Competitiveness, quality education and universities: the shift to the post-pandemic world

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Abstract

Purpose – This article aims to investigate whether there is a relationship between education for the labor market in the post-pandemic stage and the educational quality of universities, taking as a sample a group of Latin American countries and their main trading partners. Reference is made to the Global Competitiveness Report 2020 of the World Economic Forum (WEF) and the Quacquarelli Symonds (QS) index, which evaluates the quality of universities.

Design/methodology/approach – Correlations, clusters and T-tests were generated to test for significant differences, resulting in two blocks of countries being identified with statistically significant differences in educational efforts to prepare their citizens for the labor market and the quality of their universities.

Findings – It is concluded that there are examples of Latin American countries that, although they are emerging economies, are updating their educational systems at an accelerated pace to meet the needs demanded by the labor market, such as Chile and Argentina. In addition, there are some particular cases of Latin American QS universities that although they are not at a high level in their overall educational quality as a university, compared to North American and Asian universities, their graduates do show a high employability index. This means that in the graduate profile, these universities are also accelerating efforts to position them at a high level of preparedness to respond to the jobs and markets of tomorrow, just as the universities in developed economies do.

Research limitations/implications – Although the sample size is a limitation of this work, since it is based on secondary information reported by the WEF (2020) and the QS World University Rankings (2021), it contributes value by analyzing specific cases. Despite its limitations, the study yields meaningful results that put the challenges of post-pandemic employment and the role that universities play in a comprehensible framework.

Originality/value – These results put special attention on the work of universities as a crucial entity to prepare citizens to develop the competencies needed for the post-pandemic labor market, especially in terms of critical thinking and digital skills. Human capital formation will drive the post-pandemic recovery process of leading countries and universities.

Keywords Professional education, Educational innovation, Complex environments, Quality education, Post-pandemic, Higher education

Paper type Research paper

Introduction

Sustainable Development Goal #4 focuses on “quality education,” emphasizing education’s role in sustainable development, encompassing challenges from primary to higher education.

The authors acknowledge the financial and technical support of Writing Lab, Institute for the Future of Education, Tecnologico de Monterrey, Mexico, in the production of this work.
and addressing social and economic dimensions (PNUD, 2021). Human capital, crucial for economic prosperity, is shaped through education and mid-career training, impacting productivity and wages in a meritocratic system (WEF, 2020). Post-pandemic, prioritizing human capital preparation becomes pivotal for swift economic recovery. Those countries that seek to invest strategically in their human capital to respond to the challenges posed by the new markets will be the ones that move more quickly toward the recovery process.

The COVID-19 pandemic highlights the need to extend education beyond basic access, integrating it with mid-career training for active labor markets and business practices. Beyond the labor market training, human capital includes safety nets, education, training, health and support for short-term economic growth. The research question explores educational competitiveness among Latin American countries and trading partners, assessing differences in labor market preparation and linking them to university education quality. In this sense, are there statistically significant differences in the educational preparation of citizens for the labor market between Latin American countries and their main trading partners? If so, how would these differences relate to the quality of their leading universities?

The objective of this article is to test whether there are significant differences between Latin American blocks of countries and their main trading partners with respect to the educational preparation of their citizens for the labor market, taking as a reference the data of the Global Competitiveness Report 2020; (WEF, 2020) and how such differences are related to the educational quality of their main universities Quacquarelli Symonds (QS). This research article is structured as follows. First, a literature review is presented on human capital as a critical dimension of post-pandemic preparedness and the role of universities. Subsequently, the methodology and analysis are presented and a discussion of the results considering the literature review. Finally, the conclusions and limitations of the study are shared.

Theoretical framework

**Human capital as a preparation for the post-pandemic**

The World Economic Forum (WEF, 2020) identifies human capital priorities, emphasizing a talent shortage exacerbated by outdated education systems. In advanced economies, human capital development has stagnated over the past decade. Despite some improvements in education and training systems in certain developing economies, significant talent gaps persist globally. Local education systems often lag, failing to address contemporary challenges, while international mobility of human talent remains limited. Moreover, the WEF (2020) reports a 17% decrease in the importance of human talent in advanced economies and a 12% decrease in emerging economies. The adequacy of local secondary education systems is rated at 59 points (out of 100) in advanced economies and 42 points (out of 100) in emerging and developing economies, further limiting their preparedness (WEF, 2020).

In Latin America, Argentina shows positive advancements in secondary education preparation and overall graduate readiness for the post-pandemic era. While Argentina’s positive rate of change in forming human capital skills is evident, other emerging economies in the region, such as Mexico and Brazil, exhibit regression. In Mexico, the decline in educational preparation for the university graduates is less prominent compared to secondary education, indicating a visible discrepancy. On the other hand, Brazil experiences a more significant regression in skills development, surpassing that of Mexico. Notably, Brazil’s regression is consistent across various educational levels, indicating a substantial decline in skills and competencies across the board.

The Latin American countries Argentina, Brazil, Mexico and Chile (a relevant emerging economy) have significant trading partners, including China, the United States of America, Germany, the Republic of Korea, Canada and Japan. These partnerships are crucial for the
post-pandemic economic recovery through trade activities (WEF). Analyzing the performance of these trading partners in training their human capital is essential for maintaining sustainable relationships.

Among the main trading partners, China and the Republic of Korea, ranked second and third by the WEF, stand out for their effective preparation of graduates with skills and competencies. It is possible to identify a substantial and positive change in competencies training for the post-pandemic labor market. Conversely, another group of trading partners, including Germany, Canada, the United States of America and Japan, has shown a decline in all levels of graduates. Despite their recognized educational quality in previous years, they face less opportunistic conditions to train their human capital for the road to recovery. The rate of change in their educational quality has been negative (WEF).

Likewise, according to the WEF, the adequacy of tertiary education to meet employment needs is rated at 68 points (out of 100) in advanced economies and 55 points (out of 100) in emerging and developing economies (WEF, 2020). Overall, these figures have changed little in recent years. In Latin America, one of the tertiary education systems that are best placed to meet the needs of employers is Chile (71), in contrast to a much lower score for another Latin American country, Brazil (45). As a result, the ability to find skilled employees has declined in all advanced economies by 7% relative to 2016, while it has improved in developing economies by 3% (WEF, 2020).

In the survey conducted by the WEF (2020), business leaders worldwide reported difficulties in finding people who can fill vacancies in their companies in both advanced and developing economies. However, what is interesting is that, for advanced economies, the need has been growing, a marked difference from emerging economies, which, while showing a greater need for talent, the need has been shrinking. In other words, they have been having more human talent available to fill business vacancies and their needs continue to be greater than those of advanced economies.

Other data suggest that the skills mismatch due to the COVID-19 pandemic could cost 11% productivity or $18tn in unrealized gross domestic product (GDP) by 2025 (Puckett et al., 2020). An annual Global CEO Survey conducted by PWC says that 74% of CEOs are concerned due to the lack of skills availability (Stubbings and Sethi, 2020). On the other hand, many graduates have difficulty finding jobs that match their qualifications. Amid COVID-19, remote offices, digitalization, telecommuting and virtual offices have challenged labor market matching and training strategies to have workers with the right skills. More employers are looking to revise the skill sets needed and eliminate the degree requirement for specific jobs. In short, there is a skills mismatch, which refers to the gap between the skills needed by employers and the skills possessed by job candidates and this problem is evident due to lack of new skills needed for available jobs globally, accentuated during COVID-19.

Universities play a crucial role in preparing employees for future job markets and promoting inclusive prosperity. To address the apparent mismatch between graduate training and job requirements, institutions, particularly universities, must update curricula. This involves enhancing digital and critical thinking skills at school and university levels and implementing continuous training programs for lifelong learning. Business leaders emphasize the importance of adapting educational systems’ curricula in response to the pandemic, assigning primary responsibility to universities for this crucial task.

World-systems theory and the role of universities in preparing for the post-pandemic
The world-systems theory, aims to elucidate the worldwide proliferation of capitalism and a framework for understanding global inequalities and the dynamics of the world economy by identifying core, semi peripheral and peripheral countries in the global economy and how they contribute to global inequalities (Hopkins and Wallerstein, 1977). Moreover, religious
and education systems have been recognized as the primary tool for advancing dominant ideology and for securing consent for exploitative structures in capitalist societies (Clayton, 1998).

In terms of competitiveness, quality education and universities, this theory could be related in several ways: (1) Global stratification of universities, because universities worldwide are stratified in terms of academic prestige, research output and global recognition offering insights into how the competitiveness and quality of education in universities are influenced by their position within this global academic hierarchy. (2) Impact of economic structures, because different countries and their universities could influence their competitiveness and the quality of education they provide having an impact on disparities in the post-pandemic academic landscape. (3) Dependency and academic dominance, because less economically developed regions are dependent on more developed ones, while certain universities and educational systems might be dependent on the academic dominance established by universities in core countries. (4) Knowledge transfer and innovation, because in the context of universities, understanding how knowledge flows between core and peripheral institutions can provide insights into how competitiveness and quality education are shaped. (5) Socioeconomic development and education, because the quality of education and competitiveness of universities are intertwined with the socioeconomic development of nations. Therefore, the World-systems theory can provide a broader context for understanding the post-pandemic shifts in competitiveness and the quality of education in universities, considering the global dynamics and inequalities inherent in the world system.

Analyzing education and competitiveness at a country level involves considering key indicators such as global innovation development, knowledge intensity of GDP and socioeconomic development (Chentukov et al., 2021). Competitiveness, a complex concept, is strongly linked to an academic institution’s capacity for excellence compared to others, measured through indicators like education quality, research, reputation, graduate employability and talent attraction (Horta, 2009; Dimitrova and Dimitrova, 2017). These elements directly or indirectly impact graduates. Universities play a strategic role in preparing new generations for tomorrow’s job markets, especially in the post-pandemic scenario. The QS index, recognized internationally for evaluating universities worldwide (QS World University Rankings, 2021), serves as a reference for understanding the crucial role universities play in this preparation.

The QS index stands out as one of the most comprehensive tools for evaluating the quality of leading global universities. It incorporates the perspectives of over 30,000 influential individuals, including business leaders, industry professionals and experienced individuals (senior/junior). This index aims to rank universities based on their impact in producing successful employees and employers, considering factors like alumni networks, connections, career advice, internships and employability. The pillars evaluated in this ranking include employability, diversity and internationalization, learning experience, research and reputation.

As highlighted by QS Top Universities (2021), in the post-COVID-19 recovery period, the significance of graduating with skills essential for modern employers has never been higher. Universities globally are striving to showcase their ability to produce graduates with the necessary “soft skills” for the post-pandemic job market. New entrants and graduates refer to these criteria to ensure their university adequately prepares them for employment, connects them with global employers and fosters the required skills and knowledge.

Universities in the countries that are the main trading partners with the Latin American region appear in the top spots. In addition, the rating given to the Latin American countries that are part of this index is added to the list. Among the main trading partners (Germany, Canada, China, the United States of America, South Korea and Japan) of the Latin American...
countries already mentioned (Argentina, Brazil, Chile and Mexico), the QS recognizes their universities by the level of employability of their graduates, giving a score from 1 to 100.

In the North American region, the following USA universities stand out (because it is a long list, only the first three are included): Massachusetts Institute of Technology (MIT) (100), Stanford University (99.3) and the University of California, Los Angeles (UCLA) (99.1). Canada’s list includes the University of Toronto (89.5), the University of Waterloo (88.7) and Western University (73.8). In Asian countries such as China, Japan and the Republic of Korea, the employability of their graduates is also highly recognized by this index: Tsinghua University (96.9), Peking University (88.8) the University of Tokyo (87.8), Fudan University (81.8) and Seoul National University (80.9), among others. In Europe, the most relevant trade partner for the Latin American region is Germany, whose outstanding universities for the employability of their graduates include KIT, Karlsruhe Institute of Technology (72.6) and RWTH Aachen University (62.8). Finally, in the Latin American region, the level of graduate employability is high in Tecnologico de Monterrey (87.3), Universidad Pontificia Catolica de Chile (82.3) and Universidad Nacional Autonoma de Mexico (UNAM) (61.5). Other Latin American universities are not cited because the QS did not report their employability index.

There is a global demand for training international talent in both advanced and emerging economies to meet the evolving job requirements of future markets. Some universities are making notable efforts to enhance the employability of their graduates, aligning them with leading universities in advanced economies. While the employability index is noteworthy, our study opts for a broader approach, considering the overall university evaluation, including both students and graduates, as it provides a more comprehensive perspective beyond the specific employability criterion.

**Methodology**

In this research, we adopted a positivist paradigm given the nature of our study, which objective is to test whether there are significant differences between Latin American blocks of countries and their main trading partners and the educational preparation of their citizens for the labor market, taking as a reference the Global Competitiveness Report 2020; (WEF, 2020) data and analyzing how such differences relate to the educational quality of their prominent universities (QS).

The research method employed was a quantitative approach, utilizing statistical analysis to collect numerical data at country level, taking as a sample a group of Latin American countries and their main trading partners. The research design was cross-sectional, allowing us to collect data at a single point in time and analyze the relationships between education for the labor market in the post-pandemic stage (the Global Competitiveness Report, 2020 of the WEF) and the educational quality of universities (through QS index). The selection of this ranking is based on the relevance and prestige that QS has in the analysis and consulting in higher education, which makes this evaluation instrument one of the most widely known and widely used ranking systems for the evaluation and comparison of the performance of universities worldwide. In addition, it uses a methodology based on several key indicators for assessing the quality and reputation of universities, which is relevant to the present study on competitiveness.

The methodology focused on three parts:

1) Analyzing the criterion variable “Updates educational curricula and expands investment in the skills needed for jobs and ‘markets of tomorrow’” reported by the Global Competitiveness Index 2020; (WEF, 2020) and its correlation with the educational quality of their universities, considering the group of countries in general (Latin America and their main trading partners).
2) In order to examine the grouping of countries based on their education competitiveness, a cluster analysis was conducted. This analysis was conducted at the country level to gain insights and explore patterns. The cluster analysis utilized two variables: “Education for Jobs” and the “Markets of Tomorrow” and the QS educational quality index of the two main universities within each country.

The universities considered (Table 1) are Pontificia Universidad Católica de Chile and Universidad de Chile (Chile); Universidade de São Paulo and Universidade Estadual de Campinas (Brazil); Universidad de Buenos Aires and Pontificia Universidad Católica de Argentina (Argentina); Universidad Nacional Autonoma de México and Tecnhologico de Monterrey (Mexico); Tsinghua University and Peking University (China); Massachusetts Institute of Technology (MIT) and Stanford University (US); Technical University of Munich and Ludwig-Maximilians-Universität München (Germany); Seoul National University and KAIST – Korea Advanced Institute of Science and Technology (South Korea); the University of Toronto and McGill University (Canada); the University of Tokyo and Kyoto University (Japan).

To ensure comparability, these variables were standardized prior to the cluster analysis, which was performed using hierarchical clustering. This method creates a hierarchical structure of clusters by iteratively merging or splitting clusters based on their similarity or dissimilarity. As it is shown in Figure 1, the dendrogram starts with each country as an individual cluster and progressively merges them.

3) To further validate the relationship between educational quality and the identified differences among the clusters, student $t$-tests were conducted. These $t$-tests aimed to assess whether the observed variations in educational quality were statistically significant across the different clusters. By performing these tests, we sought to provide additional evidence regarding the association between the identified clusters and the corresponding levels of educational quality. The group of countries under study was selected based on belonging to the Latin American region (Argentina, Brazil, Chile and Mexico) and being one of the leading international trading partners of this region: China, South Korea, Germany, Japan, Canada and the United States of America. The list of the main trading partners was generated based on the most influential references of those countries outside the Latin American region with which trade relations are maintained. For this purpose, reports from government agencies, associations and information from banking institutions were considered (Subsecretaria de Relaciones Económicas Internacionales, 2020; ANIERM, 2021; Open Market, 2021; Santander Trade Market, 2021a; Santander Trade Market, 2021b; Santander Trade Market, 2021c).

<table>
<thead>
<tr>
<th>Country</th>
<th>Updating curricula for jobs and “Tomorrow’s Markets.”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>52.1</td>
</tr>
<tr>
<td>Brazil</td>
<td>39.5</td>
</tr>
<tr>
<td>Argentina</td>
<td>46.9</td>
</tr>
<tr>
<td>Mexico</td>
<td>43.3</td>
</tr>
<tr>
<td>China</td>
<td>67</td>
</tr>
<tr>
<td>United States of America</td>
<td>68.2</td>
</tr>
<tr>
<td>Germany</td>
<td>61.4</td>
</tr>
<tr>
<td>South Korea</td>
<td>60</td>
</tr>
<tr>
<td>Canada</td>
<td>65.3</td>
</tr>
<tr>
<td>Japan</td>
<td>51.3</td>
</tr>
</tbody>
</table>

Table 1. Education for Jobs and the “Markets of Tomorrow.”

Source(s): Authors’ own creation based on data from WEF (2020)
Table 1 includes the assessment of “Education for Jobs” and “Tomorrow’s Markets” for each country that participated in the study (WEF, 2020). Table 2 includes a list of the educational quality of the leading Latin American universities and their main trading partners (QS World University Rankings, 2021).

Cluster analysis generated blocks of countries, and subsequently, a student’s t-test analysis was applied to identify whether there was a significant difference in the university

<table>
<thead>
<tr>
<th>University 1</th>
<th>University 2</th>
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<tbody>
<tr>
<td>Chile</td>
<td>53.8</td>
</tr>
<tr>
<td>Brazil</td>
<td>54.8</td>
</tr>
<tr>
<td>Argentina</td>
<td>67.5</td>
</tr>
<tr>
<td>Mexico</td>
<td>58.8</td>
</tr>
<tr>
<td>China</td>
<td>89.2</td>
</tr>
<tr>
<td>United States of America</td>
<td>100.0</td>
</tr>
<tr>
<td>Germany</td>
<td>73.6</td>
</tr>
<tr>
<td>South Korea</td>
<td>79.0</td>
</tr>
<tr>
<td>Canada</td>
<td>82.7</td>
</tr>
<tr>
<td>Japan</td>
<td>83.2</td>
</tr>
</tbody>
</table>

Note(s): *Only the indexes of the two best universities in each country were taken because some countries only reported two of their universities in the QS
Source(s): Authors’ own creation based on data from QS World University Rankings (2021)
educational quality variable (QS) in correlation to the two clusters formed with the “Education for Jobs” and “Tomorrow’s Markets” criteria.

Results

The correlation between the variables under study was assessed as a first step considering the four Latin American countries (Argentina, Brazil, Chile and Mexico) reported by the WEF (2020) on the road to recovery from the pandemic and their main trading partners (Canada, China, Germany, Japan, South Korea and the United States of America). We looked for statistically significant correlations between “Education for Jobs” and “Tomorrow’s Markets” with the educational quality of their two prominent universities (sig. 003 and sig. 002) (See Table 3).

Using the clustering technique, we classified the countries into two distinct groups. The clustering of links between groups is shown in the following dendrogram. It shows the large space that marks the differences between the two blocks of countries (Figure 1). Table 4 shows how the countries were grouped at each stage with a significance level of 0.000 (e.g. the first to be grouped were five-Chile and eight-Japan as they had minor differences).

Using the clustering technique, we could naturally form two clusters of countries:

Block 1: Argentina, Brazil, Chile, Mexico and Japan.

Block 2: Canada, China, Germany, the Republic of South Korea and the United States of America.

Both clusters presented significant differences in terms of “Education for Jobs” and “Tomorrow’s Markets,” as well as the educational quality of their top universities (QS).

Table 5 presents descriptive statistics for each country block, such as the mean, standard deviation and standard error of the mean. As can be seen, the means widen, from education in general to the University 1 and even more in the University 2, considering the two blocks of countries.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Cluster combined</th>
<th>Coefficients</th>
<th>Stage cluster first appears</th>
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<tbody>
<tr>
<td></td>
<td>Cluster 1</td>
<td>Cluster 2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>8</td>
<td>0.640</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>7</td>
<td>1.440</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>9</td>
<td>1.960</td>
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<tr>
<td>4</td>
<td>4</td>
<td>6</td>
<td>5.650</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>10</td>
<td>12.960</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>3</td>
<td>34.600</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>4</td>
<td>39.523</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>5</td>
<td>80.973</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>2</td>
<td>348.237</td>
</tr>
</tbody>
</table>

Table 4. Agglomeration program

Source(s): Authors’ own creation/work

<table>
<thead>
<tr>
<th>ED: University 1</th>
<th>ED: University 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education Pearson’s correlation</td>
<td>0.832**</td>
</tr>
<tr>
<td>Sig. (two-tailed)</td>
<td>0.003</td>
</tr>
<tr>
<td>N</td>
<td>10</td>
</tr>
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</table>

Table 3. Pearson’s correlation

Source(s): Authors’ own creation/work
To test for a statistical difference between the clusters of countries based on the education and quality of the two prominent universities in each country, we performed a student $t$-test. We sought to validate whether there were significant differences between the two groups according to the three variables. The result of the significance was 0.000 (for the education variable), 0.017 (for the first university) and 0.008 (for the second university). In such tests, equal variances are assumed according to Levene’s test (see Table 6).

**Discussion of results**

The WEF (2020) emphasizes the significant connection between “Education for Jobs,” “Tomorrow’s Markets” and the educational quality of primary universities in a group of countries, as per the QS index (WEF, 2020). Two distinct clusters emerged: Block 1 (Argentina, Brazil, Chile, Mexico and Japan) and Block 2 (Germany, Canada, China, the United States of America and South Korea). These clusters exhibit marked differences in terms of human capital preparedness for the post-pandemic recovery and the educational quality of central universities (QS). This country-level analysis gains importance due to the strong correlation observed between higher education competitiveness, global innovation, knowledge intensity of GDP and socioeconomic development (Chentukov et al., 2021).

Block 1, comprising Latin American countries, showed less readiness in terms of human capital for the post-pandemic recovery, with generally lower educational quality in their universities (QS). Despite these disparities, noteworthy efforts by prominent universities in these countries are contributing to aligning them with the markets of tomorrow, focusing on critical thinking as highlighted by the WEF (2020). The following paragraphs illustrate examples of initiatives by Latin American universities in this regard.

In Chile, the Universidad Pontificia Católica de Chile (UPCC), the region’s top-ranked university, has actively promoted academic research in critical thinking. For instance, Río Joglar (2015) explored the influence of students’ socioeconomic status on critical thinking ability in the country. In Brazil, the University of Sao Paulo (USP), ranking second highest in the QS regionally, maintains an open repository documenting academic publications on critical thinking and critical consciousness distinctions. Additionally, USP conducts research studies in the health sector, focusing on critical thinking with practical applications.

In Mexico, Tecnologico de Monterrey, ranked fourth in the region by QS, emphasizes “critical thinking” as part of the reasoning-for-complexity competency in its TEC 21
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<th>Source(s): Authors' own creation/work</th>
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<tr>
<th></th>
<th>Levene's test for equality of variances</th>
<th>t-test for equality of means</th>
<th>95% confidence interval of the difference</th>
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<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig</td>
<td>t</td>
</tr>
<tr>
<td>Education</td>
<td>Equal variances assumed</td>
<td>0.904</td>
<td>0.369</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ED: University 1</td>
<td>Equal variances assumed</td>
<td>0.197</td>
<td>0.669</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
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<td></td>
</tr>
<tr>
<td>ED: University 2</td>
<td>Equal variances assumed</td>
<td>0.671</td>
<td>0.437</td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
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Educational Model (Conecta, 2019). Researchers at Tecnologico de Monterrey, like Román (2020), focus on critical thinking among Generation Z students, emphasizing the role of language in facilitating this skill. The EXATEC office offers training courses for graduates, emphasizing analytical skills and reasoned decision-making (EXATEC, 2022). UNAM, the sixth-ranked university in the region, promotes critical thinking through teachers facilitating reflective questions and students constructing ideas (Díaz Navarro and A Mateo Mejía, 2014). Ducoing (2011), in a UNAM-published book, explores critical thinking in education, linking it with the diversity and plurality of disciplines. In Argentina, the University of Buenos Aires (UBA) integrates the development of critical thinking into its educational strategy through a standard basic cycle. Regarding digital competencies in the Latin American region, there is a lack of a cohesive strategy linking the digital industry with human capital preparation compared to trading partners (Arredondo-Trapero et al., 2021).

Notably, Japan, the only non-Latin American country in the cluster, features the University of Tokyo (UT), where active and open thinking habits are crucial for graduates to actively seek opposing viewpoints, preparing them for labor market demands (O’Dea and Redlich, 2017).

In Block 2 (Canada, China, Germany, the United States of America and the Republic of South Korea), concrete measures have been taken to prepare the labor market for the post-pandemic recovery. In the Republic of Korea, Seoul National University (SNU) School of Business emphasizes critical thinking training, enhancing problem-solving skills and fostering creative solutions (SNU, 2017). In China, Tsinghua University (THU) offers courses focused on critical thinking, considering both ability and mindset as essential dimensions (THU, 2020). Post-Covid, the Fourth Industrial Revolution has underscored the need for technology utilization and development. The impact of this revolution on education is evident, with a growing demand for educational content aligning with evolving job requirements. Automation and artificial intelligence are predicted to replace jobs focused on simple tasks, creating new opportunities in emerging fields like artificial intelligence. The WEF’s (2016) prediction highlighted the creation of 2.1 m new jobs and the elimination of 7.1 m jobs by 2020 due to technological innovation.

In the Republic of Korea, Samsung Electronics proactively fosters human resources for the rapidly growing telecommunications market, particularly for the 6G generation. Seven universities, including Seoul National University and Korea Advanced Institute of Science and Technology (KAIST), established the “Department of Next Generation Communications and Semiconductors” in collaboration with Samsung Electronics. This department, linked to recruitment, guarantees students a position at Samsung Electronics post-graduation. Full tuition and subsidies are provided as industry-supported academic scholarships during enrollment (Yoenhap, 2020).

Competitiveness is a key focus of the economics of education, notably demonstrated by Tsinghua University (THU) in China. Located in Zhongguancun, China’s Silicon Valley, THU has played a pivotal role in accelerating early success. Top universities like Peking University, Tsinghua University and the Chinese Academy of Sciences have been instrumental in producing high-tech talent and fostering student startup ventures. Tsinghua Holdings, established by Tsinghua University, exemplifies this by creating an ecosystem where academicians, industrialists and researchers collaborate, leading to the commercialization of significant scientific achievements (Yoon, 2021).

In the context of state development strategies, a modern education and science system is recognized as a fundamental priority, as education level and human capital development are critical indicators of a country’s competitiveness and sustainability. Previous research has explored global competitiveness in education, revealing strengths in math and sciences education in Asian countries (Japan, Hong Kong, Singapore, Korea) compared to Latin
American countries (Argentina, Brazil, Chile and Mexico). This disparity serves as a reference point for future global higher education public policies. The strong correlation between higher education, economic competitiveness and sustainable development is evident. World-system’s theory provides insights into how the position of universities within the global academic hierarchy influences their competitiveness and education quality. Block 2 countries generally have better ranking positions as core countries, highlighting economic dynamics that may contribute to disparities in the post-pandemic academic landscape.

Similar to the previous section, universities worldwide, located in the main trading partner countries, actively work to develop critical thinking and digital skills. While these examples are illustrative, they may not be exhaustive or the most significant. Countries like Germany, Canada and the United States of America, along with Eastern countries, leverage the strengths of their universities to prepare generations for tomorrow’s markets.

Conclusions
This study statistically demonstrates that universities in the most advanced economies better prepare their graduates for future job markets. The case of Japan, despite being expected to align with advanced economies, resembles the situation of Latin American countries in this study. Both Japan and Latin American nations need to revise their educational programs to meet international economy needs post-pandemic. Notably, China and South Korea showcase strategic alliances between leading universities and industry to develop digital competencies in the post-pandemic stage. Some Latin American emerging economies, like Chile and Argentina, are rapidly updating their educational systems to meet the labor market demands. Despite not ranking high in overall educational quality compared to North American and Asian universities, certain Latin American QS universities show a high employability index among their graduates. This indicates efforts to position themselves for tomorrow’s jobs and markets similar to universities in developed economies.

In addition to the importance of critical thinking and digital skills emphasized by the WEF (2020), universities should focus on sustainability considerations. Emphasizing critical thinking challenges the economic model underlying growth-focused market economies, offering an opportunity to redefine this model with sustainability in mind. This approach addresses the root of the pandemic crisis, which extends beyond an economic crisis to a sustainability crisis. Leading universities should take the lead in the post-pandemic recovery by exploring new sustainable economic models. The implications of this study extend to universities, governments and policymakers, emphasizing that a country’s education quality is crucial for competitiveness. Developing digital skills, critical thinking, problem-solving and industry connections are essential for aligning the labor market with international economic demands.

Limitations and future research
This study has limitations related to temporal constraints and the varied impact of the COVID-19 pandemic globally. While we aimed to consider 2020 data, acknowledging its relevance during the pandemic, we recognize potential inaccuracies in reflecting events due to regional variations. Despite these limitations, the results offer valuable insights into the initial connection between indicators, paving the way for future research with more nuanced, the post-pandemic data for each country.

The study is further restricted by its reliance solely on the QS World University Ranking as a measure of academic reputation. Implicitly assuming elements like employability,
diversity, internationalization, learning experience and research, the selection of the QS ranking is based on its international relevance and prestige, particularly among Latin American universities. Although an additional ranking could have been beneficial, we believe that the QS World University Ranking, with its evaluation indicators, sufficiently provides the necessary data for our study.

Acknowledging the descriptive and exploratory nature of this article, we maintain that the study, despite its limitations, generates meaningful results that frame post-pandemic employment challenges and the role of universities. Looking ahead, we recognize the need to revisit this study a decade after the official end of the pandemic (2033) for accurate information on decisions and consequences in the sample countries’ labor markets. The current lack of precision, stemming from regional time differentials, positions this article as a foundation for future work in the Latin American region.

Potential future research directions include exploring: (1) Varied impacts of the COVID-19 pandemic across regions and effective strategies to address regional disparities; (2) The value of incorporating multiple ranking systems or complementary metrics for enhanced insights into specific cases; (3) Analyzing employability’s impact on the post-COVID-19 labor markets in diverse areas beyond business and technology; (4) Understanding region-specific nuances in the evolving role of universities in post-pandemic recovery and (5) Investigating how universities contribute to or are impacted by the socioeconomic development of their respective countries.

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