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Performance evaluation of Online Tests vs. In-Person Final Exams in the Bachelors in Business Administration with Three concentration(Management, Finance & Marketing) at the University of Belize.

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Abstract

The purpose of the research was to evaluate the performance of Online Tests vs. In-Person Final Exams in the Bachelors in Business Administration with Three concentration(Management, Finance & Marketing) at the University of Belize. This study was based on online testing which represents a modern and efficient alternative to the traditional in-class final exam, especially in educational contexts that prioritize flexibility, equitable access, and the use of technological tools, although these advantages lead to unethical behavioral patterns. The specific objectives were to 1. Determine if there is statistical significance in the effects caused Score types (Average Online Test vs. In person Final Exams) and Three Concentrations (Management, Finance & Marketing) on the students' performance. 2) Determine if there is statistical significance in the effects caused by the interaction between / among the Score types (Average Online Test vs. In person Final Exams) and Three Concentrations (Management, Finance & Marketing) on the students' performance. 3) Determine the concentration that has the highest performance score during the two semesters (2023-1 & 2024-1) evaluated. From a concluding stand point we can say, that the Alternative Hypothesis 1 and 2 were accepted; considering that statistical significance was found between and among the factors; specifically, Score types; (Average Online Test vs. In person Final Exams) and the Concentrations (Management, Finance & Marketing). 2.There was statistical significance in the effects caused by the Score types (Average Online Test vs. Final Exams) and as well as the Concentrations (Management, Finance & Marketing) on the students' performance score. Therefore, the Average online Tests score was superior than the in person Final Exam score. 3.There was statistical significance in the effects cause by the interaction of the Score types (Average Online Test vs. In person Final Exams) and the Concentrations (Management, Finance & Marketing) on the students' performance score. Therefore, there is an interaction between that Finance and Management scores with regards to the students' performance.

Keywords: *Online Test, Concentration, Management, Marketing, Finance, Factorial Analysis, ANOVA, Impact, In-person Final Exam, Average Test Score, Interactions, Tukey analysis.*

1. INTRODUCTION

1.1 Definition of the Problem

In recent years, educational institutions have incorporated the use of digital platforms for the application of online evaluations, in order to facilitate access, reduce costs and adapt to new virtual teaching modalities. However, this transformation has raised questions regarding the validity, reliability and fairness of the results obtained compared to traditional in-person exams.

There are concerns about factors that may influence student performance in each modality, such as the level of supervision, the possibility of academic fraud, technological conditions, anxiety regarding the use of digital platforms, and differences in concentration and the physical environment. On the other hand, in-person exams, although they offer greater control and supervision, may present logistical and accessibility limitations.

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In recent years, assessment administration has undergone a significant transformation with the advancement of technology. Traditionally, final exams have been administered in person in the classroom, under strict proctoring conditions. However, with the rise of digital platforms and the need for flexibility, especially in the wake of events such as the COVID-19 pandemic, online testing has become an increasingly common alternative.

Therefore, the problem posed in this study is to determine whether there are significant differences in academic performance, perception of fairness, and reliability of results between online tests and face-to-face exams within a given educational context. This analysis will allow us to identify which evaluation modality is most effective and fair to measure student learning.

This modality has brought with it new opportunities, such as remote access and immediate feedback, but also poses challenges related to security, fairness, and proctoring.

This comparison analyzes the main differences between the two forms of assessment, considering aspects such as logistics, academic integrity, student experience, and effectiveness in measuring learning. Administering online tests presents a number of challenges compared to in-person final exams, primarily related to academic security, student authenticity, technological infrastructure, and a level playing field. While in-class exams allow for greater control over the student environment, direct supervision, and the prevention of plagiarism or improper collaboration, online tests face risks such as identity theft, use of unauthorized resources, technical failures, and differences in access to devices or internet connections. These differences create uncertainty about the validity and fairness of academic results obtained through online assessments.

1.2 Justification

In recent years, technological development and the expansion of Internet access have significantly transformed academic evaluation methods. Educational institutions, driven by the need to adapt to digital environments particularly after the COVID-19 pandemic have increasingly incorporated online tests as an alternative or complement to traditional in-person exams.

However, this change has generated debates about the validity, reliability, fairness, and effectiveness of both types of evaluation. While in-person exams guarantee greater control and supervision of the process, online tests offer flexibility, accessibility and resource savings, but pose challenges related to the authenticity of the answers, connectivity and system security.

The present study is justified by the need to comparatively analyze the advantages, limitations and perceptions of students and teachers regarding both evaluation methods. Evaluating the effectiveness of online tests compared to in-person exams will improve evaluation strategies, strengthen academic integrity, and guide institutional decision-making toward more equitable and efficient models. Likewise, the results may serve as a reference for future educational policies on the implementation of digital assessments, optimizing the balance between technology, academic quality and educational accessibility.

1.3 Research Objective

1.3.1 General objective: Evaluate results of the students' performance in Score types (Average online Tests vs. In-Person Final Exams) of the Bachelor in Business Administration in Three concentration (Management, Finance & Marketing).

1.3.2 Specific objective

1. Determine if there is statistical significance in the effects caused Score types (Average Online Test vs. In person Final Exams) and Three Concentrations (Management, Finance & Marketing) on the students' performance.
2. Determine if there is statistical significance in the effects caused by the interaction between / among the Score types (Average Online Test vs. In person Final Exams) and Three Concentrations (Management, Finance & Marketing) on the students' performance.
3. Determine the concentration that has the highest performance score during the two semesters (2023-1 & 2024-1) evaluated.

1.4 Hypothesis

1.4.1 Null hypothesis

Ho = There is no statistical significance in the effects caused Score types (Average Online Test vs. In person Final Exams) and Three Concentrations (Management, Finance & Marketing) on the students' performance.

Ho = There is no statistical significance in the effects caused by the interaction between / among the Score types (Average Online Test vs. In person Final Exams) and Three Concentrations (Management, Finance & Marketing) on the students' performance.

1.4.1 Alternative hypothesis

Ha = There is statistical significance in the effects caused Score types (Average Online Test vs. Final Exams) and Three Concentrations (Management, Finance & Marketing) on the students' performance.

Ha = There is statistical significance in the effects caused by the interaction between / among the Score types (Average Online Test vs. Final Exams) and Three Concentrations (Management, Finance & Marketing) on the students' performance.

1.5 Significance of the study

The present research is significant because it addresses a current problem in the educational field: the effectiveness and reliability of online tests compared to in-person exams. With the increasing use of digital technologies and virtual learning modalities, it is essential to understand how these assessment methods impact academic performance, equity, security, and validity of the results obtained.

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Likewise, this study provides valuable information for educational institutions, teachers and those responsible for academic policies, as it will allow them to make informed decisions about the implementation of evaluation strategies appropriate to new educational contexts.

At the social level, research contributes to improving the quality and accessibility of education, promoting more inclusive evaluation practices adapted to the needs of students. Finally, the results of this study can serve as a basis for future research on educational innovation, learning in virtual environments and digital transformation in teaching.

1.6 Limitation of evaluation object

The present study has some limitations that should be considered when interpreting the results. First, the sample size may not be large enough or representative of the entire student population, limiting the generalizability of the findings. Secondly, external factors such as the quality of the internet connection, access to technological devices and the environment in which students take the online tests could influence academic performance.

Likewise, individual motivation and the level of familiarity with digital platforms could vary between participants, generating differences that do not necessarily reflect the effectiveness of the evaluation method itself. Finally, the study was carried out in a specific period and educational context, so the results could differ in other institutions, academic levels or technological conditions.

2. LITERATURE REVIEW

2.1 General context of educational evaluation

Educational evaluation is a central element in the teaching and learning processes, playing a fundamental role in determining educational quality and in the continuous improvement of educational systems. Its relevance lies not only in measuring students' knowledge and skills, but also in providing valuable information for pedagogical planning, institutional decision-making and formative feedback that allows strengthening learning. Historically, educational evaluation has evolved from an approach focused exclusively on measuring academic results and grading students, towards more comprehensive models that consider competencies, learning processes, socio-emotional contexts, and transversal skills. This shift reflects a deeper understanding of learning as a complex, dynamic, context-specific process. According to Nitko, A. J., & Brookhart, S. M. (2014)

In the contemporary context, educational evaluation is not limited only to traditional exams or standardized tests; It incorporates varied methods such as formative assessments, self-assessments, co-assessments, portfolios, projects and digital tools. The integration of educational technologies has made it possible to develop more flexible, timely and personalized evaluation mechanisms, favoring immediate feedback and individualized monitoring of student progress. Likewise, educational evaluation is in constant dialogue with educational policies, national and international standards, and academic quality criteria. Its function is not restricted to certifying knowledge, but also guides pedagogical innovation, educational research and the continuous improvement of training programs. In agreement with Brown, H. D., & Abeywickrama, P. (2019)

In summary, the general context of educational evaluation is marked by a transition towards more inclusive, comprehensive and learning-centered approaches. This perspective recognizes that evaluation not only measures, but also builds knowledge, guides teaching, and promotes equity and educational quality.

2.2 Online evaluations (Online Testing)

Currently, education and assessment processes have undergone a significant transformation due to the advancement of digital technology. Online evaluations, also known as online testing, represent a paradigmatic change compared to traditional face-to-face evaluation methods, allowing competencies, knowledge and skills to be measured in a more flexible, accessible and efficient way.

Online assessments are characterized by their adaptability and scalability. Students can take exams from anywhere with internet access, which eliminates geographic barriers and facilitates the inclusion of diverse learner profiles. In addition, these assessments offer the possibility of designing personalized and adaptive tests, where the difficulty of the questions is automatically adjusted according to the student's performance, allowing a more accurate assessment of their abilities according to Nguyen, J. G., Keuseman, K. J., & Humston, J. J. (2020)

Another relevant aspect is the automation of grading and immediate feedback. Through digital platforms, results can be processed instantly, allowing teachers to identify areas for improvement and students to know their achievements quickly. This increases administrative efficiency and reduces the possibility of human error in the evaluation.

However, online assessments also present significant challenges, such as ensuring academic integrity and data security. Preventing fraud or plagiarism requires the use of remote monitoring systems (proctoring), access controls and identity verification tools. Likewise, the technological gap and the unequal availability of digital resources can affect equity in evaluation, especially in contexts where connectivity is limited.

From a pedagogical point of view, online testing has opened new opportunities to evaluate competencies beyond rote knowledge, including analytical skills, problem solving and critical thinking through simulations, interactive quizzes and web-based learning scenarios. This allows the assessment to not only measure what was learned, but also how the knowledge is applied in real contexts as confirmed by Bojović, Ž., Bojović, P. D., Vujošević, D., & Šuh, J. (2020)

In conclusion, online assessments constitute an essential component of modern education, integrating technology, accessibility and efficiency. Its effective implementation

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depends on a balance between technological innovation, adequate pedagogical design and security measures that guarantee the reliability and validity of the results. As education evolves towards hybrid and digital models, online testing is emerging as an indispensable tool for the continuous and personalized evaluation of learning.

2.3 Traditional in-person exams

Traditional in-person exams represent the classic form of academic assessment in which students physically appear in a given space, such as a classroom or exam room, to demonstrate their knowledge and skills in a limited time. This type of evaluation has been the pillar of the educational system for decades and is characterized by its formal and controlled structure.

In this format, students receive an exam on paper or, in some cases, on a computer within the classroom, and must answer questions that cover theoretical knowledge, practical knowledge, or both, depending on the subject. The evaluation is carried out under strict supervision standards to guarantee academic integrity and avoid fraud, allowing the results to reflect, to the extent possible, the individual preparation of the student according to Brown, G. T. L., & Harris, L. R. (2014)

Traditional in-person exams offer significant advantages, such as the standardization of the assessment and the possibility of applying a wide range of question types: multiple choice, essay, true/false, essays or practical problems. In addition, they allow direct interaction with the teacher, who can clarify doubts about instructions and ensure that the process is equitable for all participants.

However, this model also has limitations. The pressure of time and the environment can generate anxiety in students, affecting their performance. Additionally, the logistics of organizing in-person exams involve considerable resources, such as physical space, proctoring staff, and printed materials.

Furthermore, it focuses mainly on the evaluation of rote knowledge and specific cognitive skills, and may leave aside more complex skills such as teamwork or creativity. Despite the rise of digital modalities, traditional in-person exams maintain significant value within formal education due to their reliability, structured control, and widespread acceptance as a method of academic certifications confirmed by (Brown & Harris, 2014).

Table No.1; Comparation of In persons Exams vs. Online Exam

Aspect	Traditional In-Person Exams	Online Exams
Location	They are carried out in classrooms or designated physical rooms.	They are carried out through digital platforms, from any place with an Internet connection.
Supervision	Direct supervision by teachers or exam staff.	Virtual supervision using monitoring software, cameras or remote proctoring.
Format	Paper and pencil, or in some cases computers within the classroom; includes multiple choice, essay, development and practical problems.	Digital, adaptable to different types of questions: multiple choice, true/false, essay, interactive simulations.
Integrity control.	Strict in-person control; difficulty copying or consulting external material	Use of proctoring tools and technical constraints; increased risk of fraud if not properly monitored.
Limited	Accessibility by physical space and schedule; requires travel of the student	Greater accessibility; allows flexible schedules and remote participation
Student Experience.	Controlled environment; It can generate anxiety due to the pressure of the physical environment and time	Variable environment; comfort of home, but there may be distractions or technical problems.
Skills. Assessment	Strong focus on rote knowledge and problem solving under pressure; direct interaction with the teacher	May include assessment of knowledge, interactive skills, and use of simulations; limits direct interaction.
Required resources	Physical spaces, printing, supervisors, organized logistics.	Digital platform, reliable internet, electronic devices and specialized software
Feedback.	Generally, after the exam, on paper or digitally, depending on the case	It can offer immediate feedback and real-time performance analysis
Flexibility and adaptability	Low; The date and time are usually fixed.	High; allows you to adapt schedules, formats and scalability to large groups

2.4 Comparison between online tests and in-person exams

The evolution of education and technology has significantly transformed the way students are assessed. Traditionally, in-person exams have been the standard for measuring acquired knowledge and skills. These tests are characterized by direct supervision, a controlled environment, and the possibility of immediate interaction between teacher and student. This format has been valued for its ability to guarantee the authenticity of the evaluation and reduce the risk of academic

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fraud, in addition to allowing more personalized feedback in the moment. However, it also has limitations such as rigid schedules, the need for physical travel, and the pressure that the exam environment can generate for some students as mentioned by Nguyen et al., (2020)

With the incorporation of technology in education, online testing has emerged as a flexible and accessible alternative. This type of evaluation allows students to take exams from any location with internet access, adapting to different personal and geographical situations. In addition, it offers advanced tools for creating exams, automatic analysis of results and immediate feedback. However, online testing presents significant challenges, such as ensuring academic integrity, avoiding plagiarism or unauthorized collaboration, and overcoming technological barriers that can affect student performance.

The comparison between both methods reveals substantial differences in terms of logistics, student experience and reliability of the results. While in-person exams prioritize supervision and control of the environment, online tests emphasize flexibility, accessibility, and efficiency in administration. The choice of one or another model depends on multiple factors, including the learning objectives, available resources, and the technological competencies of students and teachers. In short, the coexistence of both formats represents an opportunity to design hybrid evaluation strategies, which combine the security and control of in-person exams with the flexibility and adaptability of online tests, allowing for a more inclusive, efficient education in line with the challenges of the 21st century as confirmed by Alruwais, Wills, & Wald,(2018)

2.5 Psych-pedagogical aspects

Psych pedagogical aspects refer to the integration of psychology and pedagogy in the teaching and learning processes. Its main objective is to understand how students acquire, process and apply knowledge, as well as to facilitate strategies that enhance their cognitive, emotional and social development. These aspects allow teachers to design more effective and personalized educational experiences, considering the individual characteristics of each student. From a psychological perspective, it analyzes how the student's internal factors—such as memory, attention, motivation, emotions, and self-esteem—influence learning. For example, intrinsic motivation favors more meaningful and lasting learning, while anxiety or low self-esteem can hinder the assimilation of new knowledge. Furthermore, psych pedagogical aspects recognize that each student has different learning styles and rhythms, which requires flexibility and diversity in teaching strategies according to Woolfolk, A. (2016).

From the pedagogical approach, we seek to design and apply teaching methods that are consistent with the needs and abilities of the students. This includes planning activities that promote active participation, problem solving, peer collaboration, and critical reflection. Psych pedagogical pedagogy also emphasizes the importance of formative evaluation, understood as a continuous process that allows identifying strengths, areas for improvement and adapting teaching to each educational context. In the school environment, psych pedagogical aspects are essential to promote inclusive and equitable learning.

They make it possible to identify learning difficulties, design intervention programs and provide support to students with special educational needs. Likewise, they facilitate the construction of a positive learning environment, where respect, motivation and trust become key elements for the comprehensive development of the student. In summary, psych pedagogical aspects constitute a central axis in education, since they combine the understanding of psychological processes with effective pedagogical strategies. Its proper application contributes not only to academic success, but also to the personal and social growth of the student, preparing individuals to face the challenges of lifelong learning as confirmed by Woolfolk, A. (2016).

2.6 Technological and usability factors

In the current educational context, technological and usability factors play a fundamental role in the implementation and effectiveness of teaching, learning and evaluation processes. The incorporation of digital platforms, learning management systems (LMS) and interactive tools has transformed the way students access knowledge and how teachers evaluate their progress.

From a technological point of view, the availability of adequate infrastructure, Internet access, device compatibility and platform stability are essential elements to guarantee the correct functioning of virtual environments. Poor connectivity or technical failures can interfere with the educational experience and affect the reliability of online assessment results as mentioned by Jacob, Sanchez-Vazquez & Ivory (2020)

On the other hand, usability factors refer to the ease with which users—students and teachers—can interact with technological tools. Aspects such as the intuitive interface, accessible design, simple navigation and clarity of instructions directly influence the user experience and the effectiveness of the educational process. A platform with good usability promotes student autonomy, reduces frustration and increases motivation to actively participate in academic activities.

Likewise, the technological training of users constitutes a determining component. When teachers and students master digital tools, a more fluid and collaborative learning environment is generated. The integration of technology must be accompanied by pedagogical strategies that favor its use and ensure that the educational approach is not limited to the technical dimension, but also promotes understanding, critical thinking and creativity. In summary, technological and usability factors are pillars that support the quality of digital educational processes. An adequate technological infrastructure and high usability of the platforms allow

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technology to become a true facilitator of learning, strengthening equity, accessibility and efficiency in modern education as confirmed by Tavares & Madureira (2020).

2.7 Technological and usability factors

The institutional and regulatory perspectives in the educational field represent the framework that regulates, guides and supports the teaching, learning and evaluation processes within academic institutions. These perspectives focus on establishing clear guidelines that guarantee educational quality, equity and transparency in training processes. From an institutional vision, educational policies seek to strengthen the coherence between academic objectives, teaching methodologies and evaluation systems. Institutions, therefore, must ensure that their practices respond to national and international standards, promoting a culture of continuous improvement, innovation and accountability as mentioned by Wan Sulaiman et al., (2020).

Regarding the regulatory perspective, the laws, regulations and ministerial guidelines define the criteria that regulate educational management, curricular design and evaluation modalities. These standards guarantee that processes are developed under ethical principles, inclusion and educational justice, avoiding discriminatory practices and ensuring the validity and reliability of the evaluations.

Likewise, educational institutions have the responsibility of harmonizing their internal policies with national and international regulatory frameworks, thus ensuring the relevance and legality of their actions. This alignment allows us to strengthen educational institutions, guaranteeing that technological and pedagogical advances are applied responsibly and supported by current regulations. In conclusion, institutional and regulatory perspectives not only guide the organization and functioning of the educational system, but also contribute to the development of a more equitable, transparent and quality education, capable of responding to contemporary challenges and adapting to the social and technological transformations of the 21st century as confirmed by (Putra et al., 2022).

2.8 Previous studies and relevant findings

Previous studies on educational evaluation modalities, both online and in-person, have shown a significant evolution in pedagogical approaches and in the tools used to assess learning. Various investigations highlight that technological development and the digitalization of educational processes have transformed evaluation practices, introducing new methodologies that seek greater flexibility, accessibility and efficiency in measuring student performance. In this context, the most relevant findings indicate that online evaluations favor the immediacy of feedback, the personalization of tests and the reduction of logistical costs. However, challenges associated with academic security, the authenticity of learning and the digital divide are also identified, factors that can influence the equity of results.

On the other hand, traditional face-to-face exams continue to be valued for their control of the application environment, their reliability in supervision and their contribution to the development of social and communication skills during the evaluation process. However, the rigidity of its format and the limitations of time and space have motivated a search for more dynamic alternatives. Comparative studies between both modalities conclude that there is no universally superior model; rather, effectiveness depends on the educational context, available technological resources, test design, and student profile. In general, the literature agrees that the balanced integration of technological and pedagogical elements can enhance the validity and quality of evaluations, promoting more meaningful learning adapted to the current demands of the digital educational environment as according to Nguyen et al. (2023).

Previous studies related to educational evaluation, particularly in the comparison between online tests and face-to-face exams, have revealed important transformations in learning assessment methods. The literature indicates that the incorporation of digital technologies has redefined evaluation processes, generating new opportunities, but also challenges in academic environments.

Various research agrees that online assessments offer advantages such as flexibility in time and space, automation of grading, the possibility of immediate feedback, and access to a wide range of interactive resources. These factors contribute to a more dynamic and personalized experience for the student. However, important limitations are also highlighted, such as connectivity issues, lack of direct supervision, and risks of academic dishonesty, which may affect the validity of the results.

In contrast, in-person exams continue to be recognized for their control of the environment and for guaranteeing greater integrity in the evaluation process.

However, studies indicate that its application requires greater logistical resources, time and physical space, in addition to being less adaptable in the face of unforeseen circumstances, such as those experienced during the COVID-19 pandemic. Among the most relevant findings, a trend towards the complementarity of both models is identified, suggesting that a combination of in-person and digital strategies could offer more balanced results.

Contemporary research emphasizes that the effectiveness of each modality depends on factors such as technological infrastructure, teacher training, pedagogical design and the characteristics of the student body as mentioned by Garcia & Patel (2022) .

In summary, previous studies highlight the need to rethink educational evaluation from a comprehensive perspective that incorporates both technological advances and traditional pedagogical principles, thus seeking to guarantee the equity, validity and quality of the teaching-learning process.

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2.9 Innovations and future of evaluation

Educational evaluation is in a process of constant transformation driven by technological advances, pedagogical changes and new social demands. In the current context, innovations in evaluation seek to transcend traditional methods focused solely on measuring results, to adopt more comprehensive, dynamic and personalized approaches. Among the main innovations, the incorporation of digital technologies stands out, such as artificial intelligence (AI), machine learning and adaptive platforms, which allow the design of more precise evaluations adjusted to the pace and learning style of each student. These tools not only measure knowledge, but also analyze learning patterns, detect difficulties in real time and offer immediate feedback, thus promoting a more continuous and participatory training process according to Sarah de Rijcke et al. (2023)

Likewise, assessments based on competencies and authentic learning are gaining relevance. Instead of focusing exclusively on memorization, they seek to value critical skills such as analytical thinking, problem solving, collaboration and creativity. These practices are complemented by alternative methods such as digital portfolios, interdisciplinary projects, and collaborative assessments, which offer a more complete view of student performance. Looking ahead, assessment will trend towards hybrid, automated and student-centred models, where technology is combined with pedagogical mediation to offer more meaningful learning experiences. Greater integration of augmented reality, virtual reality and immersive environments is expected, which will allow the evaluation of practical skills in simulated contexts. Furthermore, the ethical and transparent use of data will be a fundamental pillar to guarantee the equity, privacy and reliability of the results as mentioned by Gill Norman et al.(2022).

Moreover, the future of evaluation is oriented towards a more formative, inclusive and technological approach, where the purpose is not only to measure what has been learned, but to promote learning itself, strengthen student autonomy and contribute to the development of a more innovative and sustainable education. In recent years, educational evaluation has undergone a profound transformation process, driven by technological advances, changes in pedagogical paradigms and the growing need to respond to the demands of a globalized and digital society. This innovation process seeks to overcome traditional models focused solely on measuring quantitative results, moving towards more flexible, comprehensive and learning-focused systems. The main innovations are reflected in the incorporation of digital technologies and tools based on artificial intelligence, which allow the design of more dynamic, interactive and adaptive evaluation instruments.

These tools facilitate the analysis of large volumes of data on student performance, offering immediate and personalized feedback, thus promoting continuous and self-regulated learning as confirmed by Sarah de Rijcke et al. (2023).

Likewise, the contemporary approach to evaluation is directed towards the assessment of competencies, prioritizing the application of knowledge in real contexts and the integration of cognitive, social and emotional skills. In this sense, digital portfolios, project-based assessments and performance rubrics are consolidated as effective strategies to assess the learning process in a more qualitative and holistic way. Looking to the future, a hybrid, formative and technological evaluation is envisioned, in which virtual environments, augmented reality and learning analytics converge. These tools will allow simulating authentic scenarios to evaluate practical and professional skills, contributing to a more contextualized and meaningful education. However, the challenge lies in guaranteeing ethics, equity and data privacy, essential aspects for the responsible use of educational technologies according to Lawrence A. Palinkas, Sapna J. Mendon & Alison B. Hamilton (2019).

In conclusion, the future of educational evaluation is oriented towards a more innovative, inclusive and student-centered model, which seeks not only to measure knowledge, but also to promote reflection, continuous learning and comprehensive training. The evaluation of tomorrow is conceived as a transformative process that articulates technology, pedagogy and humanity to strengthen educational quality and respond to the demands of the 21st century.

2.10 Outlook for Online vs. In-Person Exams for 2030

By 2030, educational assessment will have evolved significantly, driven by technological advances, changes in pedagogical methodologies, and increasing demand for flexibility in learning environments. In this context, online exams and in-person exams represent two paradigms with different strengths and challenges.

Online exams:

The trend towards the digitalization of evaluation will continue to rise, driven by more secure, adaptive and intelligent platforms. By 2030, online exams are expected to not only assess rote knowledge, but also measure complex competencies through simulations, virtual environments, and advanced student behavior analytics. The flexibility of these exams will allow students to take assessments from anywhere in the world, promoting inclusion and reducing geographic barriers. In addition, artificial intelligence will allow tests to be personalized according to the level and learning style of each student, increasing the efficiency and precision of the evaluation.

In-person exams:

Despite the rise of digitalization, in-person exams will remain relevant in areas where direct interaction, close supervision and assessment of practical skills are essential. By 2030, in-person exams will be more focused on practical, collaborative and real-time problem-solving skills, while technology will serve as support to record, analyze and ensure the integrity of the tests. Its value will also lie in the social experience and academic rigor perceived by students and employers.

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Comparative perspective:
By 2030, the distinction between both types of assessment will be clearer: online exams will dominate the measurement of theoretical knowledge and digital competencies, while face-to-face exams will specialize in practical, ethical and collaborative skills. Complementarity will be key, with hybrid models that combine the best of both worlds: the accessibility and personalization of online assessment along with the rigor and authenticity of in-person assessment.

In this context, education towards 2030 will be more inclusive, flexible and focused on competencies, where academic success will depend on the ability to adapt to multiple assessment modalities and integrate technology in an ethical and effective manner.

2.11 Online education vs. In-person education beyond 2030

Beyond the year 2030, global education enters a stage profoundly transformed by artificial intelligence, learning automation and universal access to digital platforms. The dichotomy between online education and in-person education is no longer conceived as direct competition, but rather as two models that evolve and redefine themselves according to the demands of a technologically advanced, diverse and highly interconnected society.

1. Online education: from alternative to dominant ecosystem

After 2030, online education is consolidated as a mature, multimodal and hyper-personalized ecosystem. The platforms integrate AI-based virtual tutors capable of adapting content and pace to each student, interpreting emotions through biometric sensors, and offering immediate feedback. This makes digital learning an increasingly human, intuitive and accessible experience. Flexibility becomes its greatest strength: students in rural areas or developing countries gain access to high-quality content without geographical limitations. Global education no longer depends on physical buildings, but on connectivity and digital literacy. Likewise, the programs offer modular, cumulative and blockchain-verified certifications, promoting more fluid educational trajectories linked to the labor market of the future.

2. In-Person Education: Renewing Your Purpose

Meanwhile, in-person education stops focusing solely on the transmission of content – a function that technology fulfils efficiently – and is repositioned as a space for social interaction, collaboration, creativity and emotional development. The campuses are transformed into laboratories of experiences: immersive classrooms with augmented reality, innovation workshops, applied science laboratories and spaces for critical debate. In-person education specializes in what the virtual modality cannot replicate with the same depth: the sense of community, coexistence, face-to-face conflict resolution, and physical or experimental practice. Beyond 2030, in-person educational centers function as socio-emotional ecosystems that complement technical training acquired online.

3. Model convergence: intelligent hybrid learning

Far from a direct confrontation, the post-2030 period is marked by the convergence of both models. Hybrid education becomes the norm, but not traditional hybrid; a smart hybrid emerges, where:

- AI distributes which content is better to learn online or in person,
- Immersive sessions in educational metaverses alternate with practices in physical laboratories, teachers become strategic mentors, supported by virtual assistants, Students completely personalize their learning paths.
- The combination produces a flexible, efficient and deeply human system, in which routine tasks are automated and face-to-face time is focused on valuable experiences.

4. Social impact and ethical challenges

Despite the progress, the future also brings important challenges:

- The digital divide persists if countries do not guarantee universal access to connectivity.
- Reliance on AI raises dilemmas about privacy, surveillance, and learning autonomy.
- Teachers must adapt to new roles, involving continuous training and institutional restructuring.

These challenges force us to rethink global educational policies that balance innovation with equity, ethics and sustainability.

5. A complementary, non-exclusive future

Beyond 2030, education is not defined by a modality, but by a fundamental principle: the personalization of learning according to the human and technological needs of the 21st century. Online education brings reach, efficiency and personalization; In-person education provides humanity, interaction and multisensory experiences. Both converge towards a future in which learning is continuous, ubiquitous and adaptable, where each student follows a unique trajectory supported by advanced technologies and living educational communities.

3. METHODOLOGY

3.1 Research Design

The study was a quantitative approach using a Random Block Design(RBD) with Trifactorial arrangement, considering that there Two Semester, Two Score types and Three factors(Semester, Score type and Concentrations) (2 x 2 x 3) involve in the study. Additionally, a random block was Design (RBD) was use to minimize the effect of the difficulties and/or differences that could exist between and among the selected courses at a given time on the assessments results (Average Online Test vs. Final Exams). Through this scenario, the objective of the study to analyze the effectiveness of students' performance on the assessments (Average Online Test vs. Final Exams) could have been done effectively.

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3.2 Population and Sample

Population: Courses or subjects from the Bachelor level in Business Administration with the three concentration (Management, Finance & Marketing) of the first semester of 2023-1 and 2024-1 were select randomly and considered for its statistical analysis.

Sample: The selection of at least five subjects from the different concentration mentioned previously were chosen and average of the Online Tests and Final Exam scores were considered for each of the subjects.

3.3 Data Analysis

The data was analyzed using the software know as Statistical Analysis for Social Science (SPSS), by applying a Random Block Design (RBD) with Trifactorial arrangement, considering that there were Two Semesters, Two Score types and Three Concentration (2 x 2 x 3) involve in the study. Moreover, a random block was Design (RBD) was use to minimize the effect of the difficulties and/or differences that could exist between and among the selected courses at a given time on the assessments results (Average Online Test vs. Final Exams).

3.4 Statistical Model:

Yijkℓ=μ+Bℓ+αi+βj+γk+(αβ)ij+(αγ)ik+(βγ)jk+(αβγ)ijk+εijkℓ

where

μ = overall mean

Bℓ = block effect (random),

αi, = Factor A(Semester)

βj = Factor B (Score type)

γk = Factor C (Concentration)

(αβ)ij= Interaction of (Semester & Score type)

(αγ)ik = Interaction of (Semester & Concentration)

(βγ)jk= Interaction of (Score type & Concentration)

(αβγ)ijk= Interaction of (Semester, Score type & Concentration)

εijkℓ = experimental error (residual)

3.5 Data presentation

The results of the analysis were presented with tables, narrative and graphs as seen below;

4. RESULT ANALYSIS

Table No.2; Excel spread sheet regarding students' performance in average online test vs Final Exam in three concentrations during Semester (2023-1 & 2024-1)

SEMESTER	SCORE TYPE	CONCENTRATION	I	II	III	IV	V	AVERAGE	GLOBAL AVE.
I 2023-1	AVE.TESTS	MGMT	80.0	80.0	80.0	81.0	86.0	81.4	85.5
		FN.AN	89.0	91.0	87.0	93.0	90.0	90.0	
		MKGT	90.5	79.0	72.5	98.0	85.0	85.0	
	AVE.FINAL	MGMT	66.0	60.0	61.0	77.0	63.0	65.4	75.7
		FN.AN	74.0	78.0	61.0	75.0	72.0	72.0	
		MKGT	91.7	95.0	80.5	92.0	89.8	89.8	
II 2024-1	AVE.TESTS	MGMT	81.0	83.0	92.0	83.0	92.0	86.2	86.2
		FN.AN	86.0	76.0	85.0	77.0	91.0	83.0	
		MKGT	80.8	81.7	91.0	99.0	95.0	89.5	
	AVE.FINAL	MGMT	89.0	67.0	76.0	53.0	61.0	69.2	61.7
		FN.AN	53.0	68.0	67.0	74.0	59.0	58.0	
		MKGT	73.0	77.0	95.0	99.0	97.0	58.0	

Source; FMSS secretary files

It is important to indicate that without a proper statistical analysis, the results of the information appear to indicated that the students' performance has been low in both semesters (2023-1 & 2024-1), without considering the interaction of the three factors (Semester, Score type & Concentrations). Hence the rationale to analyzed the information statistically, to determine the level of statistical significance of and between the three factors mentioned previously. The following table demonstrate the results of the Analysis of variation(ANOVA) the study.

Table No.3; Analyses of Variation(ANOVA) of students' performance in average online test vs Final Exam in three concentration

Tests of Between-Subjects Effects

Dependent Variable: Percent

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	392710.857a	16	24544.429	377.296	.000
Block	234.007	4	58.502	.899	.473*
Semester	4.538	1	4.538	.070	.793*
Score type	1831.538	1	1831.538	28.154	.000**
Con	1855.825	2	927.912	14.264	.000**
Semester * Score type	26.004	1	26.004	.400	.530*
Score type * Con	1237.825	2	618.912	9.514	.000**
Semester * Con	372.225	2	186.112	2.861	.068**
Semester * Score type * Con	22.558	2	11.279	.173	.841*
Error	2862.353	44	65.053		
Total	395573.210	60			

a. R Squared = .993 (Adjusted R Squared = .990)
** Statistically significance
*Statistically no Significance

According to the Analysis of Variation (ANOVA) of Table No 3, there was no statistical significance in the effects caused by Factor A; Semesters (2023-1 & 2024-1), as well as the effects cause by the Blocks (1 to 5), on the students' performance. On the other hand, there was statistical difference (28.154) on the effects caused by the Score types (Average Online Test vs. In person Final Exams) as well as the Concentrations (Management, Finance & Marketing), (14.26) on the students' performance.

With regards to the effects of the interactions, there was no statistical significance on the effect caused by Factor A, Semesters (2023-1 & 2024-1) and Factors B; Score type (Average Online Test vs. Final Exams) on students' performance. Furthermore; there was also no statistical significance on the effects of interaction caused by the three factors; being Factor A; Semesters (2023-1 & 2024-1), Factor B; Score type (Average Online Test vs. In person Final Exams) as well as Factor C; Concentrations (Management, Finance & Marketing) on students' performance.

Finally, there was very high statistical significance in the effect caused by the Factor B; Score type (Average Online Test vs. In person Final Exams) and Factor C; Concentrations (Management, Finance & Marketing) on students' performance. Furthermore**,** there was also statistical difference on the effect caused by Factor A; Semesters (2023-1 & 2024-1) and Factor C; Concentrations (Management, Finance & Marketing) on the students' performance. The tables below illustrate the Test of Tukey means for the Blocks, Score type and the concentrations.

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Table No 4: Tukey means analysis to evaluate the Blocks effects

Percent

Tukey B[a,b]

Blocks	N	Subset 1
Block 2	12	77.958
Block 3	12	79.000
Block 1	12	79.500
Block 5	12	81.733
Block 4	12	83.417

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 65.104.
a. Uses Harmonic Mean Sample Size = 12.000.
b. Alpha = .05.

As seen in the Table No.4 above, there was minimal or no statistical significance of the effects caused the Blocks on the students' performance. The means of all the Blocks are similar and therefore, we can conclude that the Blocks, minimize the effects that could cause the differences between and among themselves on the students' performance. No Tukey analysis was done for Factor A(Semesters) as well as Factor B (Score type), considering that there were only two of both. Finally, with regards, to Factor C (Concentrations), the table below illustrates that there was statistical differences with one of the concentrations, considering that the students' performance where higher in that concentration or area. According to Tukey analysis, Marketing courses generated the highest score compared to Management and Finance that were very similar in regards to performance score. Table No. 5, illustrates the subset of the concentration. That was form from the concentrations, according to the analysis.

Table No 5: Factor C; Concentrations (Management, Finance & Marketing)

Percent

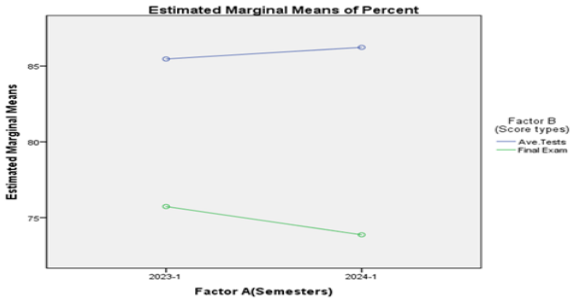
Tukey B[a,b]

Factor C	N	Subset 1	Subset 2
Management	20	75.55	
Finance	20	77.30	
Marketing	20		88.13

Means for groups in homogeneous subsets are displayed.
Based on observed means.
The error term is Mean Square(Error) = 65.053.
a. Uses Harmonic Mean Sample Size = 20.000.
b. Alpha = .05.

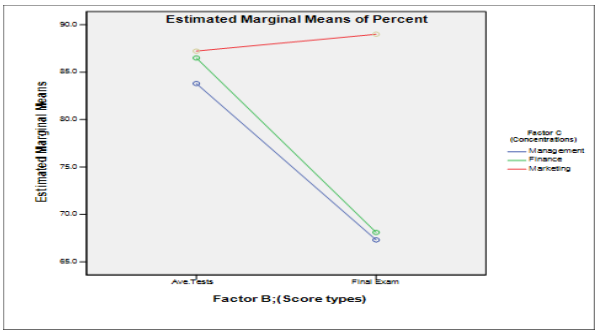
Following the Tukey analysis, the graphs below illustrate the behavioral patterns of the Factors (A, B, C) as well as the interaction between (A x B), (B X C) and (A x C) as well as the (A x B x C), as seen below;

Graph No.1; Behavioral pattern between Factor A;(Semesters) and B (Score type)



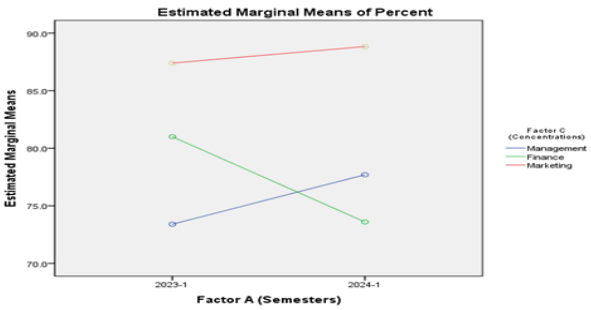
The graph above illustrates that the Average Tests score, are higher than the In person Final Exam scores. In the following graph below; you will observe the behavioral patter of the Factor A, Semesters and Factor B; Score type.

Graph No 2: Factor B; Score type vs. Factor C; Concentrations



Graph No.2; illustrates the behavioral pattern of Factor B; Score type (Average Online Test vs. In person Final Exams) and Factor C; Concentration (Management, Finance & Marketing) in both in Semesters. The graph demonstrates that the Marketing Score is superior to the Finance and Management in both semesters. With regards to interactions, in Graph No. 3 below; you can observe that behavioral pattern of Factor A; Semesters and Factor C; Concentrations. The graph illustrates that the Marketing Score is superior to the Finance and Management score. On an extra ordinary note; the graph also illustrates the intersection or interaction between Finance and Management as illustrated below;

Graph No 3: Factor A; Semesters vs. Factor C; Concentrations



A continuation, you can also observe the behavioural pattern of the interaction better the factors. According to the graph, the Average Online Test scores are superior to the In person Final Exam scores. Additionally, it is also visible that there

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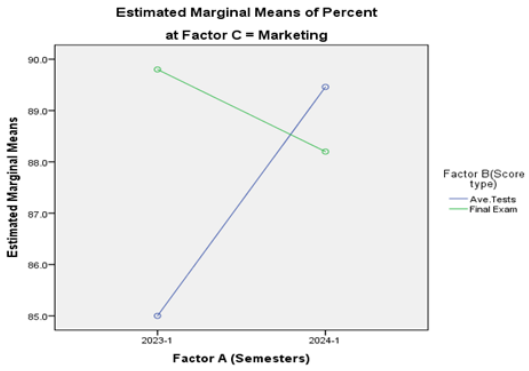
is an interaction between the Average Online Test scores and the Final Exam in both semesters as illustrated below;

Graph No 4: Factor A; Semesters vs. Factor B; Score types



5. CONCLUSION

1. The Alternative Hypothesis 1 and 2 were accepted; considering that statistical significance was found between and among the factors; specifically, Score types; (Average Online Test vs. In person Final Exams) and the Concentrations (Management, Finance & Marketing).
2. There was statistical significance in the effects caused by the Score types (Average Online Test vs. Final Exams) and as well as the Concentrations (Management, Finance & Marketing) on the students' performance score. Therefore, the Average online Tests score was superior than the in person Final Exam score.
3. There was statistical significance in the effects cause by the interaction of the Score types (Average Online Test vs. In person Final Exams) and the Concentrations (Management, Finance & Marketing) on the students' performance score. Therefore, there is an interaction between that Finance and Management scores with regards to the students' performance.

6. RECOMMENDATIONS

6.1 Online Test Assessment

1. **Use Technology based anti-cheating tool.**
   Re-enforce the used of Lockdown browser in the test with camara incorporated, so that invigilation can occur during the administering of the test.
2. **Use of Smart Assessment Design (SAD).**
   Incorporation of essay format in the test and/or the use of case analysis scenarios during the Test.

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