

Games Transmogrified to Make Classroom Teaching More Effective

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Abstract— In this 21st century it is important to reinvent future of students by adopting unseasoned and interesting methods for classroom teaching. In this paper, games which everyone is familiar in day-to-day life are transmogrified and embedded into the classroom teaching to make the learning more ingrained and emphatic. To enhance classroom engagement it is very important to adopt classified teaching strategies which make the neoteric students to attend the classes without attendance compulsion. The games discussed in the paper are not subject or stream dependent, they can be easily modified and implemented with minor change to create a reasonable fun and learning environment. Games are competitive in nature which inbuilt the problem solving skills among the students through various stages of activities involved in game play. Implementation of games in education helps students to achieve planning, strategic thinking, communication skills, group decision making, negotiating skills and the most important gain in knowledge.

Keywords- Game based learning, Class room teaching, Effective learning, Teaching methodologies.

I. INTRODUCTION

The major protest any teacher is to attain the students' attention and also teach them in a way that the concept stays with them even after leaving the classroom. There are different pedagogy techniques in every country. The method of implementation is varied in different nations. In India, the teaching method is quite different compared to other countries. Rote learning is the major drawback in the education system of our country. The method of teaching is that there is an interactive session missing between a teacher and a student. Not every pupil listens to class every-day. Many of the institutions desire for scores to advertise and attract the people towards their institution. They are inconsiderable about the knowledge acquired by the pupil. Due to the burden in institutions the students cram the answers and clear the examinations. The major drawback of cramming the answers is the pupil cannot acquire knowledge regarding the subject and also the pupil can remember the answer for a particular question for a limited amount of time. The classroom teaching now-a-days has gone beyond pen, paper, notes and books. More involvement of technology is there such as power-point(ppt), smart classes etc., but can we say that the use of power-point and smart classes have inculcated more learning among students?

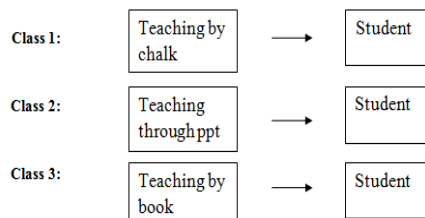


Figure 1. Classroom teaching scenario

In the pictorial representation, we can find that the interaction between a teacher and pupil is missing; it is completely visible that it is one sided scenario. To overcome this problem teaching methodology should be changed where there should be more interaction among student and teacher along with that learning should be through various activities which can lead to valuable results.

The paper is organized as follows, Section 1 contains the introduction which represents the class room teaching scenario, Section 2 explains the importance of games in education and how the implementation of games aids students, Section 3 describes the advantages of game-based learning, Section 4 explains how tambola game can be transmogrified to make mathematics easier, Section 5 explains a gaming technique which helps students to learn theory subject effectively, Section 6 explains a gaming technique for programming beginners, Section 7 explains

other games that helps students by creating a fun and engaged learning environment, Section 8 describes a gaming technique which aids in improving communication skills, Section 9 explains another gaming technique which helps to improve out of box thinking, Section 10 explains another gaming technique which helps in avoiding stage fear, Section 11 explains another gaming technique which helps students to think faster.

II. IMPORTANCE OF GAMES IN EDUCATION/GAME BASED LEARNING

Games are important in every stage of life. Education has to be interested in each and every level of education i.e., in the school level, college level as well as post-graduation level. The idea of using games in education to engage students in learning is not new[1]. Educational games has been the trending topic from a couple of years[2]. Various games are implemented in the classrooms by teachers to create a fun and engaged learning environment. Traditional schooling is considered to be ineffective and boring by most of the students[3]. Many students enjoy learning through activities given by the teacher as it keeps the student engaged and motivated[1]. Some students tend to learn more when they involve in an activity. Games are competitive in nature. Students show much passion to learn things when games are included in education as it gives amusement. Revisiting of games and activities helps in regaining foremost information[1]. Games bring out the higher level thinking skills of a pupil. Students can build their problem solving skills through games and activities. There are a variety of teaching methods that coincides with active learning pedagogy. If a pupil didn't revise and learn the chapter and verse, is there any way to acquire knowledge? This creates a problem for students because they may be discomfited by their lack of knowledge. Games consist of skill exercises. Students compete individually against other students. Educational games are intended to teach students to discover various concepts. Educational game based learning is a type of learning tool that has defined learning outcomes. Learning through performing in games is a powerful learning aid. Due to games, students can achieve planning strategic thinking, communication, group decision making, negotiating skills. It was observed that the students who were least participant in class exhibited much interest when games are included in education. Games can be implemented in every subject to create a fun and learning environment. The standard of students can be increased by implementing games in education.

III. EDUCATIONAL GAMES AIDS IN

A. Increasing Memory Capacity

Games such as puzzles, critical memory sequences help in increasing a child's memory.

B. Increasing Vocabulary

Narrating stories, playing word games, using grown up words in conversations aids in increasing vocabulary skills of a child

C. Increasing Strategic Thinking And Problem Solving Skills

Games such as Chess, Sudoku and Rubik's cube helps in improving strategic thinking and problem solving skills

D. Developing Coordination

Skill building exercises aids in developing coordination between students .

IV. INNOVATIVE GAMES DESIGNED TO MAKE CLASSROOM TEACHING MORE EFFECTIVE

A. Game Designed To Learn Aptitude

Different games can be involved and framed to make the mechanism of studies interesting. According to the game theory, every game will have its own concepts and solution parameters to be implemented keeping in mind the target players[4]. One such game is "TEST YOUR MATHEMATICAL SKILLS AND LUCK THROUGH HOUSIE." Now-a-days placement in college is a crucial thing for every student. Through this game, practice for placements in Quantitative Aptitude becomes more effective. Winning in the game is a higher motivation than attaining full marks. The process of this game is that each student will be given a housie sheet and the questions are displayed with the help of projector. There are 90 questions and the housie sheet also contains 1 to 90 numbers in a jumbled manner. Each housie sheet that is given to the students will have 6 grids. The pupil based on the given question has to solve and identify the answer. The students who solved earlier compared to others will be given first priority. With this gaming technique every pupil will be interested to solve because of the tough competition among them. The housie sheet is as shown below. Each student will be given a sheet with six grids. The pupil who solved it with great accuracy will be awarded points. For every grid in the sheet there will be 3 rows. This game not only checks the knowledge but also plays an important role to check the students concentration level. As this is the game of luck factor which will definitely play its role, it may or may not be possible to win.



Figure 2. Housie sheet

Following are the 90 questions framed for solving.

Table 1. Mathematical questions prepared for housie (Tambola) game

Answers	Questions
1	A number which is unique in itself neither odd nor even.
2	The smallest number which when multiplied with any number makes it an even number
3	A number which have the common difference i.e. 18-15, 15-12, 12-9, 6-3.
4	The number is the degree of the equation x^4+3x^2+2 .
5	A number which when multiplied by any number outcome at ones place is 0 or 5.
6	The smallest number which when squared or cubed, always have 6 at its ones place.
7	A number which represent the seven constituent of white light when it passes through prism.
8	A number which is the rule to fill number of electrons in a shell.
9	A number whose table is just counting in forward & reverse direction starting from (0 to 9).
10	A number which has a circle and a straight stick along with it.
11	Prime number next to prime number 7.
12	Two digit number that represent number of

	months in a year.
13	Number is the sum of 2^2+3^2 .
14	Square root of 196.
15	It is the number which is reverse of 51.
16	Number is the four times the square of 2.
17	Number is the sum of squares of 4 and 1.
18	Number is the abscissa of the co-ordinate (18, 0).
19	Number is twice of 10 and then subtracted by 1.
20	Number is the product of the smallest even number and 10.
21	Number is next odd number to 19.
22	Number is the twice of the prime number next to 7.
23	Number is the profit gain when A buys a chocolate at Rs. 60 and sells for Rs. 83.
24	Number is the average of the of three same number If one number is 24, find the second number
25	Number is square root of 625.
26	Number is the mode of given number 26, 26,27,22,28
27	Number is thrice of square of 3.
28	Number is four times half of 14.
29	Number is the number of days in Feb in a leap year.
30	Number is the number of days in the fourth month of a year.
31	If $n+n=62$ then what is n ?
32	Number is the square root of 1024
33	MRP of a book is Rs 200,if the seller provides Rs 177 flat off on the book. .How much does the book cost
34	If Principle amount is Rs 340 and rate of interest is 10% in time of 1 year. Find Simple Interest
35	Number is the profit If CP is 93 and SP is 128.
36	Number is in the series of 16, 20, 24, 24, 32,
37	Number is the cost of 1 game if Google play cost 6 games for Rs 222
38	Number is the square of $36^{1/2} + 2$
39	There are 40 students in class. Jay got 2nd rank in the class. What will be the rank from the last
40	Number is the product of square root of 100 and square root of 16
41	A girl buys book at Rs 100.If she gets cash back of 59% ,So the number is the amount spent by the girl on book
42	If $z+101=127$ then the number is $z+16$
43	Number is in the series of 19, 27, 35,
44	Number is the scores obtained by running between the wickets if a batsman scored 100 runs in which there are 8 sixes, 2 fours.
45	Number is the loss obtained when a book is

	bought at Rs 144 and sold at Rs 99
46	Number is the twice of $\frac{1}{4}$ of 92
47	In a deck of 52 cards first five cards of club are removed, so the number is the number of cards left
48	If quarter kg of potatoes cost Rs 12 then what will it cost for 1kg
49	Number is the LCM of 7 and 49
50	Number represents half century in cricket
51	Root of 2601..?
52	How much number of weeks fill a year?
53	Root of 3809..?
54	A Boy buys a pen worth 60Rs. The seller provides him with 10% cash back what is the amount of pen now?
55	Number when added twice gives 110.
56	In a row, a boy's place is 29th from left and 28th from right. How many boys are there in the row?
57	Rank of Nish is 4 in a class of 60 students. What is her rank from last?
58	LVIII =?
59	What is the velocity, if a body is travelling with velocity in km/hr of 16.4 m/sec?
60	Lt $x \rightarrow 2 (16x^2 + 10x + 36)/2 = ?$
61	Largest prime factor of 61?
62	Arum's age is 31; Sharma was of same age when Arum was born. What is the present age of Sharma?
63	The end points of a straight line are (49, 0), (77, 0). The abscissa of the midpoint is?
64	$10 \cdot \log_2 (2)^{6.4} = ?$
65	$(6 \cdot 2 \cdot 5) + 5 = \dots ?$
66	Quotient obtained when 132 is divided with 2.
67	$(13 \cdot 5) + 2 = \dots ?$
68	Number when divided with 2 gives the quotient 34.
69	$((11 \cdot 2) + 1) \cdot 3 = \dots ?$
70	$13 \cdot 5 + 5 = \dots ?$
71	Inclination is 45 degrees what is the 75 times its gradient?
72	Number when divided with 3 gives the quotient 24.
73	Average of 71, n, 80, 72 is 7. What is n?
74	1001010 in decimal form =?
75	A Man buys pizza at 500Rs. The seller charges extra VAT of 15% on pizza. What is the amount man spent on VAT?
76	If $5x + 4y = 6$ and $4x + 5y = 20$ find 9y
77	$2 \cdot (4! + 3!) + \text{root of } 289 = ?$
78	Sum of all first six numbers and first six odd numbers together is?
79	$100 - 21 = \dots ?$

80	125: 75: _:48?
81	L buys a Cassette at 100rs. Seller gives him 10% off. If L pays further 10% tax on it, how much L spent on cassette?
82	HCF of 3^4 and N is 1. N is?
83	$(3 \cdot 3 \cdot 3 \cdot 3) + 2 = \dots ?$
84	Two Diagonals of Rhombus are 14, 12. What is the area of this Rhombus?
85	Base and height of a right angled triangle are 6 and 7 cms respectively. What is the square of its hypotenuse?
86	Square of distance between (3, 6, and 7) and (10, 12, 8)?
87	Sum of square of first four primes is?
88	If $b_1 = 8$ and $b_2 = 14$ and height = 8. Find the area of the Trapezium?
89	A number has 2 digits 'a' and 'b'. If $a + b = 17$, $ab = 72$ and $b - a = 1$, then find the number.
90	Angle subtended in a Semi-Circle is ?

B. Working of the Game

Each student is given a housie sheet with six grids. The questions are displayed randomly. Whoever first completes the first grid with the given questions is asked for verification. After verification, the student is awarded with points. Here, luck is also a major factor because not every pupil can get the same six grids.

V. GAME DESIGNED TO LEARN THEORY SUBJECT EFFECTIVELY

Another game to make theory subject interesting even for graduation and post-graduation students is the "CHAIN REACTION." In this gaming technique starting from alphabets A-Z the student is given a form with the sub-headings of A-Z. The student has to fill all the words with respect to the alphabetical sub-heading. The keywords should be related to the academic subject. The student to whom the form is given first has to fill the keywords of first alphabet A and he has to circulate the form among other students after he is done. The student who got the form next continues filling keywords for the next alphabet. This process continues until all the keywords regarding the subject are filled by the students. With this gaming technique, a pupil can improve his/her vocabulary skills as well as he/she can attain knowledge over the subject. For example, following is a form filled with data mining subject related words. This gaming technique enhances co-ordination between students

A. Algorithm

- Step 1 : Start.
- Step 2 : Read alphabet from user.
- Step 3 : If alphabet matches with text, go to step 4.

Step 4 : If text is found in the textbook,add it to dictionary.

Step 5 : Score is incremented with 1 if text is added to the dictionary,i.e.,score=score+1.

Step 6 : else,if alphabet doesn't match with the text goto step 1.

Step 7 : Stop.

VI. GAME DESIGNED FOR PROGRAMMING BEGINNERS

Table 2. Dictionary prepared for theory subject (Data mining)

A	Analysis of system, Altering the industry infrastructure
B	Business information system, B2C, B2B
C	Customer relationship management, C2C, cybermall, competitive advantage
D	Data, Data processing, demand planning (E-commerce)
E	E-commerce, Ecommerce benefits
F	Fraud detections, Five force model
G	Global e-commerce
H	Hardware, http, https
I	Information systems, Information, Input, Investment fraud
J	Jobs In information systems
K	Knowledge workers
L	Limitations of m-commerce
M	M-commerce, Multistage model of e-commerce, Market segmentation
N	Niche strategy
O	Output, Organization, online stock trading
P	Product configuration, Phishing, Pyramid schemes
Q	Questionnaires (Used in system analysis)
R	Relevant information, Return on investment, Risk
S	Supply chain management, Secure socket layer, system
T	Traffic analysis, Treats of ecommerce, Total cost of ownership
U	User training
V	Virtual trail room
W	WAP ,Website tracking
X	
Y	
Z	

Another game is "FLASH CARDS" which is a type of puzzle which helps in creating passion to the students to improve their programming skills. With this gaming technique practice for programming becomes more effective. The student has to place the program in a correct sequence to obtain the correct output. During the process of arranging the cards in a sequence the student acquires the knowledge of

syntax, semantics and debugging. The following is an example program for finding average of two numbers. These flashcards are given to the students in a jumbled manner. The student has to place all the flashcards based on the structure of a basic program. This gaming technique can be implemented for all the programming languages.

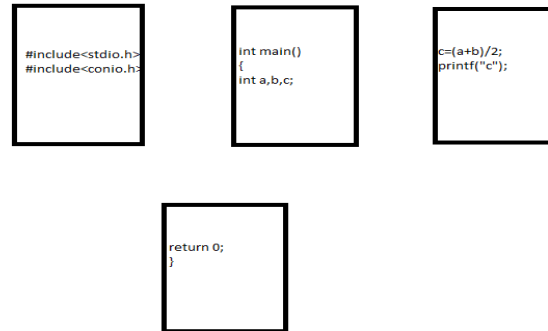


Figure 3. Flash cards prepared for C programs

VII. FOLLOWING ARE OTHER GAMES THAT AIDS STUDENTS

A. Open Book Test to Increase Concentration

Open book test is a game which aids in improving concentration among students. In this game, student is given a question as well as a material which consists of solution to that particular question. The student has to go through the provided material and should find the answer for the given question. As the student has to search for the solution in the material provided, he/she should check the entire material for the solution which helps in improving concentration

B. Algorithm

```
int openbooktest()
{
    gets(search);           //student has a question
    and ready to find here
    l=strlen(book);         //here book is a material
    which is given to the student
    for(i=0;i<strlen;i++)
    {
        if(strcmp(search,book)==0)
            got=1;
        else
            got=0;
    }
    if(got==1)
        return 1;           //search is successful
    else
        return 0;           //Answer not found
}
```

C. Explanation

This open book test will improve the student's concentration skills and remembering the key points and managing the time to write an answer

1. Conditions

- There must be a time limit
- Questions must be unique for each student and not simply asked also.

Students had to refer only the books which were given to them only

VIII. RAPID FIRE FOR INCREASING COMMUNICATION SKILLS

Rapid fire is a game in which the teacher frames the questions on a particular chapter/lesson/topic. These questions are asked orally to the students. Students have to answer them. This game helps in improving communication skills. This game also helps in interacting with the teacher.

A. Algorithm

```
int rapidfire()
{
    int score=0;
    for(i=0;i<n;i++)
//here, n is the number of questions to be asked by the teacher
    {
        for(j=0;j<1;j++)
//this is for time limit and it is set to '1'
        {
            if(answer=='correct')
//if answer is correct score is incremented with 5
            score=score+5;
            else if(answer=='wrong')
//if answer is wrong score is decremented with 1
            score=score-1;
            else
            score=score+0;
//if dont know the answer
        }
    }
    return score;
//score is returned
}
```

B. Explanation

Here, the teacher has to ask the question from a topic with different questions.

1. Conditions

- Questions must be asked from the topic which is taught.
- Students must give the answers quickly without taking much time and thinking.
- If the student takes much time to answer, he is disqualified in the game.

IX. FRAMING TO IMPROVE OUT OF BOX THINKING

This is a gaming technique in which students have to think out of the box i.e. they have to think differently over a problem for a solution.

A. Algorithm

```
int framing()
{
    int ch;
    while(1)
    {
        printf("1.frame 2.exit");
//if a student can frame a question case 1 is selected
        scanf("%d",&ch);
        switch(ch)
        {
            Case 1: count++;
// here count variable is used to count the no of framing can a student do
            break;
            case 2: exit(0);
        }
    }
    return count;
}
```

B. Explanation

1. Conditions

- The students are given the answers first and then he has to frame the more numbers of questions for that particular answer.
- When he studies the whole answer then only he can frame a question.

X. ROLE PLAY TO AVOID STAGE FEAR

Role play is a gaming technique in which a situation is given to a student and is asked for the solution that how would he react if he was in the given situation. This gaming technique helps in minimizing stage fear among students.

A. Algorithm

```
int roleplay()
{
```

```
//students are given the situation and they must act
//according to their acting score will be given
    if(acting=='excellent')
        return 5;
//5 score will be given to the student
    else if (acting=='good')
        return 4;
//4 score will be given to the student
    else if(acting=='avg')
        return 3;
//3 score will be given to the student
    else if(acting=='poor')
        return 2;
//2 score will be given to the student
    else
        return 1;
//1 score will be given to the student
}
```

B. Explanation

1. Conditions

- The main reason for this role play is to remember situations.
- When they feel that they are in that situation they can do much better and remember the story well.
- This is only for story base.

XI. QUIZ TO THINK FASTER

Quiz is to ask questions to the students. The questions are answered by the students. This helps the students to think faster and answer.

A. Algorithm

```
int quiz()
{
int score=0;
for(i=0;i<n;i++)
// here n is the number of questions to be asked by the teacher
{
if(answer=='correct')
//if answer is correct score is incremented with 5
score=score+5;
else
score=score-1;
//if answer is wrong score is decremented with 1
}
return score;
//score is returned
}
```

B. Explanation

1. Conditions

- The main reason for this is to take part in the competition
- The students have to read the lessons before they have to take part in quiz

In all the above cases there will be points in all the games the student who got the highest score will be awarded with extra points.

XII. CONCLUSION

In this paper few examples are discussed which shows how the games can be embedded in day-to-day curriculum to make classroom teaching more effective and interesting to enhance student engagement. With these games, imparting education among students will be more exciting. Although, games cannot be implemented in the everyday curriculum, but they should be practiced at least once in a week to make interaction between teacher and students more effective. These games can be implemented in the school level, graduation level as well as post-graduation level. The games which are designed can be used for the reference purpose and different methodologies can be formed according to the course requirements.

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