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Abstract

Scientists and content creators are working day and night to come up with technologies that bridge the gap between the real world and the virtual world. We have come so close to creating lifelike, photorealistic virtual content, that sometimes it's difficult to separate the computer generated wonder worlds from the real one.

These techniques have found their use everywhere, including movies, entertainment media and most prominently, Video Games. The Gaming industry has reached such great heights in the last 5 years, that it has surpassed movies in terms of profit earned.

So, there is no doubt in the fact that video games are out there and everyone is playing them. But, the question arises here that "how much does it affect our brain?" Many Scientists and Researchers have conducted numerous tests, surveys, experiments and activities to prove their theories about the effects of video games, and there have been variety of conclusions.

But, there have been way lesser studies about the people's mind-sets on effects of video games in India, and that's what we are aiming at. The Indian Mass still sees video games as an entertainment fiesta or just an addictive scam which damages the brain and makes the gamers irresponsible and violent. But to what extent is it true? How much of gaming is good and what kind of effects does it have on a person's mind? These are some questions that we aim to answer.

Introduction

Video Games have been fascinating people since their inception in the year 1958 when the first video game “Pong” was developed. People were intrigued by the fact that they could control something that was not real or tangible and they somehow became a part of a virtual world. The feeling was new and people knew that they will be wanting more. Thus, if we see today, the video game industry is worth more than $100 billion around the world.

India still lacks behind by making up just $350 million of the industry’s worth. But not for long as it is estimated to reach $1 billion by 2021 as mentioned in Forbes.[1]

Our main focus is to address the Indian public about the variety of effects of video games and not follow the assumptions that are prevalent amongst the Indian adults where video games are described as a source of brain damage and violent actions.

We are not just concerned with gaming for children as there are many educational games that prove to be helpful for children between the ages of 4-12. We are also focusing on how the violent action and Role-Playing games affect the human mind, whether it be a child or an adult.

Video Games which include a lot of violence and shooting bullets are hugely considered to be the cause of violent behaviour in adolescents. It is true to some extent but we also cannot deny that violence is just part of human nature as proven by history and the numerous wars it saw, when nothing like video games existed. As mentioned in “Action games expand the brain's cognitive abilities, study suggests”, a study conducted by the University of Geneva, Action games help the human brain to learn and adapt and improve abilities like hand-eye coordination, reaction time, and fast decision making and tracking multiple objects at a given time.

In our module, we have focused on targeting the hand-eye coordination of a player and how a game can affect it within just hours of playtime. Our research includes:

1) A survey of different adolescents (gamers and non-gamers) and their parents (gamers and non-gamers) asking them about their experience with video games.

2) A playable, controllable prototype mini-game to demonstrate how games can improve cognitive abilities and hand-eye coordination.

We have conducted a Survey and created a prototype game (Cognition Enhancer) to demonstrate the potential cognitive enhancements a video game can offer. To be clear, the Cognitive Enhancer is not a full-fledged game as it does not contain any levelling or rewarding system in game. The only goal is to demonstrate how a game can brainstorm your cognitive skills while providing entertainment.

Now let us introduce the technical aspects of the project.

Unreal Engine 4 (Version 4.15)

Unreal Engine is a high-end game engine developed by Epic Games. Unreal Engine 4 is the latest release of the engine. It was introduced in 1998 with its First release named Unreal Engine.

Unreal Engine 4 is a complete suite of development tools made for anyone working with real-time technology. From enterprise applications and cinematic experiences to high-quality games across PC, console, mobile, VR and AR, Unreal Engine 4 gives you everything you need to start, ship, grow and stand out from the crowd. Fig. 2.1.1 shows the basic environment of the engine.

A world-class toolset and accessible workflows empower developers to quickly iterate on ideas and see immediate results without touching a line of code, while full source code access gives everyone in the Unreal Engine 4 community the freedom to modify and extend engine features.[2]

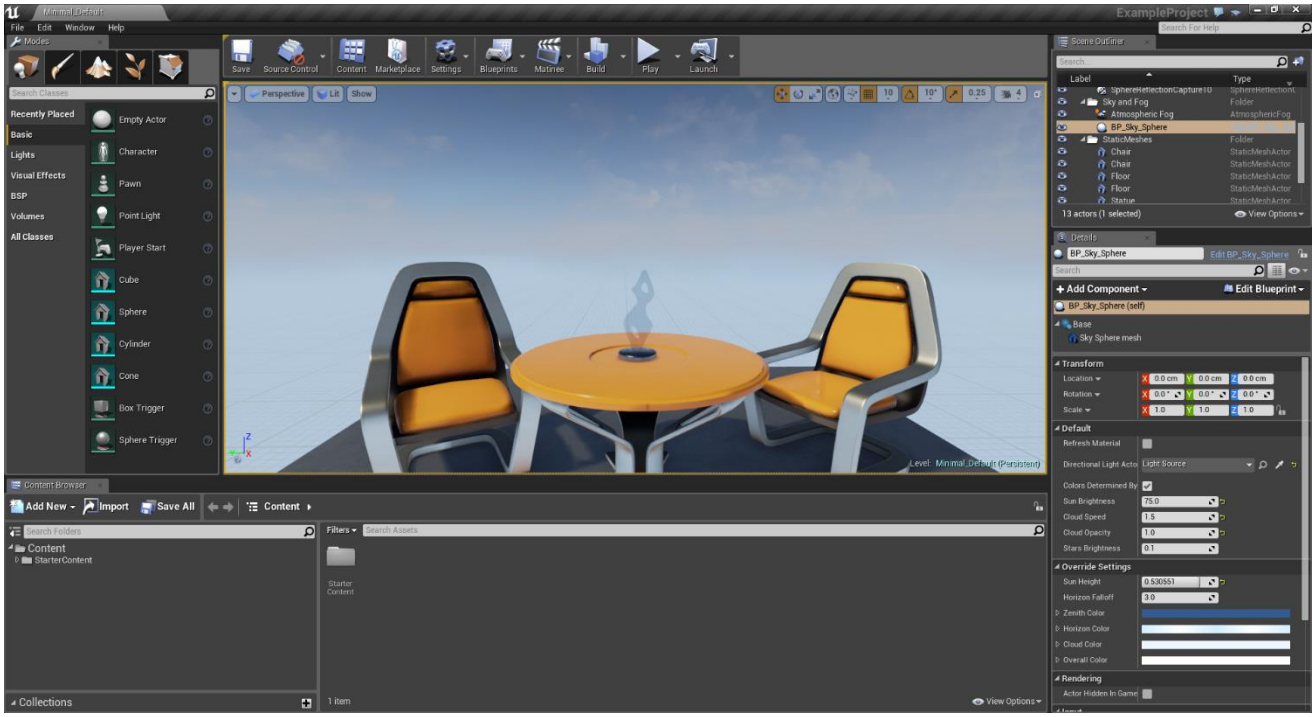

Fig. 2.1.1-The basic interface of the engine with default content it loads with

BLUEPRINTS VISUAL SCRIPTING

The Blueprints Visual Scripting system in Unreal Engine is a complete gameplay scripting system based on the concept of using a node-based interface to create gameplay elements from within Unreal Editor. As with many common scripting languages, it is used to define object-oriented (OO) classes or objects in the engine. As you use UE4, you'll often find that objects defined using Blueprint are colloquially referred to as just "Blueprints."

This system is extremely flexible and powerful as it provides the ability for designers to use virtually the full range of concepts and tools generally only available to programmers. In addition, Blueprint-specific mark-up available in Unreal Engine's C++ implementation enables programmers to create baseline systems that can be extended by designers.

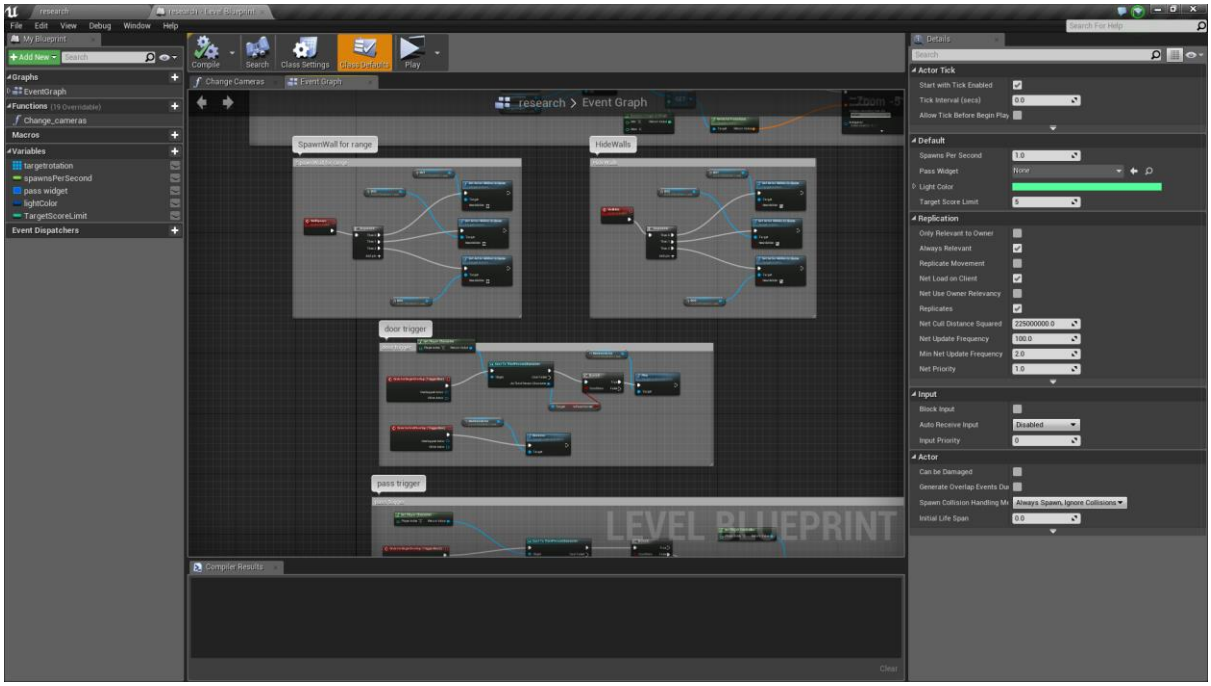

Fig. 2.1.2-The blueprint editor

Unreal Engine 4 was powerful enough to meet each of our needs but MS Visual Studio 2017 was also used for some C++ coding related to the game.

Overall, there are many aspects in effects of gaming which have quite noticeable effects on the human mind and body, like addiction, physical pain due to stiffness, coping with stress and depression, and many more but we are focusing on some cognitive effects that games can have on the human mind like better Hand-eye coordination, faster decision making, and being able to track more objects at a given time.

Literature Review

Computer games are a growing part of our culture; the global market is worth billions of dollars and the impact of games play on young people has attracted significant interest from the popular media. Three quarters of children play regularly – is this harmful or beneficial, are they learning as they play, and if so what? This review considers the findings of research into the relationship between games and players, and the theoretical and actual implications for learning. It also explains how India is growing and earning through video games.

Here, Knowledge from books could not be referred with hard facts as though books mention how games can be helpful, they do not show how particular kind of games that are being played, are affecting the people in real world. Hence, we resorted to online articles.

Below expects are used as a reference for creating this project 'Effectiveness of Gaming in India for Cognitive Development'.

1) How digital gaming in India is growing up into a billion-dollar market

The increase in mobile gaming has run in parallel to the rise in Smartphone adoption in India, which is set to have 530 million Smartphone users this year. Many game developers such as Moon Frog, 99Games, Play Simple and Mech Mocha are capitalizing on the growth in Smartphone usage to build their businesses.

"Rising Smartphone users created a stable marketplace for mobile gaming sector, as users are constantly on the lookout for new forms of entertainment," says Felix Manojh, founder of Flixy Games, a mobile game publisher that has partnered with Japanese game developers Axel mark and Tayutau. [3]

For mobile games in India, except the casino and strategy genre games have very low average revenue per user. But as the market is maturing, the sector has been getting increasing attention from investors, with many start-ups raising funds to create niche games.

Manish Agarwal, CEO of Nazara Technologies (a mobile gaming company of India) want to develop the ecosystem to enable competitive online and offline gaming, create local leagues and boost e-sports as spectator sports in India. His approach is to include localized content creation around global events such as ESL One, ESL Pro League, Intel Extreme Masters and The International, and bring in sponsors. This will give a massive boost to the creation of best e-sports players in India.

2) Now, online gaming is a career for some

Professional gaming has turned into a career in India with players of online video games forming teams that are employed on a regular salary by corporate, as seen from the article in Times of India.[4] They take part in national and international competitions where the earnings in prize money can range from ₹ 5 lakh to ₹ 20 lakh-plus per tournament. The total prize money pool announced for various domestic tournaments in the first four months of this year has already crossed ₹ 3.5scrore.

Recent boom in Mobile Gaming with the introduction of Player Unknown's Battleground, popularly known as Pubg, has gained so much popularity that ESL India is planning on organising a national tournament with up to ₹ 50 lakh prize pool.

3) About the Future in Gaming in India

India ranked fifth globally by game downloads, jumping two places up the rankings compared to the same quarter in the previous year. In India, western studios still publish most of the top grossing games on Android with mainstream favourite Candy Crush Saga, predominantly driven by young Indian women*, and games such as Subway Surfers and Temple Run also generate healthy downloads because of their easy learning curve and high entertainment value. The Indian gaming industry is not new and dates back as early as 1999 when companies such as Nazara and Indiagames were founded. Mid of 2000, more companies such as Games2win, Maujmobile, Ace2three, Rummycircle, and Zapak were founded and all attracted venture money at some stage with Indiagames getting acquired by Walt Disney in a multi-million dollar deal. [5]

4) Action games expand the brain's cognitive abilities, study suggests

A total of 8,970 individuals between the ages of 6 and 40, including action gamers and non-gamers, took a number of psychometric tests in studies conducted by laboratories across the world with the aim of evaluating their cognitive abilities. The assessments included spatial attention (e.g. quickly detecting a dog in a herd of animals) as well as assessing their skills at managing multiple tasks simultaneously and changing their plans according to pre-determined rules. It was found that the cognition of gamers was better by one-half of a standard deviation compared to non-gamers.

The psychologist analysed an intervention study .2,883 people (men and women) who played for a maximum of one hour a week were first tested for their cognitive abilities and then randomly divided into two groups: one played action games (war or shooter games), the other played control games (SIMS, Puzzle, Tetris). Both groups played for at least 8 hours over a week and up to 50 hours over 12 weeks. At the end of the training, participants underwent cognitive testing to measure any changes in their cognitive abilities. The results were beyond dispute: individuals playing action video games increased their cognition more than those playing the control games with the difference in cognitive abilities between these two training groups being of one-third of a standard deviation.[6]

5) Just one hour of gaming may improve attention

Study conducted by scientists from University of Electronic Science and Technology of China – found that participants who spent 1 hour playing video game League of Legends (A Role-playing Game) experienced changes in brain activity.

The participants also demonstrated improved ability to focus on relevant information while screening out distractions. [7]

6) Two Studies Explore How Video Games Can Treat Depression

Two new studies suggest video games could aid the treatment of depression one study, published in the journal Depression and Anxiety [8], found a video game could address cognitive issues associated with depression in older adults. A second study, published in the Journal of Medical Internet Research, found video games can improve symptoms of depression, particularly among people whose depression symptoms are more serious.

Improving Cognition in Older Adults with Depression:-
Researchers in the first study used an app called Project: EVO with 10 adults age 60 and older who experienced depression. The app is meant to improve attention and focus. Though not specifically designed to treat depression, the researchers say improvements in attention might reduce symptoms of depression.

Review Findings

Upon reviewing the above mentioned articles and many more, it was found that all studies conducted on gaming had almost the same result. When comparing the cognitive abilities of gamers and non-gamers, gamers usually came out on top and had better understanding of logic to apply and had faster, and better decision making. Gamers were also able to switch between tasks rapidly without error (known as mental flexibility).

There is still no doubt that India lacks behind in the gaming industry, but articles also show that we are rising up in the gaming world and making our presence known.

There are people who have made their career out of gaming. When someone talks about this, the non-gamer person usually thinks that it is game development that they are talking about. But, here it is actual gaming**,** playing a game as a career.

Gaming has also helped people to overcome depression and cater cognitive development amongst young as well as old adults. It also is the fastest way to impart noticeable changes in one's ability to focus on things better, because as s short as 1 hour of gaming can increase attention.

We now can agree upon one thing, that:

"Gaming is a skill and anything that requires skill, develops our mind towards perfecting that skill. If books impart knowledge, then games give us the ability to efficiently apply that knowledge in real life."

Problem Formulation

Everyone has played video games in their lives in some form. Whether it be a simple mobile game or handheld arcade games. But, very few people know how playing games really affects our mind. There's more to it than just relieving stress or providing entertainment when one is feeling a bit down.

Foreign countries like the US, UK, France, have already accepted gaming as a skill and many multi – million dollar tournaments are hosted across the year in different games. But, that's about making a career in gaming which is a long shot. What about the everyday person who just plays games to pass time or maybe also adds a bit of competition to it?

It has been proved that when little children learn things via visual and interactive stimulation, like games, they learn faster and better. But little do we know that same applies to the adult mind. Our mind adapts and learns the best via visual stimulation. Video games do that in quite a profound manner.

Have you ever noticed how you get better at a game once you play it again and again? Is it just the repetition that makes you better or does your mind learn to make better decisions? You start to predict the game's behaviour and make decisions accordingly. In a way you are outsmarting a functioning AI that has been built in a video game.[9]

When playing action games, at first you struggle at aiming and shooting but then, once you get the hang of it, you don't even have to think before placing your aim at the required target. How does this happen? Maybe your Hand-eye coordination is getting better and you have acquired the judgment of how much to move the mouse to aim where you are looking on the screen, or maybe it is just repetitive practice that helps do this.

This Research paper is focused on answering all these questions and how regular gaming helps the human mind by training your brain to achieve better focus, Visio-motor control (Hand-eye coordination), and better decision making skills, and how this affects the person's day to day routine.[10]

People might also argue that games can also have a tragic effect on a person. Taking in the factor of games like blue whale which recently had forced many players to take their own lives. It targeted the people who were depressed and offered them something rewarding which, in their mind, gave them a purpose. But can this be called a video game? It wasn't something you could play virtually. It was a game that was affecting the physical world.

Mathematical Background

There only mathematics that came into play here was dealing with vectors and 3D Rotations when implementing logics that would challenge a person to use the best of their hand-eye coordination to progress through the game.

Physics used in computer games uses vectors. There a few more things you need to know about vectors. Firstly, instead of writing (x, y, z) every time we talk about a vector, we'll just write **v** for a vector, this is the same as writing (vx, vy, vz). When I write vx, which just means the distance you have to go in the x-direction to get to **v**.

Every object has a position, which is a vector x. It also has a velocity, which is the direction it is travelling in, it is also a vector v, sometimes written as $\dot{x}$. Every object also has something called an acceleration, this is how fast the velocity is changing, and it is also a vector a, sometimes written as $\ddot{x}$. Finally, every object has something called mass, this is basically how heavy the object is, and is usually written m, but this is not a vector. If an object starts at position x, and has a velocity v which doesn't change, then after t seconds, the position of the object is xt =x + v * t. In case you're wondering what xt means, it just means the position at time t. Similarly, vt means the velocity at time t. If an objects starts with velocity v and has an acceleration a, which doesn't change, then after t seconds, the velocity of the object is vt = v + a * t.[11]

The usage of vectors was done in the shooting range created in our game.

The use of 3D rotations over x, y, z axis was performed in the shadow puzzle in the game (Fig. 6.1)

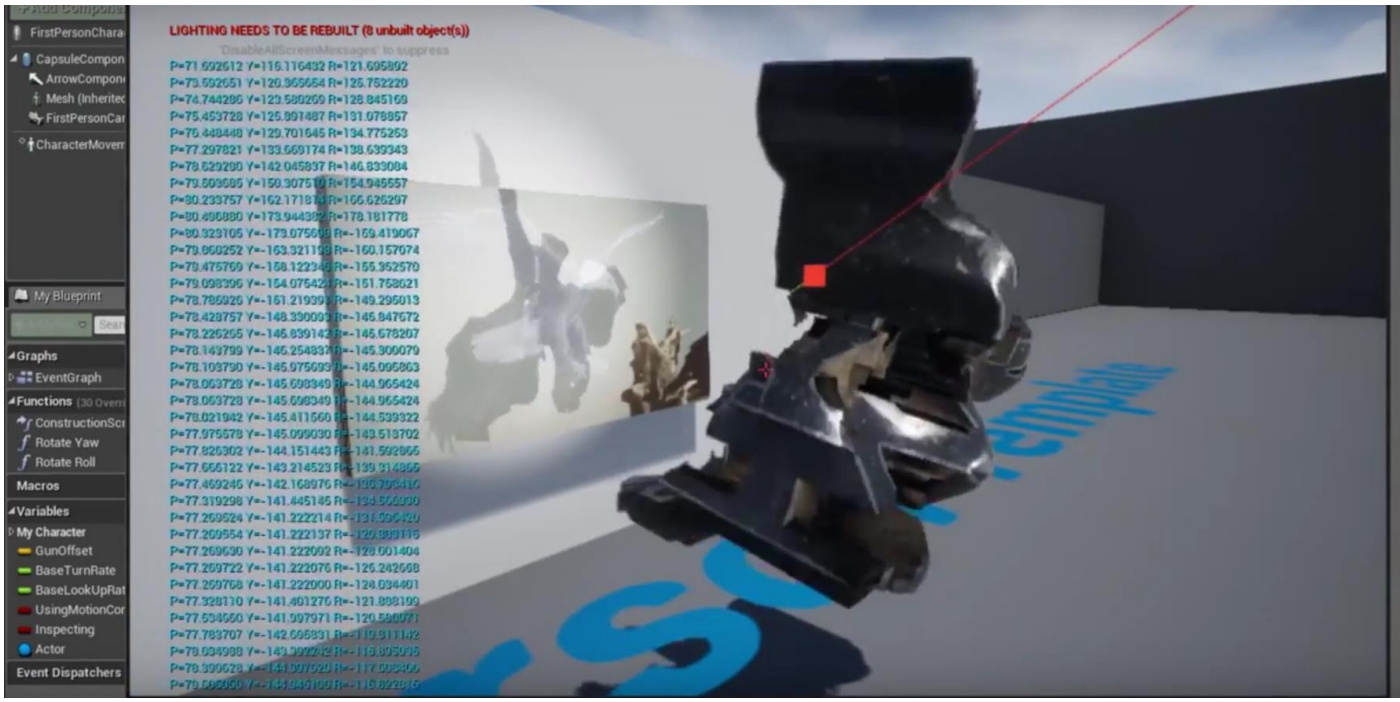

Fig. 6.1 – The shadow puzzle (3D rotations)

Methodology – Research

We wanted to demonstrate how gaming enhances your cognitive abilities. But first, we needed to know the mind-set of people around us on gaming.

- Do they play games or not?
- How many hours do they play per week?
- What changes they saw in themselves?
- How did the parents feel about their child playing video games?
- Were there any parents who also played games regularly?
- What was the age group that mostly indulged in regular gaming?

These Questions needed to be answered and so, we conducted an online survey.

The survey was targeted to adolescents and as well as to parents. We almost got equal amounts of responses from both parties out of the total 130 responses. The questions focused on topics like the types of games they played, how many hours per week they played it and what effects did they see in them when playing it regularly. We also took in account the parents' views on their child playing games.

Questions for parents

Q) Your Gender?
- Female
- Male
- Other

Q) Your age?

Q) Do you play games?
- Yes
- No

Q) Do you think paid games are too expensive?
- Yes
- No

Q) Do you know what kind of games does your child play?
- Yes
- No
- Maybe

Q) Does your child suffer from any kind of Stress or depression?
- Yes
- No
- I don't know

Q) Do you think gaming has positive effects on your child?
- Yes
- No
- Maybe

Q) Do you approve of your child playing games?
- Yes
- No

Q) Did you know that researches have proven that gaming (in a limit) is greatly helpful to children and even adults?
- Yes
- No

Any extra comments about effects of video games.

Questions for gamers

Q) Your Gender?
- Female
- Male
- Other

Q) Your age?

Q) On what platform do you play MOST of your games?
- Computer
- Gaming Consoles
- Mobile Device

Q) What kind of Games do you play? (Choose all that apply)
- Action
- Adventure
- Racing
- Educational
- Simulators (Chess, cards, etc.)
- Sports
- Other

Q) How much time do you spend (per week) to play games?
- 1 to 2 hours
- 3 to 5 hours
- 6 to 10 hours
- 10+ hours

Q) Do you think your grades suffer because of time you spend playing games?
- Yes
- No
- Maybe

Q) Do you play games when you are STRESSED and does it make you feel better?
- Yes I do and it helps
- Yes I do but it doesn't help
- No I Don't

Q) Do you get frustrated when someone disturbs you while you are playing?
- No
- Yes
- Depends on the game

Q) Overall, what kind of effect does gaming have on you?
- Bad
- Good
- Neutral

Q) Would you play games regularly if you knew it would help you overcome stress and/or depression?
- Yes
- No
- Maybe

Questions for non-gamers

Q) Your Gender?
- Female
- Male
- Other

Q) Your Age?

Q) Why don't you play games?
- I don't like it
- I don't get the time
- I think there are better ways to pass time

Q) What kind of effects do you think gaming has on a person?
- Bad
- Good
- I don't know

Q) Would you start playing games if you knew it could help you overcome stress and/or depression?
- Yes
- No
- Maybe

Objective System Design

The survey was just the first part. To demonstrate our idea we thought of making a prototype (a mini-game) to show some cognitive enhancements a game can offer. We implemented different challenging obstacles in the game and set a countdown timer so, the player has to complete all the obstacles within the given time or he/she has to replay it all over again.

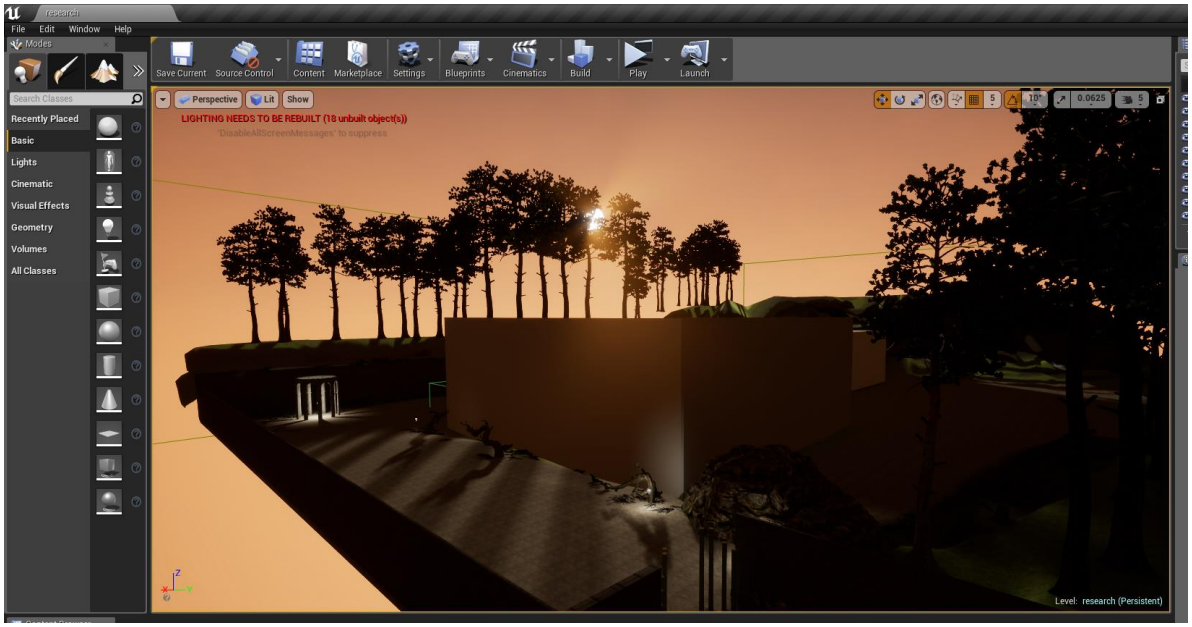

Fig. 7.4.1- Bird's eye view of our game level (part 1)

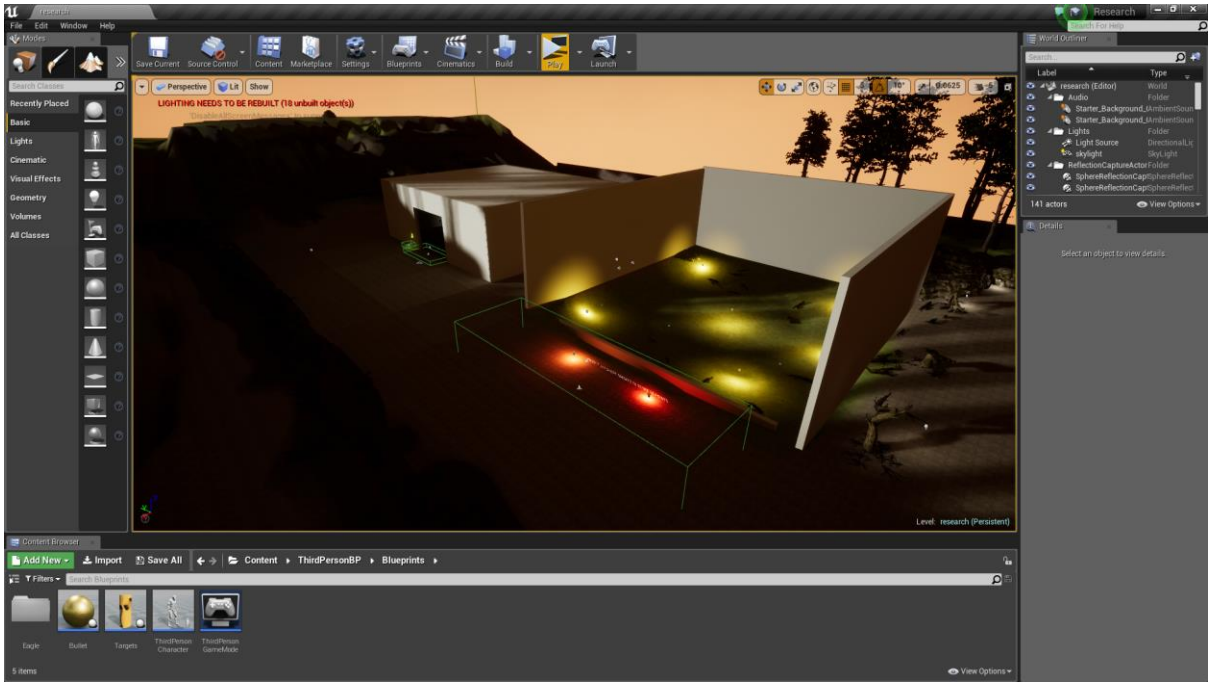

Fig. 7.4.2- Bird's eye view of our game level (part 2)

First obstacle is solving a riddle. Player needs to solve the riddle and its answer will be the password to enter the building which appear later in the game. Until the riddle is not solved the player would not be able to unlock the doors which later appears in the game and would not be able to progress further in the game. We intend to improve the thinking capabilities of the player with this. Fig. 7.4.3 shows the riddle.

Fig. 7.4.3 – First riddle

Second task is shooting range where in the player needs to shoot 15 targets to proceed further. Targets will appear randomly and the player needs to aim and shoot fireballs from the centre of the screen by clicking left mouse button.[12] Adjusting the aim and firing at the right time require focus and hand-eye coordination which would even improve our visual attention. Visual attention is the ability to focus on one aspect of the environment while ignoring other things. Playing action-oriented video games can give visual attention a boost, along with visual reaction time and visual ground discrimination.
Fig. 7.4.3 shows the shooting range.

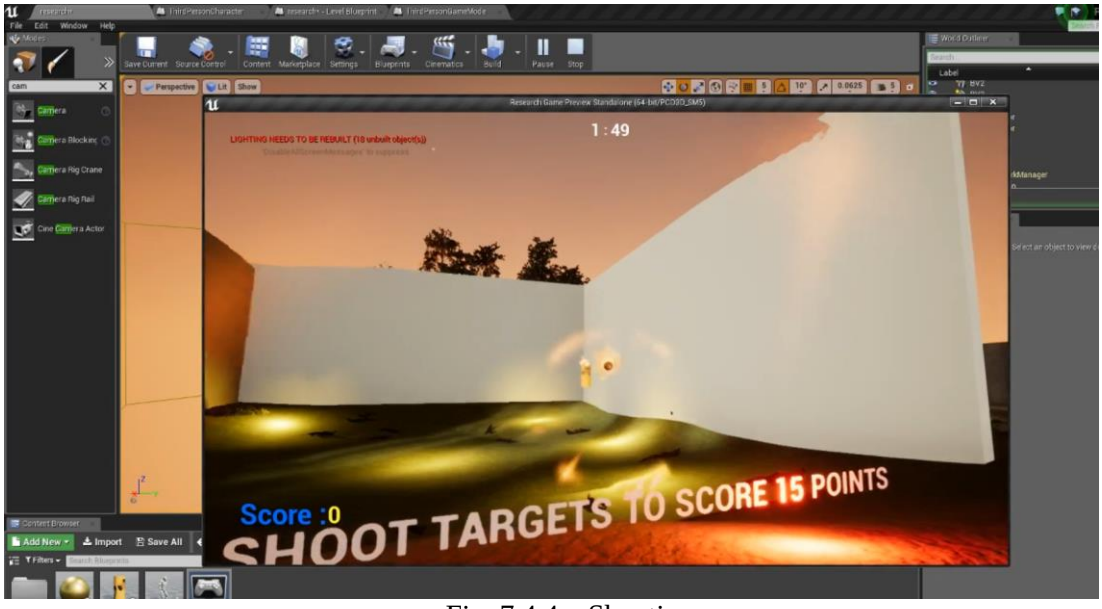

Fig. 7.4.4 – Shooting range

After shooting 15 targets the player than proceed towards the building where to open the gates you require a password which is the answer of the riddle (Fig. 7.4.4).

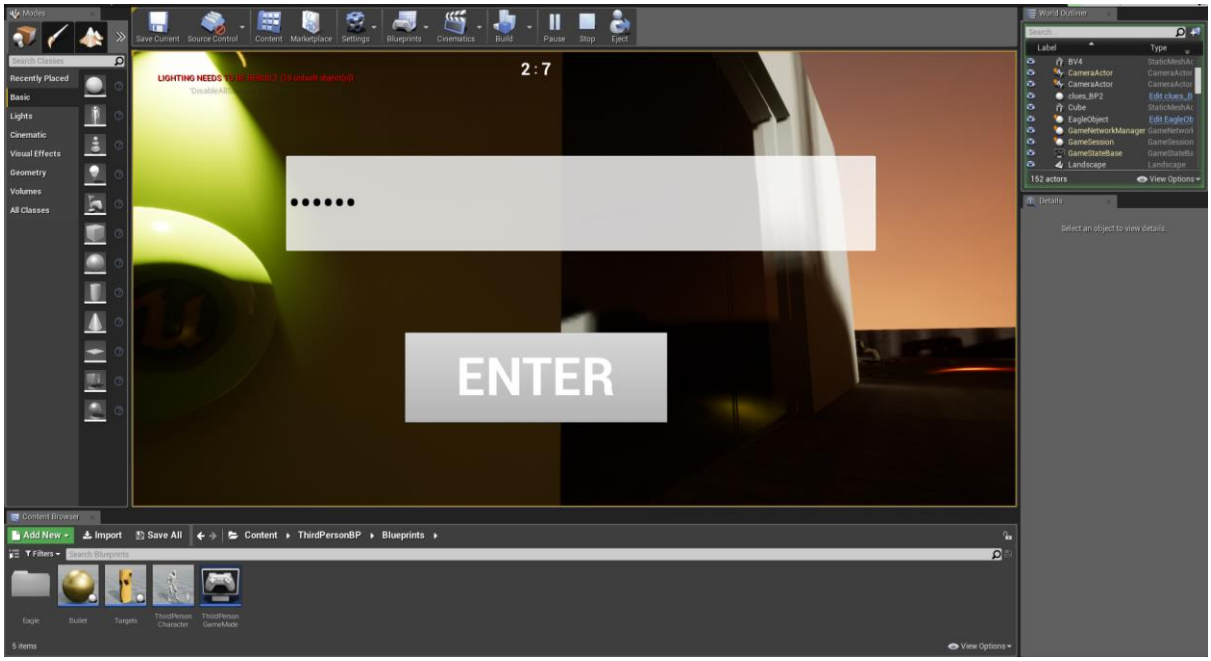

Fig. 7.4.5 Password (Answer of the riddle)

After entering the building the third obstacle appears where in the player needs to adjust the structure with the movement of the mouse so that the shadow reflected in the front would be of an eagle (Fig. 7.4.5).

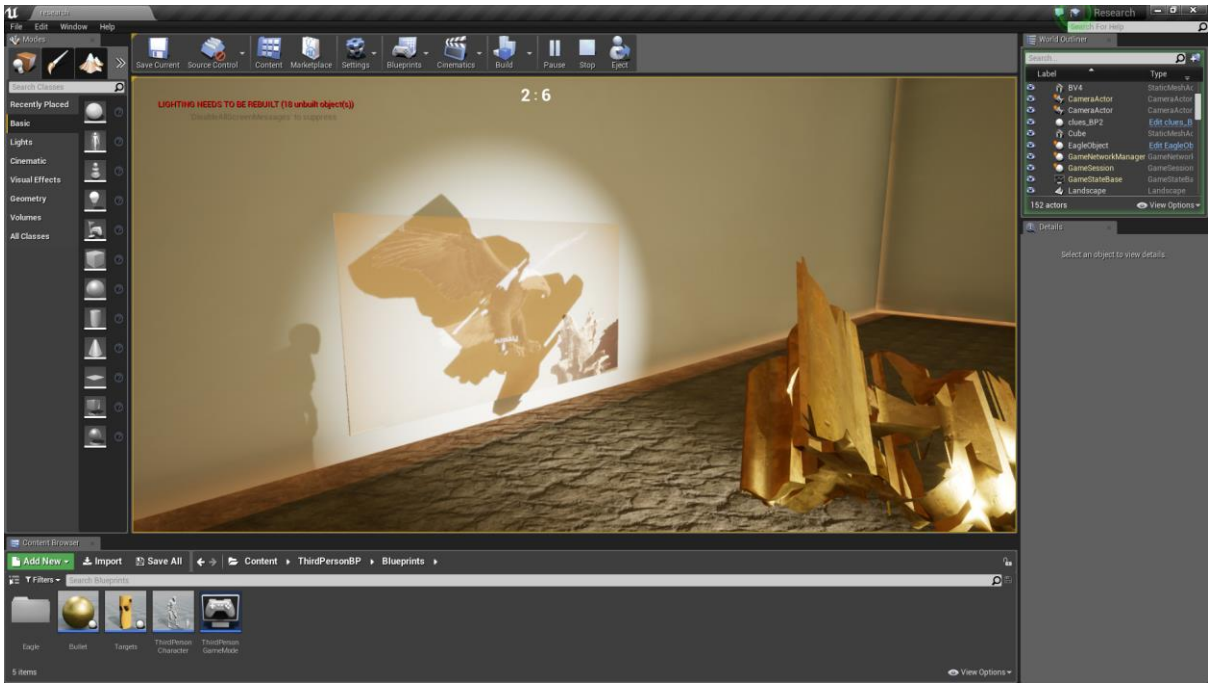

Fig. 7.4.6 – Shadow puzzle

The aim of the two obstacle is to improve visuo-motor control—what we often call hand-eye coordination.

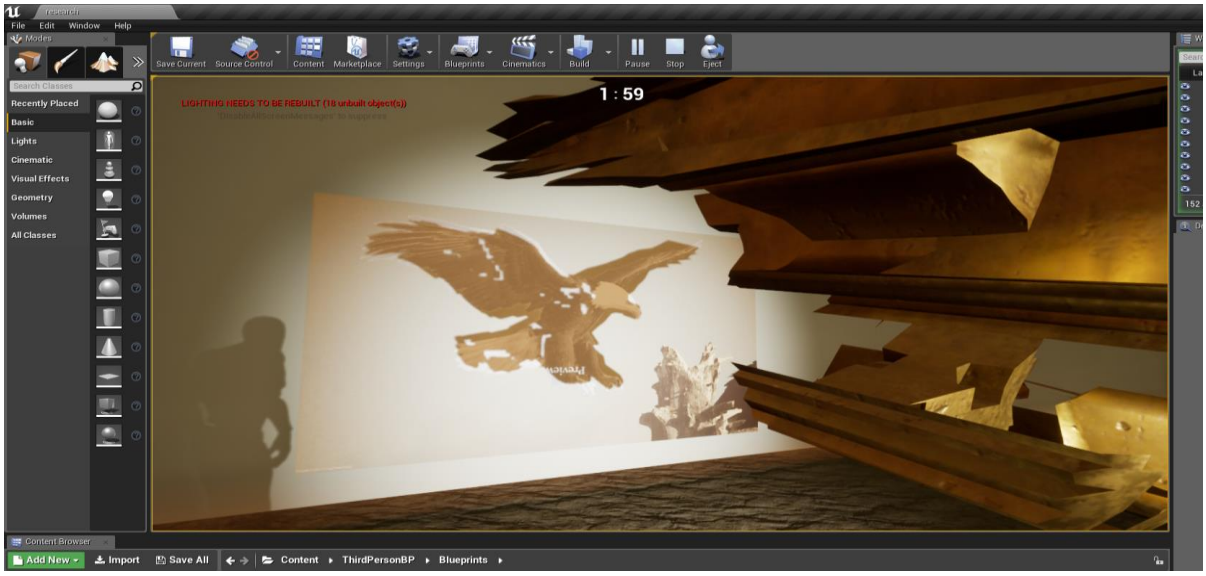

Fig. 7.4.6 – Shadow puzzle (Solved)

The game would show a GAME OVER screen if the player failed to complete these objectives within the time limit on the top of the screen.

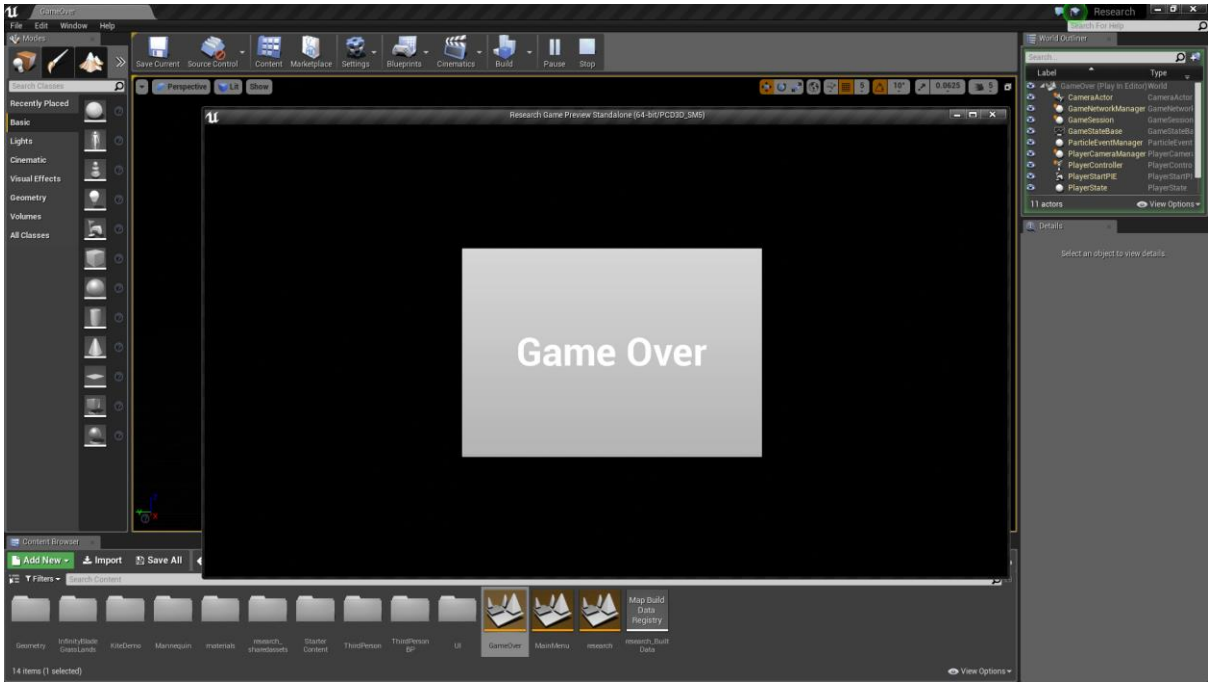

Fig. 7.4.7 – Game over screen

This just being a small scale game could not possibly cover all aspects of the effects of Gaming. But, we focused on showing how the most effect could be achieved in the least amount of time.

Result and Analysis

The Survey brought in a variety of responses. Some people were quite aware of the effects of their gaming habits while some didn't know that gaming could have a good effect on them.

Most responses were from non-parents (64.1%) but the percentage of parents (35.9%) was also pretty satisfactory to cater variety of result.(Fig.. 8.1.1)

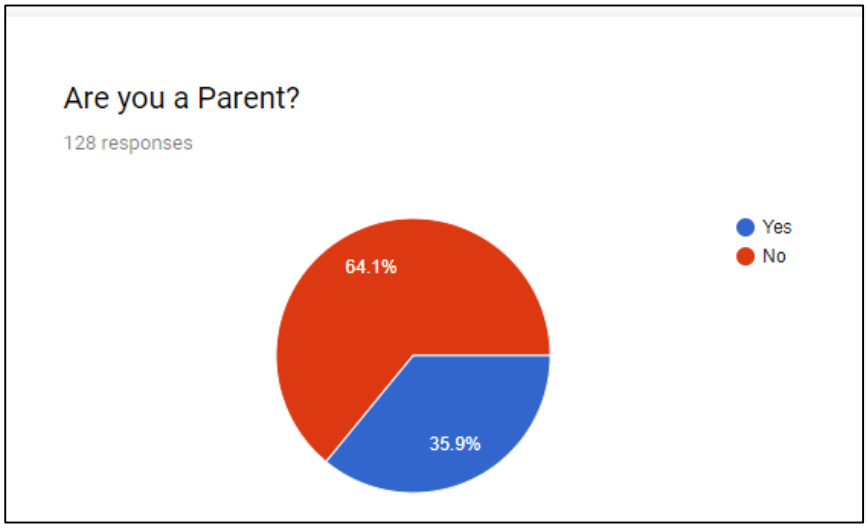

Fig. 8.1.1 Result 1

75.6% of non-parents were gamers and the remaining 24.4% were not (Fig.. 8.1.2)

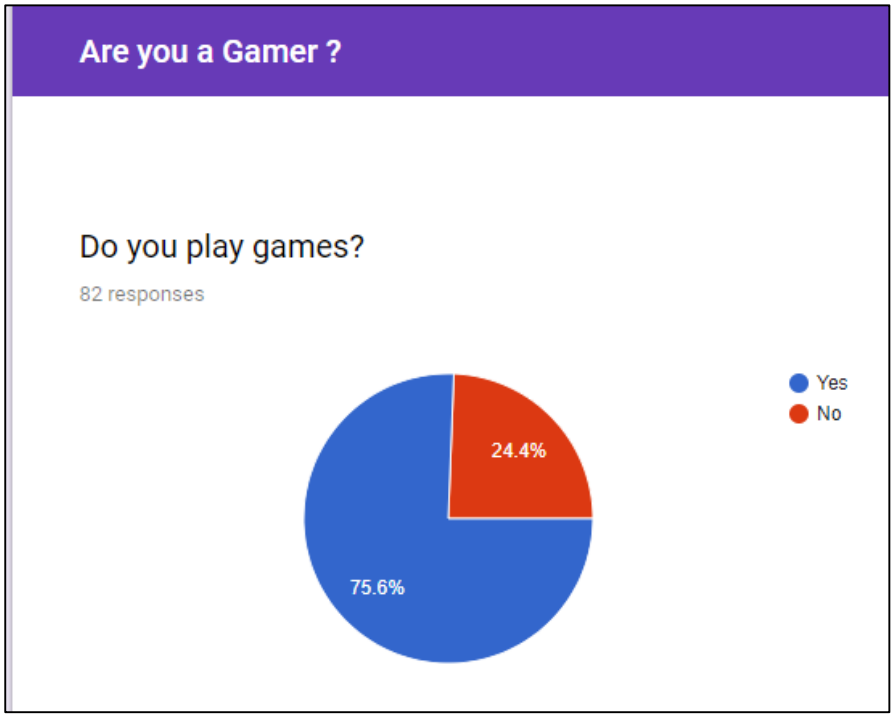

Fig. 8.1.2 Result 2

Most of the non-gamer community consisted of women. (Fig.. 8.1.3)

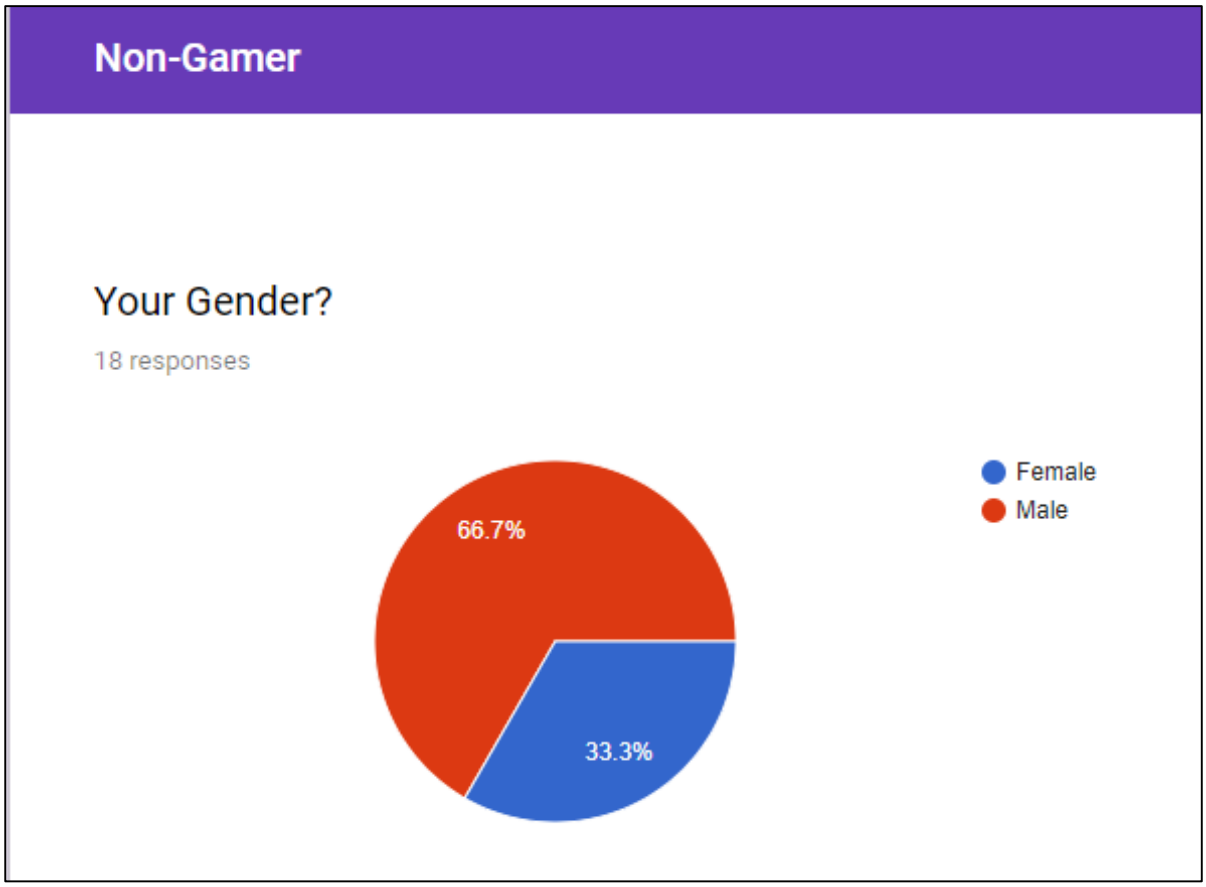

Fig. 8.1.3 Result 3

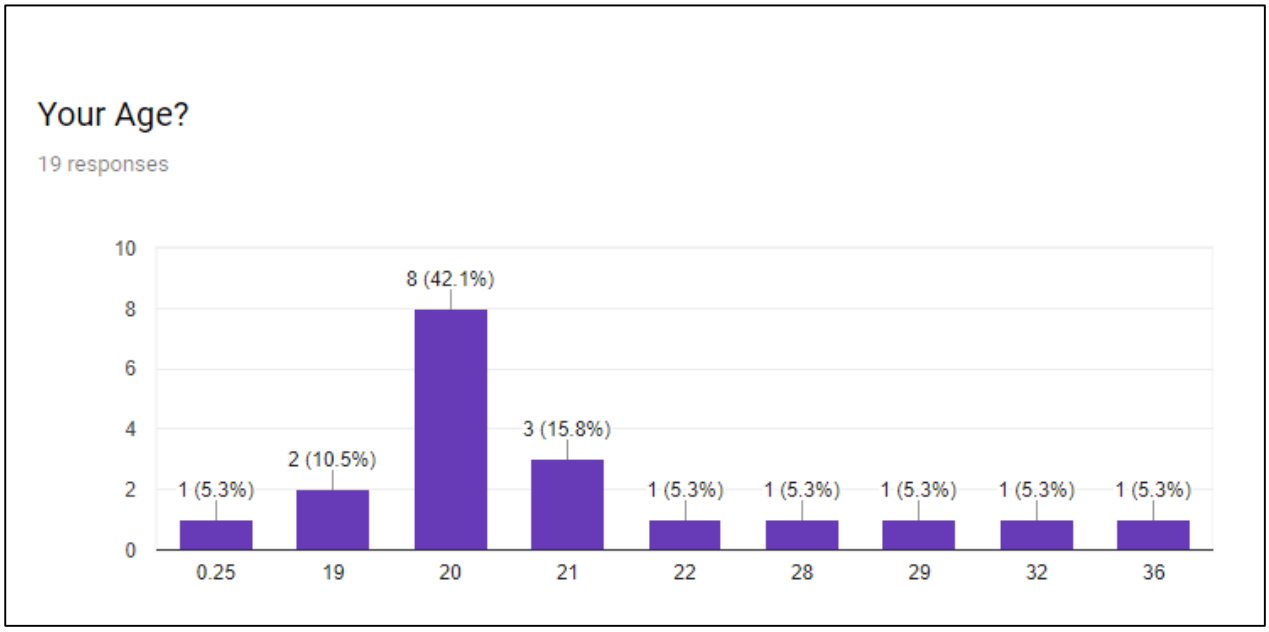

Fig. 8.1.4 Result 4

Most people didn’t think gaming was a good idea as they had better ways to pass their time. (Fig.. 8.1.5)

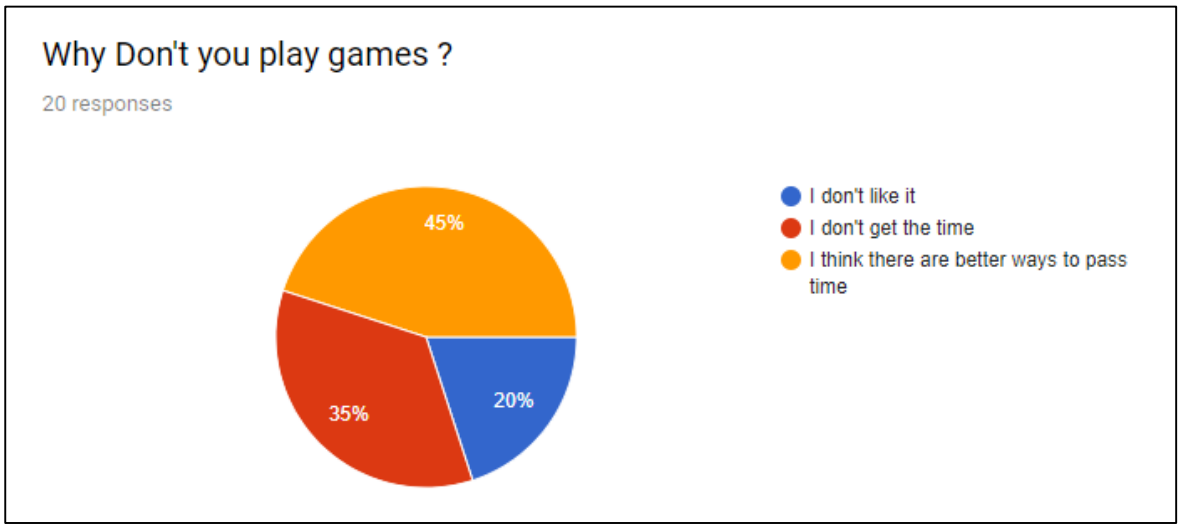

Fig. 8.1.5 Result 5

The majority of the non-gamers didn’t know what kind of effects did gaming have on a person.

(Fig. 8.1.6)

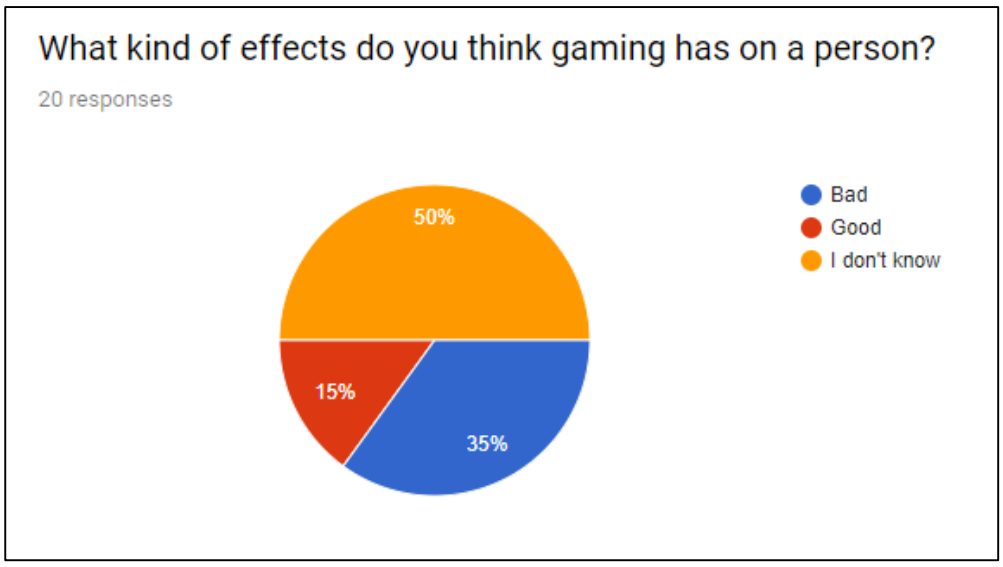

Fig. 8.1.6 Result 6

50% of the non-gamers said they would start playing games if they knew it would help them overcome stress and depression. (Fig. 8.1.7)

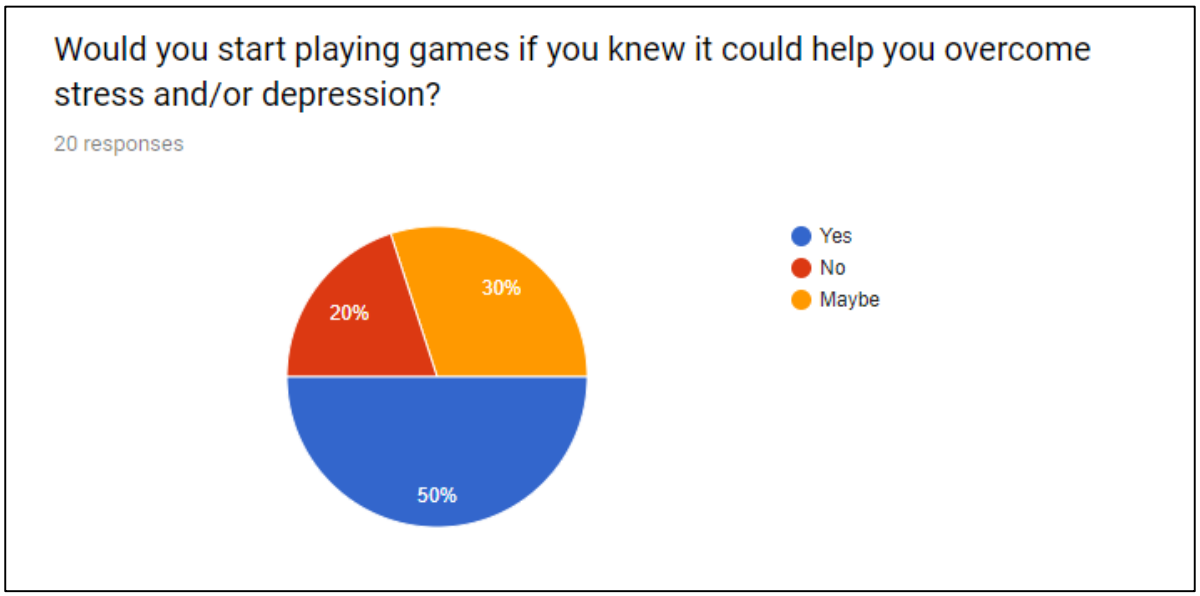

Fig. 8.1.7 Result 7

Responses from the gamers

Most of the gamer community consisted of males (77.4%). (Fig. 8.2.1)

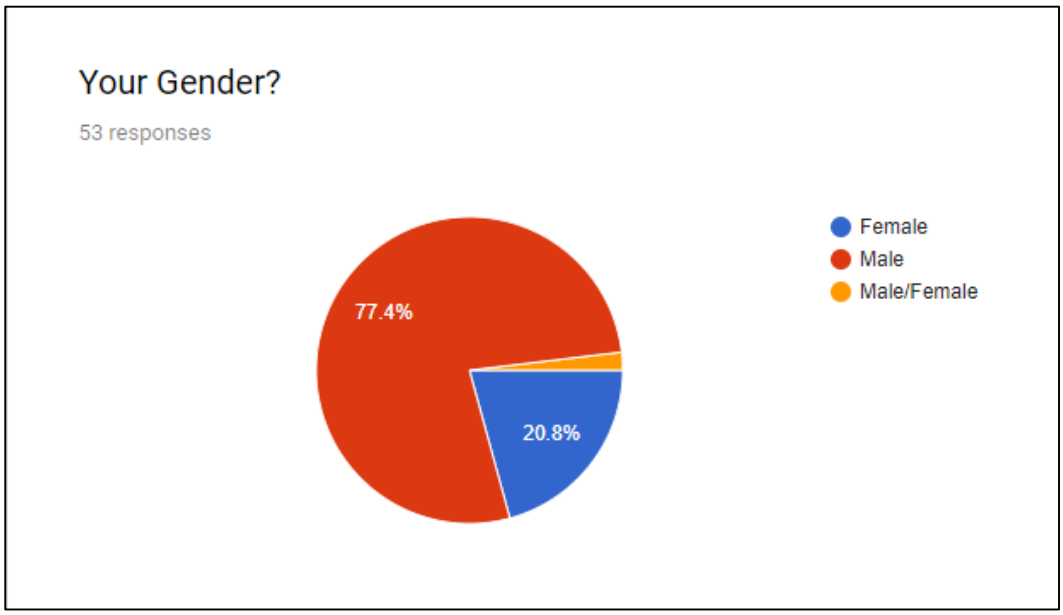

Fig. 8.2.1 Result 8

Most gamers were between the age of 16-22. (Fig. 8.2.2)

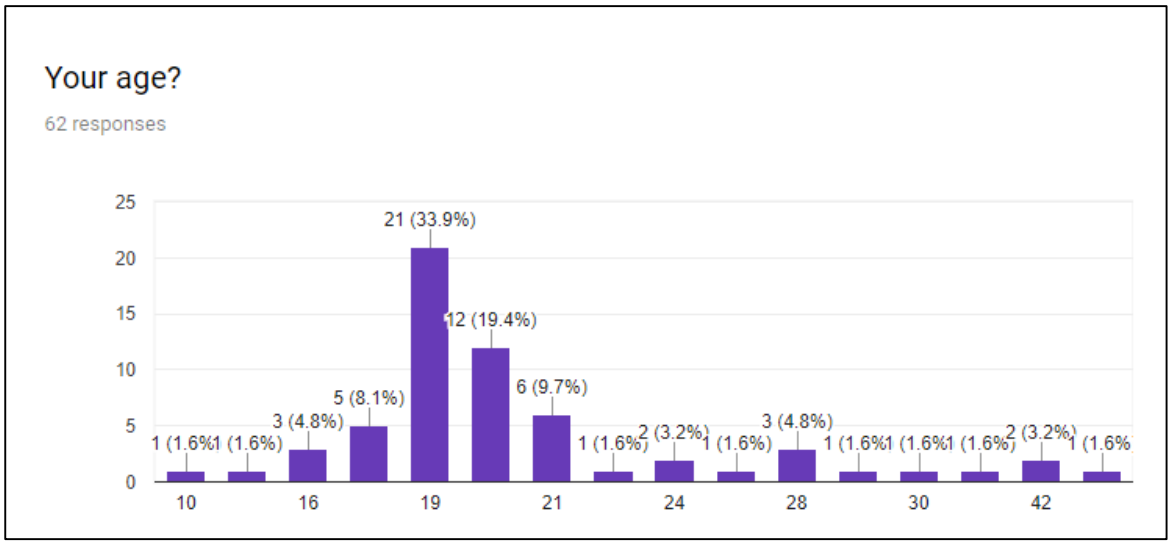

Fig. 8.2.2 Result 9

We also found out that gaming consoles still remained a luxury in India and most gamers played on PC or Mobile devices. (Fig. 8.2.3)

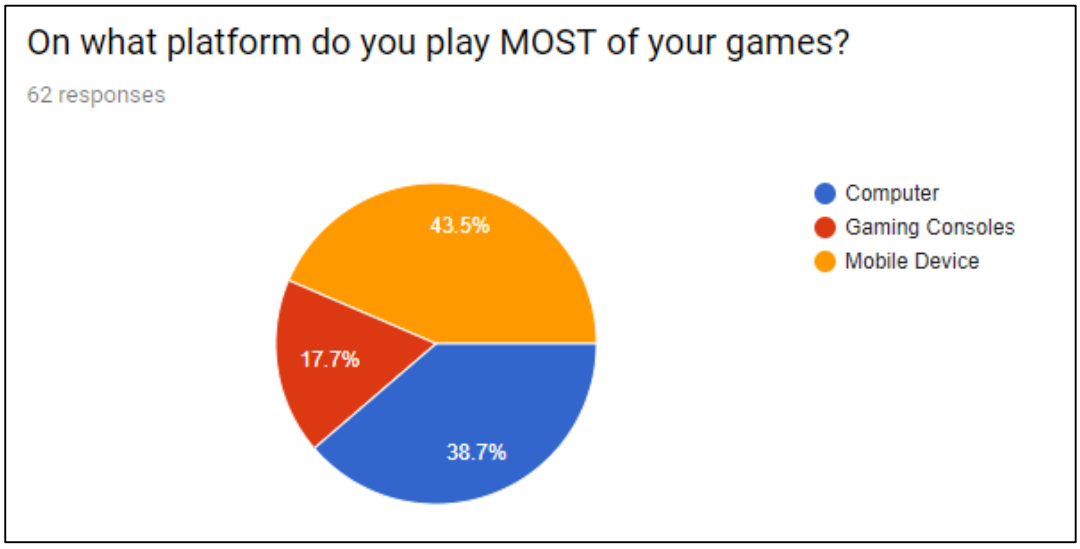

Fig. 8.2.3 Result 10

66.1% of gamers played Action games and equal percentage played adventure and Racing games (46.8%), shown in Fig. 8.2.4.

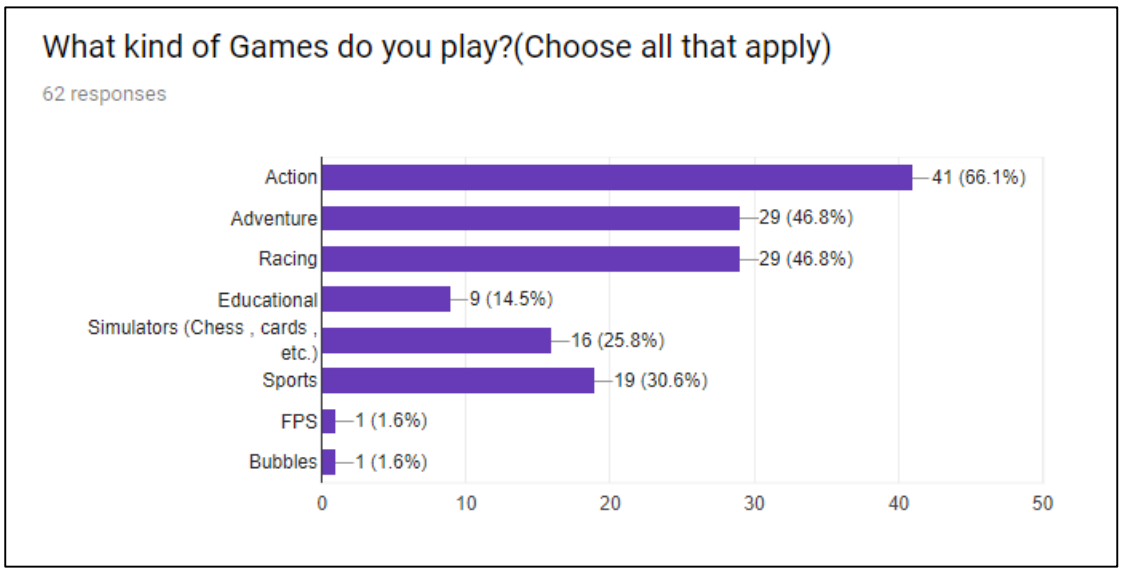

Fig. 8.2.4 Result 11

The amount of time played per week was almost the same from the pool of gamers that took the survey. This showed that there were casual gamers who just played an hour or 2 a week and also almost same amount of people who played 10+ hours a week. (Fig. 8.2.5)

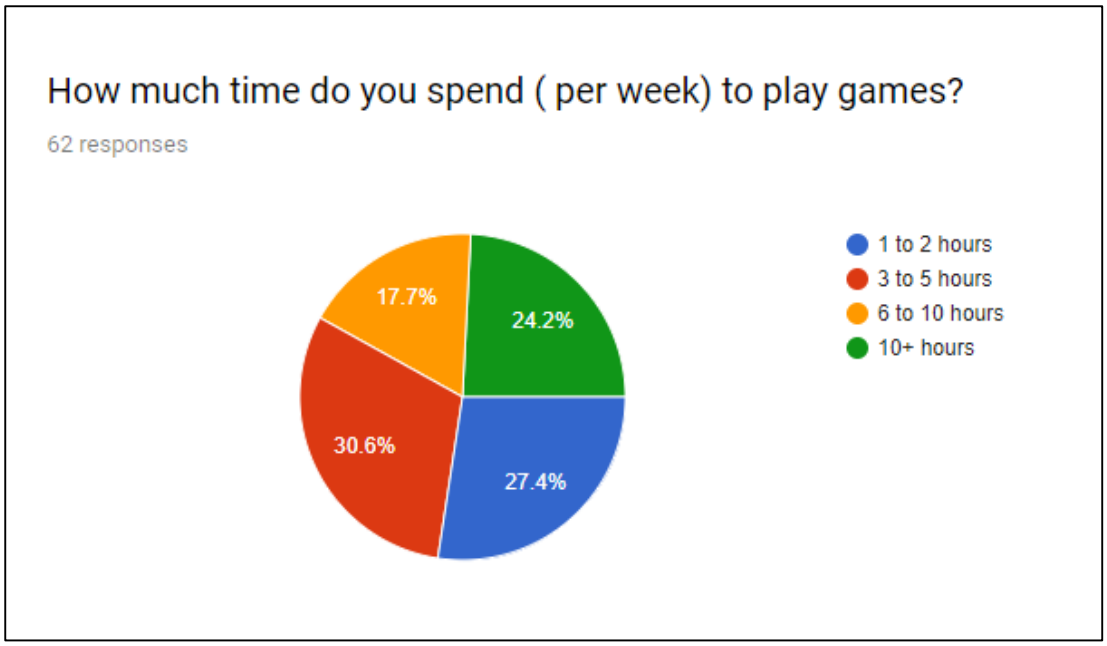

Fig. 8.2.5 Result 12

Most people said their grades didn't suffer because of gaming but some of them were also not sure. 12.9% said that heir grades did suffer because of gaming. (Fig. 8.2.6)

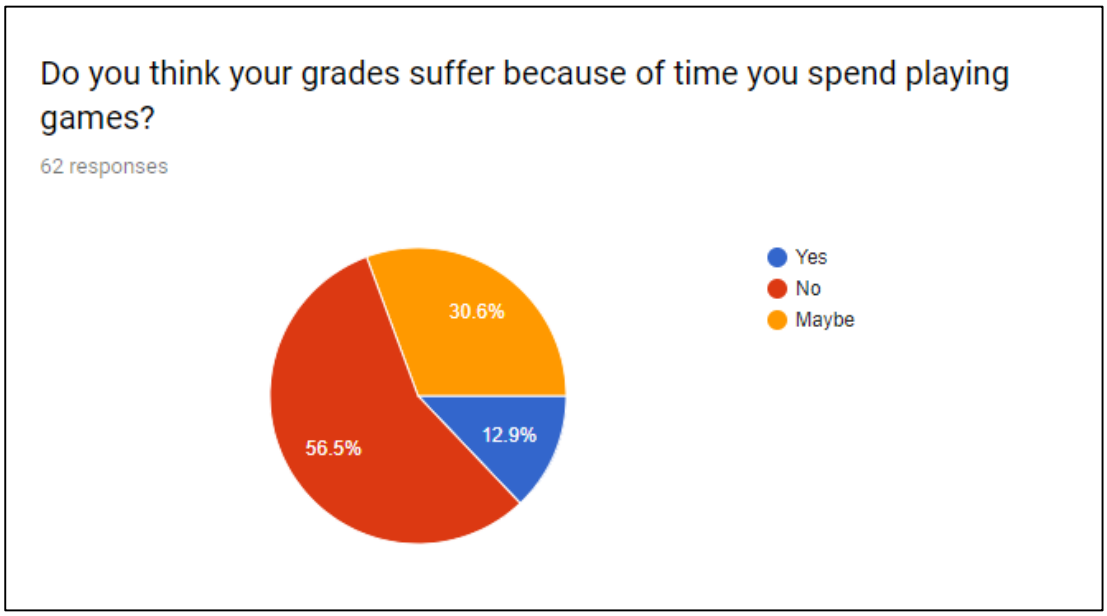

Fig. 8.2.6 Result 13

Almost all the gamers said that Games helped them overcome stress. (Fig. 8.2.7)

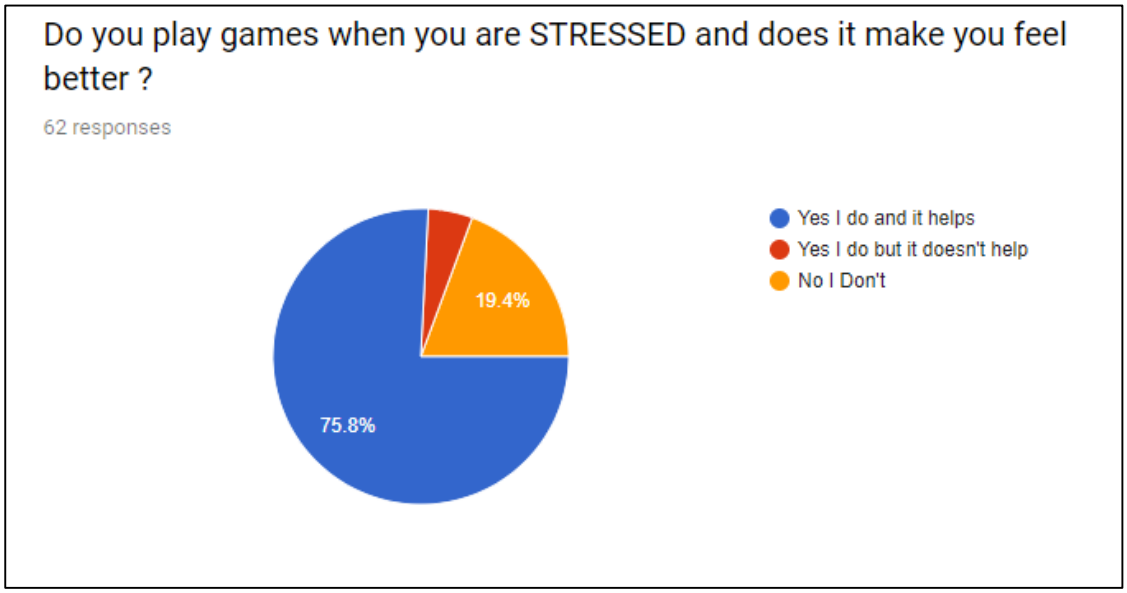

Fig. 8.2.7 Result 14

It was also important to know how gaming changes the behaviour of a gamer. Does he/she get frustrated when someone disturbs them while playing? Most said it depended on the game. (Fig. 8.2.8)

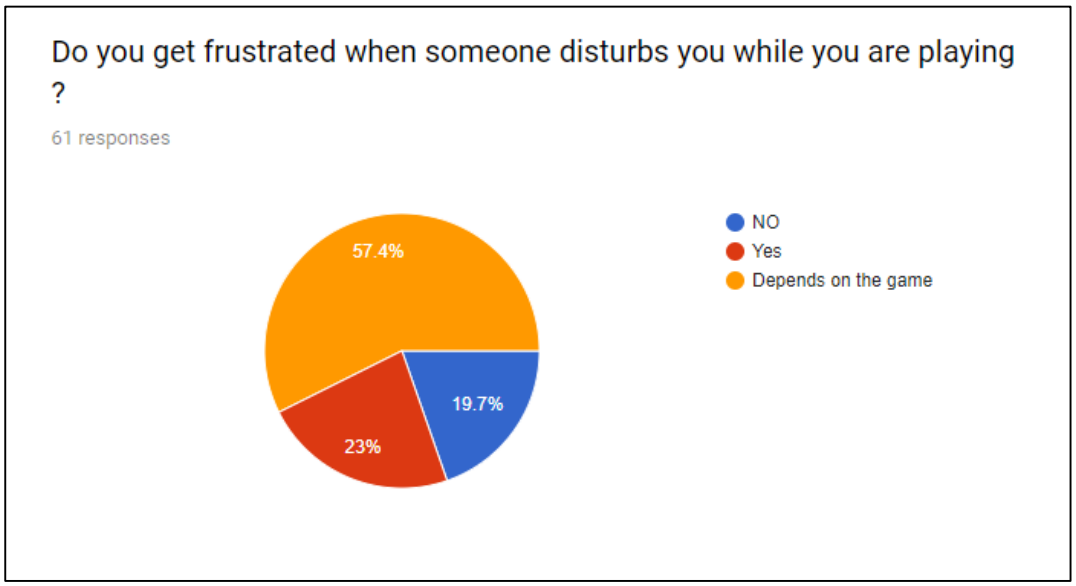

Fig. 8.2.8 Result 15

Almost none of the responses said that gaming had a bad effect on them. (Fig. 8.2.9)

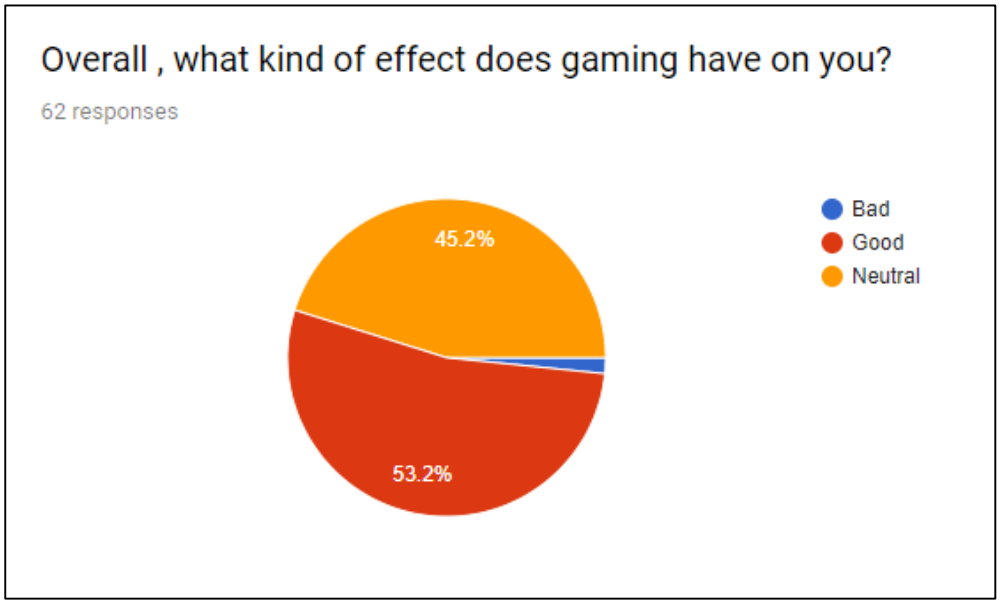

Fig. 8.2.9 Result 16

Most players said that they would keep playing games regularly if they knew it would help them overcome stress. (Fig. 8.2.10)

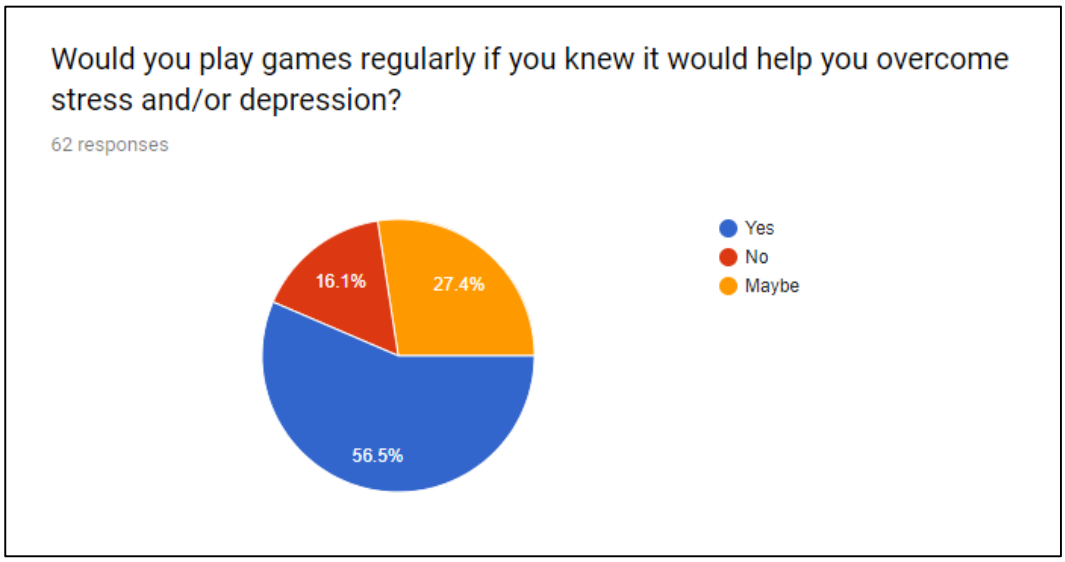

Fig. 8.2.10 Result 17

Here are some unique responses that some of the players had about their experience with gaming. (Fig. 8.2.11)

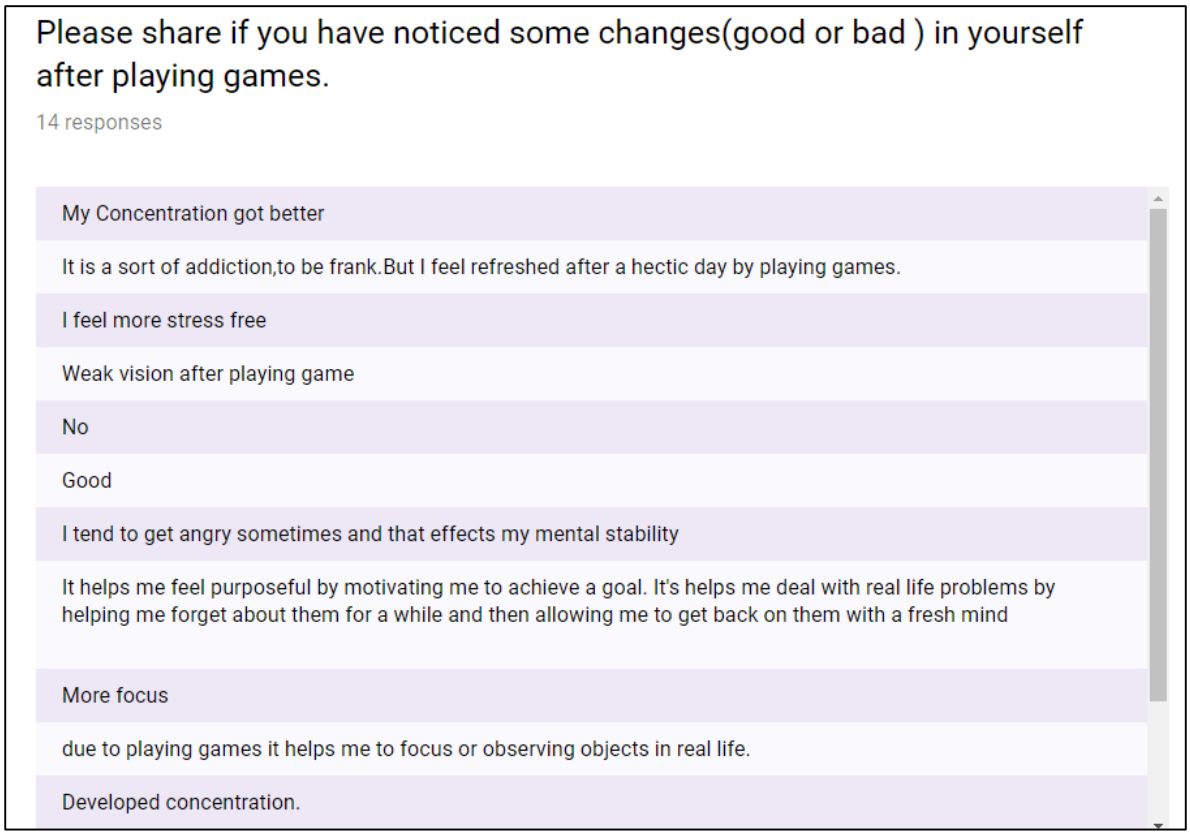

Fig. 8.2.11 Gamer Comments

Responses from Parents

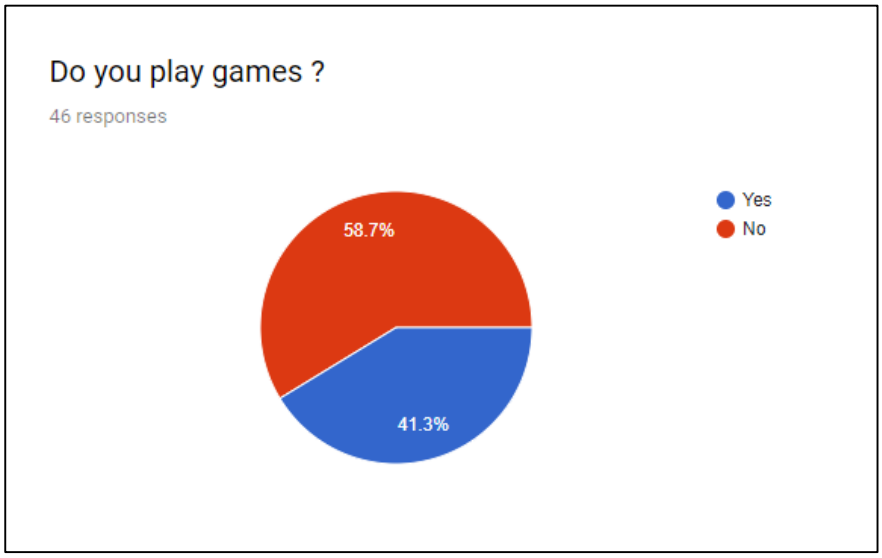

Fig. 8.3.1 Result 1

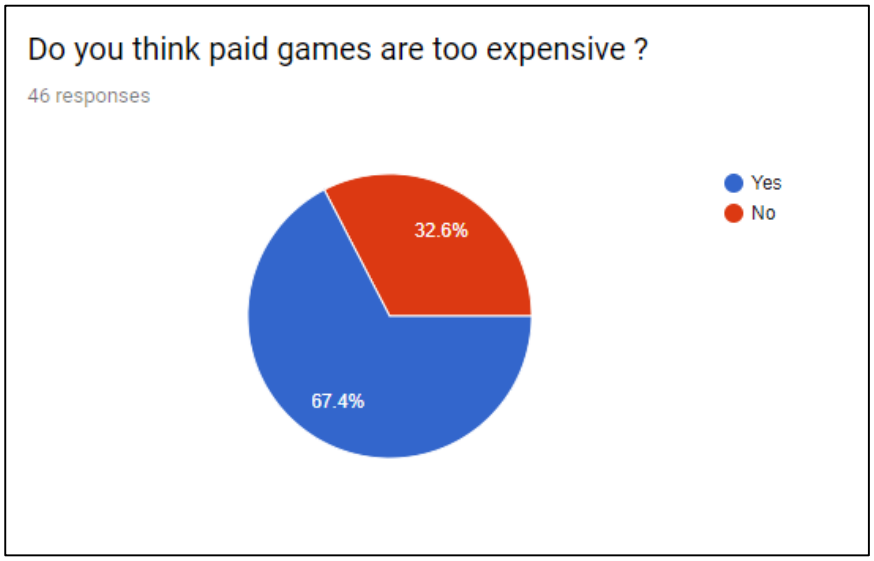

Fig. 8.3.2 Result 2

Almost 90% of the parents knew what kind of games their children played. This shows that parents do keep a check on their children's activities. (Fig. 8.3.3)

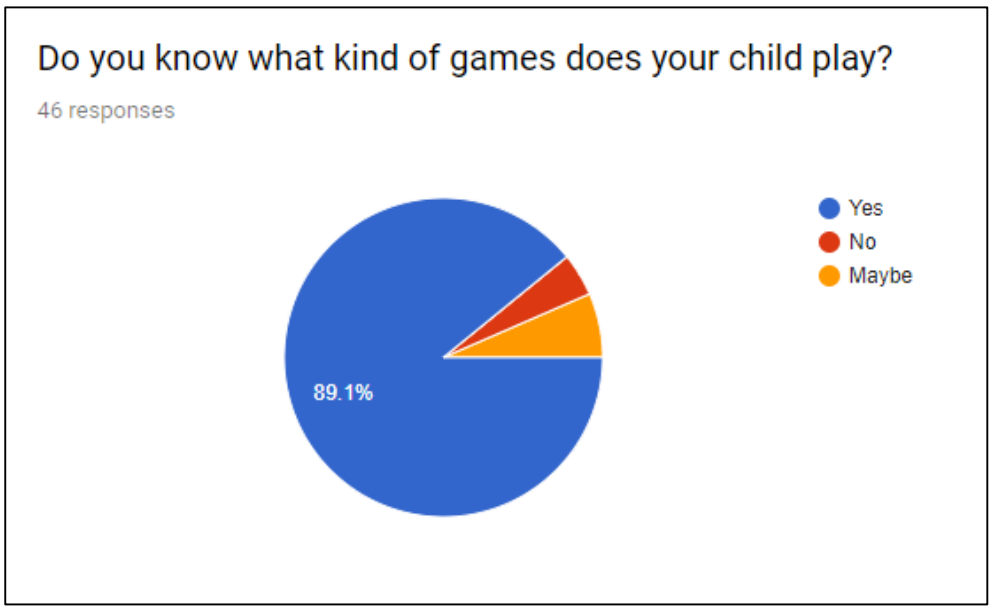

Fig. 8.3.3 Result 3

This answer clearly shows how parents are unaware of the stress their children face in today's world. (Fig. 8.3.4)

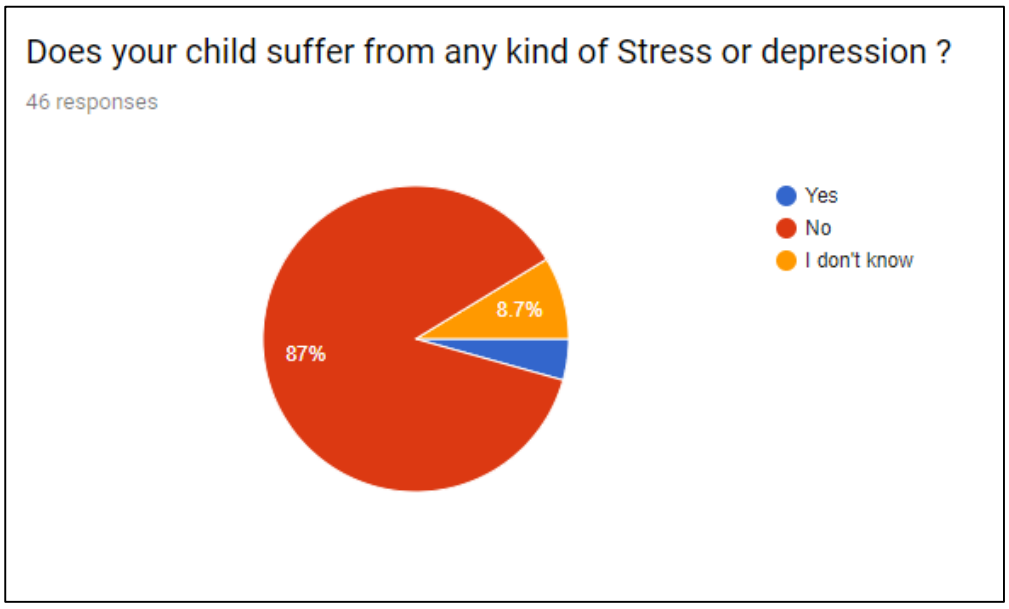

Fig. 8.3.4 Result 4

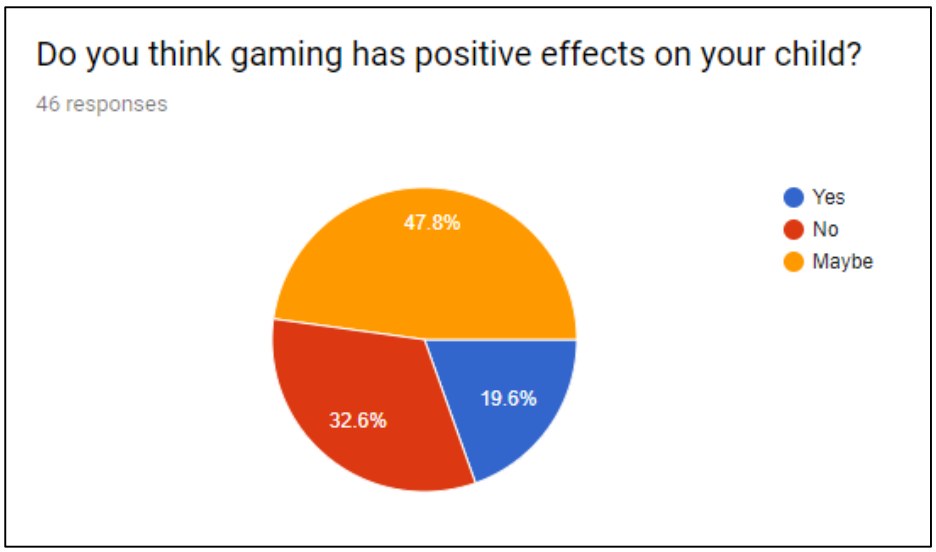

Fig. 8.3.5 Result 5

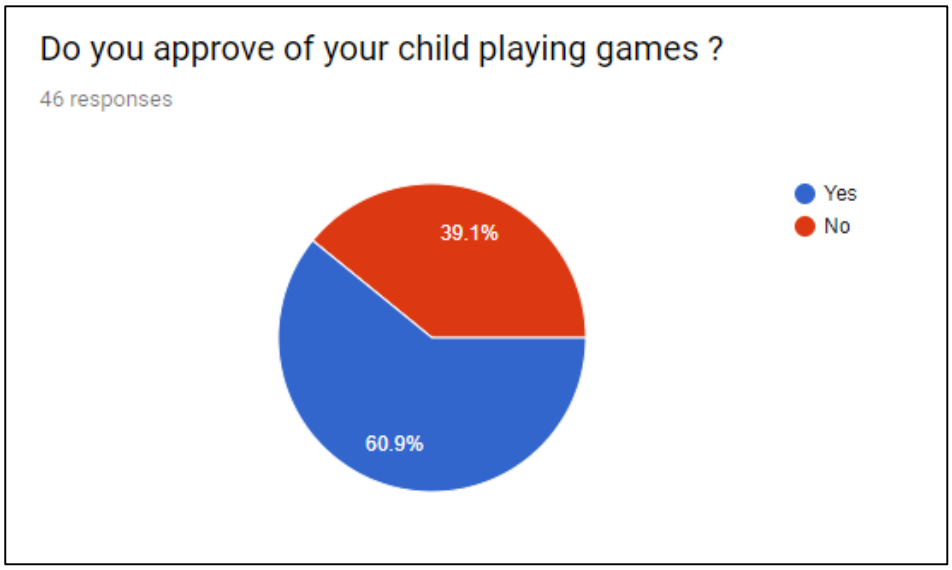

Fig. 8.3.6 Result 6

73.9% of parents knew that gaming has good effects on the player. (Fig. 8.3.7)

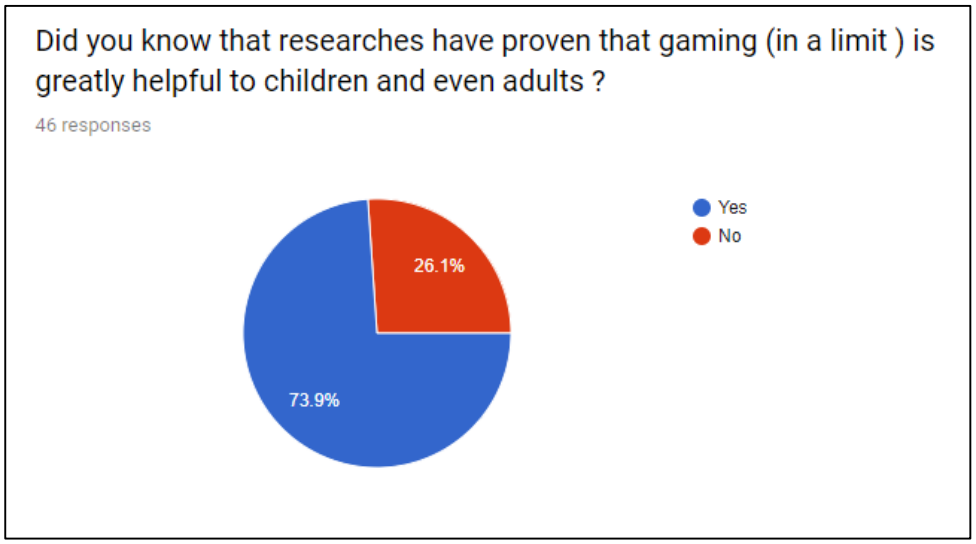

Fig. 8.3.7 Result 7

Here are some comments from the parents. (Fig. 8.3.8)

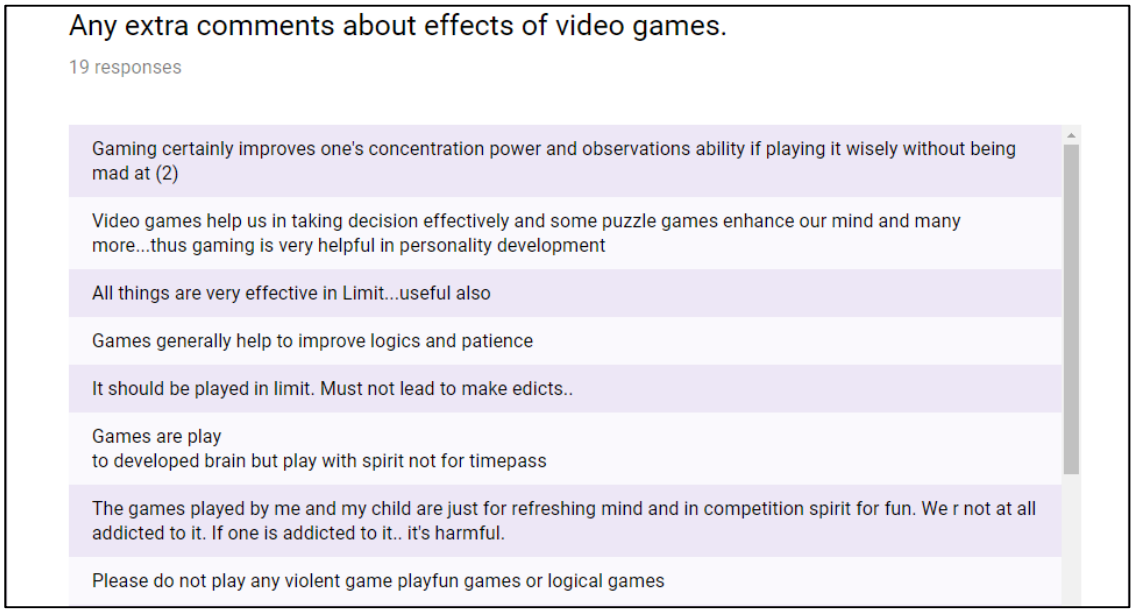

Fig. 8.3.8 Parents' Comments

The overall analysis from this survey was that

- The adult non-gaming community is mostly unaware of the effects of gaming on a person's brain.
- Gamers indulged in variety of games like action, adventure, sports, and no matter what kind of game they played, almost everyone had points to say in favour of gaming and how good it was for them in times of stress.
- Most parents knew what kind of games their children played but, most of them said their child didn't suffer from any depression. They either don't know what kind of pressure their child faces or maybe they don't wish to say about it, either way, everyone nowadays faces some kind of stress daily.
- Parents and gamers alike thought that games were good for them if played in a limit. This is true as we also believe that anything done out of limit is bad for the health.
- The most prominent point was that in India, gaming is still very expensive for people as the good games don't come free of cost and gaming is still a luxury. The people of India are not aware about the real effects of gaming, whether good or bad, because more than half of the population cannot even afford to play games.
- The hand-eye coordination that is improved with the help of gaming, helps a person in his day to day routine like focusing on more objects while driving, better decision making skills and being able to focus on the task at hand.

Conclusion

This Research project was started in the hope of enlightening people about the effects of gaming and especially focusing on how gaming can develop cognitive skills in a person. I have already stated that gaming is a skill and how it helps us apply the skills learnt from it, in real life.

This means that Gaming is neither luck, nor is it a source of making a person mad or damaging his/her brain. It is an activity that can be learned and perfected which in turn can help a person develop their cognitive abilities while having fun.

We concluded that most of the people who play games do know that gaming helps them to overcome stress and sometimes depression but, they aren't aware about the cognitive development that video games offer.

We created our game exactly for this reason. Our game focuses strictly on only one aspect of the cognitive area, i.e. Hand-eye coordination, but it will help expose the people towards similar effects that playing games has on our brain.

Gaming is still a luxury in India and not many people play games. It is necessary to expose the remaining mass of people towards a way of learning and training the human mind, that wouldn't have been possible without such advancement in technology.

Lastly, We would like to conclude by saying that if education should be made free to all, then gaming, which has become such a powerful tool in developing the human mind and making it better to perform daily tasks, should also be made available to all.

Future Scope

The future of gaming will majorly be affected by:-

Virtual Reality (V.R.) is any technology where you eliminate distractions with opacity, which replaces as many of the users senses as possible with a world that you are put into.

As virtual reality booms, it opens new doors in gaming industry. Virtual reality enables us to experience things which is not possible in reality. New innovative technologies will provide the freedom of movement and recreation of 5 senses.

Virtual reality will aid the handicapped. Those who are naturally challenged will be able to have experiences which they lack.

Artificial intelligence (AI) when added to games will generate human like responses to the situations. In the recent scenario video game AI is not true intelligence, it is mostly sorting and matching algorithm which makes us feel like it is thinking.

But with the development of AI and when applied in video games it will help us improve our mental capabilities. We will need to push our limits if we are facing AI in any game.

Games can be used for efficient learning and development purposes.

Implementing virtual reality and artificial intelligence would benefit a lot in many ways, but it comes with certain limitations too like such games require specific technology like VR gamming require VR headsets, so games with such software would also require high-end system to operate them. It might not be possible for many to afford such technologies. Hence the important drawback is that it might not be made available to everyone.

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