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Challenges of using Digital Technologies in the Context of Remote Learning for University Students with High Abilities or Giftedness

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***Keywords*—College Students with High Abilities/Super Gifted, Remote Learning, Digital Technologies.**

***Abstract*—** *The integration of two interdisciplinary areas - Education for Gifted and Digital Technologies - provided the questioning about how has been occurring the teaching-learning process of college students with high abilities or gifted in remote education. From this guiding question, it became evident the objective of identifying, from the perspective of the university student with high abilities, how this teaching process has occurred, and which digital technologies can enrich and streamline the curriculum of this student, in the context of remote teaching. To this end, we conducted an exploratory, descriptive research with a qualitative approach, whose development occurred through the participation of three college students with high abilities/super ability, enrolled in a higher education institution in the state of Maranhão. After analyzing the data, they showed a rich area for the development of studies and research, in view of the multiple potentialities of the use of digital technologies in the remote teaching of students with high abilities or over dotation. However, due to the lack of training, information and knowledge about the two areas, Gifted Education and Digital Technologies, the teaching-learning process of gifted students in Higher Education has been compromised in the context of remote teaching.*

I. INTRODUCTION

Students with above average potential should be recognized, according to the Special Education Policy (Ministry of Education [MEC], 2008), by their high performance in intellectual, academic, leadership, psychomotricity and arts areas, in addition to great creativity, involvement with learning and accomplishment of tasks in the areas of interest.

Although they are highly intelligent, these students also have specific educational needs (cognitive, emotional and social) that cannot be disregarded. In view of this, specialized educational care for these students aims to supplement the areas of mastery and complement the areas of difficulty, aiming to eliminate barriers that may obstruct education (Decree No. 7.611/2011).

In this sense, Siegle (2004) highlights the technological advances and their insertion in the field of education as "a ray of hope" for gifted educators and the bonus of the 21st century for the education of students with above average potential, in view of the numerous possibilities that these resources provide for curriculum enrichment of these students, when tuned to educational purposes and directed to the development of a new pedagogical practice that enables student autonomy.

Therefore, facing the current educational context - remote education -, its emergency character and all the difficulties inherent to this new pedagogical practice, the

current period gains relevance and becomes suitable for discussion about the teaching-learning of students with high abilities or giftedness in higher education.

It is within this context that the aim is to train a researcher of excellence, capable of investigating, acting critically and producing significant innovations for society. However, this researcher will only emerge if he is offered opportunities for the full development of his cognitive abilities through Inclusive Education.

Thus, the guiding question of this study is: How has the teaching-learning process of university students with high abilities or over gifted been carried out in the context of remote teaching? To this end, we aimed to know the perspectives of these students in relation to the operationalization of the teaching-learning process in the context of remote teaching, as well as the possibilities of using digital technologies, since these can streamline and enrich the teaching and curriculum of students with high abilities or gifted in the current learning modality.

Therefore, it was conducted an exploratory, descriptive research with qualitative approach, based on Gil (2002), from a bibliographic survey in the context of gifted education and the usability of digital technologies in the teaching-learning process. Three college students with high abilities or giftedness enrolled in an institution of Higher Education in São Luís/MA participated in this study. Data analysis, collected through open interviews, is based on Bardin (2016).

Thus, it is presented a research whose investigative bias does not end in this article, because the data explain an area still under development and that needs further studies and investigations, in order to meet the educational needs of gifted students, constantly invisibilized in the Brazilian educational system.

II. THE TEACHING-LEARNING PROCESS OF UNIVERSITY STUDENTS WITH HIGH ABILITIES OR GIFTEDNESS: possibilities of curricular enrichment from digital technologies

Gifted education is a field of interdisciplinary study in continuous construction, which focuses on two major issues: what constitutes high abilities and how to develop them in young people and adults. The evolution of this area, which is based on the field of education and psychology, has expanded the definition of what is understood today as high abilities or giftedness and how to enhance this ability through the appropriate teaching-learning process.

In this sense, Renzulli (2018) defines these learners as those who, when compared to their peers, demonstrate exceptional performance or potential to develop superior performance in academic, creative, artistic, or leadership domains. That is, it is currently perceived, both the inclusion of learners with the potential already manifested and those who show only indications for the development of such potential.

Therefore, Virgolim (2019) in analogy to the growth of a plant, explains that the abilities of individuals with superior potential are perceived in three stages: latent, emerging and manifest, being the responsibility of the educational context to collaborate so that the superior potential receives conditions to be transformed into exceptional performance, respecting the peculiarities and heterogeneity of these students, meeting their specific needs and expanding the possibilities of manifestation of high abilities or over giftedness.

To this end, it is essential that giftedness is understood through the dynamic and continuous interaction of three characteristics: above-average intelligence (internal understanding and expression of a given cognitive ability), the level of motivation in performing the task in a specific area of interest and the creativity (degree of originality and flexibility) of ideas related to the area of interest of the gifted student.

Therefore, for inclusion to be real in the identification of students with higher potential, intelligence needs to be understood from the multiple perspective of Gardner (2010), in which an intelligent person has a dominant area and low/low cognitive performance in other areas of knowledge, a fact that does not exclude him/her from being identified as a gifted individual.

The other two factors highlighted by Renzulli (2018), creativity and motivation, also need to be considered with the same relevance of cognitive ability, because it is only from the confluence of these three characteristics that the superior potential is revealed in a person, at a certain time and under certain circumstances. In this sense, the continuous interaction of gifted behavior with internal and external factors to the individual, such as the environment and personality itself, stands out.

In view of this, students with high abilities or over giftedness, despite exceeding in cognitive potential, have specific educational, emotional and social needs that, if disregarded, will significantly affect the process of identification, development and manifestation of above average ability.

Therefore, they are considered target audience of Special Education, whose specialized educational care (AEE) should supplement the curriculum, providing conditions of access, participation and learning in regular education, ensuring the transversality of special education

actions, fostering the development of resources that eliminate teaching-learning barriers and ensuring the conditions for the continuity of studies in other levels, stages and types of education (MEC, 2008; Decree n. 7.611/2011).

That said, it is noteworthy that the inclusion of gifted students in the context of Higher Education has proved to be a challenge, since recent research highlights the insufficiency of studies in the area in this environment and the consequent difficulty in identifying these students. Without knowledge and identification, it is understood that the whole process of inclusion is compromised

In this context, Renzulli (2018) proposes a triadic model of enrichment in which the lesson maker student is transformed into a first-hand researcher or creator, whose activities and pedagogical interventions offer the overview of the areas of human knowledge, with a view to providing this student with the selection of his/her area of interest, providing challenges and conditions of engagement for the deepening of studies, research and training.

Therefore, according to Ribeiro and Galvão (2018), educational institutions are the locus par excellence of the development and expression of human potential and creativity. In this sense, Higher Education, by granting the student greater depth in teaching-learning and possibilities of extension of this process through oriented research, becomes the locus par excellence of training and development of the excellent researcher, whose advances generate intellectual, social and technological innovations necessary to meet the demands of contemporary society.

To this end, Siegle (2004), since the beginning of the XXI century, explains that educators of students with high abilities / gifted need to strive to systematize a curriculum with complexity and depth, whose structure organizes, analyzes, synthesizes and communicates large amounts of information. In this proposal, the researcher argues that technology is used effectively for this same purpose, specifically, the internet itself, which would then generate the necessary aid to practice and enrich the teaching-learning process of these students.

Siegle (2004) presents, then, the fusion of literacy and technology in the 21st century as a bonus for the education of gifted students, given that the Internet provides virtual learning environment that requires the application of a series of skills for the achievement of the pedagogical purpose. These skills are commonly cited as the purpose of gifted education.

In this way, the direct relationship between the goals of gifted students' education and the competences for learning with the help of digital technologies can be seen; for example, it should be noted that both fields aim at the rapid processing of information; critical thinking, necessary in the selection amidst the infinity of information in the areas of knowledge; creative productivity, as technology has lowered the barriers that limited students from using authentic methodologies of professionals, contributing to the gifted student specializing without leaving home.

Thus, it is understood that the use of digital technologies in the teaching-learning process of students with high abilities or overdotating tends to enrich learning and curricula, in addition to generating significant and expansive possibilities to develop the excellent researcher, expanding their knowledge and enhancing their skills with dynamics and continuous interactivity (Santos & Boscarioli, 2021).

From this perspective, Pedro et al. (2011) proposes educational software as a pedagogical resource for curriculum enrichment for students with high abilities or over giftedness, provided that the quality of the digital resource is assessed, the teacher actually knows the software and performs a planning in which the educational purpose of the use of the digital resource is explicit for both the educator and the students, thus generating a new pedagogical practice.

With regard to the use of digital resources in the teaching-learning process of gifted students, Delpretto and Zardo (2010) emphasize that the goal of AEE is also to expand the student's access to technology resources, promote their participation in research practices and development of products and projects in the most diverse areas, such as arts, sports, science and others.

Thus, Santos (2019) argues that the use of digital technologies of information and communication in the teaching-learning process enables the sharing of information of interest to students, new ways to insert academic content and generates opportunities to develop criticality in the face of the information circulating in the various media, develop giftedness behavior in order to enhance and express creativity, which contributes to the increase of autonomy in the teaching-learning process.

According to recent research, digital technologies that can be adapted to different educational levels and learning styles in order to enrich the education of gifted learners (Depizzol & Pedro, 2018; Santos, 2019; Santos & Boscarioli, 2020; 2021) stand out, according to Table 1:

Table.1: Digital Technologies in the teaching-learning of gifted learners

DTIC	Pedagogical purpose	Potentiates
Power Point; Platforms like Powotoon and Canva; *MindMeister; Windows Story Remix.*	Construction of digital narratives (*storytelling*) and mind maps.	Encourages the development of critical and creative thinking, and linguistic, interpersonal and intrapersonal intelligence, with a view to sharing information.
Gamers: *Minetest, Game Edito, LightBot.*	Developing strategies for problem solving; developing a sense of leadership, social and emotional responsibility.	Creativity, productivity, logical-mathematical, spatial, linguistic, interpersonal and intrapersonal intelligence.
Arduino Platform	Construction of prototypes or robotic devices	Logical reasoning, hypothesis formulation, manual and aesthetic skills, collaborative and interdisciplinary work.
Software such as SOLFEGE 3.22.0; LMMS16; *Musescore.*	Auditory training, intervals, chords and theories, music production, music notation.	Musical intelligence mainly, but collaborates to strengthen logical-mathematical, interpersonal and intrapersonal intelligence.
Moodle Platforms, *Tele-Mentoring* or *E-Mentoring, Ask an Expert.*	Student engagement in the scientific field and mentorships in ODL.	All intelligences and skills in the most varied fields of human knowledge and the possibility to develop long-term scientific projects with specialized mentoring.
Adobe Photoshop; HyperStudio 4.0; Flash MX 2004; Podcasts.	Exploration of digital image and video production	Critical and creative production for sharing ideas and interests.
Global Positioning System (GPS) and the Geographic Information System (GIS)	Route plotting, information gathering, determining locations, data pattern visualization, geographic concepts and spatial dimensions.	Spatial, bodily-kinesthetic intelligence, investigative skills.

With this said, it is emphasized that the current synchronous and asynchronous remote educational context requires the teacher a conscious and creative posture, able to visualize the possibilities of expansion and deepening of knowledge in order to create an attractive and challenging learning environment, whose goal is the formation of critical researchers, original and responsible for disseminating quality information.

Thus, the research cited, show that the production of multimedia resources, especially the production of videos, offer the student a space for dissemination of personal interests and critical space, as well as research in robotics, which provide an opportunity for interdisciplinary research space, rich in interpersonal relationships and influences from various areas.

The use of digital technologies in the teaching-learning process of gifted students enriches Higher Education with deeper knowledge, practicality, attractiveness, significant challenges, possibilities to create original products and develop criticality, with mentoring by experts from the most diverse areas, making the student an autonomous learner and able to expand his own potential.

III. METHOD

We developed research of exploratory, descriptive type, with qualitative approach (Gil, 2002). Initially, a bibliographic survey was conducted on the fields of research in the area of *gifted education* and *digital technologies*; subsequently, interviews were conducted with three students identified and with indications of higher potential, enrolled at the Federal University of

Maranhão/Brazil: identified in this study by: D1 (27 years, female, Degree in Theatre); D2 (19 years, male, Bachelor of Physical Education) and D3 (17 years, female, Interdisciplinary Bachelor of Science and Technology).

The interviews were conducted by sending a questionnaire via *Google forms*, containing six open questions about the teaching-learning process in the context of remote teaching, with questions about which digital technologies could be used in order to improve this type of teaching. The data obtained were analyzed through critical reading (BARDIN, 2016), highlighting the most relevant points, in order to answer the research problem and achieve the objectives of this study.

IV. RESULTS AND DISCUSSIONS

According to Bardin (2016), about the content analysis in open-ended questions answers, from a first floating reading of the material, intuitions or hypotheses and objectives about the data collected may arise. Next, there is the exploration of the material, the coding, classification and categorization, to then, there is the interpretation of what was collected.

In this sense, it was assumed from the first reading, problems related to the effectiveness of the teaching-learning process of gifted undergraduates in the context of remote teaching, so it was sought in the results of the interviews, data for the analysis of two categories: the development of the teaching-learning process in remote teaching of undergraduates with high abilities or giftedness and the usability of digital technologies during remote teaching, precisely which ones are being used and which ones could be inserted in this context.

Thus, when asked how the teaching-learning has occurred in the context of remote teaching, it is significant to point out that despite D2 highlighting "[...] it has been possible to take and acquire knowledge [...]". The participants emphasized that there are many failures in the communication teacher-student, because the process has become impersonal and inflexible, with minimal contact and little openness to discussions about the methodologies used by teachers.

A relevant fact is the criticism regarding the number of asynchronous classes, because the students showed preference and need for a more direct and open communication with the teacher in real time. Thus, it is understood that, although there is learning in the context of remote teaching, the most evident problem signaled by the students was that some teachers are replacing synchronous classes by recorded lessons and/or files to be studied only by the students, since these methodologies limit the exchange of opinions and the possibility of students to ask questions in real time.

According to the students, the biggest difficulties they have been facing in remote teaching are the amount of materials for reading; little concentration in classes; difficulty in assimilating practical content, as well as lack of discussion with the faculty about the methodologies used in remote teaching, regarding the effectiveness of teaching methods in virtual classrooms, specifically for the educational needs of students with higher potential.

As for the facilities of remote teaching, unanimously, the students pointed out that they are: absence of expenses with transportation tickets and lunch; schedule flexibility. At this point, it is noteworthy that, even with the multiple possibilities of enrichment of the teaching-learning process in the virtual environment with the help of digital technologies, the facilities scored by students relate only to external factors and not in relation to the teaching itself. This allows us to infer that there is an absence of positive factors during the teaching-learning process to college students with high abilities.

In this sense, students highlighted the virtual classrooms, through the *Google Meet* platform, and the slides as digital technologies that are being used in remote teaching. However, there were some reservations, as pointed out by student D3: "I believe that the way *Google Meet* is used is not correct, because teachers seek to reproduce the face-to-face teaching within the remote [...]". The students also highlighted the side effects caused by the hours spent in front of the screen: headaches, eye strain and mental fatigue.

In other words, we confirm Santos and Boscarioli's (2021) defense that digital technologies do not enrich teaching by themselves, because it is the teacher's responsibility to define the educational goals and objectives that will be achieved through them. But this practice only happens if the educator knows and analyzes the function and potential of digital resources, as well as knowing how to handle them and, above all, planning the lesson in order to balance and ensure enrichment and learning.

When asked about how the teaching-learning process should occur in the remote context and what digital technologies could facilitate this process, D2 replied: "I believe that teachers should first be made aware of the issue of students with high abilities. Given this fact, it was found that the educational institution in question does not have a registration system or instruments of identification of these students, i.e., the three gifted students are not identified as such in the institution, researched, nor in their courses, which shows that if the student does not self-

declare with high abilities / gifted, there is no other way to identify it in the institution. This contention proves the invisibility of talents that could be polished and returned to society.

In the sequence, they also highlighted the need for content deepening, virtual learning spaces with more freedom for the act of learning itself, and to discuss with the teachers about how each of them learns best, with a view to meeting the needs of the high potential of each one, respecting their ways of learning and their specificities, in addition to exploring new methods and methodologies. In this sense, the speech of D3 stands out:

> A teacher's teaching method is not the only one available, and therefore, each student's learning method is not unique either. By having other means of demonstrating their abilities and learning content, students with high abilities/super ability would achieve substantially more, since they are usually stuck in a method in which their abilities are hidden and paralyzed.

Thus, the students highlighted that the technologies used, such as digital platforms for virtual classes and slide materials are not sufficient for the proper development and enrichment of the classes from the perspective of a student with high abilities/super ability. Teachers do not use digital technologies properly and do not take advantage of all the possibilities that these technologies can offer. The students also reported that class time is not optimized effectively during the teaching-learning process.

In addition, they pointed out that a strategy to enrich the contents of the classes would be the use of multimedia resources, such as images and videos, which would be attractive, instigating for class discussions and would awaken the creativity of these students, in addition to critical thinking, because they would have the freedom to express themselves in different ways and question the expression of their peers.

It was verified in the answers of the students the appeal: to the freedom of learning; for space for discussion of teaching methodologies; for the deepening of content; the efficiency of methods and methodologies. Since the teaching-learning process in the context of remote teaching has proved to be deficient and insufficient to meet the specific educational needs of gifted students.

Such needs permeate the cognitive dimensions, since the participants expressed the individual demand for deepening the contents, lack of flexibility in the way of learning and expressing what was learned, in addition to diversity in the materials used as pedagogical resources and sent for individual studies asynchronously, and didactic possibilities of viewing the practices that were suspended in view of the current teaching context.

The unmet needs also impact the emotional and social dimension of students, since it was scored the difficulty of concentration in class and communication with teachers, this characterized as minimal, limited and lack of interest on the part of teachers as the needs of gifted students, both for lack of knowledge and lack of empathy.

In general, it is considered that the teaching-learning process of university students with high abilities/super ability through the analysis of the data collection presented here, is insufficient for the development and training of these students, because there is a lack of pedagogical and attitudinal adaptations by the teachers, lack of knowledge and proper planning regarding the digital technologies that are being used and that could be used in remote teaching for curriculum enrichment of these students, in addition to lack of knowledge about high abilities/super ability, and the construction of an increasingly fragile relationship between teacher and student.

V. CONCLUDING REMARKS

As observed throughout the development of this research, students with high abilities or giftedness have an above-average cognitive potential in any of the areas of knowledge, alone or combined (MEC, 2008). And for the perception of these possible areas, it is necessary to understand that human intelligence is a multiple biopsychosocial construct, as established by Gardner (2010) in his theory of Multiple Intelligences.

But it is not only the above-average ability that needs to be observed, because the gifted behavior is manifested when the motivation and creativity act in confluence with the superior potential in the individual's area of interest (Renzulli, 2018). It is then the responsibility of the teacher to perceive these characteristics in the student's performance and relate them to the profile of the gifted learner such as their cognitive, emotional and social needs.

Once these students are not identified, the inclusion process is compromised, because without identification there is no way for the educational system to signal the specific demands of this audience that is also the target of Special Education. Without this specific care in the classroom and outside it, the higher potential succumbs to the accumulation of needs, facilitating risk situations for these individuals, such as academic dropout, social exclusion and the symbolic violence of invisibility.

In this sense, when reflecting on these students in Higher Education, invisibilized by the absence of identification, it is considered that it is commonplace in the

national territory the tradition of wasting talents that, in this space conducive to the formation of the excellent researcher, could contribute to intellectual, social and technological innovations so necessary to contemporary society.

Thus, we sought to identify how the teaching-learning process has been occurring in the context of remote teaching, according to the perspective of university students with high abilities/over giftedness, who have experienced, for over a year, this "new" pedagogical practice, synchronously and asynchronously.

In addition, considering the need for curriculum enrichment and dynamization of the teaching of this student, it was also aimed to know the possibilities of digital technologies in the insertion of education in this context, given the perception that these resources can be a bonus for the gifted education in all levels, stages and modes of education (Siegle, 2004).

In this aspect, according to the bibliographic survey, it is concluded: digital technologies can provide the development of skills that possibly would not awaken in non-digital practice, such as rapid processing of information, collective construction of digital narratives, development of gamers that contribute to the strengthening of creativity, criticality and interpersonal relationships (Santos & Boscarioli, 2020).

In addition to providing the expansion and enhancement of students' skills through opportunities for specialization in the field of research and innovation in investigative methods, virtual practices in platforms and software for professional use, long-term specialized mentoring, robotics projects, among others. However, this awakening only becomes possible if the educator has the knowledge and planning regarding the potential of these resources.

Thus, what was presented until then as a possibility of use, facing the new pedagogical context, remote learning, became an educational emergency for both teachers and students, who were inserted without preparation or previous experience to a new learning environment, full of possibilities, but that until today, are little noticed and considered, due to a major barrier: the lack of knowledge about digital technologies for education and the specific educational needs of students with high abilities/over giftedness.

Such considerations are highlighted from the analysis of the data collected, since it is highlighted the repetition of concepts such as flexibility, freedom, deepening of content and discussion/dialogue with teachers as the shortcomings of remote teaching offered in the context of higher education for students with above-average potential.

The expression efficiency of the method was also widely used by students, with regard to a shortcoming that has harmed all the remote education: the choice of teaching methodologies does not meet the demands of gifted students and they are not offered an opportunity to discuss and dialogue about this situation with the teachers themselves, so that they can find new ways of learning.

It is not the virtual environment, but the way methodologies once used in face-to-face classroom were inserted in remote teaching without adaptations or considerations regarding the new educational environment and the specific demands of these students.

Thus, by the data analyzed, it is inferred that the deficiency in remote teaching for students with higher potential is generated by the absence of specific training for teaching adaptation to the new context of teaching, the absence of information and knowledge about the digital resources available and the possibilities of enrichment that digital technologies can offer learning, such as the absence of knowledge about high abilities or giftedness, the lack of pedagogical sensitivity regarding the understanding that these students were also taken out of their comfort zone for an environment that has deteriorated the teacher-student relationship, the failure in the identification of gifted university students, due to the absence of registration system and monitoring of these students.

That said, it can be concluded that the enrichment of the teaching-learning process of university students with high abilities or over gifted in the context of remote teaching will only occur when the teacher is actually trained to use digital technologies, in order to articulate technology and teaching and manage in the virtual classroom the digital resources, the student and the class itself.

To this end, the use of the technological resource must have a clear and explicit purpose for teachers and students, so that the use of digital technologies contributes to the formation of an innovative pedagogical practice, which seeks to expand the possibilities of curriculum enrichment, training of the excellent researcher and specific care of the educational needs of gifted students.

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