CELL PHONE USE PATTERNS AMONG CITIZENS IN THE INTERIOR OF MATO GROSSO: A STUDY ON SCHOOLING, STUDENTS AND YOUNG ADULTS

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ABSTRACT

This study investigates the patterns of cell phone use among citizens in the interior of Mato Grosso, with emphasis on differences between age groups and levels of education. The objective is to understand how the cell phone is used as a tool for communication, leisure and digital inclusion, and to explore the implications of this use for the personal and academic development of users. The research used a combination of descriptive analysis, correlation tests, and cluster analysis to identify specific groups of use. The results indicate that individuals with lower education tend to use cell phones more intensely for leisure, while those with higher education use it more oriented to work and learning. In addition, young adults, especially in the 18-24 age group, demonstrated the most intense use for recreational activities, especially on social networks and streaming, confirming the hypothesis that recreational use is more prevalent in this group. Although there is not enough direct data to confirm the impact of recreational use on academic performance, it is theoretically argued that this excessive use can have negative consequences on

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productivity and school performance. These findings reinforce the need for public policies that encourage the balanced use of cell phones, promoting productive and educational activities, especially among young people and groups with less schooling. It is recommended to implement digital training programs, focusing on a more balanced and productive use of technology, aiming to reduce inequalities and expand opportunities for social and economic development.

Keywords: Digital inclusion. Use of the cell phone. Schooling. Young. Public policies.

INTRODUCTION

The use of mobile devices, especially *smartphones*, has become an essential part of everyday life for most people, both in urban and rural areas. In particular, the mobile phone has been consolidated as a crucial tool for communication, leisure and, potentially, as a means of learning and digital inclusion. In the context of more isolated and lower-income communities, the cell phone is not only an instrument of access to information, but also an important factor of social and economic inclusion. Thus, understanding how cell phones are used among different population groups is essential to devise strategies that can maximize its benefits and mitigate potential negative impacts.

The present research aims to analyze the profile of cell phone use among citizens in the interior of Mato Grosso, with a focus on understanding the differences in use between different age groups and levels of education. In addition, it seeks to explore the impact of this use on the daily lives of respondents, as well as the potential implications for learning and personal development. The theoretical framework used is based on digital inclusion and the influence of technology in reducing social inequalities, highlighting the role of mobile devices in promoting social and economic development (OLIVEIRA et al., 2018; KHATUN et al., 2017).

With the increased penetration of mobile devices in Brazil, access to these devices is expected to provide opportunities for personal development and digital inclusion. However, the impact of this access can be varied depending on how these devices are used. Young people and individuals with less education tend to use cell phones predominantly for leisure, which, although it provides fun and social connection, may not effectively contribute to the improvement of their human capital. On the other hand, the use for work and learning, more commonly observed among individuals with higher education, suggests a more productive appropriation of technology.

This study, therefore, aims to explore these differences in use and discuss how public and educational strategies can be improved to encourage a more balanced and productive use of mobile devices. In addition, it seeks to understand how the pattern of use among students can impact academic performance and suggest alternatives for a more beneficial use of cell phones in the educational context. Hypothesis H1 suggests that individuals with less schooling use cell phones more intensively for leisure, while hypothesis H2 addresses cell phone use by students, suggesting that it may have implications for their academic performance. Hypothesis H3 investigates the most intense use of cell phones for leisure among young adults (age group 18 to 24 years), suggesting that this age group is the most prone to prolonged recreational use, especially on social networks and streaming

platforms. These hypotheses are investigated throughout the study, using a combined analysis of statistical tests and the application of cluster analysis.

Thus, by investigating the behavior of users, this research aims to provide subsidies for the elaboration of public policies that encourage digital inclusion in a broader and more effective way, promoting the use of cell phones as a tool for learning, work and personal development. At the same time, it recognizes the need for interventions that help young people and individuals with less education to balance recreational and productive use of cell phones, in order to maximize the benefits of this technology for their personal and economic growth.

THEORETICAL FRAMEWORK

DIGITAL INCLUSION AND THE ROLE OF MOBILE TELEPHONY

Digital inclusion is a fundamental concept that refers to equitable access to information and communication technologies (ICTs), allowing individuals and communities to participate fully in the digital society. In the Brazilian context, especially in remote regions such as the interior of Mato Grosso, mobile telephony has emerged as the main way to access digital services and information. This phenomenon is particularly relevant in areas where fixed internet infrastructure is scarce or non-existent, making mobile devices essential for social and economic inclusion (OLIVEIRA et al., 2018).

Studies show that mobile telephony not only facilitates access to information, but also plays a crucial role in promoting essential services such as health and education. For example, the use of mobile phone data to obtain tourist information illustrates how this technology can be used to boost local development and social inclusion (OLIVEIRA et al., 2020). In addition, research on the implementation of community telephone networks in Brazil highlights how these initiatives can democratize access to communication and information, benefiting communities that have historically been marginalized (OLIVEIRA et al., 2018).

The relationship between schooling and the use of mobile telephony is also significant. Education plays a key role in the ability of individuals to use mobile technologies effectively. Research indicates that mobile phone ownership is correlated with higher levels of education, which in turn increases the likelihood of participation in digital services (KHATUN et al., 2017; ABDULAI et al., 2022). In rural regions, such as those in the interior of Mato Grosso, where formal education may be limited, mobile telephony becomes a vital tool for learning and access to educational resources.

In addition, digital inclusion through mobile telephony is not without challenges.

While mobile devices are more affordable than computers, relying solely on this technology may not solve all digital inclusion issues. Research on the experience of indigenous communities reveals that, despite access to cell phones, the lack of digital education and support infrastructure still limits full inclusion (SANTOS et al., 2020). Therefore, a holistic approach is needed that considers not only the availability of mobile devices, but also the empowerment of users to maximize the benefits of this technology.

In short, mobile telephony plays a crucial role in digital inclusion, especially in remote regions of Brazil. Through its ability to connect individuals to services and information, it not only promotes social inclusion but also contributes to economic and educational development. However, for this inclusion to be effective, it is essential to develop strategies that address gaps in education and infrastructure, ensuring that all citizens can fully enjoy the opportunities that technology offers.

TECHNOLOGY USE BEHAVIOR BY DIFFERENT AGE GROUPS

Mobile technology usage behavior varies significantly across different age groups, reflecting not only the needs and preferences of each group, but also the social and behavioral implications associated with that use. The literature points out that young adults, in particular, tend to use mobile devices intensively, which can be attributed to a combination of factors, including familiarity with technology and the search for social connection (BRAGAGNOLO, 2023).

Research indicates that young adults are more likely to utilize smartphones for a variety of activities, such as communication, entertainment, and access to information. For example, one study revealed that most young people have a low perception of risk in relation to cell phone use, which can lead to risky behaviors, such as cell phone use while driving (SORATTO et al., 2022). This lack of perception is often associated with the predominant digital culture among young people, which values connectivity and virtual interaction, often to the detriment of safety and well-being (DIAS et al., 2019).

In addition, the use of mobile phones by young adults has direct implications on their mental health and well-being. Constant exposure to social networks and the social comparison that occurs in this digital environment has been correlated with an increase in levels of anxiety and depression among young people (SOUZA; CUNHA, 2019). Research suggests that virtual interaction, although it offers opportunities for socialization, can also create an environment of social pressure that negatively impacts the mental health of users (SOUZA; CUNHA, 2019).

In the educational context, the use of cell phones is also significant. Studies show

that young people use their mobile devices as learning tools, accessing educational content and interacting with classmates and teachers (BATISTA; BARCELOS, 2013; GOMES, 2019). However, this practice is not without challenges, since distraction and inappropriate use during classes can compromise learning (BATISTA; BARCELOS, 2013). Research on the use of cell phones in education reveals that, although there are advantages, such as access to real-time information, there are also disadvantages that need to be managed to maximize the benefits of the use of technology in learning (COELHO; DIAS, 2021).

The analysis of technology use behavior among different age groups, especially among young adults, reveals a pattern of intense dependence and interaction with mobile devices. This addiction not only shapes how these individuals communicate and learn, but it also raises questions about mental health and risky behaviors. Therefore, it is essential for educators and policymakers to consider these dynamics when developing strategies that promote healthy and productive use of technology among young people.

RELATIONSHIP BETWEEN SCHOOLING AND USE OF TECHNOLOGY

The relationship between schooling and the use of mobile technologies is a topic widely discussed in the academic literature, showing how the level of education influences the adoption and use of mobile devices. Individuals with higher education tend to use technology in a more diversified and productive way, while those with lower education often use it predominantly for leisure and entertainment activities (GOMES; FARIAS, 2017).

Studies show that schooling directly impacts individuals' ability to understand and use digital technologies. For example, Gomes and Farias (2017) discuss how performance expectation and perceived effort influence technology adoption, suggesting that users with higher educational levels are more likely to exploit the advanced functionalities of mobile devices, such as productivity apps and educational tools (GOMES; FARIAS, 2017). In contrast, those with lower education may feel less confident in exploring these functionalities, resulting in more limited and entertainment-focused use such as social networking and gaming.

In addition, the research by Soratto et al. (2022) reveals that schooling is also related to risk behavior in the use of cell phones. Younger individuals with higher education are more likely to use their devices for activities that involve distractions, such as sending messages while driving, which can be seen as a reflection of a greater familiarity with technology and its functionalities (SORATTO et al., 2022). This familiarity, in turn, can lead to a greater propensity to use the cell phone in contexts that are not necessarily productive.

In the educational context, the use of mobile technologies is often associated with

innovative pedagogical practices. Schmidt and Valentini (2016) argue that school management and educational leadership are fundamental for the effective incorporation of mobile technologies in the teaching-learning process, which can be more easily achieved in institutions with a more educated and trained faculty (SCHMIDT; VALENTINI, 2016). The presence of mobile technologies in classrooms can therefore be a reflection not only of the available infrastructure, but also of the level of education of educators and students.

On the other hand, the research by Soares et al. (2021) highlights that, even in higher education contexts, the adoption of digital technologies is influenced by the academic background of students. Those with higher education tend to perceive more benefits in the use of digital media for academic purposes, while students with lower education may not recognize these advantages, limiting their use to recreational activities (SOARES et al., 2021). This difference in perception can result in a significant disparity in how different age and educational groups utilize technology.

In short, schooling plays a crucial role in how individuals adopt and utilize mobile technologies. While those with a higher level of education tend to explore a wider range of functionalities and applications, individuals with lower education often limit their use to leisure activities. This dynamic not only reflects the skills and knowledge of users, but also has significant implications for digital inclusion and the promotion of a more productive use of technologies in society.

IMPACT OF EXCESSIVE USE OF TECHNOLOGY ON STUDENTS AND YOUNG PEOPLE

The excessive use of mobile phones and other digital technologies among students and young people has raised significant concerns regarding productivity, academic performance, and mental health. The literature points out that dependence on mobile devices can lead to a series of adverse consequences, ranging from decreased efficiency in school activities to increased emotional and behavioral problems (ANDRADE et al., 2023; SCHÄFER; FIORESE, 2022).

Studies indicate that excessive use of cell phones can harm students' academic productivity. For example, research by Andrade et al. (2023) reveals that reliance on smartphones is associated with lower academic performance, as students are often distracted by social media and messaging apps during study hours (ANDRADE et al., 2023). This distraction can result in lower retention of information and, consequently, poor academic performance. In addition, the research by Schäfer and Fiorese (2022) highlights that excessive use of the internet can lead to difficulties in controlling the time spent online,

negatively impacting the balance between study and leisure (SCHÄFER; FIORESE, 2022).

The mental health of young people is also a growing concern as a result of the excessive use of technology. Studies show that mobile device addiction is correlated with high levels of anxiety and depression. For example, the work of Moraes (2023) points out that sleep deprivation, often associated with the excessive use of electronic devices, can result in anxiety and depression, affecting the quality of life of young people (MORAES, 2023). In addition, the research by Oliveira and Cranchi (2017) suggests that the excessive use of technology can interfere with face-to-face social interactions, leading to social isolation that aggravates mental health problems (OLIVEIRA; CRANCHI, 2017).

The relationship between technology use and mental health is complex and multifaceted. The study by Santos et al. (2021) analyzes how excessive smartphone use can impact quality of life and the risk of developing nomophobia, which is the fear of being without a cell phone (SANTOS et al., 2021). This condition can lead to a vicious cycle, where the anxiety generated by the lack of access to technology further drives overuse, creating a negative impact on young people's mental health and overall well-being.

In addition, Machado's (2021) research discusses how students' attitudes towards the use of cell phones for learning can be influenced by their previous experiences and the way technology is integrated into the educational environment (MACHADO, 2021). When used in a balanced and conscious way, technology can serve as a powerful tool for learning. However, excessive and uncontrolled use can result in detrimental consequences, both in terms of academic performance and mental health.

Thus, the excessive use of technology among students and young people presents a series of challenges that directly affect their productivity, academic performance, and mental health. Understanding these dynamics is essential for developing strategies that promote a healthier and more balanced use of digital technologies, ensuring that young people can take advantage of the opportunities offered by these tools without compromising their well-being.

METHODOLOGY

This study adopts a quantitative approach, using data collected through a *Google Forms* questionnaire applied to 402 respondents from the city of Campo Novo do Parecis, Mato Grosso, a region that has experienced great population, economic and agribusiness growth in recent years. The questionnaire was distributed digitally and addressed demographic characteristics (age, education, student status, etc.) and patterns of cell phone use (daily hours of use, types of use, etc.).

The responses were analyzed using statistical tools, including Excel and Python spreadsheets, to explore correlations and relationships between variables. The Python tool was used specifically to perform more complex statistical analysis and data visualization, enabling a detailed analysis of the associations and usage patterns between different groups.

To test the proposed hypotheses, several econometric tests were performed. First, a descriptive analysis was conducted to understand the distribution of responses. Next, Pearson's correlation analyses were applied to evaluate the relationship between demographic variables and the intensity of cell phone use. In addition, multiple linear regressions were used to investigate associations between schooling, age, and cell phone use for specific purposes (leisure or work). Cluster analysis was also performed to identify homogeneous groups of respondents based on usage patterns and demographic characteristics.

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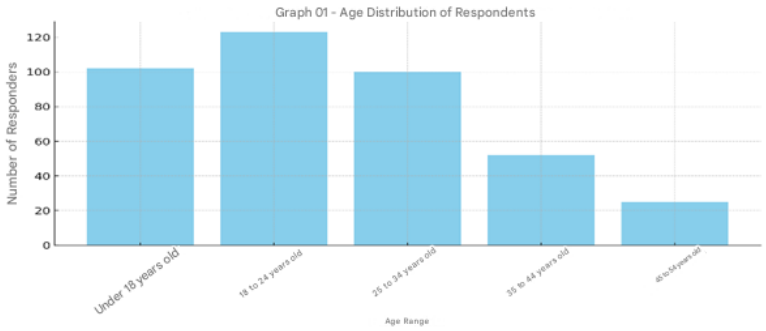
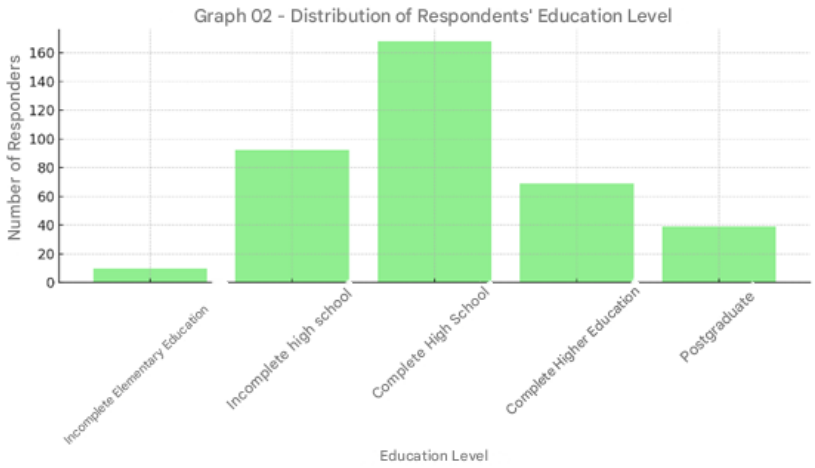
RESULTS AND DISCUSSIONS

From the analysis of the data collected, we can draw a detailed demographic profile of the survey respondents. As shown in **Graph 01** (Age Distribution) below, most participants are concentrated in the age group of 18 to 24 years (32.8%), with 123 respondents, followed by the group of less than 18 years (25.4%), with 102 respondents, and then by the group of 25 to 34 years (24.9%), with 100 respondents. These data indicate a predominance of young people among the respondents, which is an important factor for understanding the patterns of mobile technology use in this population.



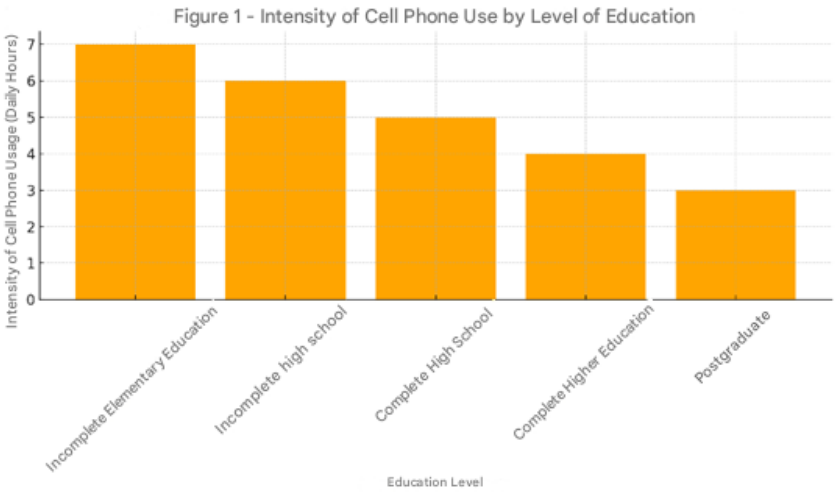
Source: The authors(2024)

In terms of education, most respondents have **completed high school** (41.8%), as shown in **Graph 02** (Distribution of Education) below. The other levels of education include Incomplete High School (22.9%), Complete Higher Education (17.2%) and Graduate Studies (9.7%). Only a small portion (2.5%) has incomplete elementary school. These data are consistent with the regional context, where high school is a predominant level of education. In addition, as discussed in the theoretical framework, education directly influences the behavior of technology use, especially in relation to the functionalities that are explored by users.



Source: The authors (2024)

By using the **Chi-square test** and **Cramer's V** to analyze the correlation between variables, the initial results suggest a significant relationship between the level of education and the intensity of cell phone use. Figure **1** (Intensity of Cell Phone Use by Education Level) below reinforces how those with lower education use cell phones more intensely for leisure activities. Respondents with less schooling tend to use cell phones for more hours a day, often as a way to access services and information that would not otherwise be available. These results are in line with **hypothesis H1**, which suggests that cell phones play a central role in the daily lives of individuals with less access to educational resources.



Source: The authors (2024)

The correlation analysis also indicated that **individuals with lower education are more likely to use cell phones for leisure**, while those with higher education tend to use them for work and studies. **Table 1** (Propensity to Use Cell Phones for Leisure vs. Work) presents the percentages of respondents who use cell phones for these purposes, separated by education levels. These data reinforce the idea that cell phone use is linked to educational and social conditions, corroborating the perspective that individuals with fewer educational opportunities use cell phones as an important source of entertainment and communication. This is consistent with the literature on **digital inclusion**, which highlights the role of mobile devices in democratizing access to information (OLIVEIRA et al., 2018).

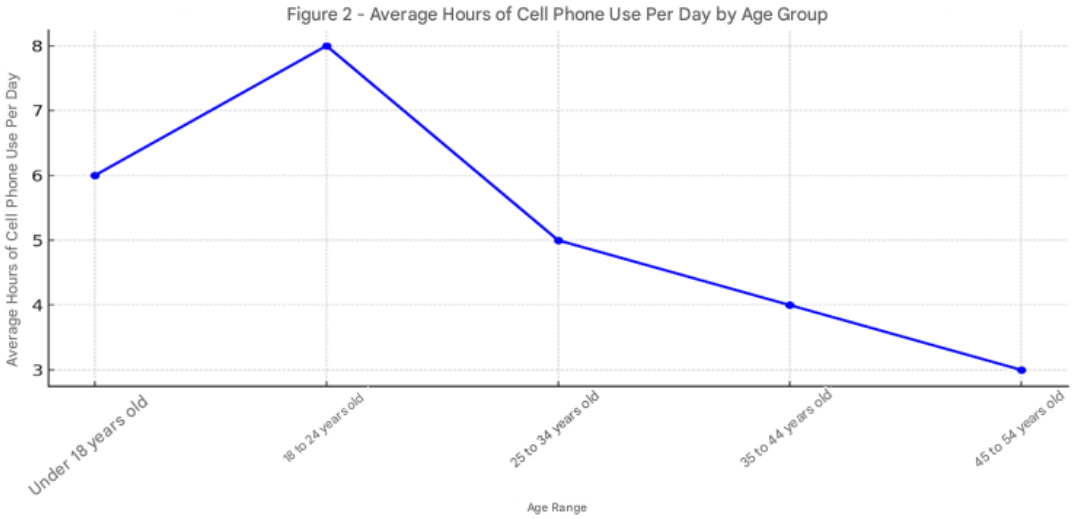
Table 1 - Propensity to Use Cell Phones for Leisure versus Work

Education Level	Use for Leisure (%)	Use for Work (%)
Incomplete Elementary Education	78.0	22.0
Incomplete high school	65.0	35.0
Complete High School	55.0	45.0
Complete Higher Education	32.0	68.0
Postgraduate	20.0	80.0

Source: The authors (2024)

In relation to students (linked to **hypothesis H2**), it was found that this group uses cell phones more intensely for recreational activities, such as social networks and games, compared to other population groups. **Figure 2** (Average Daily Hours of Cell Phone Use by Age Group) and **Figure 3** (Cell Phone Use Among Different Age Groups) illustrate that **young students make greater use of cell phones for leisure**, possibly due to the association between youth and the search for social connection, as discussed in the

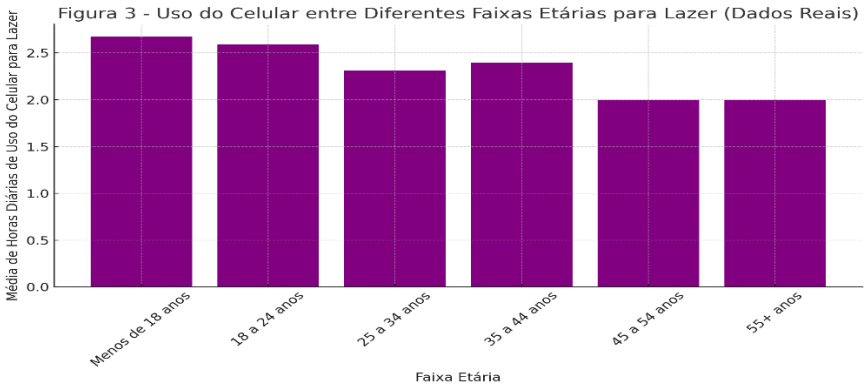
theoretical section. These findings are consistent with studies that identify a relationship between young people's familiarity with technologies and their intense use for non-productive purposes (BRAGAGNOLO, 2023).



Source: The authors (2024)

Cluster **analysis** identified a specific group of younger individuals with lower education, who had a greater propensity for recreational cell phone use. This may indicate that cell phones are seen as an important entertainment tool by young people who are still in the academic phase, which can impact their productivity and academic performance. These findings are in line with the theoretical discussion on the challenges and opportunities of **digital inclusion** and the need to promote the productive use of technologies (COELHO; DIAS, 2021).

As for **hypothesis H3**, the data show that **individuals aged up to 24 years are the ones who use the cell phone the most intensely**, often for more than 7 hours a day. **Figure 3** (Cell Phone Use Among Different Age Groups) highlights the heaviest use of cell phones for leisure in this age group, especially on social media and streaming platforms.



Source: The authors (2024)

Although there are no direct data collected and analyzed that confirm the impact of recreational cell phone use on students' academic performance, theoretically we can argue that excessive cell phone use, especially for leisure, can have negative implications on the academic performance and productivity of young people. This is in line with research that suggests a direct relationship between excessive use of technology and increased levels of anxiety and distraction among young people (SOUZA; CUNHA, 2019).

The results suggest that cell phone use is deeply rooted in the daily lives of citizens in the interior of Mato Grosso, especially among those with less schooling and among young people. For individuals with less education, the cell phone is an essential tool for communication and access to information, indicating the need for **policies that expand access to other forms of education and digital inclusion**. These policies should include training for a more productive use of cell phones, as discussed in the theoretical framework on digital inclusion and education (KHATUN et al., 2017).

In the case of students and young adults, excessive use of cell phones for leisure can have implications for their academic performance and productivity. **Educational strategies that encourage a more balanced use of the cell phone, prioritizing productive activities**, could be beneficial for this group. The cluster analysis identified three distinct groups: a group of young people with low education who use the cell phone predominantly for leisure, an intermediate group, and a group of older individuals with higher education who use the cell phone mainly for work and learning. These findings are consistent with the expectations presented in the theoretical section, suggesting different patterns of use according to the sociodemographic characteristics of the respondents.

CONCLUSION

The results of this research show the importance of the cell phone as a central tool in the daily life of citizens in the interior of Mato Grosso, especially among young people and those with less education. As identified, the use of cell phones for leisure is predominant among individuals with lower education and younger age groups, which suggests an important role of the device as a source of entertainment, communication, and digital inclusion for those who have less access to other educational and recreational opportunities. These findings are in line with the theoretical framework on **digital inclusion**, highlighting the relevance of expanding access to technological resources and promoting the productive use of technologies (OLIVEIRA et al., 2018; RABBIT; DIAS, 2021).

The cluster analysis revealed three main groups of use: young people with low schooling who use the cell phone mainly for leisure, an intermediate group, and a group

composed of older individuals with higher education who use the cell phone mainly for activities related to work and learning. These results reinforce the heterogeneity in cell phone use, indicating that education levels and age group are determining factors in usage patterns, which is consistent with studies on digital inequality and different forms of technological appropriation (KHATUN et al., 2017).

Although we do not have enough empirical data to directly confirm the impact of recreational use on academic performance, theoretically we can infer that excessive use of cell phones for leisure among young people may contribute to decreased productivity and difficulties in school performance. This is in accordance with the literature, which points out that the unregulated use of electronic devices can lead to concentration problems and increase anxiety levels among students (SOUZA; CUNHA, 2019).

The findings also suggest that public policies should focus on **digital inclusion strategies** that transcend the mere distribution of devices, also considering the education and training of individuals for the productive use of technology. Programs that aim to promote balanced cell phone use, emphasizing education and learning, could be particularly beneficial for young people, potentially positively impacting their academic performance and their insertion in the labor market.

Therefore, it is concluded that the cell phone, although an important mechanism of digital inclusion, needs to be better explored as an educational and productive tool. The expansion of educational and awareness actions on the proper use of cell phones can minimize the negative impacts of excessive use for leisure, while promoting social inclusion and economic development of individuals who need it most.

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