Conference Proceeding Issue Published in International Journal of Trend in Research and Development (IJTRD), ISSN: 2394-9333, www.ijtrd.com

FERROCARRIL: The Board Game

Disconnect to Connect

[1]Guneet Singh Panesar, [2]Muskan Soni, [3]Ayush Vishwakarma,[4]Ankit Vishwakarma,
[5]Kashish Sharma and [6]Dr.Swapnil Nema
[1 2 3 4 5]UG Student, [6]Asst. Professor
[1,2,3,4,5,6] Electronics & Communication Engineering, Global Nature Care Sanghthan group of Institutions, Jabalpur, India.

***Abstract*—**In these times when we are successfully migrating towards Digital Platforms, we are going away from the real physical world. Change is definitely important for evolution but at the same time we should not forget what made us reach this change.

Sometimes we really need to cut ourselves and go back from where we began. So we want to bring the same feel and fun back to board games that we had before video games became popular. With this intention, we have shortlisted some of the most famous games in Google Play Store and Apple App Store to bring back the vintage style life to them.

Our first approach to this idea is FERROCARRIL; a game which has diverse places, cities and locations of various countries across the globe and how these cities can be connected in a systematic manner by railroads and waterways. This is not only a game but is a progressive study of different cities in various countries spread across different continents. The game not just reflects how we can connect different cities but how we can strategically think about selecting various routes if one of the routes is not available.

To maintain the theme of various geographical locations, the surroundings in the game are generated on boards that resemble real world locations.

We are creating a search based approach to generating boards and decks of cards for our game Ferrocarril. Our evolutionary algorithm searches for boards that allow for a well shaped game arc and decks that promote an equal distribution of desirability for cities. Our approach creates game content that is specifically designed towards metrics that can affect gameplay in an impactful way.

Keywords*—Physical; Board Game; Progressive; Algorithm; Routes; Geographical Locations; Gameplay*

I. INTRODUCTION

Ferrocarril is a 2 to 5 player board game. In this game player collects resources and spend them to claim different train routes and water routes on a map to gain points. The goal of this game is to acquire more points than the other players. This game is composed of a board, based on a real world locations representing the map composed of cities and train routes (along with possible water routes) connecting them, a deck of train cards, the collectible resource that players need to claim train routes, a deck of destination cards, representing objectives that players complete in secret through the game to obtain additional points and an individual deck of chance cards. On different maps different cities are represented and connected between different train routes. We have added different maps starting with our great motherland India. The map has a glimpse of the diverse culture, the topology and beautiful cities. Along with the board featuring geographical aspects of the particular country, the destination cards have information of the particular cities and facts about them. Other countries include USA, covering attractions over cities like Las Vegas and many others; Brazil, covering tropical waterfalls and magnificent forests of Amazon along with many native cities; Australia, covering Sydney, the home of the Opera House, and amazing islands of the Great Barrier Reef and many more... We have a plan to expand this collection to many more countries so that the audience playing this game can thoroughly benefit from it.

This approach of ours is physical and definitely helps in gaining knowledge of different countries and their related facts without really going digital. And as a point of view from parents, they would love to see their kids doing something other than being involved in electronic gadgets.

Ferrocarril is a transportation themed board game (Figure 1). This game is played on a board depicting a railway map of different countries around the world. Players collect and play train cards to claim train routes across the map. Points are earned based on the length of the claimed routes whoever completes the longest continuous railway and whether the player can connect distant cities that are determined by taking ticket cards. The goal of this game is to acquire more points than the other players.

Our motive of generating board game is that it increases your brain functionality and it teaches you how to set goals and be patient. If your strategy making is strong then definitely you will win. Playing board games is great for reducing stress and makes your mind sharp. In fact, it distracts you from online games. Online games are good but sometimes they're so addictive that one loses his self control and gets stressful, gives rise to health issues, may be subjected to bullying, and may affect his focus and patience. Also it may threaten your privacy and stealing personal information on consoles and PCs could be a common issue. Our game Ferrocarril is designed by this purpose to improve your mental ability and critical thinking. The best advantage of this game is that it connects you from whole world. It not only gives names of cities also our information manual is generated in that way where you get the information about the countries their origin, region and their culture. So that playing is more fun.

The further sections of this report portray and discuss the ideas and implementations of our game:-

SECTION II begins with the Jest of the Gameplay and here we have discussed the main objectives of the game.

In **SECTION III** different components of the game have been discussed including the board, maps, and other inclusive commodities in the game.

SECTION IV deals with the Methodology of the whole concept and idea.

Finally, all the observations and results along with their analysis are cited in **SECTION V**.

All the Conclusions can be found in the **CONCLUSIONS** section of the report.

II. JEST OF THE GAMEPLAY

A. Objective

The main objective of the game is to claim routes and score the most points. These can either be rail routes or water based routes.

B. How to Play?

- The main objective of the game is to claim routes and score the most points. These can either be rail routes or water based routes.
- At the starting of the game, all players are provided with at most three Destination Cards. These cards are designed differently matching the theme and cities of the county map that is being used. These cards consist of the details related to the route and the cities, the points awarded upon completion, involved topology, distance between the destination points and other details. Reaching those targets is the ultimate goal that the player tries to complete secretly.
- The routes can only be conquered when a player reaches his turn. Here, the player can only conquer the route corresponding to the color of Train Card and also the number to train cards required to join the complete route.
- Likewise, the corresponding numbers of points (based on number of trains) are added to the player's tally.
- If the player completes his Destination task, additional points are awarded to him as mentioned on the card. If failed to do so, the mentioned points are deducted from total points.
- A chance card is a Bonus card which might help in gaining some points/turns or losing them.
- This competitive environment helps in building quick thinking skills and unpredictability of this game makes it fun to play.

III. COMPONENTS OF THE GAME

The game contains of various components which are mentioned and cited in this section.

A. The Playing Board

The playing board is the main playing area in the game. It is constructed by using high-density cardboard which is completely recycled. Also the base of the playing board is designed in such a way that it can facilitate multiple maps. That is, maps of different countries and terrains can be used depending upon the user choice. No need to get other playing boards for the same, just change the theme and map. Now, the benefit of this approach is that more maps, more versatility and more fun are added to the game without going for different boxes and setups for different countries. This approach is also quite beneficial in saving cardboard for construction of different maps and ultimately their boxes and components.

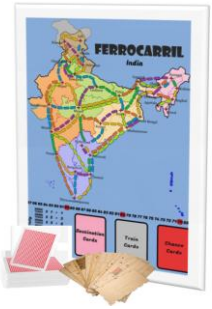


Figure 1

B. The Maps

Maps are the most important feature of the game. The maps are designed in such a way that they are evenly theme matched (Figure 2). The maps of all the countries are created in such a way that they are able to cover all the major cities and reflect the geographical aspects of the particular country. All the cities are connected in a random fashion by rail routes and also water routes wherever possible. These routes are color coded. Also all the various states are distinctly colored so that they are individually highlighted. The best part is that there are multiple maps included so that there can be more possible customization options.

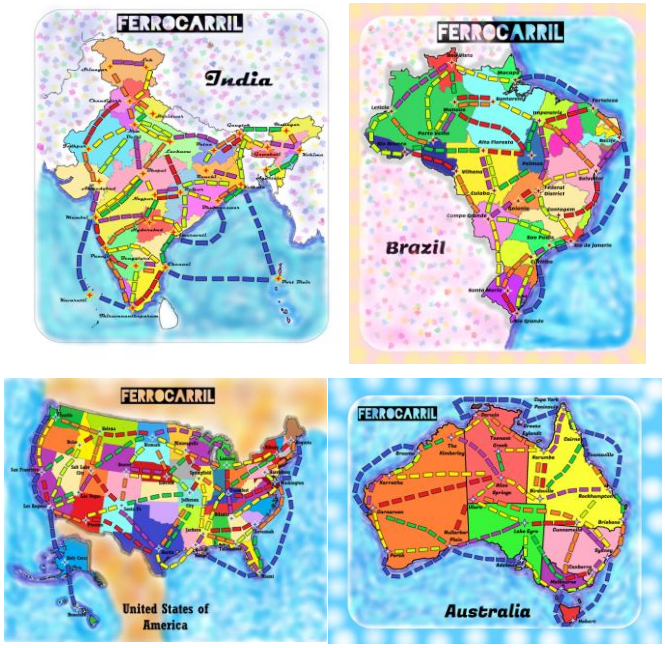


Figure 2

C. The Tokens

These basically consist of Train Pieces and Points Tokens. The train pieces are uniquely colored wooden pieces that a player needs to keep on top of the track routes in order to claim it. These represent the routes a player has claimed. These are color matched with the respective point token of the player. Now, a Point Token is basically represents a player and his points tally on the points board. Just like any other multiplayer arcade board game, the player with most points wins the game.

D. The Cards

The card section consists of three different sets of card decks viz., the Train Cards, Destination Cards and Chance Cards. The **Train cards** are the cards which are used to claim any route. These cards are route colored and each card can help accommodate one route section. Five of these cards are given to each player at the start of each game and also a player can pick one card each at their turn. The glimpse of these cards is in Figure 3.



Figure 3

The **Destination cards** are like task cards. Each player is given at most three of these at the beginning of the game and the main goal of the player is to secretly claim the task routes. The cards' country-wise back sided design sample is represented in Figure 4.



Figure 4

The **Chance cards** are like wild cards which add extra fun to the game (sampled in Figure 5). For every 10 points any player gains, a chance card must be picked up. Now these cards may benefit any player or might put them in trouble. These include getting a few more points or losing them, gaining chances or cards and much more.



Figure 5

E. The Manuals

There are two manuals included in the game. One of them is a pretty standard instruction manual that is usually provided with any other board game. But the second one is interesting. The Second one is a Knowledge Manual. This booklet contains all the information about various maps and cities mentioned in them. Information, details and facts about culture, topology, people, and so many other details is cited in the manual. This knowledge manual also contains quizzes and games to play. This helps increase knowledge and interest about various countries. Details included like topology, climate, elevation, tourist attraction, etc. helps boost knowledge.

IV. METHODOLOGY

The basic concept of our team, as discussed above is to provide the audience a way to escape the world of screens and still have an intuitive and refreshing way to gain knowledge and have fun. And the best possible way to do this is through games. When we began exploring this topic, we came across a really concerning fact but it is true.

What we observed:-

As per an astonishing article published by Jin-Liang Wang, Jia-Rong Sheng, and Hai-Zhen Wang **[1]** the Mobile game addiction is of much more concern than it seems.

The goal of this study was to examine the associations between mobile game addiction and depression, loneliness, social anxiety, and the potential gender difference in these associations were also investigated (Table 1). The results revealed that adolescent with mobile game addiction had higher self-reported depression, social anxiety and loneliness, which have supported our three hypotheses regarding the association between mobile game addiction and depression, social anxiety, and loneliness (Figure 6). Further, gender difference was observed in the path between mobile game addiction and social anxiety, with male adolescents having a stronger association between mobile game addiction and social anxiety (Table 2). This indicates that male adolescents may experience more social anxieties if they use mobile game addictively, compared with female adolescents.

A. Equations and Measurements Used

1) Mobile Game Addiction Scale : This scale was specially developed for the measurement of mobile game addiction and included 11 items **[2]** . Each item was rated on a Likert-type scale from 1 = completely disagree to 5 = completely agree, with the total scores ranging from 11 to 55. A higher score indicated a severer addition tendency. This scale has shown good construct validity, with $\chi^2/df = 2.835$, RMSEA = 0.056, 90% CI (0.044, 0.069), SRMR = 0.037, CLI = 0.970, TLI = 0.959, the Cronbach alpha coefficient in the current study was 0.84.

2) Child Loneliness Scale : The revised version of the Child Loneliness Scale was adopted to evaluate individuals' loneliness **[3]**. The scale contains 16 items, which were answered using a 5-point Likert scale ranging from 1 (always) to 5 (never); higher scores indicate elevated loneliness. Good construct validity was exhibited in the current sample, with $\chi^2/df = 2.833$, RMSEA = 0.056, 9 % CI(0.048, 0.065), SRMR = 0.0461, CFI = 0.940, TLI = 0.918. The Cronbach alpha coefficient in our sample was 0.86.

*3) Child Social Anxiety Scale :*The modified version of the Child Social Anxiety Scale was used to assess participants' social anxiety **[4]**. The term "children" in the original scale was changed to "classmate" in the current version. The scale contains 10 items and each item was rated using a 3-point Likert scale, ranging from 1 = never to 3 = always. Higher scores indicate higher levels of social anxiety. The scale has been proved to have good construct validity in the current study, with χ^2/df = 2.872, RMSEA = 0.057, 90% CI(0.044, 0.071), SRMR = 0.041, CFI = 0.951, TLI = 0.931, and the Cronbach alpha coefficient in our sample was 0.80.

4) Depression Scale : The depression subscale from the Brief Symptom Inventory (BSI) was used to assess the depression symptoms **[5]**. The scale contains 6 items and each item was rated on a 5-point Likert scale, ranging from 1 (not at all) to 5 (extremely serious). Higher scores indicate severe depressive symptoms. We did a measurement model analysis, and the scale showed good construct validity, with χ^2/df = 1.931,RMSEA = 0.040,90% CI(0.000, 0.070),SRMR = 0.020,CFI = 0.994, TLI = 0.989. The Cronbach alpha coefficient in the current study was 0.84.

B. The Approach

After analyzing the data and going through the mathematical modeling, we came to conclusions and observed the tables and figures that are collected in SECTION VI.

As we expected, mobile game addiction was positively associated with depression, anxiety, and loneliness, which have supported all of our three hypotheses and are in line with prior findings. Literature has consistently shown that video game addicts reported more anxiety, depression, lower positive affect and psychological well-being.

The best way to get these mind affecting factors to be terminated, is through physical interaction. The lesser time children will spend on electronic devices and more with the people around them, the better they will feel. They will discuss their thoughts with people they are more concerned about rather than spending that time on mobiles and other gadgets. The themes of the games are directly derived from online platforms and include the board version of the mobile games which are popular among children. So, in this way, they won't even lose their interest in the game even if it's an online game.

V. RESULTS

According to the observations, mobile game addiction is directly linked to depression, loneliness and social anxiety. The following data positively supports this.

A. Tables and Figures

Table 1

Descriptive results and zero-order correlations among the study variables.

	Mean	SD	Add.	Dep.	Lone.	Anx.
Add.	27.35	8.78		0.31*	0.21*	0.25*
Dep.	13.04	5.06	0.31*		0.46*	0.37*
Lone.	34.56	9.58	0.21*	0.46*		0.44*
Anx.	18.51	3.80	0.25*	0.37*	0.44*	

***P < 0.01**

Abbreviations Used:-
Add.: Addiction
Dep.: Depression
Lone.: Loneliness
Anx.: Anxiety

Table 1 shows the descriptive results and zero-order correlations among the study variables. Mobile addiction was positively correlated with depression, loneliness, and social anxiety, with the correlations ranging from 0.18 to 0.46 (p < 0.01)

Table 2
Multi group (male and female) analysis on the relationship among mobile game addiction and depression, social-anxiety and loneliness.

Paths	Estimate Male	*p*	Estimate Female	*p*	z-score
Add. To Dep.	0.118	0.00	0.077	0.00	-1.353***
Add. To Anx.	0.280	0.00	0.170	0.00	-1.411***
Add. To Lone.	0.311	0.00	0.160	0.00	-1.540**

**p<0.05
***p<0.01
Abbreviations Used:-
Add.: Addiction
Dep.: Depression
Lone.: Loneliness
Anx.: Anxiety

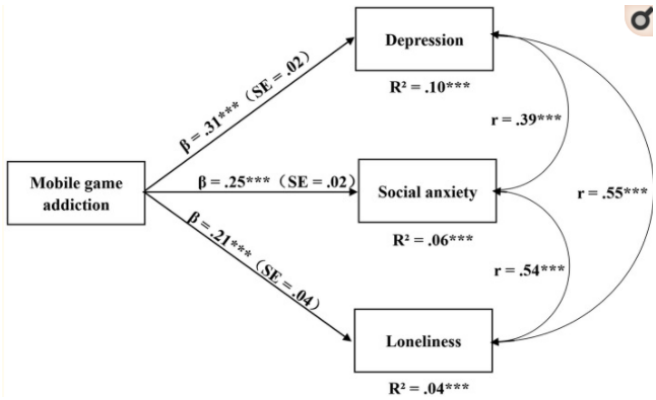


Figure 6

B. Observations

So, as per the above results it is clearly observed a person is more likely to get addicted to these mobile games in case of depression, social anxiety and loneliness. Hence we decided to take the following measures:-

- We have to create something that doesn't involve a screen.
- It should involve more than one person.
- It sound not hinder thinking capabilities, in fact should develop it.
- It should be as fun and enjoyable as mobile games.
- It should not be time-killing but time-utilizing.
- It should be highly customizable.

And we realized we already have Board Games. We just needed to make them much more relatable to the younger generation. So we browsed through the available Popular Mobile Game Titles and decided to convert them into Board Games. We started with Ferrocarril (inspired by Ticket to Ride) **[6]** and have successfully completed the Board Game's idea implementation. The upcoming projects in our list include the makeover of games like AmongUs, Bomb Squad and many others into physical format.

The Benefits of this approach:-

- These games are screen-free approach to the games that require them.
- As there is actual physical talking among the players, it eliminates the aspect of no or less conversations.
- There is no harm due to over exposure to blue-light radiation, especially in younger kids.
- The games are equally knowledgeable and intuitive.

C. Analysis

- Due to this changed approach towards cumulative gaming, we have successfully reduced the screen time while playing games. Also not only digital interaction is suppressed but knowledge and physical interaction ha significantly increased.
- Alternatively, this has lead to the audience interacting with each other by physical means such as speech and gestures. Playing it has also resulted in an overall healthy conversational environment. This includes lesser loneliness (as family members / friends are involved and all of them have to be physically present in order to play it), zero screen time (as there is no involvement of digital appliances) and has definitely resulted as a knowledge booster (details and information about various aspects is well portrayed throughout the game).
- Speaking specifically about Ferrocarril, the game has resulted in enhanced knowledge among players. The game has specifically help improve memorizing skills and knowledge about geographical aspects of various countries. Also, it has helped develop strategic thinking skills in its audience.

D. Real World Implementation

The above board game mentioned by us is registered at a National level online hackathon – TOYCATHON 2021. India despite being a home of many globally popular games like Chess, Snakes and Ladders, Ludo, etc. has lagged behind in Toy Industry. Now, Toycathon 2021 is the great initiative under the 'Aatma Nirbhar Bharat Abhiyan' by our Hon'ble Prime Minister Shri Narendra Modi which is conceived to brainstorm India's innovative minds so that they conceptualize various novel Toy and Games. Currently India's toy market stands at around 1.5 Billion USD, which primarily is dominated by imported toys. Moreover, majority of these toys do not represent Indian heritage, civilization and value systems. However, keeping the size and potential of the Indian market in mind, our government is ambitiously aiming to not only significantly reduce India's toy imports but also position the country as a major toy exporter globally to enable Indian toymakers to benefit from the lucrative, ever growing global toy industry. For this Toycathon is emphasized and encouraged to innovative solutions and designs for toys with a focus on environmental sustainability. And the broader aim of Toycathon is to "explore India's potential to build and sustain a creative ecosystem for the development of toys and games to celebrate Aatma Nirbhar Bharat.

CONCLUSION

We wanted to create a game which could be really fun to play and could help kids (and adults too) to get into the real nostalgia of board games. As a team we've been thinking on this and browsed across several articles which helped us create this board game filled with fun, knowledge and strategy. And the best part about board games: it connects the people playing it.

- Ferrocarril not just helps to develop mental thinking but also helps kids to memorize the location of important Indian cities and capitals.
- This game can help building critical thinking skills at a very young age.
- The best part is that it's offline and interactive. This can be the best way to keep children engaged in educative activities while keeping them off screens.
- One of the best parts of this game is that it will not only help kids to know about our Country in a unique way but due to changeable maps, the knowledge of whole world can be covered.
- Lastly, this would be a Make in India initiative, which will definitely boost our toy industry. Not only this game, but our Aim is to convert all the Popular Digital games into Board Game format.

Does our Game reflect Indian culture and heritage?

Definitely Yes. We have tried to keep the game as close to our Motherland. The whole map indeed, is well detailed and the Destination cards of the game contain numerous details about the Destination cities.

Kids will be able to visualize our Country's geography and topology easily. And not only our country but definitely all the important countries around the globe. It will definitely ignite in them a Spark to know more about Indian railways.

It will also increase the curiosity among people to know about various countries, their people and cultures, popular cities and tourist places, etc.

References

[1] Jin-Liang Wang, Jia-Rong Sheng, Hai-Zhen Wang. The Association Between Mobile Game Addiction and Depression, Social Anxiety, and Loneliness. Front Public Health. 2019; 7: 247. PMC6743417. 10.3389/fpubh.2019.00247

[2] Sheng J-R, Wang J-L. Development and psychometric properties of the problematic mobile video gaming scale. Curr Psyol. (2019) 20191–11. 10.1007/s12144-019-00415-6

[3] Derogatis LR, Melisaratos N. The brief symptom inventory: an introductory report. Psychol Med. (1983) 13:595–605. 10.1017/S0033291700048017

[4] Li X, Zou H, Liu Y. Psychometric evaluation of loneliness scale in Chinese middle school students. Chin J Clin Psychol. (2014) 22:731–60. 10.16128/j.cnki.1005-3611.2014.04.037

[5] La Greca AM, Lopez N. Social anxiety among adolescents: linkages with peer relations and friendships. J Abnormal Child Psychol. (1998) 26:83–94. 10.1023/A:1022684520514

[6] Alan R. Moon, Ticket to Ride, Days of Wonder Inc., 2002-2021, https://www.daysofwonder.com/tickettoride/en/