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The Impact of Blended Learning on Student Achievement

أثر التعليم الهجين على تحصيل الطلبة

by

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DECLARATION

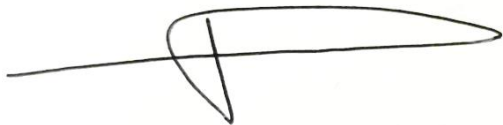
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ABSTRACT

The current work had focused on the impact of blended learning on 8-12 grade students within the greater UAE area. Particularly, the author had focused on this matter as education delivery has come to shift from its traditional focus of classroom-only, instructor centric nature and toward a variety of different components, materials, and mediums being integrated into it. Specifically, the COVID-19 pandemic has made this shift in the educational paradigm immeasurably evident with student demographics around the world experiencing changes in terms of classroom size, medium of education, and quality of education. Particularly, much of the focus on the matter, through the lenses of academic discourse and investigation, has remained mainly focused on university students with very little focus on the K-12 range. To amend this as well as fill the literary gap when it comes to the impact of blended learning, the author had focused on 8-12 grade students for the purposes of analysis. For this purpose, a diverse survey questionnaire was utilized for the current purposes and distributed electronically to a total of ninety individual students in the 8-12 grade range. These individuals offered important insight into the matter of how this range of students is impacted, academically, through blended learning. The current study was specifically conducted to answer two research questions which had entailed a focus on the mean grades of students in comparison to the instructional environments in which they took part and the impact that the environment of blended learning has on the academic achievement of students. Through their survey questionnaire, the author was able to find a considerable disparity and difference between their participants with regard to their academic achievement and the impact that blended learning has on them. Lastly, the author was able to offer a number of recommendations and insight for future academics with regard to the subject matter at hand.

المخلص

ركز هذا العمل على تأثير التعلم المدمج على طلاب الصفوف الثامن إلى الثاني عشر على منطقة واسعة في الإمارات العربية المتحدة. فقد ركز المؤلف على هذه المسألة على وجه الخصوص حيث أن تقديم التعليم التقليدي قد انتقل من تركيزه على الفصل الدراسي فقط ، وطبيعة مركزية المعلم إلى مجموعة متنوعة من تحديدًا هذا التحول COVID-19 المكونات والمواد والوسائط المختلفة التي يتم دمجها فيها. جعلت جائحة في النموذج التعليمي واضحًا بشدة مع التركيبة السكانية للطلاب في جميع أنحاء العالم والتي تشهد تغيرات من حيث حجم الفصل الدراسي ووسيلة التعليم وجودة التعليم. ظل الكثير من التركيز في هذه المسألة خصوصًا ، على الخطاب والاستقصاء الأكاديمي، والتركيز بشكل أساسي على طلاب الجامعات مع القليل . ولسد هذه الفجوة الأدبية عندما يتعلق الأمر بتأثير التعلم المدمج ، ركز K-12 من التركيز على طلاب المؤلف على نطاق الطلبة من الصف الثامن إلى الثاني عشر لأغراض التحليل. ولهذا الغرض ، تم استخدام استبيان مسح متنوع للأغراض وتم توزيعه إلكترونيًا على مجموعه مكونة من تسعين طالبًا ضمن هذا النطاق. قدم هؤلاء الأفراد رؤية مهمة في هذا الشأن، حول مدى تأثيرهم أكاديميًا من خلال التعلم المدمج. أجريت الدراسة الحالية خصيصًا للإجابة على سؤالين بحثيين، استلزمت التركيز على متوسط درجات الطلاب مقارنة بالبيئات التعليمية التي شاركوا فيها، وتأثير بيئة التعلم المدمج على التحصيل الدراسي للطلاب. من خلال أسئلة الاستبيان ، تمكن المؤلف من العثور على تباين واختلاف كبير بين المشاركين فيما يتعلق بتحصيلهم الأكاديمي وتأثير التعلم المدمج عليهم. أخيرًا ، تمكن المؤلف من تقديم عدد من التوصيات والرؤى للأكاديمية المستقبلية فيما يتعلق بالموضوع المطروح.

DEDICATION

I dedicate this thesis to my family whose unwavering encouragement, support and love have been my greatest strength throughout the journey. To my parents who have always believed in me and instilled all of their values of perseverance and hard work. To my siblings for their unintended inspiration and support in all the times of adversity.

I also dedicate this work to my mentors and friends who provided utmost guidance and encouragement when it was required. Thank you for your wisdom, patience and understanding.

Lastly, this thesis is dedicated to all of those individuals who aspire to learn, grow and overcome the challenges in pursuit of fulfilling their dreams. May this work be a testament to the power of determination and perseverance for you all.

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Chapter 1: Introduction

Technology has become increasingly embedded in our daily lives to the point that people take it for granted. However, it cannot be denied that we as a society depend largely on technology in our everyday lives; a classroom is no different. In recent years, many technological innovations have been introduced to enhance the efficiency of teaching within the classroom. Teaching has transformed from having specified rooms with computers to high-level integration in all classrooms and its methods. The efficiency provided by high-speed internet has made learning possible in the comfort of your home. Hence, educational institutes are slowly embracing more and more technological changes to keep pace with the modern world. According to one statistic, one million students from kindergarten to 3rd grade were enrolled in online learning in the year of 2011 in just the United States (Han & Ellis, 2019). These figures could be much larger on a global scale now that the world has been suffering from a pandemic which has made attending school extensively difficult for students.

It was also reported that in the year 2019, more than 50% of the students enrolled in school took part in at least one lesson delivered online (Han & Ellis, 2019). Hence, blended learning is a concept that is already present in teaching practices in larger parts of the world. Many iterations of blending learning have been introduced in teaching from the late 19th century which includes distance learning (Anders, 2018). Before the advent of the current technological boom, many delivery systems were made to make education easy for students such as return and outbound materials and mail programs. Even though distance learning was far more complicated in the past, it still led to a concept of prioritizing education for students despite their geographical restraints. As technology and education

progress, many new resources have become readily available that were not present in the past. Within the context of the UAE, internet and smartphones have made it possible for students residing outside of UAE to get high-quality education at UAE schools and universities (Dziuban, Graham, Moskal, Norberg & Sicilia, 2018).

With all the extensive technological development of the last decades, which in some cases was very optimistically intended to replace the teacher, the classroom has turned out to be an enduring system for communication. It is a cornerstone of society in the transmission of culture and the preparation of people for their proper performance in society. Presence has characteristic virtues that are difficult to match in a technological environment. In this sense, information and communication technologies (ICT) do not threaten the function of the university, what is discussed is the need for a new pedagogy, based on interactivity, personalization and the development of the ability to learn and think autonomously. In this work we assume that ICTs constitute an opportunity, that they can be integrated from the presence, tending towards a blended learning modality, as a resource and means that allows, on the one hand, to make the educational offer more flexible, thus meeting the various needs training of the population, and on the other, innovate and diversify teaching-learning methodologies and communication modalities.

Faced with this irruption of new knowledge and information technologies (ICT), education is one of the disciplines that has benefited the most. However, IT tools alone will not automatically change teaching methodologies, hence a powerful combination of the quality of traditional face-to-face analog culture (personalized and individualized) with the creative power and selective and filtering value is displayed. (collective) of the new virtual digital culture, in short, blended learning, this is a combination of face-to-face classes and online activities through institutional and / or open-source technology platforms or Web

2.0 applications for personal and group use by of teachers and students. Technological platforms help the organization of non-face-to-face activities complementary to the development of classes or face-to-face courses. Information and monitoring can be offered in a restricted way to the group of students, as well as evaluating the work carried out by them (self-evaluation tests, co-evaluation, continuous evaluation, individualized monitoring, accreditation of knowledge).

In this sense, one of the main opportunities of the new tools and Web applications responds to the principle of not requiring advanced technological literacy from the user. These tools stimulate experimentation, reflection and the generation of individual and collective knowledge, favoring the formation of a cyberspace of intercreativity that contributes to creating a collaborative learning environment. The challenge is for teachers to take advantage of this opportunity to create a learning environment supported by Web 2.0 and aimed at generating learning experiences, reflection and analysis, as well as cooperation between students, in which the teacher adopts the role of the student's guide and transforms the latter into the true protagonist of learning.

Blended learning and electronic learning are both models through which students are able to develop those capabilities that will help them not only attain employment but also live constructive and productive lives as members of society. Additionally, the use of this form of learning itself is often regarded as a skill (Vallée, et al., 2020) wherein those able to make use of the technologies involved are able to take part in self-education, develop quality information indicators, and make use of new information to practical situations in a productive manner. Moreover, Vallée, et al. (2020) show that learners able to make use of these technologies show a higher amount of cooperation and collaboration

when in groups and that they can evaluate the information given to them based on adequate assessments of its source.

1.1 Rationale

The primary objective of the study was to determine as to whether or not blended learning, as compared to traditional learning, could effectively improve academic achievement in school for students in grade 8-12 within the K-12 environment. The study adopted a non-experimental, comparative, causal quantitative design to achieve this goal. The outcomes and results of the study are likely to improve the current restricted workload for the effectiveness and impact of blended learning in secondary learning environments. This causal, non-experimental, comparative quantitative design allowed the author to make use of a small sample population of students from a non-random group to prevent the potential of researcher bias (Kan & Gero, 2017). Accordingly, the control variables included socioeconomic status, special education, ethnicity, and gender. The results of the current work are likely to allow academic leaders to make informed decisions concerning learning opportunity expansion. Lastly, the information and results that the current work presents are likely to contribute to the overall literary knowledge concerning blended learning's effectiveness and effects in academic environments.

1.2 Statement of the Problem

Education delivery has been, at least until the last handful of years, greatly restricted to a personal configuration that occurs at various times of day with few deviations in place. Simultaneously, student demographics around the globe are continually changing with classroom sizes also increasing as more and more students seek out a quality education. Conversely, learning has become somewhat temporary in the

modern day with most taking gap years between their education due either to professional or socioeconomic reasons. This has increased the difficulty involved in attaining an education as well as the interest and academic achievement of students in disciplines such as mathematics and science (Ishtiaq, 2019). The blended learning approach has become an innovative solution to welcome adult learners to education in a world of advance technology. In responding to such changes in the world and greater human society, education has become more accessible to students and has opened up its doors to non-traditional students who are unable to physically attend classes.

1.3 Research Questions

Research on blended learning seldom focuses on its effectiveness or impact on student growth or academic performance (Hockly, 2018; Hrastinski, 2019). It is essential to refute or validate the overall understanding of blended learning and whether or not it has a positive impact on student growth or performance. Accordingly, the current work focuses middle school students and will offer insight that can greatly aid academic institutions such as schools. It is significant that administrators and educators possess the knowledge needed to make informed decisions and the academic growth of mathematic students between traditional and blended learning environments will be analyzed (Rasheed, Kamsin & Abdullah, 2020). Thus, the research questions of the current work are as follows:

1. How do students in K-12 environments adapt to blended learning, specifically from grade 8-12th?
2. In controlling variables such as special education, ethnicity, and gender, what is the impact of blended learning on the academic achievement of students and how does this differ from traditional settings?

1.4 Significance of the Study

The current work will contribute to the literature on the impact of blended learning in the K-12 environments, specifically in grade 8-12th as they are able to respond to a questionnaire with clarity. Particularly, there seems to be a lack thereof sufficient literature and research into this matter and has brought about concerns as blended learning becomes more and more important for and integrated into schools across the private and public sectors (Dziuban, et al., 2018). Various prior works have illustrated the positive outcomes of blended learning for students in the post-secondary context (Smith & Hill, 2019; Vallée, et al., 2020). It is significant then to comprehend the digital student's needs and make sure that each individual students' needs are met.

Contemporary literature on the efficacy, benefits, and effects of blended learning remains mixed even whilst there is the generally held belief that, when compared to the traditional environment, the blended learning one can offer many more benefits (Boelens, De Wever & Voet, 2017). Much of the research available in terms of supporting this notion focuses on the post-secondary learning environment. Thus, the current work is likely to improve the comprehension of an appropriate and quality blended learning approach to K-12 students. It is significant to comprehend the changes in learning style, age, and maturity of K-12 students relative to higher education students. In of itself, the term refers to diverse groups wherein the learning needs and style of each student needs to be understood to deliver the most effective form of learning possible (Castro, 2019). Blended learning's nature is one that needs to be changed and tailored to the students involved to ensure effective implementation.

1.5 Brief Methodology

Quantitative research is recognized by its focus on statistics and relationships, objectivity, and structure. Conversely, qualitative research tends to lack such a structure and is often times building on existing theories, focused on interpretive analysis, content, and subjectivity (Apuke, 2017; Lucero, Adams & Turner, 2017). The current work was conducted by means of a causal, comparative, non-experimental quantitative design, which suited not only the research questions at hand but also the relationship being studied. Such an approach also ensured that the author could offer generalizable findings into the matter by means of a survey questionnaire focused on investigating, by means of comprehensive and broad coverage, the current learning experience of various students.

In this sense, it should be understood that the survey used for the current study was one that focused on evaluating and assessing the frequency of different responses from a given segment of the sample population as well as how, through hypothesis testing, different groups' inside of a given population segment can respond in differing ways (Edmonds & Kennedy, 2019). This survey was created and disseminated by means of electronic mail to ensure that it could effectively gather the greatest possible number of responses within a time period. This ensured that the survey was an effective method to collect data as well as that the information asked of participants could be simplified to eliminate the possibility of bias or controversial question items.

1.6 Limitations

The main limitations of this study are that the students at only school students of Grade 8-12th within the UAE are being studied. As there is no way to get the consent of each student participating in the study, we must opt for survey teachers instead. While we

can get relevant information regarding a student's achievement, we will not be able to evaluate how the students feel about blended learning and if they are satisfied with this kind of teaching. Hence, this is a one-sided account of how blended learning works in middle school.

1.7 Summary

Blended Learning is a useful tool for many schools in the face of the current pandemic and travel restrictions. This paper aims to understand the impact of blended learning on student achievement in school within the context of UAE. This chapter introduces the topic, the rationale, statement of problem, research questions as well as the brief methodology. The chapter ends with limitations of the study and the summary of the chapter.

Chapter 2: Literature Review

2.1 Blended Learning - Theoretical Foundation

With the progress of pedagogical practices, blended learning is defined and implemented in different ways and with many different meanings. For greater clarity and understanding of this approach to teaching and learning, this chapter includes several definitions and contributions that blended learning presents. This chapter analyzes the main theoretical contributions used as a reference in order to understand how they influence learning. To justify the importance of this form of education and to complement the purely traditional approach, Graham (2006), emphasizes that:

“[...] given the difficulty of adapting school curricula to the individual reality of students, blended learning gains strength. The result of a well-oriented use of digital resources in the classroom enables an increasingly personalized, dynamic and wide-ranging learning for students”.

Picciano, Dziuban and Graham (2014) report that:

“[...] Today there is an intense theoretical discussion about blended learning, teaching and blended learning. Many authors show that the path of education passes through the convergence between the presential and the virtual, in the integrated combination of times and spaces, making the curriculum flexible.”

In the same line of thought, Bonk and Graham (2012) explain that many institutions have started their projects to include distance classes in the curriculum,

“[...] putting in the virtual, those situations that created problems for them in their daily school life, such as students with difficulties, those with pending issues, recoveries, failures. In the virtual, they make content and activities available. The teacher stays as a consultant to answer questions and as a final evaluator. This made it possible to solve space problems, to allocate students to new classes and to reduce costs, at least for the institutions.”

2.1.1 Definition of Blended Learning

The terms “mixed”, “hybrid”, “technology-mediated instruction”, “online instruction” and “mixed-mode instruction” are often used interchangeably in current literature (Hockly, 2018).

To Singh (2021),

“[...] blended learning is an English language term, related to distance education that can be understood as blended learning or hybrid learning. The verb ‘blend’ in the English language means to mix, to combine. This form of teaching therefore combines face-to-face study with distance learning.”

The simple definition of blended learning, or hybrid education, is that of an education that combines face-to-face moments with the use of technologies that are part of distance learning. However, there are already other definitions that refer to the change in the pedagogical model involved in the option of mixing technology with face-to-face teaching.

For Hrastinski (2019), blended learning *“[...] is a bimodal, blended system – part in-person and part with distance activities [...]”*.

Blended learning is defined as hybrid learning and Kaur (2013) characterizes this type of teaching as teaching performed partly in person (with physical presence, in a classroom) and partly virtual or at a distance (with little physical presence) through communication technologies.

Driscoll (2002) identifies four different concepts about blended learning:

- I. In the sense of “combining or blending technologies, such as a virtual classroom, collaborative learning and video streaming, to accomplish an educational objective;
- II. Can combine various pedagogical approaches such as constructivism, behaviorism and cognitivism to produce an ideal learning outcome, with or without applied technologies;
- III. May combine any form of technology such as videotape, CD-ROM, web-based training and video and face-to-face tuition; and
- IV. Combine or mix technological tools with laboratory tasks.

For Gecer and Dag (2012), it is “[...] *the mixed or integrated use of face-to-face learning techniques - with the intensive use of ICT-s (Information and Communication Technologies), the network and modern means of communication [.. ..]*”.

Ferdig and Kennedy (2014, p. 128), explain that,

“[...] this type of learning usually involves a series of in-person classes or training sessions that are supplemented with the use of the Web or a learning management system to access learning resources.”

And they keep explaining that, “[...] classroom instruction can be seen as a tool combined with technology to produce a more effective learning environment than would be possible with just one of the two.”

Blended learning refers, as stated by Abar and de MORAES (2019, p. 121) in:

“[...] two learning environments that have historically developed separately, the traditional face-to-face classroom and the modern virtual learning environment, have found themselves to be mutually complementary. The result of this meeting are hybrid courses that seek to take advantage of what is advantageous in each modality, considering context, cost, pedagogical adequacy, educational objectives and student profiles.”

The issue of the blended learning approach lies in the adaptation of technologies, supporting learning methods, in addition to the existing traditional learning.

For Graham, Henrie and Gibbons (2013, p. 217):

“[...] The blended learning strategy is much more than a multiplication of channels; it is a combination of teaching/learning methods. In traditional education, the combination of multiple methodologies has been used, such as reading, laboratories, problem solving tasks, experimental research, among others. With the spread of information and communication technologies, a new concept identified by blended learning emerged, where learning is a continuous process, no longer constrained to a single context, space or a given moment. Through blended learning, students have (online and face-to-face) new learning opportunities, being able to choose or combine the offers of the curricular units according to their real needs.”

According to the definitions presented above, it can be said that the blended learning teaching model, added to face-to-face teaching, is an important alternative in the learning context, thus making face-to-face classes more efficient, as it involves different pedagogical approaches, styles and learning strategies.

2.2 Blended Learning Models

According to Graham (2006, p. 8), blended learning occurs at the levels of course activities, at the programmatic and institutional levels:

- Activity level, it happens when the classroom is mixed with computer-mediated situations;
- Course level, it happens when there is a combination of the presential classroom with the distance one as part of a curricular unit in a course. In more detail, Hrastinski (2019) mentions that “[...] *the proportion between these two types of disciplines defines whether the profile of the course tends more towards virtual or on-site [...] “;*
- Programmatic level, for Ross and Gage (2006), this level happens when the student chooses between a mix of face-to-face and online, that is, the course must have face-to-face and distance sessions;
- At the institutional level, the student attends the in-person classes of some curricular unit and whenever he wants, he can attend another one, which is 100% online. In this way, you can obtain credits for both curricular units.

Some of the blended learning models (Figure 1), described below, illustrate their variety and scope and were recently formulated in a report by Horn and Staker in 2012:

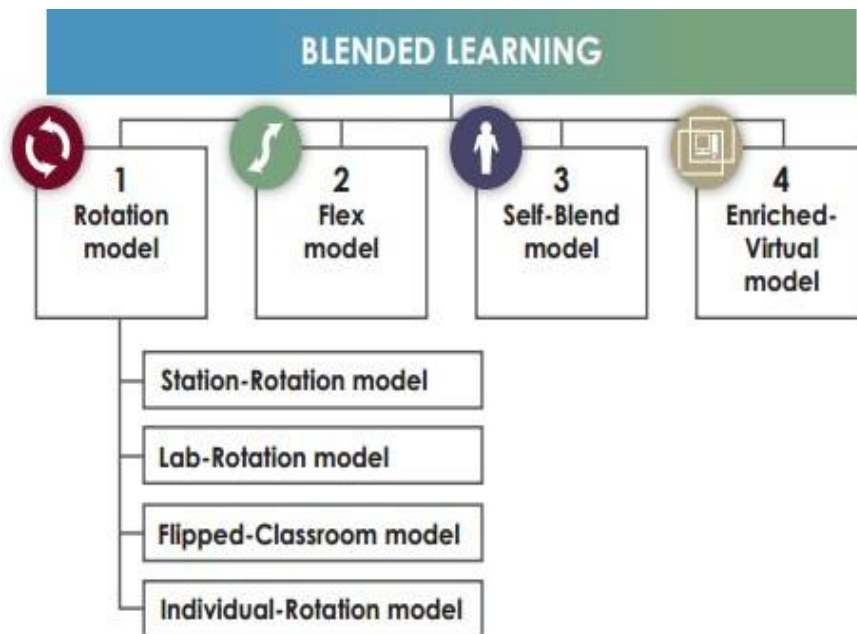


Figure 1: Blended learning model

Source: Horn and Staker (2012)

1. Rotation Model: Students alternate between different learning modalities or methods, one of which is performed in a virtual environment. Other methods might include collaborative group assignments or instruction for small groups. Most learning takes place in a face-to-face environment.

2. Flex Model: Although students are in a traditional classroom, the online component constitutes the main learning modality. Teachers are available to provide instruction or support.

3. Self-Blend Model (A la carte): the student chooses to take one or more courses online to complement the on-site courses and if the courses of interest to the student do not appear in the curriculum offered in person, they are offered online.

4. Enriched Virtual model: Students have the opportunity to divide their time between virtual and face-to-face environments. They can participate in face-to-face sessions with the teacher and can complete the rest of the activities independently.

The Rotating model consists of four sub-models:

Station-Rotation Model: The teacher divides the classroom into several stations with different but complementary activities. At least one of them proposes the use of a digital platform. The student must go through all the stations while learning a certain content.

Lab-Rotation Model (rotating laboratory): in which the student circulates between different spaces within the campus, one of them being the laboratory in which he performs online activities or laboratories for the development of specific practices.

Flipped Classroom is the teaching-learning method in which students watch content through videos outside the classroom, at home or any other environment that can access the material. In this way, he prepares himself for the activities to be developed in the classroom.

Individual Rotation Model: in which the student cycles between different learning modalities. The teacher sets individual student schedules.

The report shows possible combinations of these forms of learning and one of these is the flipped classroom model that is relevant to higher education and to the present study, as a key feature of this model is the opportunity to maximize student learning and develop their autonomy.

2.2.1 The Flipped Classroom Model

The flipped classroom or inverted classroom is the name given to the method that inverts the logic of classroom organization. Furthermore, it is favorable for students to develop autonomy, analysis and synthesis skills and promote the use of classrooms digital technologies for learning (Slomanson, 2014).

Students can review course material repeatedly outside of the classroom or at home, using technologies of their choice. The wide availability and engaging format of this type of content can be a powerful learning factor and encourage students to take more responsibility for their own learning, in addition to the student who misses class because of other responsibilities or due to illness will not be harmed.

It doesn't have high costs or big technological barriers to put into practice the inverted classroom, and teachers who master the technologies will be able to start creating their own content with the tools of the internet. Those who do not dominate will be able to absorb the contents that are available (Sajid et al., 2016).

The flipped classroom can really invert not just the classroom, but the entire teaching paradigm that goes from a traditional model in which the teacher owns knowledge, to a model in which he is the mediator (Slomanson, 2014).

2.3 The Benefits of Blended Learning

The notion of blended learning is one that is founded on the understanding that learning itself is a process that is continuous, in that every learner absorbs information in different ways. In this regard, blended learning takes the differences of learning styles of

students into consideration and focuses on making use of the best possible tools, strategies, and methods for delivering student preference-based learning experiences.

There are several advantages that lead blended learning to be an optimum approach to learning as Graham (2006) shows that there are six prominent causes for blended learning's growth in universities. These include Case and cost revision, personalization, interaction, knowledge access, and pedagogical enrichment. They also mention that the main reason for learners preferring this method of learning include cost optimization, ease-of-access, and learning enrichment.

In the ease of access and flexibility, access to education is one of the main factors. Flexibility of time and space is very important for students who take charge of their own learning. But they also don't want to sacrifice the human relationships that face-to-face moments provide.

Osguthorpe and Graham (2003) seek to balance online and face-to-face components that vary from course to course. The most important consideration is to ensure that the combination embraces the strengths of each type of environment without any of the learning deficiencies.

Cost optimization is the third major reason for the increase in blended learning courses, which prove to be more economical than face-to-face courses, as they allow students who are physically distant and dispersed to study. When you mix some content delivery modes, cost and time are optimized. Combining online learning with face-to-face learning is more cost-effective and increases learning performance and outcomes, thus expanding the opportunity to achieve knowledge from anywhere in a short amount of time (Bonk & Graham, 2012).

Dziuban et al. (2018) discuss the cost reduction with the implementation of the blended learning model and expose examples of a university where they taught classes, explaining that online classes can be replaced by work in pairs, to discuss, debate and participate in problem solving related to the course material and, as learning is student-centered, they can discuss questions received in small groups, online or on video. Simulations that can be performed on a single computer or a network of computers can also be used to reproduce the behavior of a system. Lessons can be divided into some techniques such as think-pair-share in which students have a few minutes to reflect on the previous lesson, after discussing with one or more of their peers and sharing with the class. The assessment can be done through computerized adaptive tests in which questions are selected with the aim of maximizing the accuracy of the exam based on the student's knowledge, based on previous questions. From the student's point of view, the difficulty of the exam seems to adapt to their level of knowledge. For example, if the student performs well on intermediate difficulty answers, a more difficult question will be presented, or if the student performs poorly, a simpler question will be presented.

In interviews with students about the strengths and weaknesses of blended learning, El Mansour and Mupinga (2007) provide some answers. Regarding the positive points, the students interviewed said that they can study even when they are not in the classroom because they can see it online. An important issue is the availability of the teacher to provide additional explanation and answer questions in the classroom and online, offered with personalized attention and availability to answer questions through the discussion forum or email. Online convenience and flexibility can schedule class when it doesn't coincide with working hours; on the other hand, they can study at any time requiring only computer access. The expectations were the same as in a traditional classroom, that is, the time for assignments was the same and the lesson was made with audio tapes transmitted

over the web, being very similar to a traditional class. Online group discussions allowed students more time to reflect and prepare responses well, thus improving performance of students learning through visual cues or experimental exercises. Regarding the negative points, the students complained about the rigid timetables for in-person and online classes and about the Internet connection, which was bad.

The opinion of students about the adoption of blended learning, according to Waha and Davis (2014) is positive, and the advantages are: easy access to information (notes, notices, content and material provided by teachers); ease of communication (with teachers, teacher-student, possibility to clarify doubts, student-student communication, interaction with other classes and groups); good organization and constant updating (of material, content, information, study); platform features (delivery of work in digital format, forum, online tests, e-mail, chat); economic facilities (few copies, avoiding travel to college and to deliver the work, in addition to not having to spend on printing, etc.).

Regarding costs and resources Graham (2006) and Lothridge et al. (2013) consider it as yet another advantage of blended learning. The developed material can be put online and used for a long time. Furthermore, the number of students can be increased without increasing the number of classrooms.

2.4 Pedagogical Possibilities of Blended Learning

The rapid growth of e-learning has brought some learning experiences, especially in the academic sphere. The development of student-centered methods balances the traditional classroom approach and technology-based learning, as balancing the two models has enormous potential and increases learning performance. For Graham, Henrie and Gibbons (2013), in the study carried out by Graham and his colleagues, it was found

that the offers of several learning options, in addition to the study in the classroom, increased student learning.

In 2016, Picciano, Dziuban and Graham reported that students learned more when online classes were added to traditional courses and noted that student interaction and satisfaction also improved.

The authors organized a framework (Table 1) to demonstrate that blended learning can go beyond the traditional classroom.

Table 1: Possibilities for a strategic approach in blended learning

Formal classroom:	Informal face-to-face classroom:
Teacher-led class	Working groups
Speeches	
Training/instruction	
	Virtual / Asynchronous Collaboration
Virtual / synchronous collaboration	e-mail
Live e-learning	Virtual Communication Panels
e-mentoring or monitoring	Virtual communities
Individualized learning	Performance support
Learning modules via the “web”	Help systems
	Print Job Aids
Online Resource Links	Knowledge Databases
Simulations	Documents
Scenarios	Performance/Decision Support Tools
Audio and Video CDs and DVDs	

Online Self Assessments	
Physical workbooks	

Based on the data in Table 1, online learning can be formal and informal, with different means of self-learning, assessment, and synchronous and asynchronous interaction technologies. Formal learning takes place when students are involved with material developed by a teacher, instructor or faculty to be used during class, which includes workshops, training, tutoring, on-the-job training (training employees in the classroom environment at work). Informal learning begins through student motivation, such as research activities on the internet, visiting libraries, museums, participating in events, and so on. Synchronous virtual collaboration involves face-to-face classes, live virtual learning classes and virtual training or tutoring.

Graham, Henrie and Gibbons (2013) explain how interaction technologies, synchronous and asynchronous, are processed.

“[...] In asynchronous interaction technologies, communication is processed in a non-continuous way over time (the means of communication that supports the diffusion can cause temporary delays that can go from a few seconds to days), in contrast to technologies of synchronous interaction in which communication takes place in real time, in an uninterrupted way, creating a feeling of permanent involvement (a feeling of “being there”). Asynchronous communications are therefore more flexible than synchronous.”

Graham, Henrie and Gibbons (2013) makes some recommendations for hybrid courses based on Georgia Perimeter College's experience, as selecting familiar courses can save time and space, then selecting the best faculty, an important factor in any institution

that can define a college. and provide a comprehensive training program that includes copyright and intellectual property information. Allow students the first use of technologies in place of the face-to-face class, so students have time to read, study and work on new material. The teacher must provide immediate feedback and encouragement. To clarify any doubts students may have about what a hybrid course is and how they can benefit from it, the institution should develop a public relations campaign.

It is important to recognize that each form of learning, in person, at a distance, synchronous or asynchronous, has different objectives in which students react in different ways, according to Bonk and Graham (2012, p.6),

“[...] as it can easily be recognized that the dissemination of training through written form is often more effective than orality, it also seems reasonable that online education can often bring improvements in relation to purely face-to-face methodologies.”

2.5 Blended learning in Practice

Following are some examples of good international educational practices and experiences of schools and colleges that applied blended teaching:

-High Tech High School, San Diego, Calif. - By dividing the classroom into two groups, High Tech High School seeks to help students with math difficulties in two different ways. While one half is assisted in the traditional way, with a teacher, the other half uses the ALEKS program, a virtual adaptive teaching platform in the areas of Mathematics, Chemistry, Basic Statistics and Business. While this may seem like a simple initiative, the program saw 93 percent of participating students pass the California High

School Exit Exam directly in 2010. Without the feature, the average pass rate was 80 percent (Nehring, 2021).

-eCADEMY from Albuquerque Public Schools, New Mexico - eCADEMY students take their first class in a classroom, mediated by a teacher. They are instructed to continue their work via the Internet, and must complete distance assignments as long as they keep grades above C. There are teachers available to help and answer students' questions. 70% of young people participating in this hybrid teaching experience remained in school, while the average stay in schools in the region is 50% (Light & Pierson, 2014).

-AdvancePathAcademics, Williamsburg, Virginia - This program specializes in the recovery and training of struggling, out-of-school students. Using specific and strategically designed tools to attract students, AdvancePath bet on hybrid education as the main attraction for the development of students. Using technology, they seek to link the school curriculum with activities that are part of the daily lives of young people, but at the same time, they maintain aspects of the traditional school, aiming to prepare them for college or a technical course. In the 2010/2011 school year, 50% of students who participated in AdvancePathAcademics went on to a higher education course (Super & Murray, 2010).

With the examples above, it is possible to verify the benefits of applying the blended learning model, its flexibility and its pedagogical effectiveness. The combination of face-to-face and distance learning can work if there is well-defined planning and objectives, as blended learning is seen as a solution to the isolation that some students feel when faced with fully distance learning courses, thus ending the monotony, often existing in the classroom. However, in order for the student to overcome online learning difficulties, models and teaching methods and content delivery strategies must be discussed in order to increase satisfaction and boost learning outcomes.

2.6 Blended Learning and the Institution

According to Gawande (2015), for the integration of technologies to occur in institutions, the implementation of political changes, concepts, values, beliefs and procedures are essential. It is also necessary to change the physical space, the time of the teacher, school and classes. The curriculum and infrastructure must be rethought, and teachers trained. Briefly explained, this integration involves:

Management: management that involves political and administrative aspects, according to Gecer, and Dag (2012), concerns the reorganization of groups of students, classes and classes, the reformulation of the institution's physical space, speed and new means of communication involving new technologies, transparency the data presented by the school and new teacher contracts with clarity in their time management.

In this regard, Gecer, and Dag (2012), clarify what this time management includes:

The time when they research the best interactive ways to develop activities making use of available multimedia resources. Include another time to discuss new ways and possibilities for exploring these resources with other teachers and technicians and to reflect on all the referrals made, share experiences and assume the fragmentation of information, as a significant educational moment for recreation and emancipation of knowledge (p. 82).

Teacher training: the training of the teaching staff will depend on the technologies and media to be used. In training, it is necessary for the teacher to understand how technologies and media work, as well as their pedagogical possibilities, starting from the integration with the teaching process.

Technological infrastructure: currently, it is not enough for institutions to have computers and software. It is also necessary for them to be in good condition to access the internet and other services available on the networks.

Curriculum: following a new educational proposal, the educational institution must also reformulate its curriculum and include in it new short and long-term educational objectives, new goals and methodologies, new forms of assessment and activities.

Therefore, the educational institution needs to prepare its physical structure, human resources, methodologies, training of teachers and managers and the design of new curricula to meet this demand (Gecer & Dag, 2012).

2.7 Blended Learning and Teachers

The change in the social context and in the student's, profile requires from the teacher other skills that do not apply to the face-to-face education model.

According to Jeffrey and associates (2014), a new teacher's role to work in the digital context must involve a professional as a learning strategist, creating a human involvement that overcomes the possible impersonality of the telematic medium and promoting debate with mutual help. Thus, "the teacher will need to be permanently open to the new, have a critical view when selecting information, be in tune with the challenges of each moment and be constantly attentive to educational processes" (p. 12).

For Comas-Quinn (2011), the teacher who proposes himself as a pedagogical mediator in virtual learning environments and with constructionist characteristics, that is, the "virtual being together", must develop the following characteristics, skills and abilities:

- be focused on student learning.
- build a relationship of trust, empathy and mutual collaboration between student and teacher.
- being the student's partner during the educational action, which includes planning, carrying out and evaluating.
- provide a cooperative environment with an equal relationship with its students.
- have a deep domain of their area of knowledge, demonstrating competence and updating in relation to the area and encouraging research among students.
- be creative to seek with the student solutions to new situations and be open to the new and unexpected proposed by the students.
- be available for frequent and continuous dialogue, being agile in giving
- feedback.
- have interpersonal communication that considers the subjectivity and individuality of students.
- have an expressive communication in terms of distance learning, pointing out paths, not solutions.

Thus, the blended presence demands from the teacher training for the pedagogical use of technology and the development of competences for the distance activity, methodologies and practices that are different from the classroom.

2.8 Blended Learning and Students

The student has a fundamental role in their learning about technologies. He must have an active participation in the construction of his own knowledge, working in a cooperative way, to reflect on his own thinking and that of others. He, too, must be more

autonomous and manage his time. Thus, in agreement with Poon (2013), students are an integral part of the authors who are present in blended teaching, “especially in learning situations that provide for the participation of students, their individual and collective productions as part of the teaching-learning process “(p. 347).

Rafiola and associates (2020) state that students also benefit from blended learning, mainly semi-presence can add gains in training for students in on-site courses, such as: (i) the development of autonomy and self-organization, since distance learning activities demand such behaviors and (ii) the development of skills in the use of ICT, which are necessary tools for adequate monitoring of content at a distance (p. 132).

2.9 School Performance and Blended Learning

The performance of blended learning is open to different definitions, with several factors that can be considered associated with it (Hrastinski, 2019). According to Nehring (2021), courses can have different performance objectives and each one can be measured separately and in a different way. The exploration of literature in this domain allows us to affirm that there is no agreement regarding the establishment and meaning of the relationship between academic performance and online communication, as can be confirmed below.

On the one hand, the investigation developed by Nehring (2021), when carrying out a correlational analysis between the visibility of online students and their performance in learning, in a postgraduate course carried out online with 14 students, allowed the authors to verify that there is a strong relationship between academic results and online participation - the latter, measured through online visibility, that is, the number of participations of each student. According to Lecocke et al. (2019), more active students

tend to outperform fewer active students, the author suggesting that visibility seems to favorably affect academic performance in some tasks, particularly those that require more social presence and group interaction. However, the same author emphasizes that the studies carried out with a view to assessing visibility in online courses - which include the analysis of interaction in discussion forums - are too restricted in scope and that their results, even when they are favorable in relation to the impact on academic performance, are not transferable to other online learning situations or extend to the development of other skills. The works of Waha and Davis (2014), which focus on the analysis of content in 38 online discussion groups, involving 300 university students, over a period of six months, with a view to studying the construction of knowledge in groups electronic and asynchronous discussion boards, allow to support an identical opinion, as they found that discussion groups with more activity present better results, also observing greater knowledge construction in these same groups.

However, Firat (2016), in his studies on the correlation between alienation indicators, academic results and WebCT usage indicators (Blackboard LMS) of 53 university students, states that there is a curvilinear relationship between academic results and online participation. According to this author, a smaller number of participations predicts a limited academic achievement, but a larger number of participations does not imply or guarantee better academic results, in fact, when in excess, they can prove counterproductive. The author clarifies and proposes as a justification for these conclusions the fact that less participation can negatively affect student results, since it minimizes or represents less active involvement in online learning, however, an excessive number of participations can be synonymous with high involvement, but in itself implies a reduction in the time available for other learning tasks, thus reducing the student's effectiveness in carrying out them. Also, according to this author, some students may conclude, incorrectly,

that a greater number of participations in the discussion forums would compensate for the lack of investment in other learning behaviors, which are equally relevant and required.

Tarantino, McDonough and Hua (2013) justify their studies on the effects of different types of social networks on student performance, stating that existing investigations are not conclusive, since there are multiple factors involved in the learning process. In fact, other factors, such as the learning materials, the content provided and the pedagogical objectives themselves defined (in addition to the coherence between them), can equally influence the students' academic results. Thus, the multiplicity of factors associated with academic performance in learning is highlighted, both in person and online.

Likewise, Dickinson (2017), when analyzing the influence of online interaction and the sense of presence on the academic performance of 23 students who attended an online postgraduate course, whose activities were carried out in a completely asynchronous regime, had already mentioned that the relationship between interaction measures and academic performance tends to be inconsistent, revealing itself to be dependent on the means and measures used to analyze the two constructs. The author states that online discussions tend to take longer than in a face-to-face situation and, as there are many possible sources of information, they may act counterproductively, as students can shift their focus away from the topic under discussion. Dickinson (2017) considers that students' online interactions are related to performance on written tasks, but not to final grades. This author concludes, however, that despite the inconsistencies found in this domain, the interpretation of the importance and role of interactions in online learning should not be discarded, stressing as necessary the development of more studies, in order to understand

the real effects of online interaction on learning outcomes. In this perspective, the relevance and interest in analyzing both direct and indirect or mediated effects is added.

Super and Murray (2010) advise prudence in the analysis of participation in asynchronous discussions, highlighting the effect associated with online moderation exercised by the teacher/instructor, since this may not be present in a timely manner, and because it takes time to correct or clarify the comments made by the different participants, it can lead to possible misinformation or even a disturbance in the continuity of the discussion, as well as the sense of its usefulness.

In addition, Firat (2016) when analyzing responses to questionnaires from 53 students of an online master's course, who were flagged for being apparently inactive, comments that, in an online context, it has not yet been possible to reach the conclusion that a greater interaction promotes better academic results and less interaction promotes worse academic results. However, the author states that students devote much of their time to tasks related to learning, which include, for example, access to the forum, which gives them greater visibility, recognizing that academic results tend to turn out better in students who also demonstrate greater visibility. Going deeper into the relationship between communication and school results, Firat (2016) and Dickinson (2017) report that students who limit their interactivity also tend to achieve the goals of defined learning. However, Firat (2016) states that further studies are needed to better understand the dynamics between asynchronous online communication and learning, concluding that despite the favorable effects associated with online visibility on student success, it will be premature to conclude the existence of causality among the phenomena, while alerting to the fact that invisibility is not directly associated with a lower involvement in the course or with worse academic results. The author considers that the existence of witness learners should be

taken care of in an institution that promotes social constructivism as a form of learning. According to the author, the perspective that academic performance is based on interaction and visible content neglects the entire learning process that could take place in alternative ways, that is, in a way that is not externalized nor supported by identifiable evidence online.

In light of the above, it appears that, although there are several studies that focus attention on the analysis of the meaning and strength of the relationship between blended forms of learning and establishing online education and the student engagement and the academic results of students in courses carried out entirely or in-part at a distance, there are no consensual or clarifying results about this relationship hence, the author of this study has chosen to study this topic in detail.

Chapter 3: Methodology

The methodological planning is fundamental in any investigation, representing the organizational element and the overall work orientation scheme (Sileyew, 2019), allowing, therefore, to provide a specific direction to the procedures (Creswell & Sinley, 2017). Hence, this chapter discusses the methodology for this research paper in detail.

3.1 Research Design

Analyzing the formulated objectives, it is observed that these raise the need to study online participation rates and concrete academic results, as well as the association between the data. Thus, the present investigation takes a quantitative methodological approach, characterized by the ability to test objective theories, examining the relationship between variables through statistical procedures (Creswell & Sinley, 2017). It is intended, therefore, according to Creswell and Sinley, (2017), “a quantitative presentation and manipulation of data, with a view to describing and explaining the phenomenon on which these observations fall”. Regarding this type of approach, Sileyew (2019) states that for a meaningful interpretation, the data must be objective and result from observations and empirical measures, safeguarding the validity and reliability of the instruments. The author also mentions that this type of methodological approach has a deterministic component that suggests the importance of analyzing the relationships between variables as a way to answer the questions asked.

Considering that the present investigation has as one of the objectives to study the existence of a relationship between variables of blended learning and student achievement in grade 8-12, it is also assumed a methodological perspective referred to by Apuke (2017) as quantitative-correlational, since it intends to study “understanding and the prediction of

phenomena through the formulation of hypotheses about the relationships between variables” (p. 29).

This investigation was delimited on the theme of blended learning practices and methodologically organized with the objective of ensuring the scientific rigor that is necessary to consolidate the production of new knowledge. Thus, we opted for a quantitative with an exploratory objective, built through a case study, using a questionnaire.

In this outline, the references on blended learning practices were previously presented, to contribute to the educational theoretical constitutive processes. About the exploratory objective of this research, it is understood, according to Gil (2007), that research of this nature involves: (a) survey; and (b) analysis of examples that encourage understanding of blended learning among students of Grade 8-12th (GIL, 2007).

3.2 Instrumentation

Bloomfield and Fisher (2019) define the questionnaire as “an investigation technique composed of a “set of questions that are submitted to people with the purpose of obtaining information about knowledge, beliefs, feelings, values, interests, expectations, aspirations, fears, present or past behavior, etc”.

Bloomfield and Fisher (2019) state that the responses collected through the questionnaire bring data to describe the characteristics of the surveyed population. Some advantages listed by the author favored the choice of this instrument, as they are adequate for the context of this research, namely:

- it can reach a large number of people, even in a large geographic area.

- guarantees the anonymity of responses.
- allows people to respond when they see fit.
- does not expose the respondent to the influence of the researcher's opinions and personal aspects.

In this study, the application of a questionnaire aimed to raise information regarding the academic achievement of students in blended learning environments, as well as identifying how they understand blended practices.

The questionnaire was the technique chosen by the researcher, not only to contemplate the data collection and complementation between the instruments, but also to give voice to the students about the experiences lived during the course. From the moment the data were collected, they were selected, analyzed and interpreted, using an adapted technique of content analysis. The selection of data considered delimiting the aspects that aimed the research.

At the time, the research project was presented to explain the objectives to be achieved with the instrument. After discussing the items that made up the questionnaire, it was necessary to submit it to some modifications to achieve the proposed objectives. Along with the questionnaire, there was an Informed Consent Form (TCLE) regarding the authorization to use the data provided. The initial sending process and the return of students took approximately ten days. It is worth adding that the invitation was sent to the 100 identified students, who took blended learning courses during the first and second semester of 2021. Out of the 100 contacted students, only 90 students completed the questionnaire and sent it back in time. This data will be presented in more detail in the next chapter.

3.3 Data Collection

According to Creswell and Sinley (2017), an effective planning allows all the methodological elements to come together, allowing the researcher to question aspects such as the delimitation of the problem, hypotheses and variables under study, subjects and samples to be used, moments of evaluation and intervention, instruments to be used and analyzes to be carried out with the data. In this sense, the participants, data collection instruments and data collection and organization procedures are characterized in the following subchapters.

Creswell and Sinley (2017) state that, in the sense of rigorous data collection, the investigator must present detailed information about the instruments to be used in the proposed study, or as (Dawson, 2016) refer. on the “set of items, questions or situations more or less organized and related to a certain domain to be evaluated”. This clarification is important considering the need to “verify that the data collected in the investigation are stable over time and have internal consistency, especially if they come from multiple sources” (Dawson, 2016). Thus, the reliability of the scientific study is allowed, achieved through the use of “reliable instruments and standardized techniques for data collection” (Dawson, 2016), which enables the replication of the study (Glik et al, 2005).

In this sense, the instruments used in this study are presented at the end of the study, highlighting that their use involves the collection and analysis of data directly related to the scope and objectives stipulated for the research in question.

3.4 Sampling

This study is developed for students of 8-12 grade attending at least one blended learning course, and simultaneously use asynchronous online communication tools, namely discussion forums, as a basis for developing some of the learning activities, requested in the different constituent modules of the compulsory courses, in the course in question. In this context, it is intended to concretely analyze the blended courses taught within the UAE schools, specifically addressing the group of students in the 2020/2021 curricular year.

Regarding the sampling process, it is also worth mentioning Coutinho (2011, p. 90) who characterizes this type of sample as non-probabilistic, since it is not possible to specify the probability of a subject belonging to the study population. According to the author, since this is an already constituted intact group - in this specific case a complete class -, this is a convenience sampling, with the advantage of allowing a study in a real context, but with the disadvantage of its results be generalizable beyond the study group (Schutt, 1998, cited by Coutinho, 2011, p. 90).

Participants were all of UAE nationality and belonged to an age group between 14 and 20 years old as the study constitutes of students from grade 8 to 12. The group has a mean age of 16.5 years and a standard deviation of 4.67. Analyzing the distribution by gender, shown in Figure 3, it is possible to conclude that the majority (79%) of the participants were female, and the rest (21%) were male.

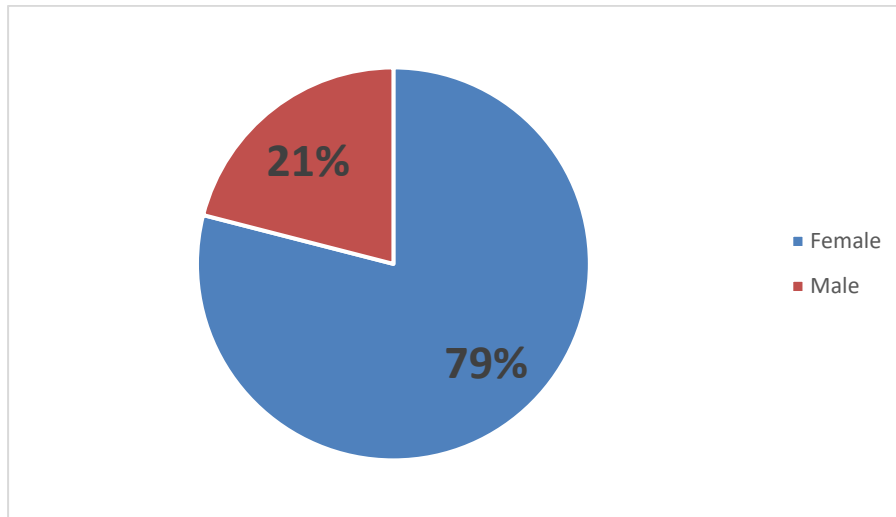


Figure 2: Characterization of participants by gender

As for the degree of education of the participants, the analysis of Figure 4 allows us to conclude that most participants (75%) were enrolled in a 10-12th Grade and only a quarter of the participants (25%) were enrolled in 8th and 9th Grade.

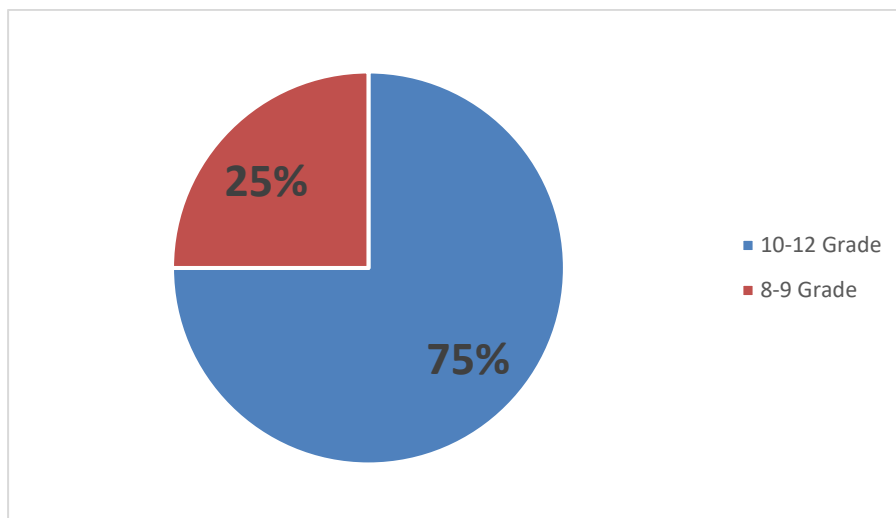


Figure 3: Characterization of the participants regarding the degree of training

3.5 Research Procedure

The data collection process started in September 2021, with the collection of information about the participants, and was completed between October 2021 and November 2021, through the remaining procedures, described below.

When intending to use academic achievement of students in school, it is essential to understand that these students are only relying on blended learning practices due to the current pandemic. There is a good chance that these students would have had a different experience with blended learning, had it not been imposed on them due to the pandemic. There is also the matter of converting students to a more blended learning experience as many students were studying in a traditional manner before the pandemic and transition was abrupt and sudden.

The questionnaire is a self-reported questionnaire and the author aimed to understand how students perceived their academic achievements as a result of blended learning. Hence the questionnaire asked the students about their grades in the blended learning courses, which were organized and coded, replacing the students' names with a numerical code (from 1 to 28) as this question was optional and only 28 students felt comfortable in answering this question. The coding was done in order to guarantee confidentiality and the anonymity of the participants. These data were analyzed using descriptive statistical techniques.

In order to test the veracity of the research hypothesis, the study intends to focus on the role of each of the actors in blended learning as a whole, whereby the sociometric indicators relating to the centrality of each student and their final average scores were later imported to SPSS Statistics software, in order to explore the relationship between their

levels of participation in online discussion forums in blended learning courses and their academic results.

3.6 Data Analysis

SPSS Statistics (<http://www.ibm.com/software/analytics/spss/>) is statistical analysis software, being “a powerful computer tool that allows you to perform complex statistical calculations and visualize your results in a few seconds” (Norušis, 2006). It is a comprehensive tool that accepts different types of data and enables a wide range of statistical procedures, with data manipulation capabilities for analysis and reporting (Norušis, 2006). In the context of this study, version 22 of the software was used, with the specific objective of statistically analyzing the relationship between variables, namely through the calculation of correlation coefficients.

3.7 Ethical Considerations

It is important to mention that, during all stages of this investigative process, there was a constant concern with the study's quality parameters, as well as with the ethical principles indicated as essential in the literature. Thus, the rights of the participants were considered and safeguarded in accordance with the opinion of (Connelly, 2014), which includes: the right to self-determination, with the participants freely deciding on their participation in the study; the right to privacy, as the participants only shared the information they found convenient; the right to anonymity and confidentiality, with the names of the participants being coded numerically and in such a way that individual data, namely classifications, cannot be associated with the identity of the subject; the right to protection against discomfort and harm, with the investigation not producing any effect, whether favorable or unfavorable, for the participants; and the right to fair and equitable

treatment, with participants being informed in due time about the nature, purpose and duration of the investigation for which their participation was requested, as well as the methods used in the study. Investigator duties were also assumed in accordance with the assumptions of the American Education Research Association, according to which the latter has the responsibility to produce correct reports and without falsifying or fabricating results, to correctly reference all sources used in the reflection processes, of to avoid plagiarism and misappropriation of works and ideas by other authors, and also to allow verification, replication and deepening of the study carried out (AERA, 2006, p. 39).

Safeguarding the need for a free and informed consent for the investigation (Connelly, 2014), authorizations were previously requested from all the elements involved. In this way, consent was obtained to carry out this study. It is also mentioned that guardians of all participants consented to their data being used in the manner of this study and that all data were used exclusively for the purposes of this investigation, without any other data, in addition to those actually considered for the study, were analyzed.

Chapter 4: Findings and Analysis

Taking into account the methodology defined for this study, it is useful to approach the different data collected and processed in three different contexts, in accordance with the defined objectives. In this way, the students' final classifications and the statistical relationship between the students' classifications and the indicators of participation in the online forums in question are presented and then analyzed. Given the answers, frequent access to the internet and the computer, as the use of these technologies generates broad familiarity and different ways of learning.

In the question about difficulties in reading on the computer, 67% of the students answered that they do not have difficulties and 33% yes, that they do. The reasons for those who have difficulties reading on the computer were:

- I wear glasses. My eyes are tired if I spend too much time on the computer.
- The computer's brightness hinders me.
- When I read on my computer before bed, my sleep suffers.

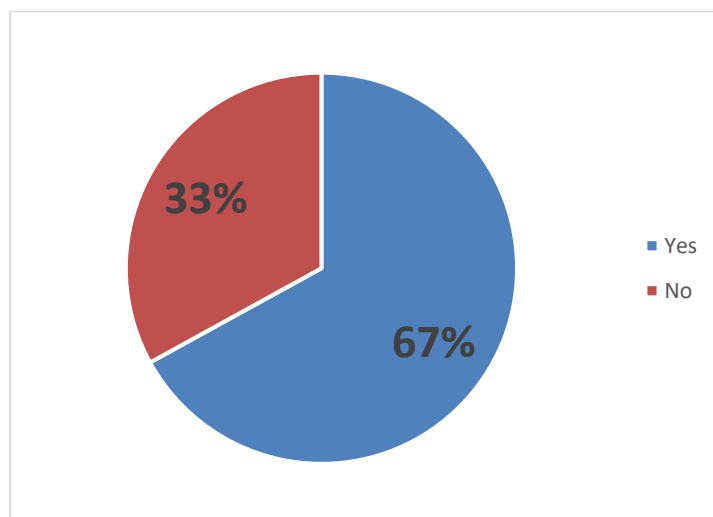


Figure 4: Percentage of participants with reading difficulties on computers

In figure 6, most students, 80%, answered with collective agreement, that computer and internet use are important, 5% answered with collective disagreement and 15% answered neutrality. In order to have a better view of how this factor appears in the questionnaire. Based on the answers, it was possible to see the importance of technologies in facilitating the teaching and learning process. Nowadays, it is difficult to imagine that the student or anyone else does a research or project without using the internet.

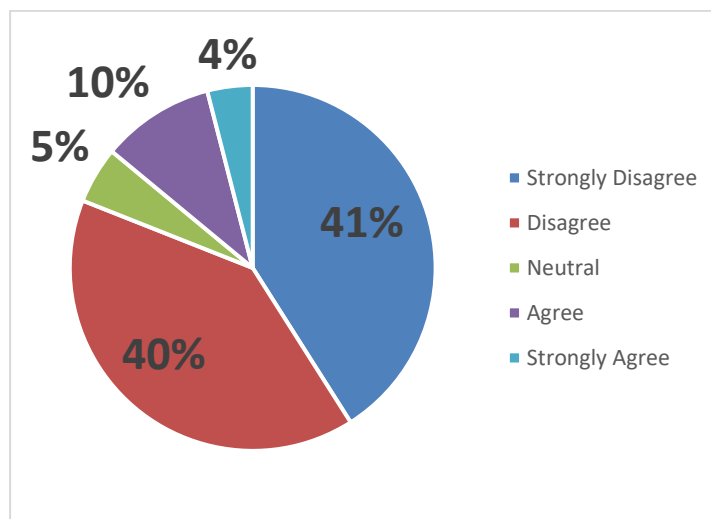


Figure 5: Percentage of participants who think computers/internet is important in the classroom

In the question about encouraging or recommending the use of the internet for schoolwork (figure 7), it can be seen that 67% of students do not recommend or encourage the use of the internet and 33% answered that they do. With technological advances, students must be well informed, updated and included in the digital environment, as everything is based on technology, work, education, leisure and social networks. Awakening and stimulating interest in technologies, both among students and teachers, is not simple. In addition to watching movies, staying on social media, the student could start with content development, on any topic of interest.

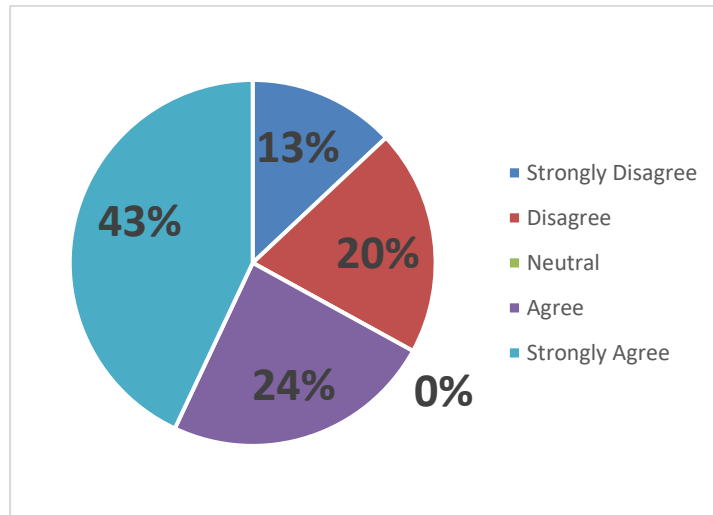


Figure 6: Percentage of participants who recommend internet usage in class

Below is the presentation and discussion of the responses obtained from the participants concerning the main portion of the questionnaire. For the question whether online exercises helped to consolidate the content of in-person activities, the students reported that the exercises helped to consolidate the content of in-person activities, 16% that strongly agreed, 37% agreed, 26 % disagreed and 21% strongly disagreed as seen below.

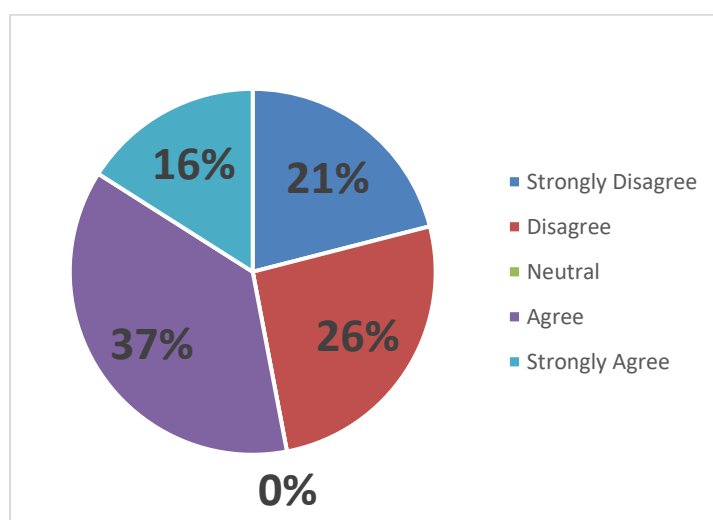


Figure 7: Percentage of people who think online learning helped to consolidate the content of the face-to-face activities

Face-to-face teaching and online teaching should not compete with each other, as the two methods are important and add value according to the interest, personality and time of each individual. When asked whether the online exercise was easy to understand, 21% of the students answered that they strongly agreed, 53% agreed, 21% disagreed, 5% strongly disagreed. In view of these answers, it is possible to observe the importance of developing technological resources, with a view to student learning and offering different formats of face-to-face classes.

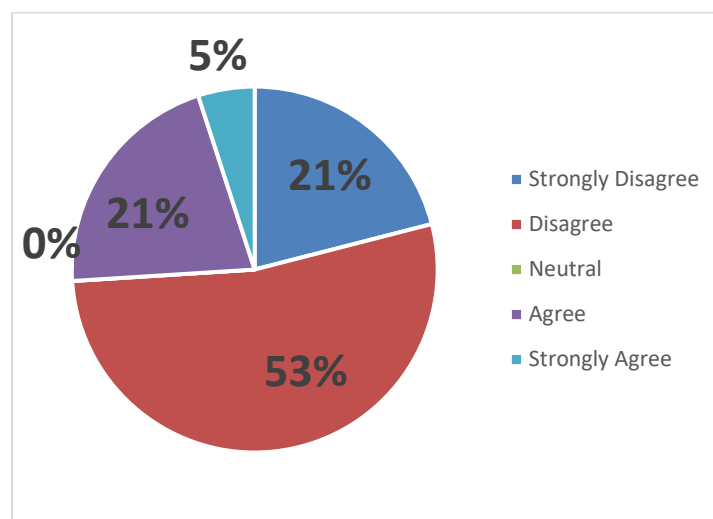


Figure 8: Percentage of participants who think that the contents of online learning easy to understand

About the question of whether the content was useful, 10% of the students answered that they strongly agreed, 60% agreed and 30% collectively disagreed. Useful content is essential as it improves the student's experience and encourages the development of other exercises that integrate the content.

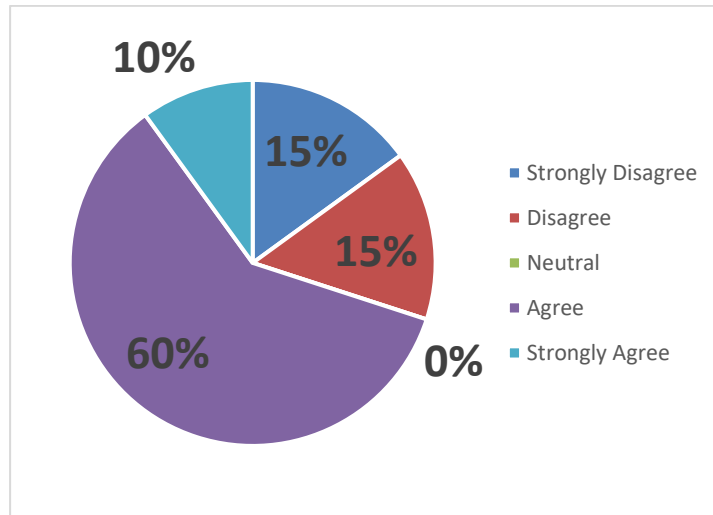


Figure 9: Usefulness of online learning contents

The below figure shows the students' answers about participation in online education and whether their opinion about this type of education improved, 53% answered yes and 47% no. In this regard, Aliyyah, et al., (2020) state that:

“[...] You have to leave the classroom to see the world”, she says. The High-Tech High model foresees practical classes outside the classroom, meetings with several professionals, and even “work with something significant” in the case of older students.”

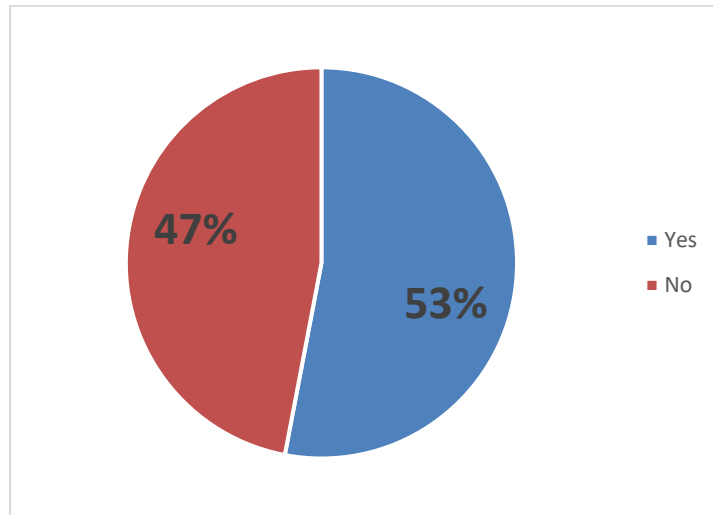


Figure 10: Percentage of people who think that online learning improved their perception of learning

Regarding the question, if the online course is a good way to acquire new knowledge and improve their professional skills, 84% of students answered yes and 16% no. Most students had a positive answer to the question, as the job market is increasingly competitive and seeks competent and complete professionals, that is, with knowledge, skills and attitudes. It is necessary to pursue continuing education, improving acquired knowledge and obtaining new knowledge, as it is a basic and necessary condition to enter the labor market.

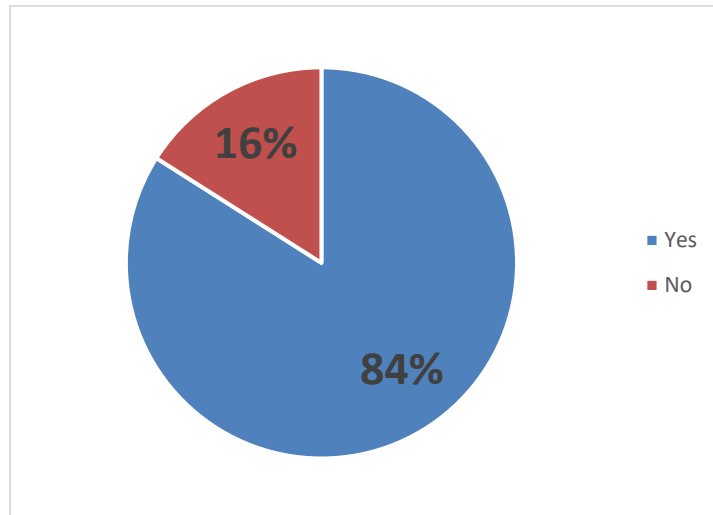


Figure 11: Percentage of people who think that online courses/exercises are a good way to acquire new knowledge and improve your professional skills

In the question, if the student felt motivated to perform the exercises online, 5% answered that they strongly agreed, 27% agreed, 26% disagreed, and 42% strongly disagreed. Why are most students not motivated to do exercises online? It is possible that the student is not interested in learning modeling; they find it difficult or, basically, because they are interested in another knowledge of the course. As it is a new learning experience, Pei & Wu (2019) cite that:

“[...] Students have, during their initial study process, difficulties in time, organization and planning about when and how to study, in addition to confusion about the conditions and demands of learning tasks, as they recognize that it is about a new learning experience that they don't know how to act on. These difficulties respond to a difference between their initial expectations of dedication and effort, and the real demands of distance learning, which were unknown, due to their lack of experience as students of this modality.”

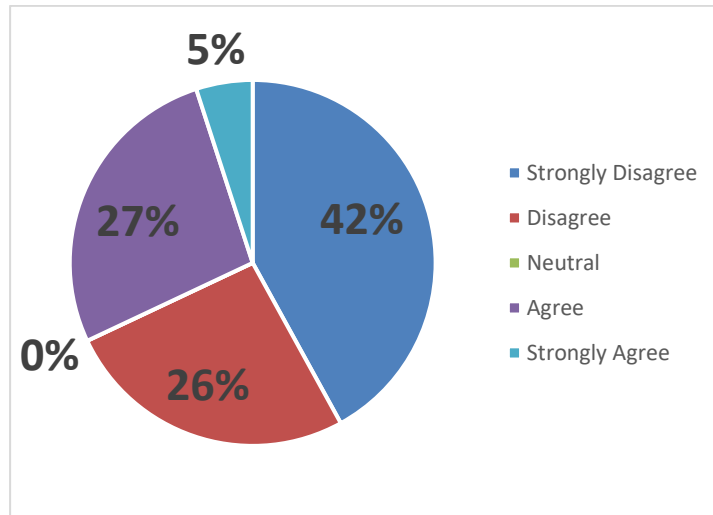


Figure 12: Percentage of people felt motivated to take part in online learning

When asked whether online exercises were as rigorous as on-site exercises, 63% of students answered yes and 37% no. Research shows that the integration between on-site teaching and on-line teaching proposals aiming at the personalization of school services. These measures are part of Hybrid Teaching, or “blended learning”, one of the trends in 21st century Education.

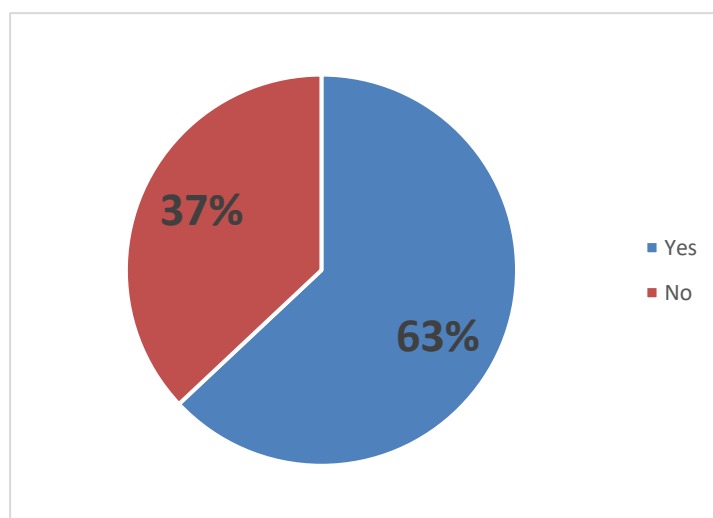


Figure 13: Percentage of people who think online classes require the same effort as on-site education

Additional comments (criticism, praise, suggestion) were written by two students:

The online exercises were good in the proposal, but the way they were presented made the activity uninteresting (diagramming, text time, lack of a soundtrack in unexplained moments...).

Making a video for the student to play doesn't help at all. If it were a program that made the mold, it would be much more interesting than an internet tutorial.

These criticisms were important to realize that not all students are happy and how much remains to be done to make online classes satisfactory in their use, regardless of visual or usefulness. To develop specific software for modelling takes time and would be very expensive for the institution, or even for professionals who deal with this type of technology. Thus, in summary, it can be said that most students who responded to the survey are young, single women, who have a computer and internet access, understand the concept of online classes and their accessibility at school or at home. They think the initiative is good, that the technology is interesting, not only for personal and professional growth, but the content was also useful, which helped to consolidate the contents of the in-person activities, the exercises were easy to understand and with the same rigor of the in-person classes, this fact was not affected by online exercise.

4.1 Students' Grades in Compulsory Courses

From the analysis of the set of the students' grades in their compulsory courses was also sought out from the participants. These range from a minimum of 10 values to a maximum of 20 values. The total value of the arithmetic mean of the classifications corresponds to 16.48 values and the calculation of dispersion measures in this data set allows us to conclude that they have a standard deviation of 1.94 and a variance of 3.77.

The calculation of the arithmetic means of the grade per student, considering only the six compulsory courses is presented in the below table

Table 2: Average Grade

Student	Arithmetic Mean
1	14.83
2	17.33
3	17.50
4	17.83
5	16.67
6	16.50
7	17.33
8	12.67
9	16.33
10	17.20
11	18.00
12	17.00
13	15.67
14	17.00
15	18.33
16	16.17
17	16.00
18	16.83
19	17.20
20	16.00

21	17.50
22	16.00
23	17.33
24	18.00
25	13.00
26	15.33
27	16.67
28	15.33
Total Arithmetic Mean	16.48

From the analysis of the above table, it is possible to refer that all students obtained positive final average ratings, ranging from a minimum of 12.67 (student 8) to a maximum of 18.33 (student 15). The final total mean corresponds to a value of 16.48 showing an above average, with the data in the table presenting a standard deviation of 1.33 and a variance of 1.76. Accordingly, the table to follow illustrates the centrality indicators of the participants on a per participant basis of the students that attempted the grades question.

Table 3: Centrality indicators by participant

Participant	Indegree Centrality	Outdegree Centrality	Proximity (Entries)	Participant (Exists)	Intermediation
1	37.00	42.00	79.41	57.45	20.73
2	44.00	67.00	62.79	58.70	5.54
3	76.00	92.00	67.50	60.00	7.52
4	48.00	89.00	77.14	62.79	21.71
5	26.00	18.00	57.45	62.79	4.78
6	29.00	48.00	54.00	65.85	11.78
7	25.00	54.00	67.50	47.37	0.40

8	40.00	19.00	51.92	55.10	1.13
9	72.00	79.00	69.23	64.29	7.90
10	60.00	65.00	64.29	62.79	15.65
11	74.00	86.00	64.29	71.05	37.48
12	61.00	42.00	61.36	62.79	8.88
13	64.00	37.00	64.29	71.05	10.32
14	57.00	43.00	65.85	72.97	14.31
15	67.00	52.00	69.23	69.23	11.91
16	51.00	45.00	60.00	71.05	13.21
17	51.00	43.00	67.50	71.05	12.71
18	41.00	31.00	65.85	65.85	19.72
19	42.00	41.00	67.50	64.29	3.81
20	48.00	42.00	65.85	64.29	4.00
21	63.00	67.00	67.50	60.00	7.92
22	38.00	45.00	65.85	65.85	12.31
23	55.00	88.00	71.05	72.97	24.64
24	65.00	23.00	57.45	72.97	23.10
25	46.00	42.00	67.50	75.00	30.40
26	44.00	41.00	64.29	69.23	24.54
27	67.00	44.00	67.50	71.05	22.14
28	31.00	37.00	65.85	65.85	31.48

Note: Non-standard centrality indicators. Signaled the maximum and minimum values for each indicator.

These indicators assume particular relevance, as they are part of the aforementioned guidance on the specific role of each participant. It is added that the non-normalized values were considered, since the data come from a composite matrix (Hrastinski, 2019). These indicators constitute the relation of the levels of participation that the students had in online education, which, together with the average classifications of each student, allow for the exploratory statistical study that is described in the following. A brief analysis of the above table, taking into account the meaning of these indicators, allows us to state that participant

3 is the one with the highest degree of centrality, both in terms of the number of entries (92.00) and the number of exits (76.00), that is, it is the one with the greatest number of direct connections with the others. Participants 25 and 1 are the ones with the greatest effectiveness in communication and the greatest independence, respectively: participant 25 has the highest value in terms of the ability to reach a large number of participants through a reduced number of connections (proximity exit = 75.00); and participant 1 has the highest value for the ability to receive information from a large number of participants over a reduced number of connections (proximity entry = 79.41). In turn, it appears that participant 11 is the one with the greatest capacity to exert some control over the communication flows in the network, as it has the highest degree of intermediation (37.48).

Regarding the minimum values, the following stand out: participant 7, with the lowest number of connections for sharing information (Indegree Centrality = 25.00), also presenting the lowest value in terms of the ability to reach a large number of participants through of a reduced number of connections (proximity exit = 47.37) and the lowest value regarding the flow control capacity of the network (intermediation = 0.40); participant 8, having the lowest value for the ability to receive information from a large number of participants through a reduced number of connections (proximity entry = 51.92); and participant 5, with the smallest number of information reception connections (Outdegree Centrality = 18.00).

4.2 Relationship Between Online Learning and Academic Results

In order to know how the levels of participation in online learning's influence on the final average grades of each student, an exploratory statistical analysis was carried out to verify the extent to which the values of the final average grades of the students are

correlated with the sociometric indicators of centrality studied. To this end, Pearson's correlation coefficients were calculated (Hockly, 2018), whose values are shown in the below table.

Table 4: Pearson's correlation between arithmetic mean and indicators of centrality

	Indegree Centrality	Outdegree Centrality	Proximity (Entries)	Participant (Exists)	Intermediation
Average R	.382*	.481**	.178	.018	-.040
Final <i>sig. (2- tailed)</i>	.045	.010	.366	.929	.838

Note: * significant value for $p < .05$ ** significant value for $p < .01$

The analysis of these data shows that all variables have a positive correlation with the final mean, with the exception of the intermediation, which has a negative correlation (-.040). It is also observable that the highest correlation is found between the dimensions of Outdegree Centrality and the final mean classification (.481). The analysis of the significance values obtained allows us to conclude that only Indegree Centrality and Outdegree Centrality reveal a significant association relationship with the final average of each student. In order to deepen the study of this statistical influence, the author had intended to analyze the extent to which the variability of the final mean was attributable to each of the variables that revealed significant levels of correlation – Indegree Centrality and Outdegree Centrality. Thus, the univariate multiple linear regression model was calculated (Ge & Wu, 2020), assuming the final mean as the dependent variable (Zhang, Zhang & Singh, 2018). In the analysis of the model, the Enter method was initially used, allowing the author to verify that 28.5% ($R^2 = .285$) of the variability of the final average

classifications was explained by the joint action of the centrality factors. To better understand this relationship, the Stepwise method was subsequently used, in order to ascertain the proportion of the contribution of each of the factors in question, whose results are shown in the table below.

Table 5: Multiple linear regression model – stepwise method

<i>Indicators Included</i>	<i>R</i>	<i>R²</i>	<i>R² <i>Adjusted</i></i>	<i>Standard of Error <i>Estimation</i></i>
Outdegree Centrality	.481	.231	.201	1.20864

Excluded variables: Indegree Centrality, proximity (output); proximity (entrance); intermediation; dependent variable: final average

The analysis of the table allows the author to conclude that the factors corresponding to Indegree Centrality, proximity (entry), proximity (exist) and intermediation were excluded from the model, with only the Outdegree Centrality factor being included. The data indicate that this factor explains about 23% ($R^2 = .231$) of the variability in the final average grades, or, in other words, about 23% of the total variability in the final average grades of the students is attributable to the Outdegree Centrality evidenced by the subjects. Thus, Outdegree Centrality is assumed to be the main influencing factor of the variability observed in the final average classifications of students.

Chapter 5: Results and Discussion

After analyzing the data under exploration in the previous chapter, it is useful to discuss the results obtained in a transversal way to the established objectives and in the sense of the formulated research question. In this context, it is important to remember that the present study was delimited by two research objectives, which intended to carry out essential data analysis, which assumed the need for a relational study in order to determine even at what point can the research question asked be answered. It is recalled that this research had aimed to understand whether there is an association between the mean grades for students and their instructional environments – online or offline education. The relevance of the question in question comes from the fact that it is verified through the literary review that, despite several studies focusing on the analysis of the described association, in particular on asynchronous communication supported by discussion forums and its relationship with academic results of 8-12 grade students in courses carried out entirely at a distance, there are no clear and consensual results on the subject (Dziuban, et al., 2018; Rasheed, Kamsin & Abdullah, 2020; Vallée, et al., 2020). The first defined research question intended to explore the academic results of the participants as compared to instructional environments, and its relevance is linked to the integration of the participants' ratings in the calculation of the average grades, thus allowing the constitution of the variable representative of the academic results of the students, fundamental for the relational analysis defined in the methodology. The results obtained by the students stand out, where it is interesting to note that all had positive average ratings (above 10 points), with a pass rate of more than 99% in their compulsory courses. Specifically, the focus of the current study was that of 8-12 grade students to evaluate the impact that blended learning can have on these individuals.

The second objective of the investigation consisted of controlling for variables such as gender, ethnicity, etc. and evaluating the impact of blended learning on the academic achievement of students and how it differs from their learning in a traditional setting. Through the results of the current study, the author was able to find that, in controlling for such variables, blended learning can positively impact academic achievement with most favoring the use of computers and similar technologies for educational purposes. The exploration of measures of centrality allowed us to observe that some students in the sample stood out for accumulating maximum or minimum values in the set of centrality indicators. Participant 3 stands out, for example, for simultaneously presenting the highest degree of centrality in terms of entry and exit degrees, thus being the most central element in terms of the number of connections in the network; and participant 7, which simultaneously presents the lowest values in terms of Indegree Centrality, exit proximity and intermediation, being, therefore, the element of the network that showed the least capacity to create connections with other participants, to reach other participants and to serve as an intermediary in the transmission of information, having, therefore, a greater relationship of dependence with the other participants. The calculation of measures of centrality proved to be equally essential for the present investigation, as it used the indicators that represented the participation indices of everyone, another factor necessary for the correlational analysis defined in the methodology.

The achievement of the research objectives allowed the analysis of the relationship between the levels of participation in the 8-12 grade students' online learning and the respective academic results. In this context, the use of centrality indicators as independent variables and the mean classification as a dependent variable, enabled the exploratory study developed, and the calculation of the Pearson correlation coefficient allowed the author to constitute the Indegree Centrality and Outdegree Centrality indicators as

significant variables. In this sense, since the significant variables refer to the number of connections per individual, the present investigation proves the trend defined by Smith & Hill (2019), towards an association between better academic results and greater visibility in blended learning environments. The results found are also in agreement with previous investigations (Castro, 2019; Halverson & Graham, 2019; Suartama, Setyosari & Ulfa, 2019; Bouilheres, et al., 2020), which reinforce the existence of a direct relationship between the number of online participations and academic performance, namely in situations where communication and collaboration it's essential. It is, therefore, possible to answer the research questions, which focused on the impact of instructional environment on the grade and academic achievement of the participants.

Going deeper into the previous question, the results obtained in the analysis of the linear regression model allow us to conclude that 28.5% of the variability of the final average ratings of the participants is explained by the joint action of the centrality factors, making it possible to identify that the Outdegree Centrality index was responsible for variation of about 23% of the final average grades of the students. This fact allows the current author to conclude that, in the present study, and about the influence of participation rates in blended learning environments on the final average ratings of students, the number of connections received is the indicator that assumes greater preponderance. The number of connections initiated by the participants (Indegree Centrality), although significant, reveals a secondary importance (5.4%).

In the present study, it was also possible to observe the non-verification of significant correlations between the intermediation and proximity indices and the final average ratings. The difference in the significance of the correlations between indicators seems to agree with the opinion of Jowsey, et al., (2020), who suggests that the

relationship between academic performance and online interaction depends on the means and measures used in the analysis of the constructs. However, these results can be justified by the dispersion pattern of the connections in the participants' scores. In this sense, an analysis of their educational materials, academic context, the infrastructure available and used for them, and the various other factors that lead to interparticipant differences should be analyzed by further academic assessments on the matter. Prior research on the matter shows the existence of several factors that may influence this dispersion: the distribution of tasks by work groups; the existence of synchronous online communication channels to support learning parallel to the materials of the curriculum; or the existence of an ambiance week, which, due to its objective, may have intended to encourage socialization among students thus leaning away from course materials and more so toward extracurricular goals within their blended learning environments. In this context, as suggested by Boelens, De Wever & Voet (2017), Albiladi & Alshareef (2019), and Adi & Fathoni (2019), it is also important to consider that there may be students who, despite having a reduced amount of time in terms of learning through their instructions, may have been able to reach learning objectives with equal success, since it is possible to continue to develop the required learning through processes not considered in this study. Such extraneous variables should be focused on in future works to ensure that a better understanding of the matter can be attained as well as that further assessments may be able to uncover various aspects that the author may have been unable to account for through a larger sample population.

Chapter 6: Conclusion

In view of the discussion of the obtained results presented in the previous chapter, a complete reflective and conclusive analysis is necessary, which considers the relevant aspects of the present investigation. The ubiquity of technology and the internet today is increasingly relevant to the promotion of more effective teaching-learning methodologies, taking into account the attitude of current students towards new technologies and online communication tools. However, despite the growing acceptance of online discussion forums as an educational resource (Asarta & Schmidt, 2020), there is insufficient evidence of their benefits for meaningful learning (Kristanto, 2017). In this sense, the present investigation sought to contribute to the clarification of the theme in question, taking as its central purpose the study of the relationship between participation in instructional environments and their impact on the academic performance of 8-12 grade students. It appears that the quantitative methodological approach adopted proved to be adequate, in what Han & Ellis (2019) contextualize as the exploration of the relationship between variables and data analysis through statistical procedures. The research work carried out showed that, as argued by Al-Samarraie & Saeed (2018) and Cronje (2020), a relationship between levels of participation in blended learning environments and the academic results of students is observable, and that, taking into account the various indicators under analysis, in the situation under study, the main influencing factor of academic results is outdegree centrality – dependent on the amount of students with similar demographic characteristics. This means that the academic performance reported by the participants of the study was congruent to their demographic characteristics wherein those partaking in and preferring blended learning environments – ones that integrated offline materials with

online ones and vice versa – were able to perform better than their contemporaries about such environments.

Additionally, the different communication tools available on the internet make it possible to share information online in a way that is not only asynchronous, but it is also synchronous, so it should be noted that the participation indices in such instructional environments do not represent the totality of interactions between students. In this sense, as mentioned by Islam, et al., (2018), it is still important to develop more in-depth studies on this theme, contributing to clarifying the influence of other forms of communication on academic classification. In the context of the work methodology adopted, based on works such as that of Medina (2018), Ibrahim & Nat (2019), and Rafiola, et al., (2020), the importance of cooperation and collaboration between students and institutions for information sharing is also highlighted, which can be fostered both by the affectivity and sense of presence developed by the students, as well as by the need to share information (Sáiz-Manzanares, Escolar-Llamazares & Arnaiz González 2020), therefore, it would be equally enriching to deepen studies on this domain and its relationship with academic performance.

In this context, although the carrying out of group activities promotes the strengthening of interactions between its elements, it can also enhance a “marked distinction of groups in the established network” (Aliyyah, et al., 2020), it is also possible to consider the influence of other factors on academic results, such as the importance of developing collective skills in group work (Hrastinski, 2019), among others. Analyzing the characteristics of this research work, it is also important to highlight any limitations associated with its development. In this sense, the limitations inherent to the research design adopted are highlighted, in which the need for concern with ensuring the anonymity

and privacy of the participants is highlighted. The limitation related to the sampling process is also assumed, since the present investigation has characteristics that do not allow its generalization due to the specificities of the group under analysis (Vallée, et al., 2020).

Additionally, due to the nature of the study as well as the relatively small sample size used for the purposes of achieving its research aims, it would be important for further literary efforts on the matter to focus on improving their qualitative focus whilst ensuring that they can analyze the extraneous variables that the current author was unable to account for. Specifically, by making use of a survey and qualitative interviews in combination as well as a narrowed down quasi-experimental focus on individual institutions and groups of students, further literary efforts would be able to add considerably to the literature available on the matter. Nonetheless, the current work does provide significant insight that further efforts should attempt to make use of.

Particularly, the connection between self-reported grades on a preconstructed scale as well as the connection between the responses of the 8-12 grade students and their demographics adds greatly to the discourse on blended learning as well as the academic insight on it. The sampling approach used for the current work, however, did lack in its ability to coherently sample large amounts of participants in a short amount of time thus allowing for the author to recommend that further literary efforts should focus on making use of pilot studies to the matter to evaluate their sampling approaches beforehand in a practical manner. Whilst the overall literature on the matter consistently debates concerning the most appropriate methods for such a work, future academics should ensure that they are able to make use of the sampling approach most appropriate and suitable for their works based on prior pilot testing and approaches.

Such would not only ensure notable improvements in data analysis and quality but would also benefit future academics when it comes to coherently analyzing a single institution. Conversely, larger, more longitudinal studies on the matter would also be recommended given that there is currently a lack thereof any notable longitudinal research on the matter of blended learning and its impact on students (Boelens, De Wever & Voet, 2017; Dziuban, et al., 2018; Castro, 2019; Edmonds & Kennedy, 2019; Baber, 2020). However, Edmonds & Kennedy (2019) emphasizes that the type of sampling that had been used for the current work contributes positively to an understanding of the phenomenon, as it enables an analysis in a real context. It should also be noted that the small number of participants, despite being close to the value assumed as the optimal minimum for a correlational study (Vallée, et al., 2020), is limiting in the analysis processes, particularly with regard to the exploration of clusters or subgroups. In this context, a higher number of participants could allow consideration for aspects inherent to different communication patterns developed between students, or even to variations between their final average grades.

Further self-reports of grades should be made use of alongside corroboration with their actual grades as offered by their educators. By integrating educators into such matters of study, future academics would be able to corroborate the self-report grades of their participants with those reported by their instructors as well as assess their academic performance considering this. As blended learning, like most other forms of contemporary education, does not take place in isolation, the perspective of the educator would be critical to further analyzing and evaluating the academic performance and achievement of students. It should also be noted that, in the context of the UAE, the sample size amassed for the current study was nonrepresentative of the whole and does not directly correlate to real world statistics but rather offers academic insight that can inform further study on the

matter. Despite the limitations observed, it is considered that the objectives of this study were achieved and the reflection on the results obtained allowed valid and pertinent conclusions, capable of contributing to a better understanding of the relationship between blended learning rates and students' academic results. Further efforts should also attempt to evaluate the impact of blended learning on students apart from those from 8-12 grade.

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Appendices

Appendix – A - Informed Consent Form

This study aims to report on the impact of blended learning on student achievement. As many of the students have been transitioning to a new era of learning due to the pandemic, this is an important topic to explore. This study will not be exposing your personal information and will only be used for statistical analysis after which the data will be destroyed. Your responses will also not be reported to your school or your teachers. You can ask your parents to sign the consent form below or get in touch with the researcher through the email this survey was sent to you. In case you do not want to participate in this study, you can simply not respond. Thank you for your time.

Do you have permission from a parent or a guardian to participate in this study?

OR

If you're 18+, do you consent to participating in this study?

Yes

No

Appendix – B - Survey

- **Name:**
- **Gender**
 - Male
 - Female
- **Age**
 - 14-15
 - 16-17
 - 18-19
 - 19-20
- **Do you have difficulties in reading materials on computers?**
 - Yes
 - No
- **Online classes require the same effort as on-site education**
 - Yes
 - No

S. No.	Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	Computers/internet are important in the classroom					
2.	You recommend internet usage for classrooms and learning environments					
3.	Online learning has helped you to consolidate the content of the face-to-face activities					
4.	The contents of online learning are easy to understand					
5.	Online learning contents have been useful					

6.	Participating in online learning improved perception of learning					
7.	Online courses/exercises can be a good way to acquire new knowledge and improve your professional skills					
8.	Felt motivated to take part in online learning					

Please rate your Grades in Blended Compulsory Courses (OPTIONAL)

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6
- ☐ 7
- ☐ 8
- ☐ 9
- ☐ 10
- ☐ 11
- ☐ 12
- ☐ 13
- ☐ 14
- ☐ 15
- ☐ 16
- ☐ 17
- ☐ 18
- ☐ 19
- ☐ 20

Please offer your comments for any of the responses
