A study with all schools in the city of Maricá during a complete academic year using games to increase students confidence in their professional possibilities in the games industry

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***Abstract*— Brazil is one of the largest video game markets in the world, however, its own game industry is almost non-existent. Although at first unrelated, Brazil's public schools focus little on technology use beyond day-to-day affairs, even though Brazil's National Curriculum guiding document - BNCC, recommends the use of technology in significant ways that stimulate student's critical thinking. The city of Maricá, Rio de Janeiro, Brazil, decided to legitimize games in schools via a yearlong project, to stimulate local game industry and comply with the National Curriculum guidance. This research was based on results regarding the yearlong experiment with students held during the aforementioned project, called Ti- Games. This initiative involved all fifty schools of the city and is an attempt to answer whether games in schools can or cannot help stimulate student's confidence in relation to game industry professions. Answers were drawn from 88 students who managed to reach semi-finals and were involved with activities during the whole school year. The study will also show other secondary impacts resulting from the Ti-Games project.**

***Keywords*— Games, Gamers, Tournament, Ti-Games, Schools**

I. Introduction

The following research was done following a city-wide project called Ti-Games Maricá, executed over the school year of 2019 and involving all fifty schools in the city, public or private. The project's main activity was a school versus school game tournament, however, there were a series of workshops, talks and other activities related to games or the game industry. The project involved 2.500 students as well as 400 teachers.

This project was the city's first initiative towards building a game development cluster. The main goal was to legitimize game use in schools in hopes to bridge gamers with the game industry. The research's main goal was to observe the impact of said project and the use of games in schools in a legitimate manner. We hoped to observe if the use of games in the school environment, by the school itself, would increase student's self-esteem, increase their professional perspectives in technological fields and if the legitimate use of games could have other positive influences.

One of the foundations for the project was Brazil's National Curriculum guiding document [1] and how it states the use of games to guide the learning process [1]. One of its main goals is the use of technology in schools beyond administrative tools; however, most Brazil's public schools are still unable to attend to this recommendation, worsening the outdated educational system.

As this research will show, the city of Maricá, in Rio de Janeiro state, planned to follow the BNCC guidance, by starting with games legitimacy in schools. As Newzoo [2] research of 2018, had shown, there were more than 75.7 million gamers in Brazil. Most of the Brazilian youth played at least one digital game and the country was in 2018 the thirteenth biggest game market in the world.

II. Terms and Definitions

In order to avoid the debate on what constitutes a game and the many common mishaps due to translation, we shall use, for this research, the term "game" as referring to electronic games of entertainment, excluding gambling, and "gamer" as those who play it. Mainly because, the English dictionary Merriam-Webster defines the term "gamer" as being someone who plays games and in Brazil, game is already associated with digital or electronic games.

There are many game tournaments, more commonly known as e-sports (electronic sports), however, the project mentioned here, Ti-Games, has a unique format, developed with specific goals that in many cases are contrary to more common versions of e-Sports. For this reason, when referring to tournaments, we are specifically mentioning the Ti-Games project. While the core of Ti-Games project was a yearlong school versus school game tournament, there were several other activities related to games but focused on game culture and game development. Workshops, talks, gatherings and meetings focused on legitimizing games in schools, were held during the year. However, for the sake of concision, all mentions of Ti-Games and or tournament are referring to this complete project and not just the competition.

Since one of the goals of the project was the legitimacy of game uses in schools, it is important to clarify that by "legitimate", we mean official use of games in schools, by schools and with the support and incentive of school faculty.

III. Theoretical Reference

In 2011, two renowned professionals of the audiovisual digital industry – Ian Livingstone and Alex Hope – made a study [3] for England's Ministry of Culture. This report stated that for the development of high-tech industries, reforms focusing on technology use in basic education are paramount.

The study showed that most students ended not receiving information, nor having access to technology that enabled the development of skills required for digital industries. This lack of access during school years, amounted to students not even envisioning professional possibilities in these areas, let alone prepare them for high-tech industry, such as game development and visual effects.

A. Digital Natives and Learnings

Marc Prensky is one of the leading voices behind the reasoning for a technological focus in schools. Author of, "Don't Bother Me, Mom – I'm Learning" [4], Prensky argues for the use of games in the development of children and adolescents. He attributes possible benefits to the mere act of playing video games, such as increased sociability. In his opinion, teachers are "digital immigrants" while the current younger generation (students) are "digital immigrants", this disparity leads to communication problems.

Author of the terms "digital native" and "digital immigrant", he believes "digital natives" are those who were born in a world filled with digital interfaces, contrary to "digital immigrants", who saw these technological developments.

Although we know of the existence of students who fit the above classification during the period of the pandemic in which students and teachers were migrated to digital environments, we had many reports of students who were unable to access platforms due to social inequalities as pointed out in the 2020 work of Catanante or for operational reasons many "digital natives" were unable to perform some tasks shared by their teachers.

Supporting Prensky's claims of cognitive benefits from playing video games, is game developer Jane McGonigal (Reality is Broken: why gaming can make us better and how they can change the world) [5]. She states that the sheer act of playing online role-playing games, could increase the odds of people solving major world problems. She concludes, based on her extensive research on the area, that games strengthen social connectivity, as well as help gamer develop their self-esteem and make them optimistic. As she states, purposeful play builds self-confidence and real-world problem-solving skills [5].

In this perspective, in the 2019 study by Zhonggen [6] in which they carried out an analysis of a decade on the Web Base, Sciences found as positive aspects of the use of serious games in education, such as the gain of cognitive skills, the possibility of greater flexibility in learning and the performance gain.

For the purposes of this research, her observations on the way games increase players' optimism and self-confidence are fundamental for comprehending the results obtained in this research, however, her views on games as social tools are shared by philosopher [7] "playing and games can promote social grouping".

IV. Brazil's Technology Dissonance

There were more than 75.7 million players in Brazil according to research company Newzoo in 2019 [2]. In that same year, Statista [8], a leading technology consumption research company, showed that Brazil was amongst the top five countries that most consumed the internet, with the majority of the population accessing the internet at least once a day. In 2020 it was also reported by Statista [8] that Brazil surpassed the United States in individual time spent on social media per day. In defiance of these facts, most public schools in Brazil offer no infrastructure even to the most basic levels, such as basic computers or internet access, let alone programs focusing on technology use or technology receptivity.

One evidence of the state Brazil's public schools feels to the current student's habits (digital natives), is in the last Program for International Student Assessment [9]. While this evaluation has been done every two years for the last twenty, there has been little sign of evolution in regard to public school's environments as perceived by students. "Bullying, indiscipline and loneliness: the climate of Brazil's schools as revealed by PISA in 2018" was the headline that gave way to international notoriety of a system that has little to no focus on embracing students [9].

The same report states that Brazil had a 50% drop out rate and 41% of the students recognize the high levels of indiscipline. 23% felt alone in school, while 13% self-declared feeling sad in school. These rates were in some cases double of most OECD countries. The report points out the obvious, a better school environment helps reduce the dropout rate; which in 2012 Brazil had the third highest rate amongst countries researched by United Nations Development Program (UNDP) [10].

The city of Maricá is seen as an exception to the rule, as it not only had the resources to invest in public school infrastructure, but also on programs such as the Ti-Games project in order to rethink ways of increasing technology receptivity in schools.

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V. Necessary Study Delimitation

The project focused on a series of activities that aimed for the insertion of games in schools and the recognition of gaming culture by these institutions, yet this article focuses mainly on the impacts of said project on students. Hence the following sections will describe only a portion of the complete Ti-Games project.

VI. Methodology

One of the goals of the project, Ti-Games, in relation to students, was to help students develop socially through games as well as develop their self-esteem via legitimate game activities held within the school environment and by the school itself. For this reason, the project, including the video game tournament, was developed focusing on cooperation, formation of school spirit and had no monetary gains as well as no ranking of individual students.

In its first phase, each school receives internal game activities such as workshops, talks and video game tournaments. This is done to select students with greater affinity to games. The only prerequisites are being a gamer and between the ages of 12 and 18.

All schools had to have at least one principal or director participating in a brief talk about games and its educational uses. Teachers of each institution were invited for this talk; they were also briefed on the game industry and its economic relevance. Our intention was to stamp out misconceptions about games and bring this generation of "digital immigrants" closer to their students, who are "digital natives" [4].

Students were then assembled for a talk about career possibilities in the game industry in order to broaden their vocational perspective. The first practical activity with the students was a game design workshop, with the aim of showing how games are made. The second main activity for these same students was a video game competition designed to form the school's team.

After forming a school's team, the institution advances to the tournament's second phase, school versus school tournament. The first phase ended at the same time for all fifty schools.

This second phase of the project required institutions to compete against each other in similar fashion as students did within each school. However, the point system used was solely meant to register the effort of each school in being present at these external activities, however, was not disclosed to students as not to deter them from trying hard.

Since the project was about effort and school mobilization through games, semi-finals and finals happened in one single event. The prize, a "gaming room" was awarded for the first and second placed teams, as well as a metal plaque with the team's names. There were no individual rewards to avoid students from focusing on monetary gains.

A. Student Experiment and Results

This data collection was done at the end of TI-Games with only those students that managed to reach the semi- finals. For this reason, only those present in the very end, answered the questionnaire (Appendix A) Furthermore, answering was voluntary as well as their participation, even so, there were approximately 2500 students participating in Ti-Games

The focus of the questionnaire was to observe through the student's own opinion the impact of using games in school environments by their schools. It was also intended to evaluate what was expected of them in relation to their schools before the project started. This way, we could better comprehend the relation of game communities with their respective schools.

Fig. 1. Teacher with her students participating of TI-Games.

While 2500 students did participate of the first phase of activities, the second phase was held with more constant events and most of them in after school periods. This generated interesting and unexpected results, such as the mobilization of school communities. Parents, friends, and teachers helped teams reach events. Since the intention was to measure the impacts of the whole experience, to truly try to comprehend the effects of legitimate game use in schools after a full year, only students present in the semi-finals and finals were able to answer the research.

As a result, we found that 71% of students said that there was an incentive from teachers to participate in the contest, and in addition, most students - specifically 81% - do not believe they would receive this incentive from the school, encouraging them to participate in contests in this model.

These students were asked about their abilities and potential to win in game competitions, 59% of them answered that they already imagined themselves participating in competitions of this kind, however, 96% of the students shared that they felt confident in winning future contests. We believe that this is a fundamental factor to demonstrate that these students' belief enhances their own abilities.

After analyzing the data, we noticed that 39% of the students admitted that they feel motivated by the possibility of becoming professional players (e-athletes). What caught our attention was the lack of correlation between this and the fact that 76% of students claim to have thought about becoming game developers before TI-Games.

But it is important to highlight that all students who were present and actively participated in the activities were gamers interested in gaming culture.

Furthermore, we found that 24% explicitly expressed their willingness to work with technology, 16% showed interest in becoming Youtubers and 15% expressed interest in becoming game developers, as we can see in graph 01.

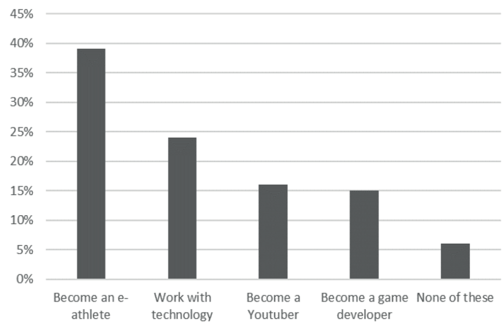

Fig. 2. Interest in acting in the technology industry.

TABLE I. DESCRIPTIVE ANALYSIS OF DATA COLLECTED WITH STUDENTS WHO REACHED TI-GAMES SEMI-FINALS

Interest in a free game developer course	
Yes	74%
Maybe	25%
No	1%
Got encouraged by any teacher	
Yes	71%
No	29%
Ever imagined being on a game contest	
Yes	59%
No	41%
Ever thought school would encourage a game contest	
Yes	19%
No	81%
Believe could win other contests	
Yes	96%
No	4%
Ever faced prejudice for playing games	
Yes	43%
No	57%
Ever considered becoming a game developer	
Yes	76%
No	24%
What enjoyed the most	
Know Maricá is focusing on game development	61%
Make new friends	18%
Learn how games are made	8%
Know there are professions connected to games	6%
Have more time to play games	5%
Other reasons	2%

Our last question was Regarding the students' opinion about the project: "what did they like the most about the project?" Even though five possible answers were available, 61% of the students said they liked knowing that the city of Maricá is a city of openness for players and reinforced the importance of the game through official government institutions.

The second aspect that was highlighted by the students, with 18% of the responses, was the fact of making new friends. We believe that this may be the most relevant sign of the potential of games as social tools, or at the very least, it indicates a repressed potential of the emergence of a need to create a gaming community in Maricá before the TI- Games contest.

Although TI-Games are considered an extremely difficult competition, 2,500 students actively participated and competed in various ways over an entire year. Participating in this challenge encouraged students who felt more confident about the possibility of winning new game competitions. Through data analysis we can also conclude that most of the students who participated aspire to work with games or gaming-related professions, with that, we can conclude that TI-Games has achieved one of its main goals to a high degree. We can also legitimize other positive results with the integration of games in schools, however, it is necessary to develop further research to measure the extent to which these results were influenced by the TI- Games project.

VII. ANALYSES OF RESULTS

By crossing the analyzed data with the works of references and authors mentioned in the theoretical referential chapter, we obtained as a result a strong correlation between the TI-Games result and some of the claims.

Next Gen Report [3] has as one of its main assertions that the use of technologies as a merely administrative use in schools prunes the professional perspectives of students in areas related to high technology.

As a result of the experience, we concluded that the majority of students, who worked until the end of the project, want to work with games. We have previously stated that 76% of students consider becoming game developers, which means a possible impact of the use of games in schools and by schools.

As one of the main objectives of the research was to understand whether games are a good option for implementing technology beyond administrative use in schools, the results we obtained further reinforce the statement made by Next Gen Report [3] than in their report while also answering one of the questions of 1.1, “does the games used legitimately in school activities increase the interest of students in professions based on digital?”.

We highlight here the increase in student confidence as a result of having participated in a long and challenging game contest. As we could see, although many lost the contest there was no apparent dismay on the part of these students who, on the contrary, will demonstrate self-esteem to win future game contests, this statement correlates with the statements of Jane McGonigal [5] about games and the improvement in the optimism generated by the act of playing.

Pedersen [11] developed a similar research on sports performance and self-esteem that had their improvement proven in adolescent girls after participating in sports achievement experiences. TI-Games, unlike the work mentioned above, is not a physical sports competition, but it can be considered an electronic sports competition, which seems to us to answer the question about the use of games in school, increasing self-esteem and confidence from the students. As shown by Miller [12] by Hamidi [13] [14]and other studies investigating the impacts of game use and game-based learning at school further confirm this possible increase in self-esteem due to the legitimacy of game in schools.

The union of students during the development of the experience is evident, which we consider the second-best result of the competition. The mobilization of the school community - although we do not have data to demonstrate -

was also evident during the development of the contest, especially in the school versus school phase, it took place outside school hours, many teams depended on parents for transport. The occurrence of several teachers who volunteered to take students beyond school hours and sometimes on weekends also reinforces our previous conclusion. This correlates even more with what Jane McGonigal [5] says about games that help build and strengthen social connectivity. This is further corroborated by one of the most cited authors on games, the philosopher [7] "playing and games can promote social grouping".

The fact that these students are digital natives may have contributed to the results we presented above. According to Prensky [4], digital natives have increased their receptivity to technology, in the sense that they can understand new technologies more quickly.

What surprised us the most, considering the format of the contest where the games were not advertised and most titles were unknown to the students who participated, the quick learning of the participants just watching the games.

Sharing among students, those who did best sharing information about how to play, even though they were competitors, demonstrates that cooperation among participants was high. Players want to cooperate with each other, as Jane McGonigal [5] puts it, showing what they know, this sporting attitude matches these digital native participants.

The high interest of students is evident in the development of the contest, even though the number of responses obtained - 88 - is very low compared to the number of participants - 2,500. The number of participants that was allowed by the Maricá city hall was limited to only 2,500 (maximum number of signatures allowed) because she believed that a larger number could disrupt daily school life.

Despite this limitation, some schools even have four hundred enrolments. And even though this is not relevant in the results obtained, the interest demonstrates the affinity that digital natives have with games and their culture.

VIII. Conclusion

The project had positive results and the research managed to show that there was an increase in student's confidence and a possible increase in their sociability.

However, the most important research contribution was the comprehension of numerous future research possibilities on the impact of games in education. For example, there were some students with autism that actively took part in the activities, this meant that a few teams had at least one representative with autism. To understand the full impact of the project on students with disabilities would alone be an interesting line of research.

The mobilization of the school community was another surprising result. Many parents and teachers worked together in order to get their childs and or students involved in the many events that were held from Monday to Monday. While Ti- Games did offer events daily, it was not to force participants to go, but as a way to offer more opportunities to those that had greater difficulty in partaking in the activities.However, it was quite common to see students and their families and or teachers in every single event.

The city mobilization towards a common goal (Ti- Games) was another relevant social impact of the project. This can be noticed by the media coverage of the project as can be seen on Figure 02. Unfortunately, we were unable to observe the lasting impacts of the project on students, due to the Covid-19 Pandemic in 2020.

Fig. 3. Media coverage of TI-Game.

From left to right: Regional TV coverage; National TV coverage; National radio coverage. Source: For Games (2021).

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APPENDIX A:

Avaliação do Torneio Intercolegial de Games - Alunos
Obrigado por participar do maior e mais difícil torneio de games da America latina! *Obrigatória. Agora dê uma força pra gente com essa avaliação.
E-mail*:
Como você ficou sabendo desse projeto? *
Algum professor te incentivou a participar? *
Sim
Não
E você achou que sua Escola fosse te incentivar a jogar videogames? *
Sim
Não
Você já se sentiu discriminado por gostar de jogos eletrônicos? *
Sim
Não
Você já pensou em se tornar desenvolvedor de Jogos Eletrônicos? *
Sim
Não
Se tivesse um curso gratuito de desenvolvimento de Jogos em Maricá, você tentaria frequentar? *
Sim
Não
Talvez tentasse, mas não tenho certeza
Depois de ter participado desse Torneio, você acha que teria chance de vencer em outras competições com Jogos? *
Sim
Não
Qual dessas possibilidades mais te atraem? *
Se tornar YouTuber
Se tornar e-Atleta
Se tornar desenvolvedor de Jogos
Trabalhar com tecnologia
Nenhuma dessas
Outra (especifique):
O que você curtiu mais no projeto? *
Fazer novos amigos
Ter mais tempo para jogar
Aprender como os Games são feitos
Saber que existem profissões com Games
Saber que Maricá está abrindo espaço para os Gamers
Outro (especifique):
Que profissão você pretende exercer quando terminar os estudos? *
Nome da sua Escola (opcional):
Seu Nome (opcional):


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Avaliação do Torneio Intercolegial de Games - Alunos
Obrigado por participar do maior e mais difícil torneio de games da America latina!
Agora dê uma força pra gente com essa avaliação.

E-mail *
E-mail válido
Este formulário está coletando e-mails. Alterar configurações

Como você ficou sabendo desse projeto? *
Texto de resposta curta

Algum professor te incentivou a participar? *
Sim
Não

Alguma vez você já tinha imaginado participar de uma competição de Games?
Sim
Não

E você achou que sua Escola fosse te incentivar a jogar videogames?
Sim
Não

Você já se sentiu discriminado por gostar de jogos eletrônicos? *
Sim
Não

Você já pensou em se tornar desenvolvedor de Jogos Eletrônicos? *
Sim
Não

Se tivesse um curso gratuito de desenvolvimento de Jogos em Maricá, você tentaria frequentar?

- Sim
- Não
- Talvez tentasse, mas não tenho certeza

Depois de ter participado desse Torneio, você acha que teria chance de vencer em outras competições com Jogos?

- Sim
- Não

Qual dessas possibilidades mais te atraem?

- Se tornar YouTuber
- Se tornar e-Atleta
- Se tornar desenvolvedor de Jogos
- Trabalhar com tecnologia
- Nenhuma dessas
- Outros...

O que você curtiu mais no projeto?

- Fazer novos amigos
- Ter mais tempo para jogar
- Aprender como os Games são feitos
- Saber que existem profissões com Games
- Saber que Maricá está abrindo espaço para os Gamers
- Outros...

Que profissão você pretende exercer quando terminar os estudos?

Texto de resposta curta

Nome da sua Escola (opcional) *

Texto de resposta curta

Seu Nome (opcional)

Texto de resposta curta