Habit and perception towards games and game-based learning in India: A survey study of awareness and experience with digital games

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ABSTRACT
In this study, 701 Indian persons responded to a survey asking them about their game-playing habits and perceptions towards learning through games. The survey instrument was used to gauge the participant demographics, awareness towards types of games, experience with various genres of games, playing habits, and perception towards the use of games for learning in schools. The paper also grouped participants through their age groups and gender and tried to extract preferential patterns. Findings show that a majority of respondents were positive about the integration of games for the purpose of learning within the classroom. When presented with a hypothetical opportunity, STEM subjects overwhelmingly opted for learning through games, followed closely by history, geography, business studies, and programming. An analysis of keywords indicates that the participants connotate games with words like 'challenge', 'competition, 'fun', and 'learning', indicating a primarily positive association. The findings also highlight disparities and similarities in preferential patterns when the responses were grouped according to their age and gender. The findings of the study provide support to the use of game-based applications in Indian education. It can motivate policymakers of pedagogy to experiment with the use of game-based learning applications in the classroom to utilise and optimise teaching-learning methodologies. Future research would include such studies that analyze the effectiveness of various game-based applications in the Indian classroom. It would potentially be comprised of experiment setups where the participants can experience educational games and then self-report on perceived learning and compare the experience with the traditional classroom teaching-learning methodologies.

Keywords
Playing Habit, Indian Population, Game-based Learning, Perceived Learning, STEM Education

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INTRODUCTION

The use of digital games has increased significantly due to the rise of online platforms and easy access. The research by Market Research Future comprehensively reports that the global gaming industry that is valued at 155.9 billion dollars in 2019 is envisioned to grow at a 14.5% compound annual growth rate till 2026 (Market Research Future, 2020). In India, the 2021 KPMG report projected that the gaming industry is to grow from 800 million dollars in 2021 to around 2200 million dollars in 2025 (Menon, 2021). Even the Indian union budget of 2022 placed the gaming industry as an important sector that will soon be getting significant attention. On the other hand, the education sector in India has been infiltrated by technology due to the forced digitalisation in light of the COVID pandemic and also due to the rise of innovative edtech(education technology) tools like learning apps and remote learning lifestyles. These changes give rise to the question of whether digital games, which are already being embraced by the Indian market, can be used in the growing education sector for teaching-learning. It then becomes pertinent to understand the perceptions of the Indian population when it comes to games and learning. Although research generally attributes games to be good tools to impart learning (Squire & Jenkins, 2003; Squire, 2003; Gros, 2007), the data is scarce when it comes to the Indian population.

LITERATURE REVIEW

Prior research has confirmed that games can be employed to improve teaching-learning in schools (Briscoe et al., 2018, Devaney et al., 2018, Barros et al., 2019, Bressler et al., 2019, Kim et al., 2019, P. Rose et al., 2020). Although studies have explored awareness and attitude towards games through various factors of demographics like age, gender, etc there has been little research in the context of India(Cassell & Jenkins, 2000, Iftikhar, et al., 2008, Ghuman & Griffiths, 2012). There does exist literature that highlights the problems of knowledge transference from the field of gaming, however, most of it alludes to the cause to be resonant with any specialized activity that a participant unfamiliar with the domain might face (Bennerstedt, 2013). Though these studies have been useful in directing the narrative of using games in learning, a further study in India can help to localize the generality of research in the field. Also, the intent of this research is more focused on the perceptions of the Indian population towards games and game-based learning and not to gauge its effectiveness, which is the scope of future study.

METHODOLOGY

In order to understand the level of awareness, attitude, perceived learning, and acceptance towards game-based learning, a mixed approach of quantitative and qualitative data collection was taken. A questionnaire, used with preset guiding descriptions was employed through electronic mail and messaging.

SAMPLE AND DATA

An online survey questionnaire was used for the collection of data from a convenience sampling of the entire student population of seven upper primary, high, and higher secondary schools where the survey questionnaire was sent through electronic mail and messaging. In India, upper primary denotes the 6th and 7th standard, high school denotes the 8th, 9th, and 10th standard, while higher secondary denotes 11th and 12th standards. Students along with a few teachers participated in filling up this survey. As the survey revolved around the learning aspects of games, the majority of respondents were chosen to be from education-related fields, such as

teachers and students. A pilot study with 20 students was initially conducted, through the analysis of which, the questionnaire was modified to some extent, mainly in regards to the phrasing of the questions. The questionnaire followed the BRUSO model of question formation, where the aim is to make the questionnaire Brief, Relevant, Unambiguous, Specific, and Objective (Peterson, 2000). The primary data collection was conducted by sending out emails to the students as well as electronically messaging teachers and administrators of various schools so that they could disseminate the survey to their respective students. The email and the message requested the recipients to contribute to the study and included a link to the online survey. Survey requests were sent to a net approximation of 2500 contacts, where the secrecy and anonymity of their responses were maintained, and they were notified that the collected data would be used in academic journals. Another follow-up email was sent after an interval of 7 days. 701 eligible responses were selected for appropriate analysis.

MEASURES

Constructs that have been formerly confirmed were employed to establish the content rationality of the scales used in the present study (Hair, et al., 1998). Using the recommendations of previous studies and researchers, all items were structured briefly and simplistically (Hinkin, 1998). The questionnaire was comprised of three sections; the first tried to establish the independent variables of age, gender, and geography of the participants, the second section asked the participants about their gaming habits, and the third section comprised of open-ended questions which aimed at understanding the participants' attitude towards games and learning. A five-point Likert scale was used in a couple of questions in which "1" denoted "definitely yes" while "5" represented "definitely not".

DELIMITATIONS OF THE STUDY

This research is restricted to extracting a generalized perception towards games and learning. A more specific and focused study into each subject and game genre could be included in the future as a consequential study. Another restriction is that the study only conducts the survey in the English language, whereas a study oriented towards the Indian population may benefit largely from local language interactions.

DATA COLLECTION AND ANALYSIS

This section provides a summary of all the findings of the study, which emerged as a result of the survey questionnaire.

Demographics

Response analysis shows that 53.4% of the respondents identified themselves as males, 44.7% identified themselves as females, and the remaining 1.6% either chose not to reveal the answer, or answered as 'other'. This gender ratio was found to be similar to the ratio of the larger Indian population sitting at 51.96% male population versus 48.04% of the female population (World Population Prospects, 2019). The largest age group at 73% was between the ages of 15-24 years, 16.9% of the respondents were between 25-34 years, 7.4% were between 10-14 years, while the rest of 2.7% were above the age of 35 years. As the overall aim of this research is to gauge the perceptions and attitudes of the people engaged in higher secondary education in India, the largest section of respondents being between the ages of 15-24

years were seen as pertinent to the study. Tables 1 and 2 summarize the demographic profile of the respondents.

Table 1 Gender profile of the respondents

Gender	Male	Female	Other / Undisclosed
Total	371	311	19
Percentage	53.4 %	44.7 %	1.6 %

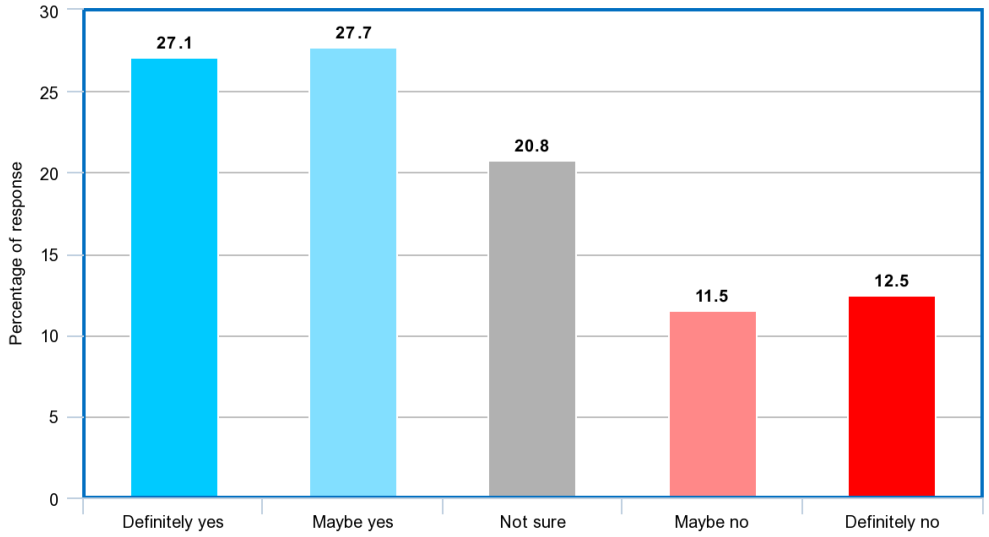
Table 2 Age group profile of the respondents

Age Group	10-14	15-24	25-34	Above 35
Total	51	505	117	28
Percentage	7.4 %	73 %	16.9 %	2.7 %

Game-playing habits and experience

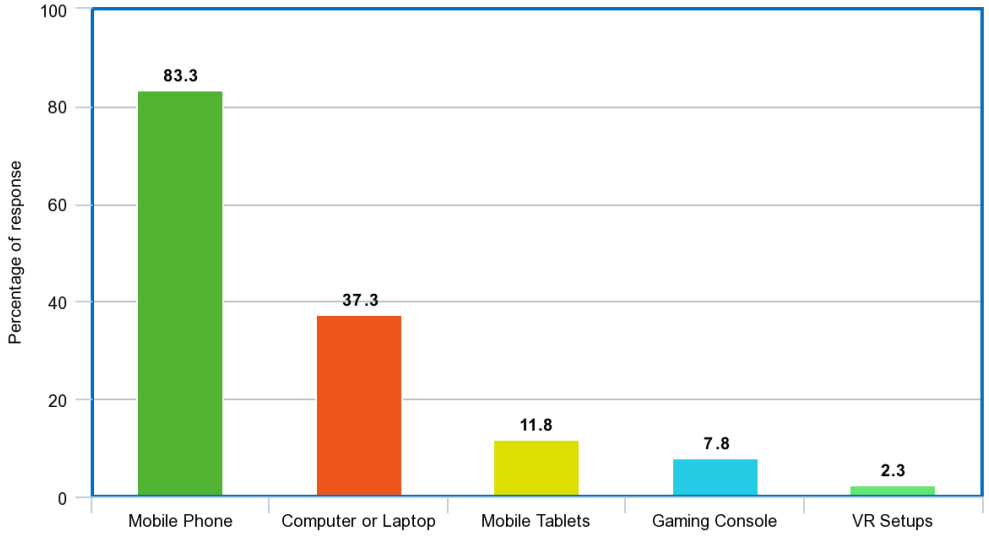
In order to understand the respondents' perceptions and experience regarding games, they were asked about whether they perceived themselves as gamers, what devices they used for playing games, what types of games they were aware of, and which types of games they preferred to play. According to Kowert et al. (2012), gamer identity can be better understood by asking the respondents themselves whether they identify themselves as gamers or not. This is because subjective attitudes are often found to be better at indicating group traits and attitudes than objective measuring criteria (Kowert et al., 2012; Jetten et al., 2001). Therefore, when the respondents were asked 'Do you consider yourself to be a gamer?', percentage analysis found that 27.1% of the respondents opted for 'definitely yes', 27.7% opted for the option of 'maybe yes', 20.8% responded with the option 'can't say for sure', 11.5% opted for 'maybe no', and the remaining 12.5% responded by opting for 'definitely not'(see Figure 1).

Figure. 1 Answer distribution of question 'Do you consider yourself to be a gamer?'



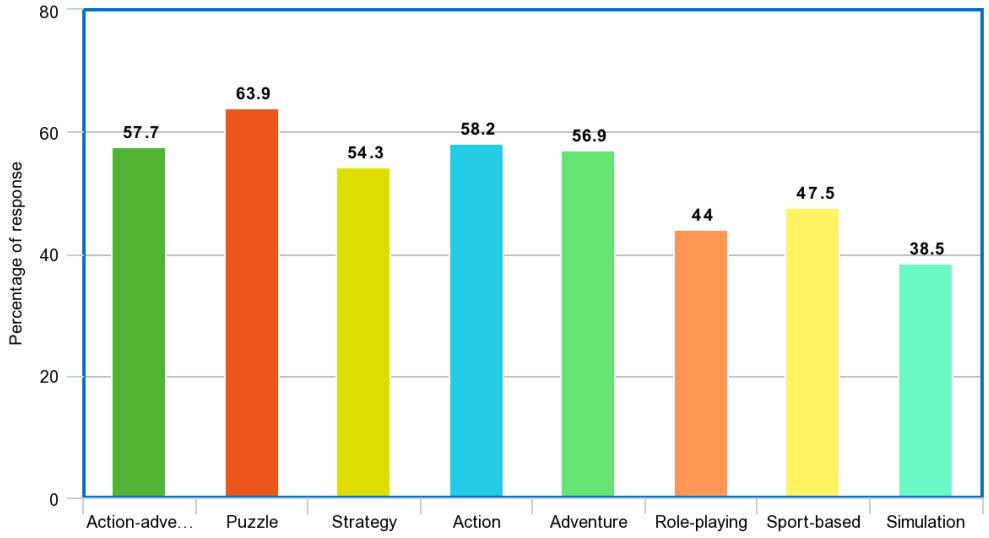
To understand game-playing habits, one of the questions asked respondents about the platforms on which they played games (see Figure 2). Findings showed that 83.3% of the participants played on mobile phones, while 37.3% used personal computers or laptops, 11.8% opted for mobile tablets, 7.8% for gaming consoles, 2.3% selected the option of virtual reality setups, and 5.6% responded by saying that they did not play at all (Note: the participants were allowed to select more than one option, therefore the sum of the percentage does not add to 100).

Figure. 2 Percentage distribution of question 'What devices do you play games on?'



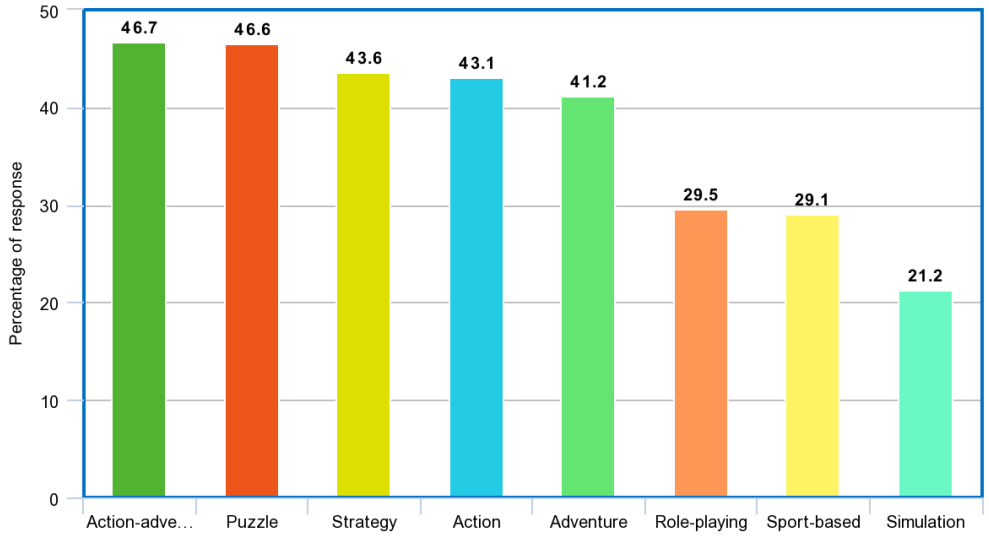
Another question presented a list of game types and asked the respondents about which of them they were aware of (see Fig 3). Formerly confirmed constructs were implemented to confirm the selection rationality of the game types used in the present study (Amory et al., 1999; Aarseth et al., 2003; Apperley, 2006; Arsenault, 2009). Puzzle games were selected by 63.9% of the participants, action games were opted by 58.2% of the respondents, action-adventure games were selected by 57.7%, adventure games were selected by 56.9%, strategy games were selected by 54.3% of the participants, sport-based games were selected by 47.5%, role-playing games were known by 44% of the participants, and simulation games were selected by only 38.5% of the participants (Note: the participants were allowed to select more than one option, therefore the sum of the percentage does not add to 100).

Figure. 3 Percentage distribution of question 'What sort of game types are you aware of?'



In a similar question, participants were asked about which types of games they liked to play (see Fig 4). Here action-adventure games came out on top, being selected by 46.7% of the respondents, while puzzle games came in a close second at 46.6%. Strategy games and action games were similarly opted for at 43.6% and 43.1% respectively. Adventure games were preferred by 41.2% of the respondents, while role-playing games and sport-based games were similarly preferred at 29.5% and 29.1%. Simulation games were once again at the bottom in the preference order at 21.2% (Note: the participants were allowed to select more than one option, therefore the sum of the percentage does not add to 100).

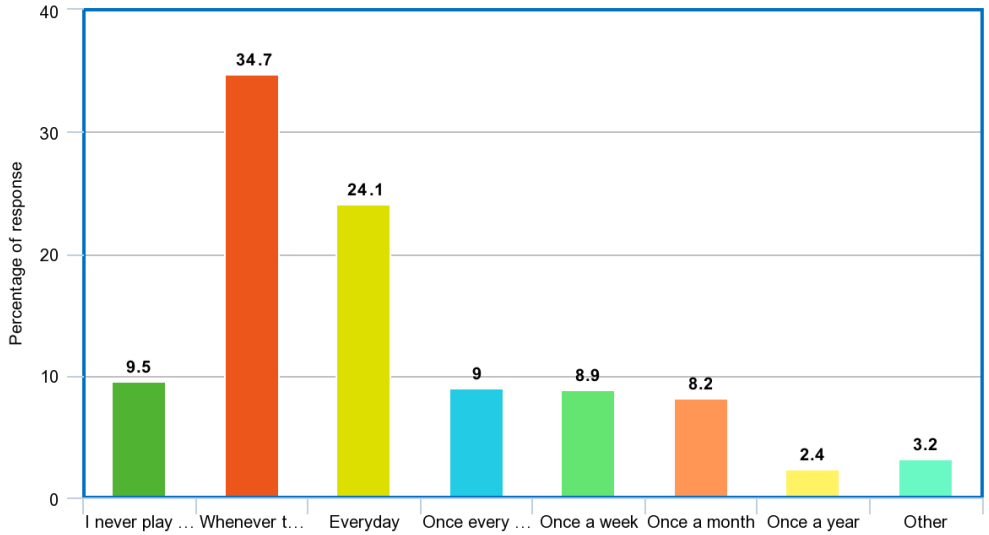
Figure. 4 Percentage distribution of question 'What sort of games types do you like to play?'



As for the frequency of playing games, 34.7% selected the answer 'Whenever the time permits', 24.1% opted for 'Everyday', 9.5% selected 'I never play digital games', 9% selected 'Once every two days,' 8.9% selected 'Once a week', 8.2% said 'Once a month', while 2.4% responded by selectin the 'Once a year' option. The rest of the participants at 3.2% decided to write their own answers and were found

responding with things like, ‘Often’, ‘Used to play a lot but haven’t in a long time’, ‘Deleted games because of 12th(standard)’, ‘3-4 times a year’, and ‘As per my mood’ (see Fig. 5). The findings indicated that the majority of the respondents would be willing to play games every day if there was a formal time section dedicated to it.

Figure. 5 Percentage distribution of question ‘How frequently do you play digital games?’

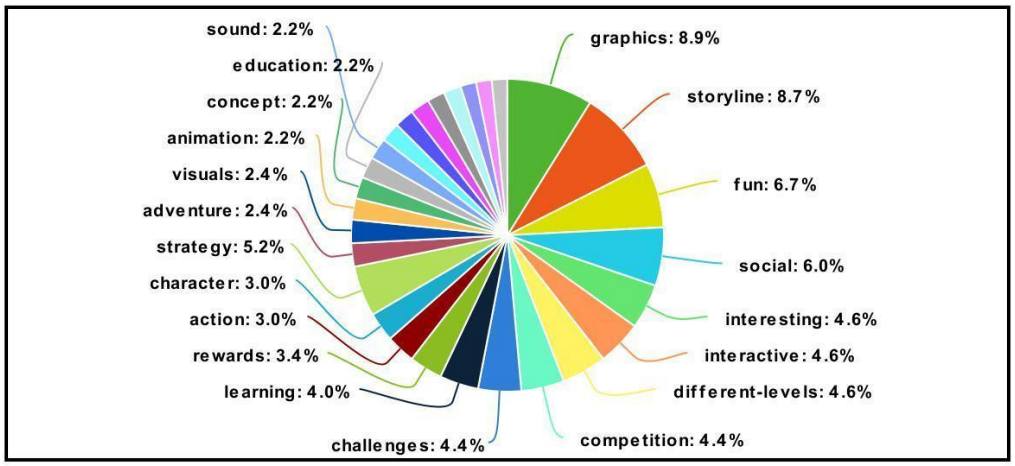


Games and engagement

To understand the attributes that contribute to engagement in games, participants were asked to describe through keywords the factors that they thought increased engagement in games. The participants were allowed to give more than one answer. Any responses that were given in the wrong window were removed. Out of the 600 given responses, 553 were considered eligible for analysis. Words that were related but written in a different way like ‘art’ or ‘arts’ were simplified under one of the selected terms. The participants were free to type up their responses and were not presented with hints of keywords in any way, the resultant data was provided entirely by the sample.

There were several factors that were considered by the participants as contributing to engagement in games. Percentage analysis showed that graphics, storyline, fun, and social were the top 4 keywords mentioned by the participants. Fig. 6 represents the percentage distribution of all the keywords.

Figure. 6 Percentage distribution of keyword mentions when asked about factors that influence engagement in games.

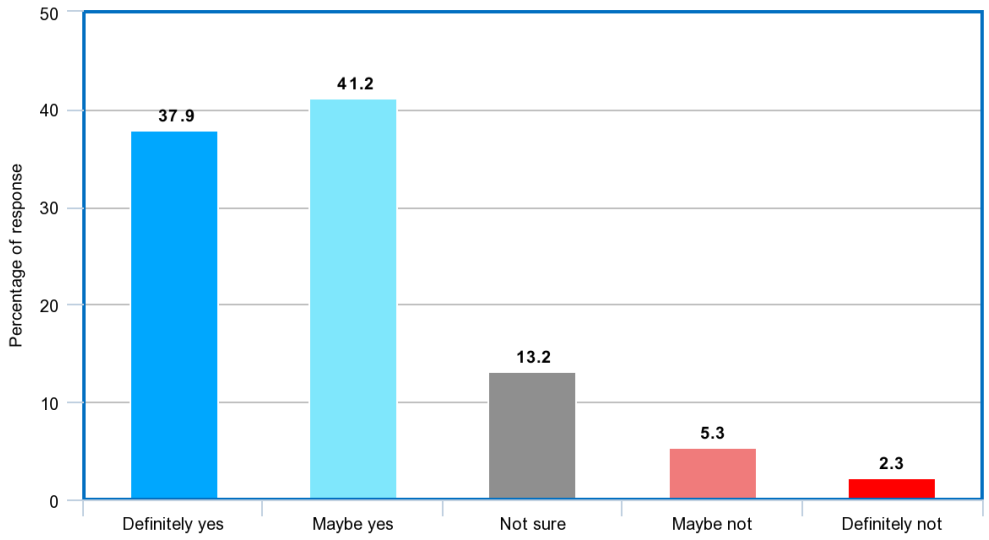


Games and perceived learning

The third section tried to understand the participants' perception of the relationship between games and learning. Therefore, the survey asked the respondents whether they considered games to be a learning tool, which was followed later by a question that asked them whether they would like it if the schools of India employed games to teach scientific concepts. This was followed by a question that asked if there were particular subjects that they would consider learning through games.

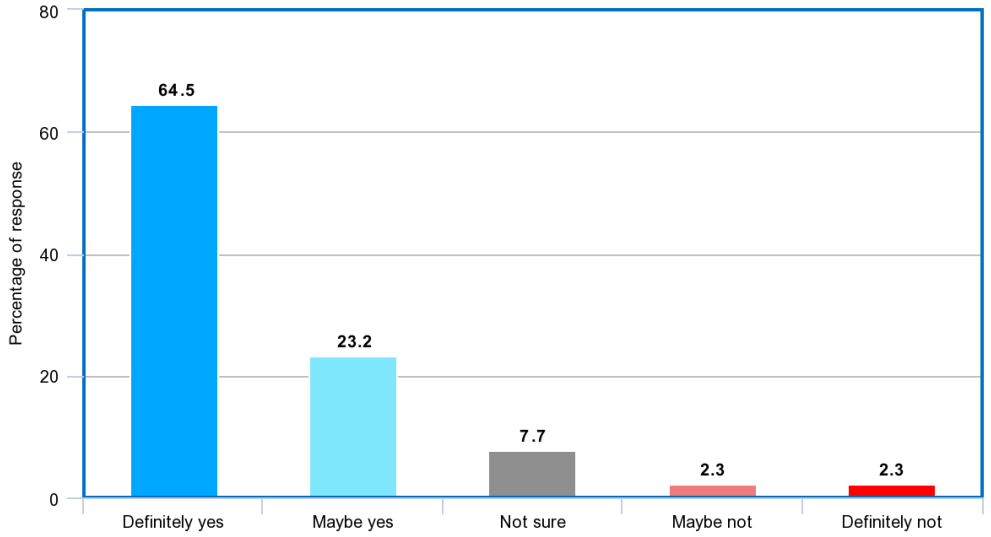
In the question 'Would you consider games to be a learning tool?', 41.2% of the participants responded with 'Maybe yes, 37.9% responded with 'Definitely yes', 13.2% said that they were 'Not sure', while 5.3% of the participants responded with 'Maybe not', and only 2.3% selected the option 'Definitely not'(see Fig. 7). This response indicated a majority of positive perceptions towards the use of games for learning.

Figure. 7 Percentage distribution of responses to the question 'Would you consider games to be a learning tool'



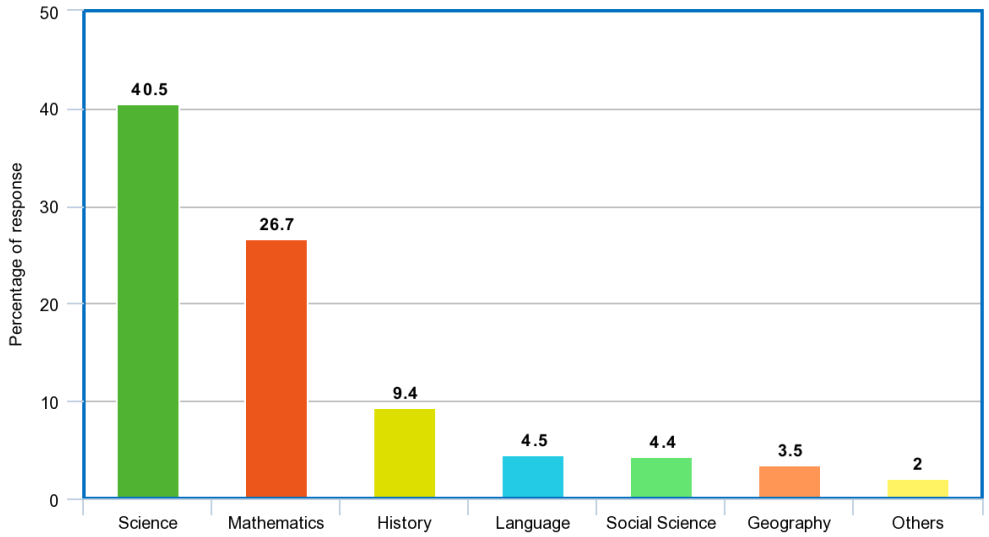
When asked whether the participants would like if the schools of India employed games to teach scientific concepts in class, a large section of 64.5% responded with 'Definitely yes', 23.2% responded with 'Maybe yes', 7.7% said that they were 'Not sure', while the option 'Maybe not' and 'Definitely not' were opted for equally at 2.3% each. Findings again indicate the use of games in school for teaching-learning is seen in a positive light by the respondents (see Fig. 8).

Figure. 8 Percentage distribution of responses to the question 'Would you like schools to use games to teach scientific concepts in class?'



In continuation of analyzing the perception of games and learning in school, the participants were asked about the specific subjects they would like to/would have liked to learn through games. Out of the total answers given (participants were allowed to write more than one subject), 26.7% of the total mentions were for mathematics, while science was at 13.4%. However, respondents had also separately mentioned physics, chemistry, and biology at 17.3%, 7.5%, and 2.3% respectively. If counted collectively, the mentions of science(including physics, chemistry, and biology) came out to be at 40.5%. Following science and math, history was at 9.4%, language at 4.5%(2.8% mentions of English included), social sciences at 4.4%, geography at 3.5%, while economics, accounts, business studies, sports, and coding were all mentioned at below 2%. The percentage analysis of this question clearly depicts that participants have a diverse range of subjects that they would/would have liked to learn in school through games. However, science and mathematics show themselves to be the choice of the majority here, collectively standing at 67.2% (see Fig. 9). Other subjects at 4 or fewer mentions were not added in this analysis.

Figure. 9 Percentage distribution of responses to the question 'Which subjects would you prefer to learn through games'



Preferences examined through age groups and gender

The last section revisits the data to distinguish the preferences of the learners according to their age groups. The key groups made here were from ages 10 to 14, 15 to 24, 25 to 34, and 35 to 44. There were other groups above 44 however, the number of responses was not deemed enough to represent any generality. Another subsection distinguished the groups through the genders they identified themselves with.

- *Age group 10 to 14*

  This group revealed that if given choice, their preferred subject to learn through games would be the sciences followed by mathematics. The responses showed that around 85% of the participants from this group were using mobile phones to play games. The preference for game types was that of puzzle games, closely followed by action-adventure, and purely adventure games.

- *Age group 15 to 24*

  Similar to the previous group, the participants from the ages 15 to 24 also showed a desire to learn the different sciences which were followed by mathematics. It must be noted that here the sciences were mentioned by their specific fields like biology, chemistry, physics, etc. Here the use of mobile phones was almost double the number of personal computers used. This group preferred action-adventure games, followed by adventure games and strategy-based games.

- *Age group 25 to 34*

  Desired subjects of learning through games for this group were again science and maths, however, they also showed significant interest in learning history. The group played games mostly on mobile phones while some used personal computers. The preferred type of games were puzzle games which were followed almost equally by action games and strategy games.

- *Age group 35 to 44*

  As with all the other groups above, the preferences for desired subjects here were the sciences followed by mathematics, and the device used for playing games was largely mobile phones. In preference for game types, this age group preferred puzzles followed by strategy games

- *Females*

  The participants that identified themselves as females showed almost equal desirability to learn science and mathematics through games. They overwhelmingly testified to the use of mobile phones for the purposes of gaming in which they outnumbered the computer users by 10 to 1. Females showed to prefer mostly puzzle games with action-adventure being a distant second.

- *Males*

  In slight contrast to females, the respondents who identified themselves as males overwhelmingly desired to learn science where mathematics was a distant second. The number of mobile users was double the number of participants who used personal computers, and for the desired game type, males preferred action games as the first, closely followed by action-adventure games and strategy.

CONCLUSION AND DISCUSSIONS

The objectives of this study were to examine the habits and perceptions of the Indian demographics towards games and game-based learning. After the data collection through a survey of the sample and its analyses, the results were obtained.

In the section that tried to understand game-playing habits, we discovered that the most used device for playing games were mobile phones, with personal computers and laptops being a distant second. As for types of games, the participants were most aware of puzzle games, closely followed by action-adventure and adventure games. As for playing preferences, action-adventure games and strategy games were voted closely as the top two. As for the frequency of playing games, many of the respondents said that they either played every day or whenever the time permitted them to play.

To understand what factors participants found to be interesting, they were asked to write down keywords that they felt made a game more engaging. Words such as graphics, storyline, fun, social, interesting, interactive, and more were pointed out by the responses. This finding is insightful for the future considerations of designing and developing games.

When asked whether the participants found games to be a learning tool, around half of the respondents replied with some sort of affirmation by saying either ‘definitely yes’ or ‘maybe yes’. 40% of the participants were neutral about their opinion, and only a collective of around 8% responded with a ‘definite not’ or a ‘maybe not’. This shows that a large section of the population considers games to either be a tool for learning, or they are still indecisive about it, however, only a very small section of the population disagrees on games being a learning tool. This is complimented overwhelmingly by the next question in which the participants were asked whether

they would like if the schools of India employed games for teaching and learning scientific concepts. Here, around 88% of the respondents agreed with either a definite yes or a maybe yes, while only 5% went the opposite way. The remaining 7% stayed neutral with their responses. The findings here indicate a positive acceptance or at least an anticipation of the Indian population to experiment with teaching-learning through games in the schools of India. When the participants were asked about the specific subjects that they would prefer learning through games, science and mathematics were voted the most.

It was observed that when grouped according to age groups, some preferences remained the same throughout while others changed. A desire to learn science and mathematics through games was resonant along with all age groups. The preferred type of game changed for different groups where the people below 14 and above 25 preferred puzzle games while the section that belonged between 14 and 25 preferred action-adventure more. The devices that the participants were using for playing games was dominated by mobile phones followed scarcely by personal computers.

In groupings by gender, males preferred action games, while females preferred puzzle games. Males responded with overwhelming desirability to learn science through games, while females preferred mathematics and science similarly. There was consistency in device usage as both the groups largely used mobile phones for gaming.

The results here serve as encouragement for game developers, designers, and researchers to orient and familiarise themselves with the educational pedagogy and syllabus of India in an effort to integrate games with it, hoping to amplify the quality of education.

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