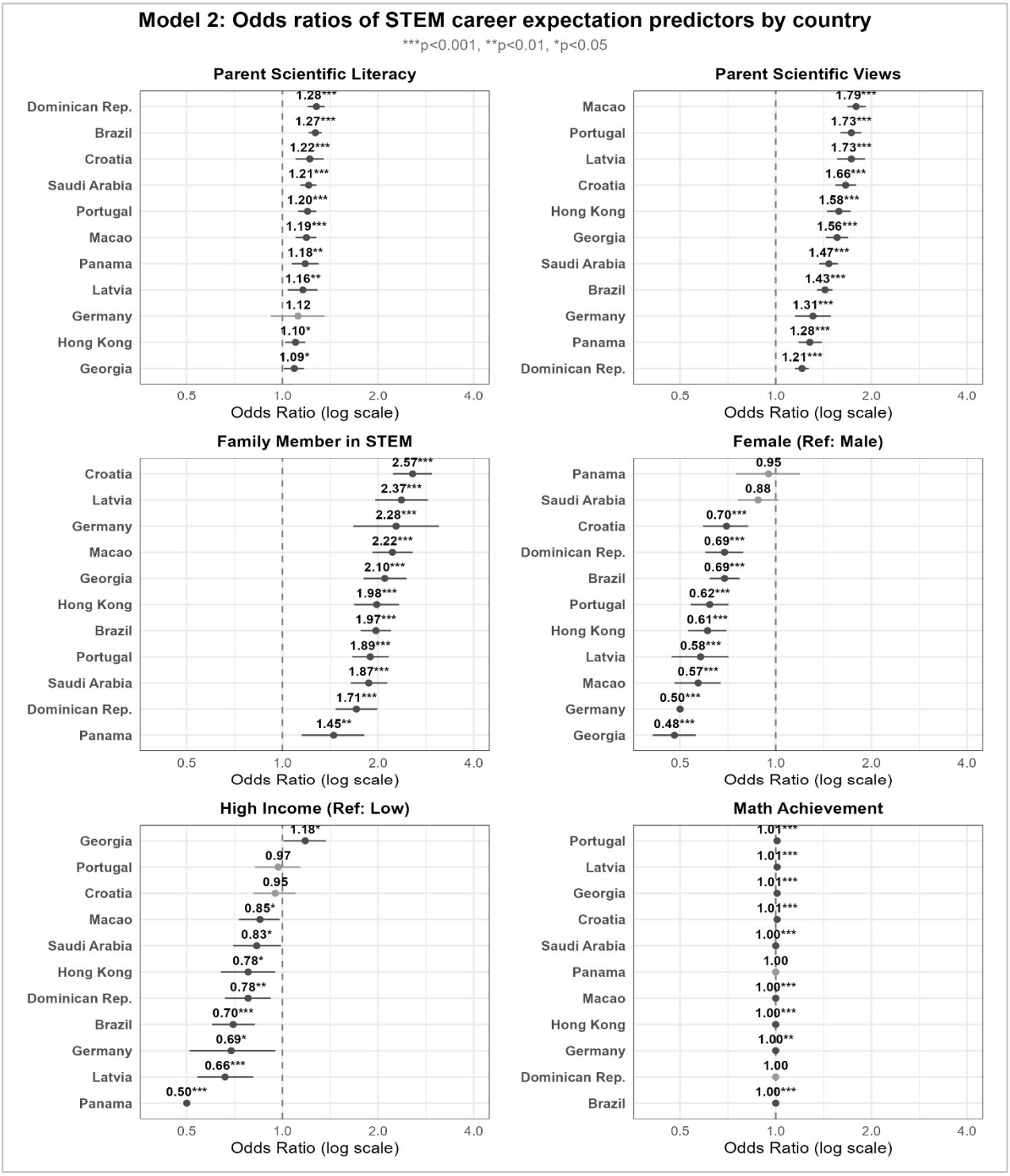

Figure 2. Forest plots of odds ratios of predictors (Model 2) parents' STEM expectations for children in 11 countries. Data points to the right of the 'line of no effect' (OR = 1.00) indicate an increase in the odds of parents' STEM expectations (i.e., a positive relationship between expectations and the variable). Conversely, data points to the left suggest that a variable decreases the odds of STEM expectations (i.e., a negative relationship between expectations and the variable). Finally, data points line indicate that the variable does not affect STEM expectations.

The effects of gender, achievement in math, and socioeconomic status

The results (Figure 2) show that the odds of parents expecting a child to pursue a STEM career are lower when the child is female compared to male in nearly all countries. The exceptions are Panama and Saudi Arabia, where the odds are also lower for females, but the differences are not statistically significant. The largest gender disparities are observed in Georgia (52% lower odds, OR = 0.48), Germany (50% lower odds, OR = 0.50), Macao (43% lower odds, OR = 0.57), and Latvia (42% lower odds, OR = 0.58). In terms of parental income, the results indicate that parents in

the high-income bracket, compared to those in the low-income bracket, have significantly lower odds of expecting a STEM career for their child in eight countries—including Panama (50% lower odds, OR = 0.50), Latvia (34%, OR = 0.66), Germany (31%, OR = 0.69), and Brazil (30%, OR = 0.70). Georgia is the only country in which parents in the high-income bracket show higher odds of STEM career expectations for their children compared to those in the low-income bracket (18%, OR = 1.18). Finally, math achievement have little to no influence on parents' STEM career expectations for children.

4. DISCUSSION

Science capital and parents' expectations for children

The study found that all three science capital measures were generally positively associated with parents' STEM expectations for children across all countries. This included having a family member working in STEM or knowing someone who does, *parent scientific literacy*, and *parent scientific views*. The positive impacts of these variables on expectations became more apparent when other covariates affecting expectations were controlled for—socioeconomic status, children's gender and achievements in math. These findings are consistent with the results of studies based on student samples (Du & Wong, 2019; Kutnick et al., 2018; Moote et al., 2020). Panama and the Dominican Republic exhibited the most distinctive patterns of associations across the three science capital variables. Both countries recorded the lowest odds ratios for *family member in STEM* and *parent scientific views* predicting STEM expectations. However, unlike Panama, the Dominican Republic also showed the highest odds ratio for *parent scientific literacy* predicting expectations. Alos, the two countries with the highest odds ratios for *parent scientific literacy*—the Dominican Republic and Brazil—are both located in Latin America, while the top three countries for *family member in STEM*—Croatia, Latvia, and Germany—are all European. In contrast, *parent scientific views* displayed a more geographically mixed pattern, with Macao, Portugal, and Latvia leading. These findings suggest that the salience of specific forms of science capital in shaping parental STEM expectations may reflect underlying geographic, cultural, and socio-economic contexts.

The positive impacts of science capital suggest that families with more science capital in the 11 countries expect their children to pursue science careers. This expectation may stem from an understanding of the "symbolic and exchange value" of these credentials (Archer et al., 2015a, p. 926) and a desire to facilitate their children's transition to a relatively prestigious and opportunity-rich occupational domain like STEM. This also relates to the proposition that the educational attainment, social, economic, and occupational positions of parents "shape their taste and perception of what is an appropriate educational and professional career of the children" (Eberharter, 2012, p.17). Parents' expectations also influence occupational status transmission among individuals (Martin, 2012). Thus, the positive relationship between science capital and parents' expectations in this study also indicates the role of science capital in driving differences in STEM educational and occupational outcomes across the respective countries.

Overall, working in a STEM-related field—or knowing someone who does—had the greatest influence on parents' expectations for their children to pursue STEM careers. This factor had the strongest effects in Croatia, Latvia, Germany, Macao, and Georgia, where it more than doubled the likelihood of such expectations. Stefani (2024) found that mothers working in STEM fields tend to encourage their daughters to pursue STEM courses in higher education, though not necessarily STEM careers, while fathers are more likely to encourage their sons to pursue STEM both in education and as a career. These suggest that open communication between parents and children regarding educational and occupational pathways—often shaped by the parents' own careers—helps forge a logical link between parental STEM backgrounds and expectations. Parents may see themselves as role models and thus hope their children will follow similar paths.

Parent scientific views—views on the importance of mathematics—was the next variable with the strongest effects on their STEM career expectations for children. The questionnaire items measuring this variable were job-focused. The results thus suggests that when parents perceive mathematics as valuable for future job prospects, they are more likely to encourage their children to pursue STEM pathways. This aligns with the expectancy-value theory proposition that subjective task values in a given academic domain are positively associated with educational and career expectations and aspirations in related domains (Eccles & Wigfield, 2020).

Parent scientific literacy, while positively associated with parents' STEM expectations, had the smallest effect sizes among the science capital variables. In most countries, its influence only became statistically significant after accounting for the child's gender, math achievement, and socioeconomic status in Model 2. This suggests that the effect of parent scientific literacy on expectations may be conditional, emerging more clearly when other relevant child and family characteristics are considered.

Gender, socioeconomic status, math achievement and parents' expectations for children

Being a female child, compared to a male child, either decreased the likelihood of parents expecting the child to pursue a STEM career—or had no statistically significant impact—in almost all countries. The recurrent pattern, observed across 11 countries, underscores the deeply rooted nature of this gendered tendency, cutting across diverse socio-cultural and economic contexts globally. While parents may provide a supportive environment conducive to STEM outcomes (i.e., fostering science capital), they may still be less likely to encourage girls to pursue STEM pathways (Lloyd et al., 2018). This discrepancy could contribute to the consistently lower parental STEM expectations for female children.

Similarly, parents in the high-income bracket, compared to those in the low-income bracket, were less likely to expect their children to pursue STEM careers. This aligns with the findings of Morales et al. (2024), who reported that parents' STEM expectations for their children were moderated by income group. Specifically, parents in the lower income quantiles had higher STEM expectations, which positively influenced their children's own expectations. In contrast, no significant moderation effects were found among parents in the upper income quantile. Morales et al. suggested that this pattern may be due to the fact that greater access to resources in high-income families reduces the centrality of parental income in shaping children's STEM career expectations.

Children's achievements in mathematics had either minimal (OR = 1.01) or no effect (OR = 1.00) on parents' STEM career expectations across the countries studied. Given the consistency of these findings, further investigation is warranted. Some studies have found that school-level academic performance is a stronger predictor of students' college and programme enrolment than national exam scores (Silva et al., 2022). This suggests that students' PISA scores—as used in the present study—may relate differently to parental expectations than do classroom-based or school-level assessments. Future research in the studied countries could therefore explore alternative measures of math achievement, such as classroom grades or teacher evaluations, to better understand the link between student performance and parental STEM expectations.

5. CONCLUSIONS

The study examined how different variables, particularly science capital, affect parents' STEM occupational expectations for their children in 11 countries. Science capital has only been studied in a few settings outside the United Kingdom, and all studies are based almost exclusively on student samples. Our study thus effectively addressed significant research gaps in science capital research, specifically how science capital relates to parents' STEM occupational expectations for children in different socioeconomic, cultural, educational, and political contexts.

In general, science capital was found to have positive effects on parents' STEM expectations in all countries. These findings contribute positively to the discourse on increasing students' expectations and enrolment in STEM. For example, given the close relationship between parents' science capital and their expectations, and consequently, parents' expectations and the expectations of children, increased parental science-related capital can contribute significantly to raising students' expectations and attainments in STEM. These findings thus highlight the importance of developing strategies to increase parents' access to science-related resources. This can be achieved by fostering more positive attitudes and views toward the application of science in everyday life and by encouraging parents to expand their social networks to include STEM professionals. The latter is particularly important when one considers that parents' who reported either working or knowing other people with STEM jobs had the highest STEM expectations for children in all the countries.

Limitations and directions for future research

The study is not without limitations. The three science capital variables were proxies derived from the PISA 2022 parent questionnaire. They undoubtedly reflect the descriptions of the various types of science capital investigated in this study, both in terms of content and implications. However, it is possible that using the original science capital questionnaire (Archer et al. 2015a) will produce different estimates of science capital for the respective countries, as well as their relationships with parents' STEM occupational expectations. Also relevant is the number of science capital indicators examined here. While Archer et al. elaborated on several types of science capital, only three proxies were extracted from the PISA 2022 parental questionnaire. Thus, research involving as many types of science capital is required to provide additional perspectives on how science capital influences parents' STEM-related occupational expectations and plans for their children.

Finally, why socioeconomic status—specifically income—relates differently to parents' STEM expectations for their children compared to science capital, which also encompasses aspects of socioeconomic status, warrants further investigation, particularly through qualitative approaches. One possible explanation is that higher income, as an indicator of status, may be applied in more varied and general ways. It may offer parents a broader range of developmental priorities for their children, in which career development may not be as prominent as other domains

such as well-being or personal fulfilment. In contrast, science capital is more narrowly focused and more directly linked to educational and career outcomes. Thus, its influence on parental expectations may be more specifically directed toward children's academic and occupational trajectories, whereas income may operate more diffusely across multiple life domains.

References

[1] Archer, L., Dawson, E., DeWitt, J., Seakins, A., & Wong, B. (2015a). "Science capital": A conceptual, methodological, and empirical argument for extending bourdieusian notions of capital beyond the arts. *Journal of Research in Science Teaching*, *52*(7), Article 7.

[2] Archer, L., Dawson, E., DeWitt, J., Godec, S., King, H., Mau, A., Nomikou, E., & Seakins, (2015b). Science capital made clear. *Enterprising Science Project, UK*. https://www.stem.org.uk/sites/default/files/pages/downloads/Science-Capital-Made-Clear.pdf.

[3] Archer, L., DeWitt, J., & Willis, B. (2014). Adolescent boys' science aspirations: Masculinity, capital, and power. *Journal of Research in Science Teaching*, *51*(1), 1–30. https://doi.org/10.1002/tea.21122.

[4] Baker, W., Sammons, P., Siraj-Blatchford, I., Sylva, K., Melhuish, E. C., & Taggart, B. (2014). Aspirations, education and inequality in England: Insights from the Effective Provision of Pre-school, Primary and Secondary Education Project. *Oxford Review of Education*, *40*(5), 525–542. https://doi.org/10.1080/03054985.2014.953921.

[5] Briley, D. A., Harden, K. P., & Tucker-Drob, E. M. (2014). Child characteristics and parental educational expectations: Evidence for transmission with transaction. *Developmental Psychology*, *50*(12), 2614–2632. https://doi.org/10.1037/a0038094.

[6] Cooper, G., & Berry, A. (2020). Demographic predictors of senior secondary participation in biology, physics, chemistry and earth/space sciences: Students' access to cultural, social and science capital. *International Journal of Science Education*, *42*(1), 151–166. https://doi.org/10.1080/09500693.2019.1708510.

[7] Creed, P. A., Conlon, E. G., & Zimmer-Gembeck, M. J. (2007). Career barriers and reading ability as correlates of career aspirations and expectations of parents and their children. *Journal of Vocational Behavior*, *70*(2), 242–258. https://doi.org/10.1016/j.jvb.2006.11.001.

[8] DeBacker, J. M., & Routon, P. W. (2017). Expectations, education, and opportunity. *Journal of Economic Psychology*, *59*, 29–44. https://doi.org/10.1016/j.joep.2017.01.004.

[9] Dockery, A. M., Koshy, P., & Li, I. W. (2022). Parental expectations of children's higher education participation in Australia. *British Educational Research Journal*, *48*(4), 617–639. https://doi.org/10.1002/berj.3786.

[10] Du, X., & Wong, B. (2019). Science career aspiration and science capital in China and UK: A comparative study using PISA data. *International Journal of Science Education*, *41*(15), 2136–2155. https://doi.org/10.1080/09500693.2019.1662135.

[11] Eberharter, V. V. (2012). *The intergenerational transmission of occupational preferences, segregation, and wage inequality: Empirical evidence from three countries*. SOEPpapers on Multidisciplinary Panel Data Research, No. 506, Deutsches Institut für Wirtschaftsforschung (DIW), Berlin.

[12] Eccles (Parsons), J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L. & Midgley, C. (1983). Expectations, values and academic behaviors. In J. T. Spence (Ed.), *Perspective on Achievement and Achievement Motivation* (pp. 75-146). San Francisco:W. H. Freeman.

[13] Eccles, J. S., & Wigfield, A. (2020). From expectancy-value theory to situated expectancy-value theory: A developmental, social cognitive, and sociocultural perspective on motivation. *Contemporary educational psychology*, *61*, 101859.

[14] Givord, P. (2020). *Are students' career expectations aligned with their skills?* OECD. https://doi.org/10.1787/ed790c76-en.

[15] Godec, S., Archer, L., Moote, J., Watson, E., DeWitt, J., Henderson, M., & Francis, B. (2024). A missing piece of the puzzle? Exploring whether science capital and stem identity are associated with stem study at university. *International Journal of Science and Mathematics Education*. https://doi.org/10.1007/s10763-023-10438-y.

[16] Guo, X., Lv, B., Zhou, H., Liu, C., Liu, J., Jiang, K., & Luo, L. (2018). Gender differences in how family income and parental education relate to reading achievement in China: The mediating role of parental expectation and parental involvement. *Frontiers in Psychology*, *9*, 783. https://doi.org/10.3389/fpsyg.2018.00783.

[17] Jacob, B. A., & Wilder, T. (2010). Educational expectations and attainment. NBER Working Paper No. 15683. *National Bureau of Economic Research*. https://eric.ed.gov/?id=ED508124.

[18] Kirk, C. M., Lewis-Moss, R. K., Nilsen, C., & Colvin, D. Q. (2011). The role of parent expectations on adolescent educational aspirations. *Educational Studies*, *37*(1), 89–99. https://doi.org/10.1080/03055691003728965.

[19] Koshy, P., Dockery, A. M., & Seymour, R. (2019). Parental expectations for young people's participation in higher education in Australia. *Studies in Higher Education*, *44*(2), 302–317. https://doi.org/10.1080/03075079.2017.1363730.

[20] Kutnick, P., Chan, R. Y.-Y., Chan, C. K. Y., Good, D., Lee, B. P.-Y., & Lai, V. K. W. (2018). Aspiring to become an engineer in Hong Kong: Effects of engineering education and demographic background on secondary students' expectation to become an engineer. *European Journal of Engineering Education*, *43*(6), 824–841. https://doi.org/10.1080/03043797.2018.1435629.

[21] Lai, T., Liu, F., & Huang, Y. (2022). The influence of parental educational expectations on children's higher education attainment: re-estimation based on instrumental variables. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.899348.

[22] Lippman, L., Guzman, L., Keith, J. D., Kinukawa, A., Shwalb, R., & Tice, P. (2008). Parent expectations and planning for college: Statistical analysis report. NCES 2008-079. In *National Center for Education Statistics*. National Center for Education Statistics. https://eric.ed.gov/?id=ED501131.

[23] Lloyd, A., Gore, J., Holmes, K., Smith, M., & Fray, L. (2018). Parental influences on those seeking a career in STEM: The primacy of gender. *International Journal of Gender, Science and Technology*, *10*(2), 308-328.

[24] Lopez-Agudo, L. A., Marcenaro Gutierrez, O., & Latorre, C. P. (2018). Parents' and students' gender-interaction: The effect of parental expectations. In J.-O. Escardíbul & Á. Choi (Eds.), *Investigaciones de Economía de la Educación 13* (1st ed., Vol. 13, pp. 57–70). Asociación de Economía de la Educación. https://EconPapers.repec.org/RePEc:aec:ieed13:13-03

[25] Lu, H., Nie, P., & Sousa-Poza, A. (2021). The effect of parental educational expectations on adolescent subjective well-being and the moderating role of perceived academic pressure: longitudinal evidence for China. *Child Indicators Research*, *14*(1), 117–137. https://doi.org/10.1007/s12187-020-09750-8.

[26] Lumley, T. (2022). *mitools: Tools for multiple imputation of missing data* (2.4) [Computer software]. https://cran.r-project.org/web/packages/mitools/index.html.

[27] Lumley, T. (2024). *Survey*: *Analysis of complex survey samples*. R package version 4.4.

[28] Marcenaro-Gutierrez, O. D., & Lopez-Agudo, L. A. (2017). The influence of the gap between parental and their children's expectations on children's academic attainment. *Child Indicators Research*, *10*(1), 57–80. https://doi.org/10.1007/s12187-015-9361-z.

[29] Martin, M. A. (2012). Family structure and the intergenerational transmission of educational advantage. *Social Science Research*, *41*(1), 33–47. https://doi.org/10.1016/j.ssresearch.2011.07.005.

[30] Moote, J., Archer, L., DeWitt, J., & MacLeod, E. (2020). Science capital or STEM capital? Exploring relationships between science capital and technology, engineering, and maths aspirations and attitudes among young people aged 17/18. *Journal of Research in Science Teaching*, *57*(8), 1228–1249. https://doi.org/10.1002/tea.21628.

[31] Morales, M. F., del Río, M. F., & Espinoza, A. M. (2024). The influence of parent's expectations and children's early skills on children's future STEM career prospects. *Revista Latinoamericana de Psicología*, *56*, 189. https://doi.org/10.14349/rlp.2024.v56.19

[32] O'Donnell, A. W., Redmond, G., Arciuli, J., Robinson, S., Skattebol, J., Raghavendra, P., Thomson, C., Wang, J. J. J., & Emerson, E. (2022). The Association between parental educational expectations and school functioning among young people with disabilities: A longitudinal investigation. *Exceptional Children*, *89*(1), 60–78. https://doi.org/10.1177/00144029221087392.

[33] OECD (2009). *PISA data analysis manual: SPSS, second edition*. https://www.oecd-ilibrary.org/content/publication/9789264056275-en.

[34] OECD (2010). *PISA 2009 results: what students know and can do: Student performance in reading, mathematics and science (Volume I)*. Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/education/pisa-2009-results-what-students-know-and-can-do_9789264091450-en.

[35] OECD (2021). *Parent questionnaire for PISA 2022: International option: Main survey version*. https://www.oecd.org/content/dam/oecd/en/data/datasets/pisa/pisa-2022-datasets/questionnaires/PARENT%20QUESTIONNAIRE%20PISA%202022.pdf

[36] OECD (n.d.). *PISA 2022 data*. Retrieved 17.05.2025 from https://webfs.oecd.org/pisa2022/index.html. https://webfs.oecd.org/pisa2022/STU_QQQ_SPSS.zip

[37] OECD (2024). *PISA 2022 technical report*. PISA, OECD Publishing, Paris. https://doi.org/10.1787/01820d6d-en

[38] Pacáková, H., & Ježek, M. (2016). Gender-influenced parents' investment in children's education. *Pedagogická Orientace*, *26*(4), 695–708.

[39] R Core Team. (2024). *_R: A language and environment for statistical computing_*. [R]. R Foundation for Statistical Computing. https://www.r-project.org/.

[40] Rimkute, L., Hirvonen, R., Tolvanen, A., Aunola, K., & Nurmi, J.-E. (2012). Parents' role in adolescents' educational expectations. *Scandinavian Journal of Educational Research*, *56*(6), 571–590. https://doi.org/10.1080/00313831.2011.621133.

[41] Roth, T., & Salikutluk, Z. (2012). Attitudes and expectations: Do attitudes towards education mediate the relationship between social networks and parental expectations? *British Journal of Sociology of Education*, *33*(5), 701–722. https://doi.org/10.1080/01425692.2012.668835.

[42] Schmitt-Wilson, S. (2013). Social class and expectations of rural adolescents: The role of parental expectations. *The Career Development Quarterly*, *61*(3), 226–239. https://doi.org/10.1002/j.2161-0045.2013.00051.x.

[43] Silva, P. L., Sá, C., Biscaia, R., & Teixeira, P. (2022). High school and exam scores: does their predictive validity for academic performance vary with programme selectivity? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4134133.

[44] Smyth, E. (2020). Shaping educational expectations: The perspectives of 13-year-olds and their parents. *Educational Review*, *72*(2), 173–195. https://doi.org/10.1080/00131911.2018.1492518.

[45] Stefani, A. (2024). Parental and peer influence on STEM career persistence: From higher education to first job. *Advances in Life Course Research*, 62, 100642. https://doi.org/10.1016/j.alcr.2024.100642

[46] Taskinen, P. H., Dietrich, J., & Kracke, B. (2016). The role of parental values and child-specific expectations in the science motivation and achievement of adolescent girls and boys. *International Journal of Gender, Science and Technology*, *8*(1), 103–123.

[47] Wang, X., & Chen, B. (2024). Investing in sons or daughters? The educational aspirations of rural parents in China. *British Journal of Sociology of Education*, *45*(1), 101–118. https://doi.org/10.1080/01425692.2023.2274817.

[48] Wong, E. S. (2013). Gender preference and transfers from parents to children: An inter-regional comparison. *International Review of Applied Economics*, *27*(1), 61–80. https://doi.org/10.1080/02692171.2012.700702.

[49] Yamamoto, Y., & Holloway, S. D. (2010). Parental expectations and children's academic performance in sociocultural context. *Educational Psychology Review*, *22*(3), 189–214. https://doi.org/10.1007/s10648-010-9121-z.

[50] Zhan, M. (2006). Assets, parental expectations and involvement, and children's educational performance. *Children and Youth Services Review*, *28*(8), 961–975. https://doi.org/10.1016/j.childyouth.2005.10.008.

[51] Zhan, M., & Sherraden, M. (2011). Assets and liabilities, educational expectations, and children's college degree attainment. *Children and Youth Services Review*, *33*(6), 846–854. https://doi.org/10.1016/j.childyouth.2010.12.006.

Dual Education Entities and Their Importance for Better Employment of Graduates in the Labor Market

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Abstract

Placing graduates in the labour market is an important task not only for the Department of Education, but also for employers. Nowadays, it is necessary that a graduate of a secondary vocational school comes to the labour market excellently prepared not only in the field of theoretical knowledge but also in the skills that are necessary for the performance of work activities. In the paper we are dealing with the issue of dual education in Slovakia, its transformations over the years, the legislative framework of such education. We approach the basic elements participating in dual education and their influence on vocational training of secondary school students. Education and vocational training are key factors that influence youth employment. In dual education, secondary vocational school pupils can acquire the necessary competences and attitudes in preparation for work, thus facilitating their transition from the school to the working environment. The paper includes the most significant results of the questionnaire method of our own construction and the interviews we conducted with pupils, teachers and workers who are involved in and actively participate in dual education in the selected enterprises. Together we identified the pros and cons, advantages and disadvantages of the above mentioned education.

Keywords: pupil in dual education, dual education, employer, school in dual education, dual education legislation

1. INTRODUCTION

Dual training, which aims to meet employers' ideas of employee training that is “tailored to the employer's requirements”, is now increasingly promoted. This training is a close collaboration between the school, the employer

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and the pupils. In dual education, pupils combine theoretical knowledge with practical skills and the result is that they are ready for independent work, which enables them to enter the labour market better and faster.

2. DUAL TRAINING

In the past, during the socialist period, there was general and vocational education in secondary schools. At that time everything was aimed at the working class, at developing and building companies, it was necessary to have as many workers as possible working in them.

Malicek and Muthová (2019) state that the socialist regime was focused on the working class, its main interest was in building companies, improving them, so that as many workers as possible worked in them. There were secondary vocational schools that cooperated with various enterprises, which provided pupils financially and materially at the time of instruction. Employers tried to prepare school graduates so that they could immediately start working according to the needs of the enterprises, while trying to build up and provide as much support and benefits for their employees as possible. In the secondary apprenticeship schools, the main form was vocational-apprenticeship training, with the practical part making up about a quarter of the course. At that time, there were also three-year apprenticeships without matriculation, with continuous four-month work experience in enterprises. Changes took place after 1989.

Nowadays, according to Průcha (2009), thanks to vocational education, pupils acquire the prerequisites for good functioning in working life, for employment in their field. Employment means the prerequisite to find a job in the conditions of the labour market in different periods of life. In secondary vocational schools, education is divided into theoretical and practical teaching. Practical education includes exercises, vocational training, apprenticeships, vocational or artistic practice, depending on the discipline. Practical training may take place in schools, educational establishments or in the workplaces of natural and legal persons who have concluded a contract with the school on the conditions, content and scope of the work to be carried out, related to the field of education.

Vocational education includes practical training carried out in vocational secondary schools and conservatories. It provides pupils with the necessary competences and work habits. The following forms of practical training are known:

Vocational training - a vocational subject which is implemented according to approved educational programmes, the pupil may participate in it, if necessary, also during school holidays.

Vocational training - takes the form of work practice, producing products appropriate to the future occupation. It is carried out under the guidance of a competent person - the vocational training master, who supervises and is responsible for the pupils' activities.

Practical training - through which pupils deepen their theoretical knowledge and skills in medical, economic, technical and other activities. It takes place in group form in school facilities or at workplaces designated for practical training (www.minedu.sk, 2018).

There are now many calls for employers to promote the principle of partnership and cooperation between all stakeholders in the development of education and training systems and the development of lifelong learning. In this context, dialogue between secondary vocational schools and employers is important. Only effective cooperation between employers and secondary vocational schools can ensure that vocational education in schools is more closely linked to the labour market needs of employers in preparing their future employees.

Dual training is based on an apprenticeship contract between employer and apprentice, a dual training contract between employer and vocational secondary school, and thus links practical training at the employer's school with theoretical training at the vocational secondary school. In society, it is an important tool for preparing a skilled workforce for the labour market and, at the same time, it is an important tool for reducing youth unemployment, the main cause of which is the mismatch between the skills of school leavers and the needs of employers, which is also one of the disadvantages of young people entering the labour market.

The emergence of dual education is mainly aimed at minimising the shortage of skilled labour in company production. Another important factor for its introduction in the Slovak Republic is the high unemployment rate of secondary vocational school graduates. On 20 October 2021, the National Council of the Slovak Republic adopted Act No. 413/2021 Coll, No 61/2015 Coll. on Vocational Education and Training and on Amendments and Additions to Certain Acts, as amended by Act No 209/2018 Coll. The Act entered into force with its promulgation in the Collection of Acts on 19 November 2021 and became effective as of 1 January 2022. The process of drafting and approving this Act should be seen in the context of reflection on the results of the National Project “Dual Education and Increasing the Attractiveness and Quality of Vocational Education and Training” and the response to the requirements of the application practice. Act No 413/2021 Coll. brought about several changes in the dual education system with expected positive effects on the business environment and social impacts.

The amendment to the Vocational Education and Training Act has brought several fundamental changes:

- it responds to the administrative burden on employees in the process of verifying eligibility for dual training by removing the obligation to submit an extract from the Commercial Register of the Slovak Republic. This document replaces the obligation to submit an extract from the criminal record with an affidavit.
- another change is the possibility to carry out practical training in the form of work experience also in an accredited institution as part of practical training abroad.
- Changes were made in the process of informing the school, via the staff member, of information concerning the unfilled number of apprenticeship places for dual training and the list of admitted pupils who have not received confirmation of dual training provision from the employer. Applicants who have not enclosed a certificate with their application form shall be informed of the possibility of concluding an apprenticeship contract for the provision of dual training.
- New grounds for termination of the dual training contract by the school. The pupil and his/her legal representative may terminate the apprenticeship contract for dual training if the pupil or his/her legal representative concludes a new apprenticeship contract for dual training with a new employer. However, the new employer must have signed a dual training contract with the school.
- The school receives the same amount of normative funding per pupil in the dual education system as for a pupil not involved in dual education,
- simplification of the process of certification of employers for dual education, extension of the definition of a workplace of practical training,
- Deletion of model curricula and model syllabuses from the Act,
- increasing the proportion of practical training as part of dual education,
- reducing the period for terminating a contract from the previous three months to one month,
- the introduction of the institute of a company school,
- the introduction of the position of chief instructor (in addition to practical teaching of pupils in dual training, he/she also performs the necessary tasks related to the coordination of practical training), stricter qualification requirements for the position of chief instructor (at least 5 years of experience) and the expansion of the content of the training,
- modification of the competences of self-governing regions in the area of determining the number of first year classes of secondary schools for individual study and teaching fields in the full-time form of study, for the admission procedure for the following school year (Secondary School Performance Plan),
- Career guidance - within the framework of the National Dual Project, the so-called Dual Points and the Orientation Centre have been created and are located in all regional towns in Slovakia,- the introduction of a contribution to the provision of practical training in the dual education system, - tax reduction for employers who provide practical training in dual education, etc. (Act No. 413/2021 Coll., 2022).

In pedagogical practice, a Manual of the Dual Education System (2024) has been developed for dual education, which is a guide for secondary vocational school staff, the staff of the school's founder and for employer staff who decide to participate in the dual education system and thus take responsibility for the practical teaching of secondary vocational school pupils. It also guides the employer and the school through the process of joining the dual education system when carrying out practical training with the employer. It provides the school and the employer with basic information on the legislative conditions of the dual education system, on the conditions of material and financial security of the pupil, on the tax and levy obligations of the employer and the pupil, which are connected with the provision of practical training.

The European Union has adopted a number of plans and regulations relating to dual training in the various countries in order to strengthen the educational, practical skills of, in particular, secondary vocational school graduates. In particular, it is about streamlining the skills of pupils already during their preparation for a future profession in a school environment. Many countries in the European Union also use a vocational education and training system in the education system, which not only has an impact on unemployment, but also promotes the overall development of the country in question.

For the proper functioning of practical training and its completion, contracts are established which determine the rights of the participants involved in dual training. This ensures that the requirements for the pupil, school, employee relationship are clearly defined. Contracts can only be granted if the employer has a Certificate of Competence for the provision of practical training. It will then present them to the parties for whom the contracts are intended, giving them time to study and evaluate them.

3. PUPIL IN DUAL EDUCATION

An employer who participates in dual training together with the school with which it has a contract accepts pupils into the dual training system. Pupils can find out about dual training by:
- an offer published directly on the employer's website,
- by means of an excursion directly in the company,
- recruiting pupils for temporary work in the company,
- by attending an open day at the company,
- internships for primary school pupils with the employer.

The most important subject of dual education is the pupil, who has certain obligations arising from the Act on Dual Education and must respect and comply with them. Several aspects are set out for the proper operation of dual education.

Kováč and Žitňáková (2015) state that if we want the pupil to thrive in practical education and comply with the regulations within the dual education contract, it is necessary to constantly motivate him/her. It is necessary for the vocational master to use all methods, means, strategies and ways of teaching to ensure that the pupils not only know how to perform their work independently, but that they develop a positive attitude towards their work activity. How the apprentice is assessed in the learning process is important; it is the assessment that can strengthen the apprentice's progress and his/her conviction that he/she really wants to do this work in the future. It is also important to use non-verbal communication in appraisals as a smile, appreciative look and nod of the head can create a good atmosphere in the workplace. If a pupil is often evaluated negatively, this can affect their performance and their attitude towards their future profession.

According to BILLA (2019), by engaging in dual education, a pupil can gain the following benefits in the form of:
- A financial allowance to help the family from the expenses of the pupil, which can lead to a better financial situation for the family,
- the acquisition of practical skills in a real company environment, which brings the pupil progression in his/her field, resulting in a better salary already during the recruitment process,
- acquiring work habits already during their studies, leading to easier integration into the work team
- by acquiring the necessary professional knowledge that will contribute to the improvement of the company where he performs practical training and develop the overall status of the company,
- acquire practical competences that lead him to work independently and to master problem solving,
- by participating in various training courses, he learns about the process of operation and the company and gains an overview of the possibilities for growth and promotion in the future.

The money and time a company invests in a student in dual training is in its own interest. By working with a trained employee who stays with the company, the company creates a favorable promotion of the company.

Dual training is an opportunity for all those who want to be part of it. It is open to anyone who wants to be trained in practical education. The school is a place that ensures and facilitates the transition of pupils from the school environment to the workplace through the acquired knowledge and competences in the field they have chosen.

If a school wants to participate in dual education, it must:
- find out about the fields that would be suitable for dual education,
- make a survey of the companies to work with the school,
- adapt the school's curriculum and syllabus,
- adjust the number of apprenticeships needed in the school's workshop,
- recruit and enrol pupils in dual training,
- assign suitable staff to work in dual training,
- establish the conditions for admission to dual training in cooperation with the employer,
- cooperate with the company in providing information about the pupils, their attendance and the activities carried out,
- be aware of the rights of withdrawal from the Dual Education Contract (SIOV, 2019)

Practical training is provided by the employer to the pupils in his/her company, this training forms an organisational part of the employer with whom the secondary vocational school has concluded a contract. Employers are obliged to give the school management access to observe pupils who undertake practical training with them. The employer shall allow the pupil to make an easy transition from school to employment. It enables the apprentice to do work during his/her studies that prepares him/her for employment after the end of his/her education. For the proper functioning of

dual training, it is necessary for the company to have competent teaching and non-teaching staff. This is a group of people whose task is to prepare students for the performance of work in their future employment. This group includes:
- master of vocational training,
- the chief instructor,
- instructor.

Each of the aforementioned has certain responsibilities and competences within the framework of dual education. For the proper functioning of practical training, they must use all competences that lead to the fulfilment of the content of the educational activity.

4. DISCUSSION AND CONCLUSION

Dual education has been implemented for several years in the framework of the practice of secondary vocational schools in the Prešov Region. The aim of our research was to find out the attitudes, opinions of vocational training masters, employers, school management on dual education, its quality, to identify its positives and negatives, how the stakeholders are satisfied with the results of the practical training of pupils for the work process, whether the pupils have sufficiently applied in their field, etc. The main research method was a self-constructed questionnaire, which included 21 closed and open-ended items. It was distributed online and 210 respondents participated in the research. Another method was interview with school heads and employers in different fields. We analysed the results and present the most interesting ones in our paper.

Through interviews with school leaders, we found that there is a need to continue to support dual education, but there is an associated burden on school leadership in terms of legislative regulations and administration. We visited secondary vocational schools that have been practicing dual education for three years, but among the respondents were principals who have only one year's experience with dual education and who still need a lot of support and guidance. They all agreed that students in dual education have better developed practical competences, are more skilled, know the working environment and can cope with solving some problems related to their field. This leads them to improve their theoretical training as well, because problem solving, manual e.g. repair, even under the guidance of a master trainee, also requires theoretical knowledge.

The training masters complained about the tardiness of some students, which cannot be tolerated in the work process. On the positive side, many pupils are becoming more interested in professional practices, improving their professional communication, tool handling, respect for the master's authority, etc. Some are unfocused and there is damage to material or downtime, which should not happen in practice. In all cases, the pupils have good conditions for practical training and evaluation. In smaller districts, schools have difficulty recruiting pupils to study.

By analyzing the questionnaire we found that the masters of vocational training have a problem with the theoretical knowledge of employees when hiring them, but after the experience of hiring employees who have been dually trained, 78% of respondents have a positive evaluation of dual training as a very suitable preparation for practice. After completing dual training, students are more likely to be employed directly in the company in which they did their practical training. As many as 62% of respondents complained about the behaviour of the pupils towards staff and clients, when courtesy and a professional explanation of the procedure to the client was needed.

Dual education also brings positives for companies, as skilled pupils also take part in more demanding tasks where not only professionalism but also logical thinking and practical skills are required.57% of the respondents said that such pupils helped the company with their work.

Vocational training masters, 91%, stated that graduates of dual training show quick and easy adaptation to the working environment, the workplace team and also respond flexibly to work tasks.

Dual training still needs a lot of time to identify as many of its positive and negative aspects as possible, so that we can provide young people with the best possible preparation for their future occupation and thus enable them to better position themselves on the labour market.

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References

[1] BILLA (2019). Duálne vzdelávanie. [online]. [cit. 2025-04-15]. Dostupné na internete: <https://www.billa.sk/specialfolder/footer/kariera/dualne-vzdelavanie/dualnevzdelavanie>.

[2] Kováč, L., Žitňáková, L. (2015). *Systém duálneho vzdelávania – manuál pre zamestnávateľa, strednú odbornú školu a zriaďovateľa školy*. Bratislava: ŠIOV v rámci národného projektu Rozvoj stredného odborného vzdelávania, 2015. 211s.

[3] Maliček, M., Muthová, N. (2019). Význam duálneho vzdelávania na Slovensku. In: *Ekonomika a spoločnosť*, [online]. 2019, roč. 20, č. 2 [cit. 2025-02-12]. Dostupné na internete: <http://www.ekonomikaaspolocnost.umb.sk/wpcontent/uploads/2020/07/2_2019.pdf>.

[4] *Manuál systému duálneho vzdelávania.* Bratislava: Štátny inštitút odborného vzdelávania v spolupráci s Radou zamestnávateľov pre odborné vzdelávanie a prípravu. 156 s. 2024

[5] Průcha, J. (2019). *Odborné školství a odborné vzdělávání. Fungování systému, problémy praxe a výzkum.* Praha: Wolters Kluwer, 2019. 196 s. ISBN: 978-80-7598-158-5.

[6] SIOV - Štátny inštiút Odborného vzdelávania. (2019). Učebná zmluva. [online]. 2019.[cit. 2025-02-05]. Dostupné na internete: <http://dualnysystem.sk/wpcontent/uploads/2019/07/Vzor-u%C4%8Debn%C3%A1-zmluva-od-9-2019-Kv.pdf>.

[7] *Základné princípy systému duálneho vzdelávania.* [online]. [cit. 2025-02-05]. Dostupné na internete: https://www.minedu.sk/zakladne-principy-systemu-dualneho-vzdelavania/

[8] Zákon č. 413/2021 Z. z., ktorým sa mení a dopĺňa zákon č. 61/2015 Z. z. o odbornom vzdelávaní a príprave a o zmene a doplnení niektorých zákonov v znení zákona č. 209/2018 Z. z. [online]. [cit. 2025-02-05]. Dostupné na internete: Zákon č. 413/2021 Z. z.

Problems and Challenges of Independent Learning at Campus

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Abstract

Campus is a place of learning for students by face-to-face in class, where lecturers become the main source of learning, making students less independent in solving problems in everyday life. This shows the lack of independence of students in carrying out their learning process. The policies made provide opportunities for inventive learning, by adjusting to the needs of students that are not yet available, students are directly involved in real life, Lecturers are required to compile, implement, and assess their learning process to encourage students to master various knowledge in order to enter the world of work. Lecturers are required to be able to adapt to technology as an intermediary for the learning process without reducing the essence of education, while students are asked to remain active and independent even in distance learning. In the study, it is aimed to determine the challenges and problems of Independent Learning at campus that the students and lecturers experience in the process of campus life. It has been concluded that universities should facilitate the implementation of the fulfilment of the period and study load of students in the learning process by providing students to take part in the learning process outside the study program and outside the university. The challenge that arises among academics is to reconstruct the appropriate and feasable higher education curriculum both between similar study programs and between universities.

Keywords: Independed Learning, Educational Management, Campus Life, Educational Policies

1. INTRODUCTION

In the world of lectures, students need to be more independent in their learning. Unlike previous education, which tended to be more structured and directed by teachers, lectures position students as the main driving force in the learning process. The concept of independent learning is very important because this ability will affect students' learning outcomes and academic success.

Independent learning has become an increasingly important issue in today's educational world. Amidst rapid changes in the learning environment, students need to be active in managing their own learning processes. In the age of advanced knowledge and rapidly developing technology, the ability to learn independently has become a very valuable skill (Hastuti, 2020). Independent learning can be defined as the ability of students to take initiative and responsibility for their own learning processes. This includes the ability to manage time, plan learning strategies, monitor progress, and evaluate learning outcomes with minimal dependence on direct guidance from teachers (Zubaidah, 2020).

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Why is it important to encourage independent learning? The main reason for this is that it gives students control over their learning processes and allows them to develop the skills needed for lifelong learning. In addition, it helps students develop independence, intrinsic motivation, and the ability to overcome challenges. In a changing society, students need to have the skills to face various changes and challenges in the future. Independent learning provides a strong foundation for developing these skills, such as critical thinking, creativity, communication, and collaboration.

In addition, independent learning prepares students for lifelong learning (Joey and Wulandari, 2021). In an era where information and knowledge continue to increase rapidly, students must be able to learn independently, find and evaluate relevant resources, and continue to develop their knowledge and skills throughout their lives. By understanding the importance of independent learning and implementing relevant strategies, we can help students become resilient, independent learners and be ready for a dynamic future.

2. INDEPENDENT LEARNING

Independent learning is a skill that is not only related to learning, but also more related to how the learning process is carried out. Independent learning activities will create learning activities that emphasize student learning awareness and give students more freedom to determine how they will learn and what they want to learn. Therefore, it can be said that this independent learning activity is closely related to the behavior of students in carrying out their own learning activities. Independent Learning is a learning process in which individuals proactively take responsibility for their own education. It involves setting personal learning goals, determining appropriate learning methods, and self-assessing progress. Independent Learning gives students the freedom and flexibility to control the pace and direction of their learning.

Independent learning is defined as an individual effort to achieve academic proficiency, especially for students. Once this skill is mastered, it can be applied in a variety of situations, not just limited to a lecture or university setting. With this ability, students will be able to face new challenges without having to rely on traditional problem-solving methods or seeking help from others.

Independent learning is a learning approach in which students take an active role in their own learning process (Ratnawati & Yulhendrib (2024); Arifin & Herman, 2018). In Independent learning, students have more control over their own understanding, achievement of learning goals, and development of skills and knowledge. In Independent learning, students become active agents responsible for their own learning process. They take the initiative to plan, organize, and manage their own time to study. Students also learn to identify their own learning needs and organize the resources needed to achieve their learning goals.

One of the key elements in Independent learning is students' ability to work independently (Qizi and Kobiljanovna (2018); Yuniharto & Nisa, 2022). They develop effective learning skills such as managing time, solving problems, finding information sources, and evaluating their own progress. Students also learn how to overcome obstacles and challenges in their own learning. Independent learning teaches students to take responsibility for their own learning success. They take responsibility for their learning decisions, including choosing appropriate learning methods, setting learning goals, and evaluating learning outcomes. Students also learn to take responsibility for the process of self-assessment and reflection on their own progress (Sumarmo, 2002).

Independent learning encourages students to understand themselves more deeply as learners. They learn to recognize their strengths and weaknesses, effective learning styles, and learning strategies that work best for them. Students who understand themselves better can optimize their learning efforts. Independent learning does not mean that students are completely free from guidance or control. Teachers still play a role as facilitators and guides in the learning process. They provide direction, feedback, and relevant resources to support students in achieving their learning goals. With the independent learning approach, students not only learn to acquire knowledge and information, but also develop lifelong learning skills, build self-confidence, and develop intrinsic motivation in the learning process (Hockings, Thomas, Ottaway & Jones (2018).

The independent learning method is an equity learning strategy carried out individually or in groups. In the application of this method, it must be properly managed by the teacher, who must go through a comprehensive planning process. In its application, this method implies a comprehensive preparation phase, coordinated implementation, and a correct learning outcome evaluation process so that students can reach the expected proficiency standards.

In its application, this independent learning method can be carried out individually or in groups, and limited assistance is needed so that learning activities can be more focused and organized. The meaning of the word independent means that students are not dependent on others in the learning process.

Independent learning is a skill that is not only related to learning, but also more related to how the learning process is carried out. Independent learning activities will create learning activities that emphasize student learning awareness

and give students more freedom to determine how they will learn and what they want to learn. Therefore, it can be said that this independent learning activity is closely related to the behavior of students in carrying out their own learning activities.

2.1. Types of Independent Learning Methods

The methods that can be used in learning strategies are Small Group Discussion, Simulation, Discovery Learning, Independent Learning, Cooperative Learning, Contextual Instruction, Project-Based Learning, Problem-Based Learning and Collaborative Learning:

- *Small Group Discussion* is an element that can ensure that students are active in the learning process. This method can be used when students are given tasks to explore ideas, conclude several important points, develop students' skills and knowledge, solve problems, and it can also be used when students want to review the topics learned the previous day.
- *Simulation* is a model that can bring real-life situations into the classroom. The benefits of this method are to change the perspectives of students by applying general skills, applying special skills or teams, developing problem-solving skills, etc.
- *Discovery learning* is a learning method that focuses on using existing knowledge. This method is useful for building students' knowledge through independent learning.
- *Independent learning* is a learning activity process carried out by individual students on their own initiative. The benefits of this method are to create awareness and empower students. If you want to apply it, you must meet the assumption that students' abilities depend on their independent learning abilities.
- *Cooperative learning* is a group learning method designed by teachers to solve a case or do homework. This method is useful for developing students' active learning habits, instilling a sense of responsibility in students, and improving students' socialization and collaboration skills and abilities.
- *Contextual Instruction* is a learning concept that helps teachers relate topics to real-life situations. This method can motivate students to make connections between knowledge and its applications in daily life.
- *Project-based learning* is a learning method that uses project assignments as a means of learning activities to achieve proficiency in attitudes, knowledge, and skills.
- *Problem-based learning* is a learning method that involves problems. In this case, students must search or dig for information to solve the problem.
- *Collaborative learning* is a learning method that emphasizes cooperation between students based on the consensus created by the students. In this method, the teacher will provide open-minded situations.

According to research by Ivonne Ruth and Vitamaya Oishi, (2020), it is stated that implementing independent learning provides students with various benefits in the learning process. The benefits are: students can learn according to their own desires, hopes, and motivations. They can also understand important topics more deeply, which will increase the effectiveness of the learning process. In addition, students have the ability to plan and evaluate their own learning outcomes. Independent learning makes them more active in learning and thus gain a deeper understanding. During this time, students are invited to think critically, not just memorize the studied material, thus developing their critical thinking skills.

2.2. *Strategies for Implementing Independent Learning*

In order for independent learning to be implemented effectively, students need to develop the following strategies:

- *Setting Learning Goals:* Having clear goals will motivate students to focus. These goals can be understanding difficult concepts or achieving certain grades.
- *Creating a Study Schedule:* Setting a consistent study time helps students avoid material accumulation and facilitates the learning process.
- *Finding a Variety of Learning Resources:* Students can use a variety of learning resources such as books, magazines, learning videos, and group discussions to gain a broader perspective.
- *Improving Self-Assessment:* Periodic self-assessment allows students to evaluate their progress and identify areas for improvement.

2.3 Characteristics of Independent Learning Methods

Independent learning does not mean that students learn individually, but it is learning that requires students' independence in learning. This independence can help students determine their learning goals, learning resources, the material they study, and how students learn the material without being tightly regulated by the teacher.

Here are the characteristics of independent learning methods:

1. *Students Set Learning Goals:* Students can set learning goals according to their own wishes, but by the end of the learning activity, students should achieve the main goals set.
2. *Students Have the Freedom to Use Learning Resources and Media*: Students have the opportunity to choose the learning resources and media they will use in learning.
3. *Flexible Learning Place and Time:* In this case, students can carry out learning activities according to their own comfort.
4. *The Intensity of Learning Activities is Determined by Students*: The learning pace and learning intensity are determined by students according to their needs, abilities and available opportunities.
5. *Students Have Their Own Learning Styles:* Students have the right learning path or style for themselves.
6. *Learning Assessment:* The evaluation of learning outcomes is carried out by students

2.4 Strategies of Independent Learning Method

The independent learning method strategy is a learning strategy that aims to increase student initiative, independence and self-development. Independent learning can be done with friends or in groups in its application. A paradigm shift from the learning process that initially focused on teachers to student-centered learning. This method is expected to encourage students to actively participate in the learning process. In the student-centered learning process, students will have the opportunity and opportunities to learn independently, which can eventually increase the students' own quality. The most important part of the concept of independent learning strategies is that each student can determine the information sources needed to facilitate their learning activities. Here are the strategies for independent learning methods:

1. Strategic Place to Study: Independent learning can be done at school, at home or in the library. To achieve this learning, students and teachers should ensure that the learning environment used by students is comfortable and can make students more productive in learning. In this way, students can carry out the learning process well.

2.5. Examples of Independent Learning

As mentioned above, self-paced learning can take many forms. Here are some examples of Independent learning:

Online Courses: Online courses are probably the most common type of Independent learning. Many universities, colleges, and educational institutions offer online courses where students can access course materials, complete assignments, and take exams at their own pace.

Professional Development Courses: Professional development courses are available for those looking to learn new skills, expand their knowledge in a specific field, or advance their careers. These courses can range from business and leadership skills to technical skills like coding and marketing communications. Many are offered by private companies and professional organizations like LinkedIn Learning, Coursera, and edX.

Professional development courses often offer a variety of resources, including interactive lectures, multimedia materials, and online discussion forums. Students can access these resources at their own pace and complete assessments on their own schedule.

Video Tutorials: Video tutorials are another example of Independent learning, providing students with a visual and interactive way to learn new skills. These tutorials can be found on a variety of platforms, including TikTok, YouTube, and Udemy, and cover topics ranging from cooking to coding. These video tutorials allow students to watch and rewatch as many times as they need to understand them. And students can go back and review specific sections of the tutorial, pause the video to take notes, or rewind and replay sections of the lesson.

Language Learning Apps: Language learning apps like Duolingo and Babbel are great examples of Independent learning. These apps offer a range of exercises and quizzes that are tailored to the student’s level, allowing students to practice their language skills at their own pace.

Flexible Learning Time: Independent learning can be done according to the time set by students. Each student has his own time asset according to the availability of time he has.

Flexible Learning Pace: The student's learning pace is determined by the student himself in line with the student's needs, abilities and opportunities.

Learning Methods Adjusted by Students: Each student has the right learning path for him. Students who follow the independent learning method must first find out what their own type is. After that, it will be easier for them to determine the learning method that suits their own conditions and abilities.
Evaluation of Learning Results: In order to evaluate the learning results, students will do it themselves. By comparing their learning goals and the results they have achieved, students can find out the degree of their success.

3. BARRIERS TO IMPLEMENTING INDEPENDENT LEARNING

In the modern education era, teachers need to have many strategies and experiences to be successful in transforming knowledge and experience (Zulhafizh, 2021). Independent learning is an important focus in developing students' learning skills. Although independent learning has significant benefits, there are several barriers that can hinder its successful implementation. Understanding these barriers is important for educators to overcome these challenges and create an effective learning environment.

Students often face difficulties in developing independent learning skills, such as managing time, planning learning, and motivating themselves. They may be accustomed to a structured learning approach and receive direct guidance from their teachers (Igirisa, 2017). This lack of independent learning skills can be an obstacle to using time effectively and taking the initiative to learn independently. Independent learning requires a high level of discipline and motivation. Students need to have the will and responsibility to manage their time and follow their own learning plans. However, many students face difficulties in maintaining self-discipline and long-term motivation. Lack of appropriate support and encouragement from the learning environment can also affect students' motivation levels.

In the digital age, teachers need to be able to innovate as the pandemic has changed learning patterns (Zulhafizh, 2022). Technology plays an important role in supporting independent learning. However, some students may not have sufficient access to the necessary devices and internet connection. Lack of technological readiness can be a serious obstacle to implementing independent learning that involves the use of digital tools and resources. In independent learning, students are expected to be able to understand instructions or materials independently. However, some students may have difficulty understanding complex materials or unclear instructions. This can be a significant obstacle in designing an effective independent learning plan.

Independent learning positions students as independent learners who often work alone (Martina, 2020). However, this can reduce social interaction and collaboration among students. Some students may feel isolated or have difficulty solving problems together without direct guidance from their teachers or support from their classmates.

4. CHALLENGES IN INDEPENDENT LEARNING

Despite the many benefits to be gained from independent learning, students often face challenges such as lack of motivation, difficulty in managing time, or dependence on lecturers. To overcome this, students can seek help by forming study groups, seeking guidance from lecturers, or using existing e-learning platforms.

- It reduces the interaction between teachers and students in the learning process.
- This method is not suitable for all students or teachers.
- Students are less disciplined in carrying out independent learning, which is combined with laziness in learning, slowing down the process of student learning activities.
- This learning method is only suitable for adult students because they are more trained to act independently.

These are some independent learning methods that can be used as references in the learning process. In order to see the development of students' abilities, teachers should evaluate the learning results before and after the learning method is applied.

5. CONCLUSION

Independent learning is a learning approach in which students take an active role in their own learning process. They have more control over their understanding, achievement of learning goals, and development of skills and knowledge. Independent learning involves students planning, organizing, and managing their own study time. They also learn to identify their own learning needs and organize necessary resources. Students develop effective learning skills such as managing time, solving problems, finding information sources, and evaluating their own progress. They also learn to overcome obstacles and challenges in their own learning.

Students are responsible for their own learning success, including choosing appropriate learning methods, setting learning goals, and evaluating learning outcomes. They also gain a deeper understanding of themselves as learners. Although Independent learning has its benefits, there are barriers that can prevent its successful implementation, such

as lack of Independent learning skills, low discipline and motivation, lack of technological readiness, difficulty understanding complex materials, and lack of social interaction and collaboration. There are several practical strategies that can be implemented to facilitate independent learning, such as setting clear learning goals, using effective presentation methods, encouraging active participation through discussion and collaboration, using online learning resources, building student independence by assigning responsibility, and providing constructive feedback.

References

[1] Arifin, F., & Herman, T. (2018). Pengaruh Pembelajaran E-Learning Model Web Centric Course Terhadap Pemahaman Konsep Dan Kemandirian Belajar Matematika Siswa. 12, 1–12.
[2] Hastuti, (2020). Membangun Motivasi Dan Kemandirian Peserta Didik Berkebutuhan Khusus Melalui Flipped Classroom Di Masa New Normal Covid-19. September, 181–192.
[3] Hockings, C.; Thomas, L.; Ottaway, J. & Jones, R. (2018). Independent Learning--What We Do When You're Not There. *Teaching in Higher Education,* v23 n2 p145-161.
[4] Igirisa, N. (2017). Pengaruh Model Flipped Learning Terhadap Hasil Belajar Matematika Ditinjau Dari Gaya Belajar Siswa. 02, 80–84.
[5] Ivonne Ruth Vitamaya Oishi. (2020). Pentingnya Belajar Mandiri Bagi Peserta Didik Di Perguruan Tinggi. *Jurnal IKRA-ITH Humaniora,* 4(2), 50–55.
[6] Joey, R., & Wulandari, D. (2021). Pembelajaran seumur hidup di abad 21 untuk menghadapi era disrupsi. 20(2), 1215–1222.
[7] Martina, F. (2020). *Pelatihan Pendekatan Genre-Based Pada Pembelajaran Keterampilan Menulis* Bagi Guru Bahasa Inggris Smpn 10 KOTA BENGKULU.
[8] Qizi, M.Z.A., & Kobiljanovna, S.M. (2021). The significance of teaching independent learning and its benefits for students. *Novateur Publications Journal* NX, 7(3), 354-358.
[9] Ratnawati S.,Yulhendrib, W.R. (2024). Sustainable Action and Transformation of Change in Teachers' Learning Leadership Model: Promoting Students' Independent Learning. *International Electronic Journal of Elementary Education.* Volume 16, Issue 4.
[10] Sumarmo, U. (2002). Kemandirian Belajar: Apa, Mengapa, Dan Bagaimana Dikembangkan Pada Peserta Didik Oleh: Utari Sumarmo, FPMIPA UPI. 1983, 1–9.
[11] Yuniharto, B. S., & Nisa, A. F. (2022). Trihayu : Jurnal Pendidikan Ke-SD-an Implementasi model pembelajaran ajak temani mandiri untuk menanamkan profil pelajar Pancasila. 9(1), 65–71.
[12] Zubaidah, S. (2020). Keterampilan Abad Ke-21: Keterampilan yang Diajarkan Melalui Pembelajaran. Online. December 2016.
[13] Zulhafizh, Z. (2021). Peran dan Mutu Pelaksanaan Pembelajaran oleh Guru di Satuan Pendidikan Tingkat Atas. Jurnal Kependidikan: *Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran,* 7(2),
[14] Zulhafizh, Z. (2022). Manajemen Informasi sebagai Penguatan Pemahaman Belajar di Era Pandemi Covid 19. Edukatif : *Jurnal Ilmu Pendidikan*, 4(3),

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