

Project BECTO

Applied scientific gaming method to improve and facilitate new learning technology

Project Description

Medical science is continuously improved and developed, but it faces some challenges like complexity and difficulty in application for the students to keep in touch with the existed knowledge which require us to seek out new methods that can facilitate and improve critical thinking to solve problems, find solution, and gain better understanding. Students can gain information and experience through try and error as well as spending lots of years after graduation in practicing and working in different places, but if we can create a method by which medical science students in the first year and beyond can practice their fields and try new strategies that allows them to join in scientific discussion while they are playing a game! Yes this can be possible by implementing project BECTO which aims to make science interesting and give a chance to practice and improve student skills by applying the knowledge while enjoying the practice. This game can be played from the first year of school till they are graduated.

This project is based on developing a card game by summarizing some of the bacteria that can cause illnesses, diseases and antibiotics which can treat those infections, some miscellaneous cards are also designed to facilitate the game and make it more interesting.

The basic principle of this card game is based on the fact that games will be always acceptable by individuals and specially students, because they will feel a kind of playing, but in fact the game is not that easy. Its main aim is to implement and strengthen the basic knowledge the students have. It could be considered as levels of difficulties according to the student level and capabilities.

5 types of cards are designed (Bacteria Cards, Antibiotic Cards, Immunity Helper Cards, Immunity Reduction Cards, and Zone Cards) in which they contain referenced information and summary about the card function in the game.

The game is not only limited to antibiotics but it can be farther developed to include all types of infections and diseases, and it can be subjected for contentious updates to provide new data according to the new medications in the market, and the new diseases, also those card are available in a hard copy and a prototype is also done to demonstrate the idea.

This method can be introduced to some universities first to measure its acceptance among the students and assess its advantages and limitations.

The Player will have the chance to practice against bots in the App to be familiar with the gameplay and then he can join his friends by challenging them using their ID or from his friend list, and he can play normal online (Normal/Rank) matches with different people and have the chance to get new random cards.

Some specific educational features will be introduced first before the complete release of the App, like introducing the program to a university and test the students by competitive challenges between each other, and the students will be assessed based on their performance in the match and their ability to utilize the cards to the best level (winning or losing will not determine the student score), instead there will be an artificial intelligence in the app to analyse the students game play and to what extent they used their cards and what options they had to do, in another words if the student had the best understanding of the game criteria and had the knowledge required to optimize his gameplay he will get a better score even if he was the loser in the match.

BECTO project can be launched in 5 phases:

Phase 1: Hard copy of the cards can be distributed and evaluated by a medical team, preferred to be in a university.

Phase 2: Software design and programming step to link the cards using QR codes with the program in which if you have a card and you want to use it in the software you can scan its code and it will be available in your account.

Phase 3: Alfa release to try the application with a selected professional academic team.

Phase 4: Beta release in which the application will be available for university students by linking it with their ID and track their progress and notes.

Phase 5: complete release of the project to the public in Apple store and Play store, along with a hard copy release of the BECTO cards in the market.

BECTO Rules

- **How to play? (This can be changed according to the requirements)**

- Each player will have 4000 life points and 4000 Immunity points.
- Players can win when there life points is becoming 0
- Each player will draw 6 cards when the game starts.
- Player’s card collection must be more than 39 and less than 81.
- Player will lose if his cards finished and he has nothing to draw.
- If the immunity is 4000 no infections can be developed thus the life points cannot be reduced.
- When Immunity points is lower than 1000 the player will lose 200 life points each turn.
- Infections can be developed when the immunity is less than 4000 according to the infection type.
- Initially 5 types of cards are designed (Bacteria Cards, Antibiotic Cards, Immunity Helper Cards, Immunity Reduction Cards, and Zone Cards).

- **Cards designs**

- Each card is designed in such a way that will provide the basic information on the right side, title on the top, picture on the middle, power points or immunity points according to the card type, and on the bottom there is 2 paragraphs, first one is general information about the antibiotic, bacteria, or the miscellaneous card, and the second paragraph is about the card effect related to the game, and lastly on the bottom each card will have a reference link from a trusted website, also some cards in different classes can have some variation on their design like: color, information on the wright, and specific card information.

- **Bacterial Power Points Calculation**

Activity	Gram Staining		+ or -	50		Not stained	100
Oxygen Dependence	Requires O ₂	50	Do not Requires O ₂	50	Can live in both conditions	100	
Shape	Mono-Shape	50		Multi-Shapes		100	
Rarity	Common	0	Un Common	50	Rare	100	Unique 200

- Immunity points consumed from each antibiotic depends on:

Activity	Bacteriostatic		0		Bactericidal		100				
Pregnancy	A	0	B	50	C	100	D	150	X	200	
Gram + or –	+		0		-		0		+ & -		50
Route	Orally		0		IV		100				
Renal Clearance	Not cleared by kidney		+		0		Cleared by kidney		50		

If the infection is not developed yet

- Orally given antibiotics will have a delayed action of 1 turn in which the bacteria can revive or be enhanced by ability or any immunity reduction card, but the bacteria in this stage can't do damage but it can attack if the antibiotic is Bacteriostatic.
- IV antibiotic can produce the action immediately and remove the bacteria from the field.

If the infection was developed

- The infection will be developed after certain time if the bacteria was not treated and the treatment method will appear to the player with specific conditions and antibiotics to be used. (If the player has the antibiotic card in his hand he can play it directly but if the treatment requires more than 1 antibiotic and the player is missing one of them or both he can pay a specific amount from his HP to create the required antibiotic(s) and use it once. (The cost of HP required will be calculated based on the antibiotic immunity requirement X 2)

- Card types

Bacteria Cards						
Title	G +/-	O+/-	Shape	Rarity	Power	Description (Front 7.5, mini pro bold type)
Escherichia coli	-	-	Rod	Common	400	Straight rod shape bacteria, gram negative, anaerobic, and enterotoxins producer, which can cause infections varied from food poisoning to urinary tract infections. <ul style="list-style-type: none"> This card can infect the host if the immunity points is less than 3800 and can last for 3 turns consuming 200 HP if not treated. Reference: http://www.toptenreviews.com/software/education/best-typing-software/

Antibiotic Cards

Title	Activity	Pregnancy	G+/-	Immunity	Description (Front 7.5, mini pro bold type)
Ampicillin	Bactericidal	A	+ and -	200	<p>Ampicillin is used to treat or prevent many different types of infections such as bladder infections, pneumonia, gonorrhea, meningitis, or infections of the stomach or intestines.</p> <ul style="list-style-type: none"> Ampicillin is used to treat Beta lactamase resistant bacteria it can treat it immediately after playing this card but when this card activates it will consume 200 Immunity points. <p>Reference: https://www.drugs.com/mtm/ampicillin.html</p>

Immunity Helper Cards

Title	Type	Immunity Granted	Description (Front 7.5, mini pro bold type)
Physical Exercise	Fast activation	500	<p>Physical activity may help flush bacteria out of the lungs and airways. This may reduce your chance of getting a cold, flu, or other illness. Exercise causes changes in antibodies and white blood cells (WBC). WBCs are the body's immune system cells that fight disease.</p> <ul style="list-style-type: none"> This card can be activated immediately and grant the player 500 Immunity points. <p>Reference: https://medlineplus.gov/ency/article/007165.htm</p>

Immunity Reduction Cards

Title	Type	Immunity Reduction	Description (Front 7.5, mini pro bold type)
Smoking	Delayed activation	500	<p>It's no surprise that smoking increases one's risk of developing respiratory illnesses, such as bronchitis or pneumonia. This is due to tobacco smoke's immune suppressing effects, as well as smoke entering and damaging delicate lung tissues.</p> <ul style="list-style-type: none"> This card can be activated only after one turn and it can cause reduction by 500 Immunity points for 3 turns <p>Reference: https://vapingdaily.com/smoking-effects/smoking-and-the-immune-system/</p>

Zone Cards

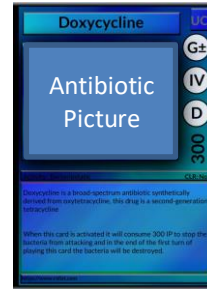
Title	Type	Rounds	Description (Front 7.5, mini pro bold type)
Pregnancy	Delayed activation Trimesters (1 st , 2 nd , 3 rd)	9	<p>The pregnancy category of a medication is an assessment of the risk of fetal injury due to the pharmaceutical, if it is used as directed by the mother during pregnancy.</p> <ul style="list-style-type: none"> Classes: A=Save, B= Save, C= antibiotic can't be used twice otherwise Immunity will decrease 200, D= 200 immunity, X=500. <p>Reference: https://chemm.nlm.nih.gov/pregnancycategories.htm</p>

Card Designs:

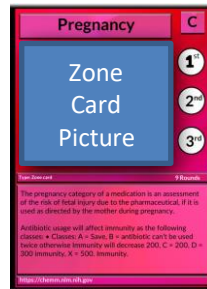
1) Bacterial Cards



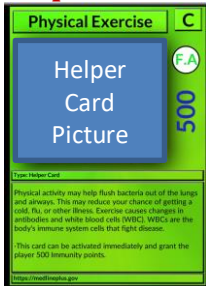
2) Antibiotic Cards



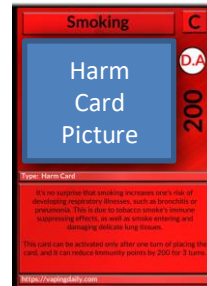
5) Zone Cards



3) Helper Cards



4) Harm Cards



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