Making Learning Engaging Through Interactive Games

Mr. Kartic Vaidyanathan

Interdiscplinary

IIT Madras

Week – 01

Lecture - 05

We will continue to discuss the benefits of game-based learning with scientific evidences. To start with, we will discuss a publication in the Journal of Chemical Education, publisher being American Chemical Society. This is about how a board game in the context of learning mole calculation in stoichiometry was made enjoyable and interesting. This talks about the design implementation and how it was evaluated. I am just quoting the permission link here and we will continue the discussions around it. So, this was done by Amornrat and Tanita and we will see the details.

This was in the context of grade 10 students as has been indicated. It consists of a main board, a 5 player board, 7 set of cards, having reactant cards, conversion factor cards, exchange rate cards, etc. We are not going to so much discuss the design of the game, while it matters. The intent of the game is going to be more discussed and the findings because that is what finally matters.

So, it is to teach students how to calculate a mole which is translated into the narrative of an industrial plant comprising several units for the production of different products. So, moving on to the design feedback as perceived by the users, let us take a look at the questionnaire and how the audience felt about it. As you can see the bottom, the grading colors for the different ratings are mentioned and the greens correspond to agree and strongly agree, neutral being yellow and red being strongly disagree. If we look at the overall set of questions and answers, most of them have a high degree of light green and green and let us take a look at the specifics of those questions too. I was active while playing the board game because of its competitive element.

As we have seen, game encourages a sense of competitiveness which is very essential in bringing that interest and engagement. However, I want to distinguish

that this competition is slightly different from the competition that is seen in an assessment context or an exam context. There, it is more like, it is like the students feel a sense of threat because there is a lot more weightage that they associate in their minds with respect to marks scored, grades, etc. Whereas in the game context, the competitiveness is more for the social element and the willingness to win and wanting to perform better. So it's more like a healthy competition.

And rather than a standalone player game, playing with people brings in that fun element. Now, the second aspect is about I felt more challenged while playing the board game because of the inclusion of emergency, lucky and carrier promotion cards. Now, a game should not just include only the learning elements. It should include some randomness, fun and things that are adding to the fun element in a different way as in it should not be purely learning oriented. That's where this emergency lucky cards, if you can see many of the games, card games have things like action cards which are not really related to the learning itself, but force the player to gain some actions or make them do some acts that could change the nature of the game.

So, these cards help in making the game more challenging in nature. The third aspect, repetition. We have emphasized that repetition is very key to learning any concept, more so when it is difficult or when it is perceived boring. Now, bringing the repetition element in a traditional teaching learning context is difficult because it comes in the form of the teacher re-emphasizing the same facts or probably through assignments, which can get a little bit overwhelming. But because in a game context it is also embedded with fun elements and you play with others and there is competition, you do not really feel the repetition.

But the repetition happens and therefore the learning happens and the skill level also has gone up as evaluated by the students themselves. The fourth aspect about the difficulty level of a game, this is very, very vital. It says it suited my ability. Oftentimes, if a challenge is perceived as too simple for a learner or if it is the other extreme of if it is too difficult for a learner, there is actually disengagement. Because in the former case, boredom sets in quickly saying that this is a very easy game and it's not to my standards, I know better kind of a thing.

And in the other case, okay, this is too overwhelming. I don't think I'll be playing it. So, there has to be that right mix between the user skills and the difficulty level of the game so that it is kept slightly more challenging than what the user's abilities are that promotes them to actually play the game. So, that aspect has been kept in mind and that's what we see in the feedback. The fifth one is about the cohort that played

the game.

While in a classroom there could be probably let us say 30 to 40 students or it could be a large classroom of 80 to 100 students, we do not know this context, but the idea is to keep it in smaller groups. The smaller groups of 3 to 5 was appropriate because in a large group certain voices get lost, if we keep a group as 10 or 12, it becomes unmanageable and people, not everybody gets a chance to speak. In fact, one of the challenges in a regular classroom setting, even if it is like 30 to 40 students or if it's a large classroom, is that one is hesitant to speak up and even if they aren't, even if the teacher encourages and provides them an opportunity, it's practically , the learners are hesitant to speak up in a large audience because it does, we do form, what do you say, we are hesitant, what if we go wrong, such feelings come in. But if we keep the groups as small groups, maybe 3 to 5, 4 to 6, there is a sense of small camaraderie that builds in and people are more open to speaking with like-minded people and everybody gets a voice. It's very rare that even the very silent person doesn't speak up in a small setting.

So, that comfort level is ensured in a card game or a board game setting where the players are with each other. Yeah, rule clarity is the sixth point. That's very essential. Game should not be too complex to understand and irrespective of what the game is, it should be easy enough to understand. The seventh point is about the duration of the game.

Well, the game should not be too short, ending up very quickly, nor should it be very prolonged. Both of these cause boredom or I would say stagnation in the gameplay. It should be just the right size and that this game seems to have fitted. That game design is very essential so that the students are involved right throughout the game play process. The best part is if the students feel like playing once more or two more times, that's the best example of a well-designed game and not when they feel that, okay, when is it going to get over or it has gotten over too quickly.

I mean, you need to strike that right balance The eighth one is about the configurations were consistent and facilitated comprehension and playing. The aspects of the game, aesthetics, the other elements built in the game should be appropriate and help in the comprehension of the concepts. The ninth also again talks about images and text. they being attractive, the right color combinations and pleasing to the eyes and that also causes attraction towards the game. So, all of these aspects, most of these aspects I would say it is scoring 70 and above in terms of agreeing and strongly agreeing.

Of course, in some of the factors, There is scope for improvement, but I think by and large it seems to be a well-designed board game. Now, when it comes to the functionality of the game, the first point is about being an effective tool for the instruction of mole calculation. This is very important. The first few aspects that we discussed were about the design of the game itself. This is about the functionality.

So, if this game is seen as an effective tool for the instruction of the mole calculation, which is essentially the purpose of designing the game, so that seems to be well met. The next aspect is about, it helped me see the relationships between mole, mass, volume and number of particles. So, this correlation has come out very well and the great aspect is almost 93 percent of the students have voted favorably, which is a very positive sign. The fact that they are able to see the relationships very well means from the learning dimension, it has been designed extremely well. The next aspect is about mole of an initial substance and the mole of the product obtained from the product exchange.

This again is related to functionality. Close to 90 percent of the people were able to really learn and appreciate the concepts. The next aspect is about it created a relaxing and an enjoyable learning environment. This is so very vital. The previous points were related to the concepts being taught.

Now, this aspect is about being the atmosphere. The atmosphere of learning should be relaxing and enjoyable. Now, what could sometimes happen and in fact, it happens in often, I would say more often is that is so much of theory and text starting from middle school going on to undergraduation and post-graduation that teachers and facilitators tend to rush up, not deliberately, but they have certain course targets, certain lesson completion plans that they need to meet that makes them rush on things. In topics where the students can easily do a self-reading and understand, it is not so much of a problem, but in concepts where It is involved when there is time pressure, it acts as a deterrent and the students tend to get disconnected. Specifically, in those areas, this game-based learning and this is a classic example where it has proven to be a great intervention.

It has provided that relaxing and enjoyable atmosphere and also provided a clarity of concepts. So, this has helped serve the overall functionality of the game very well. And the last one is about applying for other related purposes. So, the students here again, once you have understood and once you have learnt in a conducive environment, it is only natural that they are able to take it forward and apply in other purposes. The last dimensions where they have measured is on the

promotion of learning itself.

In some cases, there seems to be a little bit of overlap between this and the previous one. Like for example, I would have thought that relaxing and enjoyable and learning environment could have come here, but that's okay. So, let's start with what they have measured here. I learned in an engaging environment and had hands-on practice. So, very correlated engaging environment, hands-on practice.

So, these things usually are not easily possible in a classroom lecture-based environment and the fact that the game has facilitated it is just wonderful. And look at the score of this. It is 100% green. This is really remarkable.

You see 69 and 31 add up to 100%. that is fantastic, not even 1% of the learners have felt otherwise. So, it goes to highlight how important it is to create that engaging environment with hands-on practice. So, moving on to the next one, I gained a learning experience through playing the board game, which is again rated very high, almost 97% of the learners so very vital from a learning point of view. The 17th aspect is about self-discovery of knowledge. There is learning that comes from the teacher, from the content or the material, new information, new concepts.

And then there is learning that comes from interacting with peers, which has also been enabled. And the last aspect is connecting the dots, connecting the learning that come in from the books, teacher, the game kit and from the peer learners. The last is the self-discovery of knowledge. Connecting all these aspects together, it has been made possible that they are able to do that self-learning. I learned in an active and a motivated manner.

Yes, with game dynamics in place and an engaging environment, it has promoted a conducive environment. The last aspect again, a game has prompts that helps one share knowledge with others and also learn from them. See, all of us need nudges, nudges for learning. In a classroom setting, a good teacher asks thought-provoking questions and facilitates discussions. However, it is not easy for all and it takes a lot of preparation time.

The games when designed well act as a toolkit for the teacher in enabling this. How do you make every learner talk? Share what they know, what they have understood with each other. Now, it does not mean that everybody has understood it right. Even if we share our understanding which could be or need not be fully right, It serves as a trigger for discussions with the fellow classmates and that environment is created in a board and card game which leads to fruitful discussions. Sometimes they may

still have doubts which is where the teacher as a facilitator is available.

They mark down areas which they are unclear and at the end of it, those questions can get raised and the concepts can get cleared. So, all in all from the design, functionality and promotion of learning, this particular game case study has scored really well.