The 8th International Educational Games Competition

At the 14th European Conference on Games Based Learning

23 - 25 September 2020

This booklet includes the outlines and descriptions of the games submitted The 8th International Educational Games Competition. This is for reference purposes. If you wish to obtain more information about any of the games contact details are provided.

Game outlines in this book will be presented to judges in one of the following categories, finished games, games in development and student games. The Finished games are further split into digital and non-digital games.

PM Hero

A Project Management enhanced learning experiential game

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Game Description

It is no secret that workplaces are changing their learning and methods structure rapidly, to keep up with global innovation and trends (McCabe 2015). With a growing need for learning methods that are different from the conventional sitting in a classroom setting, while covering many topics. Innovation has started taking place in the learning sector, and new methods are introduced with more customized contents to train and enhance individuals' knowledge of Project Management concepts. Based on Basten (2017), gamification applies game-related elements to non-game contexts, and it is becoming a trend in business domains as a learning tool. Not only this, but gamification contributes to usability, trust and motivation, amongst many others. With the aim of engaging individuals, allowing them to test their current knowledge, apply it to situational scenarios, acknowledge the gaps in their knowledge and revisit knowledge sources for educational purposes.

As gamification engages users in high interaction, the competition element contributes to a fun and enhanced learning experience. Not only this there are individualised reports generated at the end of the game, and every decision affecting the overall outcome. The game is an online mobile application and as such allows accessibility across various platforms. It has a series of questions and MCQs, the answers of which need to be correct to progress the game, and the difficulty varies depending on the speed of responding and whether the correct answer is achieved in the first try.

The game is designed to provide real-time scenarios with questions to be answered. Users will be treated as the hero of the game in a modern world where the technology has become a main pillar. The hero will save the real-life simulated projects from impeding financial losses through making critical decisions based on PM knowledge areas in order to achieve success. Each success leads unto the next level, until the game is completed within 60 minutes. This could be supplemented for educational purposes in classrooms or training sessions. In order to adapt to various curriculum structures, the game could be played in its entirety, or stages in time frames and subsequent class discussions about the concepts at hand. This game opens several opportunities for educational purposes, engaging learners, enhancing the classroom experience and reducing their disengagement through using their mobile devices – which they could have otherwise been using to socialise and be distracted from the class. Hopefully an engaging educational experience that will re-shape the Project Management concepts delivery and training for PM students worldwide.

Learning Outcomes

This game concentrates on ensuring high-level requirements of being:

- An Educational online game

- Improving new project managers current skills

- Developing the game based on the gamification concept

- engaging scenarios that require thinking

- Enhancing Project Management concepts and solidifying understanding

- Varying difficulty levels with an opportunity for individuals to revisit sources for knowledge enhancement

Uniqueness

Simple User Interface with engaging scenarios and grounded in Project Management literature and pedagogical concepts which gamifies the learning experience and enhances the knowledge retention process while making learning fun for individuals of various backgrounds and experiences

Forgetful Janez

The main purpose of the game is to familiarize the student with the binary recording of decimal numbers, letters and words.

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Game Description

http://hrast.pef.uni-lj.si/ecgbl2020/

The main purpose of the game is to familiarize the student with the binary recording of decimal numbers, letters and words.

The game is intended to students in the fourth, fifth and sixth grades of primary school. Playing the game does require students to have some foreknowledge of binary system.

The main character in the game is the actor Janez, who throughout the game tries to find the notes from which he will learn for tomorrow's test. While searching for them, he gets to know the different obstacles he tries to overcome by logical thinking and making different decisions. With every hurdle Janez overcomes, he gains some of the knowledge he needs for the test, and gets one step closer to his notes, which will help him to further consolidate his knowledge.

Learning Outcomes

- Students learn how the binary number system works by converting decimal number into a binary number,

- students learn how the binary number system works by converting a binary number into decimal number,

- students learn how the binary number system works by converting letters into a binary number,

- students learn how the binary number system works by converting a binary number into a letter.

Uniqueness

Students learn about binary number system trough a fun game with real everyday problems and unique story based on children life. The advantage of our game is that students can come up with different results when playing multiple times, discovering hidden elements of the game that make it more realistic. For example, we mean theme in the mail that the player can change, and this does not affect the course of the game itself. There are many of these elements in the game and when students discover one, it motivates them to play the game more than once.

Lathe Safety Simulator (VR): HTC Vive STEAM Game

Play Lathe Safety Simulator VR and learn about the safe operation of an industrial lathe with levels covering topics including lathe overview, safety, practical exercises and missions aided by your friendly, voice driven robot guide providing feedback and guidance on your progress.

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Game Description

Health and safety training is essential in industry and particularly for work places and environments that involve the use and operation of heavy machinery and power tools. Consumer grade virtual reality headsets and related peripherals are now available and increasingly affordable. Speech recognition/synthesis and Question-Answering (QA) systems have improved dramatically over the last decade. Voice driven digital assistants, based on cloud-based services are growing in popularity and can be used in a range of diverse application areas.

This game explores and practically demonstrates the use of virtual reality for lathe safety training. A metalworking lathe and surrounding work environment was recreated as part of a room scale virtual reality experience allowing students to interact with and operate the virtual lathe guided by and receiving feedback from a robot NPC assistant.

Four interactive simulations are available to cover topics including an overview of the machine parts, operational safety, turning a workpiece and feedback on the skills learnt. The planning and practical design of lathe safety simulator game used the Learning Mechanics–Game Mechanics (LM-GM) framework for serious game analysis and design with related learning outcomes.

The game validation approach follows a four step procedure: (a) analysis of the learning outcomes for each level and performance indicators, (b) development of learning/game mechanics and detailed game scenarios (c) careful design of the gameplay challenges to ensure that the performance indicators match learning outcomes and (d) performance indicators are cross checked with analytics.

Learning Outcomes

Upon completion of the game, students should be able to:

- Locate and explain the function of each of the following lathe parts: headstock, chuck, spindle, chuck guard, spindle speed selector, start button, emergency stop button, lathe apron, apron handwheel, carriage, cross slide, tool dock, locking levers, tailstocks and drill bit dock.

- Understand the importance of safety, protective clothing and following the required safety procedures when using a lathe.
- Understand how to prepare and clean the work area and secure the workpiece.
- Be able to select the proper tools to use to machine the type of part required and perform basic operations on the lathe i.e. drilling a hole, extruding and cutting a work piece Interpret basic blueprints and create a work piece to a required specification.

Uniqueness

The game demonstrates the use of the LM-GM framework in the design and analysis of a Virtual Reality Game for Health and Safety Training and explores the practical use of voice in VR. It further explores the use of virtual digital assistants in this context and proposes subsequent improvements in later versions and iterations of the game.

The game is published and available for free download from STEAM using the link below (HTC Vive required to play the full game). It has had 4700+ installs to date.

https://store.steampowered.com/app/644660/Lathe_Safety_Simulator/

Wired

Learn the fundamentals of electricity in this atmospheric puzzle-platformer

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Game Description

Wired is a puzzle-platformer where all the puzzles are built on a realistic physical model of electricity. This means that by playing the game, you will also learn how electricity works.

You will learn things that are not normally encountered until A-Level physics - but no prior knowledge is necessary and you won't have to solve any equations or even get out of bed.

You play a young woman who finds herself trapped in a derelict building that has remained untouched since the 1970s. Climbing ever higher through the building to keep an appointment with a mysterious professor who lives at the top, she must wire up the fuel-cells through switches to the doors and rising platforms to get out.

Wired is a full length game taking between 3 and 6 hours to complete.

Learning Outcomes

An understanding of electric charge, voltage, current and how these quantities get distributed around a network of components. resistors in parallel and series, equivalent resistances, fuses and switch logic.

Uniqueness

It teaches electtrical topics which are way beyond anything covered in existing educational games and it does whilst staying a fun game throughout.

Pat Pat Lions

Your Touchable Arithmetic

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Game Description

Players act as shepherds to protect hundreds of lions from one elephant. The elephant is actually a NPC (non-player character) who takes action base on certain conditions. "Pat Pat Lions" can be used to play 2 different games.

Episode 1 focuses on counting, addition, subtraction, and problem-solving. Players compete against each other to become the first shepherd who brings back 100 lions from the grassland to the shed. Meanwhile, the elephant might interrupt and grab away lions. Players can use special tools to enhance their progress.

Episode 2 focuses on multiplication, division, remainders, and cooperation. Rolling 2 dice to determine how many rows and columns of lions should be gathered in the central pile. Players can play a card to divide the central pile into groups. In the elephant's turn, it will take away the remainders. All players work together against the elephant.

Beyond this surreal game background, the booklet provides factual knowledge about wildlife in Africa as well.

Learning Outcomes

Players who barely know number-counting can play "Pat Pat Lions". After enjoying 2 episodes of "Pat Pat Lions", players will be capable to perform adding (making ten), subtracting, multiplying, dividing, knowing remainders. Observing other players' trays keep them comparing and counting differences between numbers. Using tools and deciding slot-movement helps players build their problem-solving skills. Cooperating with others against the elephant helps their collaboration and communication skills.

Uniqueness

Most educational games provide a practising platform. Players are required to have the aimed mathematical skills before capable to play those games. "Pat Pat Lions" is actually a learning tool rather than a practising tool. It brings mathematics back to the touchable reality from numbers on papers.

JAMP/ Solve the Problem, Stop the Clımate Crısıs, Save the Earth

A game which teachs every age students and adults, quadratic algebraic expressions easily with a scenario that draws attention to the global climate crisis

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Game Description

The game takes place today. When the player enters the game world, s/he faces a climate crisis

scenario. There are symbols such as cut trees, factory chimneys and nuclear waste, and helpless people on a yellowed world image where the continents are barren due to drought. Story:"Global climate change is no longer a possibility, but the reality itself. The world is in the midst of an ecological crisis. There is no time to lose. 6th Massive extinction began. The only remedy to save the world is to limit global warming to 1.5 degrees and achieve zero carbon emission. A climate station project was launched with the initiative of a few scientists and prospective investors. If the algebraic puzzle is solved, green house gas emission stops. Connect to the system at the station from the world, decrypt the passwords. Earn badges with the points you collect at the end of each level."

There are 5 levels, As the level increases, the contribution increases in reducing carbon emissions.

The aim is to reduce and even eliminate carbon emissions and stop the global warming level.

I created JAMP as an in-class activity for my math class and got great results. Then last year, I converted it to a board game to attend the 7th educational game competition and it was invited to Denmark as a board game finalist. Thanks to the judges' feedback, we added gamification elements and wrote the story that you read at the top. And this year mobile app was developed with the same principles, and tested in the classroom. Children loved the game and challenged each other much more than the board game version.

There are 3 algebraic tiles (jigsaws) in the puzzle, 2 easy rules and tiles are introduced to the players. We say nothing about the task, algebra is presented just as a tool to play the game. Combining the X piece next to x, 1 next to 1 can come in length. the models shape has to be a rectangular or square. Now its time to model the expression, miraculously many of them build the model.

Learning Outcomes

We teach our students quadratic algebraic expressions in 7th and 8th grades. Many students are afraid of math and have many prejudices. I have been teaching the task as a game for 4 years. I searched for a material and found out the magnetic sheets. I custom ordered magnetic algebraic tiles and started to use in the class. In the first level, students factorize a quadratic 3-term algebraic expression without any instruction. In the second level, without actually "multiplying", they find the multiplication of algebraic expressions by simply building a puzzle (i.e. modeling). And as a teacher I observed that most students participate with enthusiasm, even the ones who previously never showed any interest in class. With my game permanent learning takes place. And this year mobile app, it is now even more engaging. Children love the game and challenge each other much more than the board game version.

Uniqueness

Each teacher uses algebra tiles in modeling algebraic expressions, but what makes the method unique here is that the subject of modeling has been transformed into a game reduced to 2 simple rules, and can teach a difficult math subject only with the "jamp" game. By playing "jamp", students don't realize but they all learn the subject easily. Children or adults learn better when they are not stressed out about learning. My game managed that, I tested on many age groups. they all work. Finally, this year thegame's mobile app version is ready with the same principles of the boardgame version but with a strong scenario about climatecrisis. That scenario draws attention to the most

important problem Earth and its inhabitants face today, and converted the game to a strategy game that uses algebraic solutions. That gives to players a strong reason to continue to play and increase the excitement.

GramMars Wars

Game for kids and adults to learn English & ESL grammar

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Game Description

GramMars Wars is an educational game about English grammar featuring RPG mechanics. Learn grammar while leveling up a team of cards that you can collect and will help you to defeat the English & ESL questions in the form of evil aliens.

GramMars Wars belong to a new generation of engaging online games, where the player will be able to not only learn but also level their team and unlock unique skills. Thanks to strategic thinking, the player can bypass some of the most challenging questions. When a player experiences difficulty, he can keep trying, and through experience points, the game will balance itself, so it becomes easier.

An early version is now available at www.grammarswars.com

Learning Outcomes

You'll learn about nouns, compound adjectives, linking verbs, verb tenses, sentence composition, and other vocabulary and fill the blank questions.

Uniqueness

The online ranking system and the fact that you can collect and level up your own monsters cards similar to Pokemon.

Chesstroika

A viable addition to the Chess genre using conventional board and Pieces but with many new checkmating scenarios possible

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Game Description

Troika means three leaders or a carriage drawn by three horses. The game Chesstroika can involve more than three of the same type of Chess piece e.g. a Knight. The underlying scenario is less male-dominated (no King as such) more democratic - as in Perestroika - and gets away from the conventional 19th Century-style battle opening line-up. It uses a standard Chess Board with its 64 squares, a set of Draughts pieces and a matching set of Chess pieces, although the Kings and some other pieces are not used. At the start, twelve draughts Counters for each player are set up on the board in a specific pattern. As play develops, a Counter can be moved to any vacant adjacent square

and converted to a Chess Piece, which may then attack, defend or 'checkmate' as in conventional Chess but in this case not just a King but ANY opposing piece. When pieces are attacked they are obliged to move and when this is not possible a checkmate occurs irrespective of the type of piece: Counter, Pawn, Knight, Bishop, Rook or Queen. This feature arguably makes the game more interesting than Chess. Complex scenarios develop as more pieces are introduced on both sides, with opposing pieces being captured or checkmated until one player has removed all of the other player's Chess pieces. In a single game many checkmates, typically six to sixteen, can be achieved by either or both sids, sometimes more than one in a single move.

The main features are:

• Uses just twelve on-board playing pieces per player (compare Chess 16)

• Setting up is very easy with twelve Counters per player placed on the board

• The starting player has a choice of 40 opening attacking moves (Chess nil)

• Any type of piece may be attacked, captured or checkmated (compare King only)

• Several checkmates may occur during the course of a single game (one only)

• Checkmates on six different types of piece are possible leading to original matings

• Optionally, points may be awarded for the number and value of pieces checkmated during a game or unable to move at the end, i.e. not just a WIN or LOSE result

• The rules are simple, with no special or exceptional cases, loops or stalemates

A game may last for anything between around 10 and 60 moves and while providing the same type of engagement which Chess has done for over 1000 years, it further extends this engagement and enjoyment by revealing many new situations never seen in Chess. The version described is deliberately designed for use with equipment already present in many households.

Learning Outcomes

Short term engagement in a competitive environment. Longer term development of strategy and decision-making skills.

Uniqueness

Uses conventional checker-board and pieces but players are presented with many new choices at each stage. Points can be scored for checkmating any of six types of piece i.e. not just a win or lose result.

Digitalised Production Control
From lean manufacturing to digitalised production in a fun simulation game

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Game Description

The developments of digitalisation, also referred to as the fourth industrial revolution, lead to a fundamental change in industrial production across all sectors. Industrial production is currently often organised using lean production methods. These methods are changing, and digital tools for

production will increasingly be used in the future. The digital transformation of the production causes challenges in the manufacturing industry. Firstly, some companies have none or few competencies in this field and do not know the advantages for the company itself as well as for the employees caused by the digital transformation of production. Secondly, the role of employees in production is changing and they are often reluctant to adapt to these continuous changes.

Simulation games are dynamic models for the game-based simulation of a system with the aim of better understanding, evaluating and designing systems. The artificial environment of a simulation game imitates the functions of a real environment and situation in which the players can gain experience and make decisions without pressure or real consequences. Therefore, simulation games are seen as an adequate approach to qualify employees in manufacturing industry.

The simulation game developed by Fraunhofer IPA uses active learning methods to achieve higher learning outcomes than the comparatively passive conventional method of frontal teaching. Two production methods are implemented and combined in two different rounds of the simulation game. In the end, the advantages and disadvantages of the different types of production are discussed with the participants. The main goal of the simulation game is to understand the basic principles and backgrounds of lean production and digitalised production in general.

The result of this work is the elaboration and implementation of a simulation game which meets the requirements and learning outcomes described above. In the context of the simulation game, three fields of action and directions of digitalisation in production are emphasized, namely efficiency, transparency and the generation of data.

Learning Outcomes

Description:

- Interactive simulation game with several rounds;

- Assembly of mBots (simple robots) according to different manufacturing principles;

- Encourages participation and implementation of newly-gained information;

Aims:

- To understand the challenges facing manufacturers of products with high numbers of variants;

- To combine the concepts of lean production and Industry 4.0;

- To experience the advantages of digital production planning and control;

Added benefits:

- Suitable for the training and further education of employees and students;

- Demonstrates the principles of Industry 4.0 by way of an interactive game;

- Increases the understanding and acceptance of Industry 4.0;

- Serves as an introduction to Manufacturing Execution Systems (MES);

Uniqueness

The simulation games already available have a focus on production and partially fulfil the features: the target groups of simulation games are students and workers, the quality process of production is implemented, the manufacturing processes of production are implemented and key performance indicators (KPI) for production are considered. However, the digitalised production control (Manufacturing Execution System) was not considered in the these simulation games, which

indicated that a new simulation game was needed to fill this gap. In the interactive simulation game "Digitalised Production Control", the participants become familiar with the changes in production planning and control brought about by Industrie 4.0. They can experience these changes for themselves by assembling simple robots.

Welcome Rookie: A Game of Ethics

Welcome Rookie is an immersive card-based game that teaches medical ethics to student doctors, utilising an augmented reality app that intelligently evaluates players performance.

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Game Description

Student doctors need to develop clinical reasoning skills as part of their professional development. Case-Based Learning (CBL) based on real/simulated patient cases is a common approach in medical education (Brown et al., 2016) linking student learning with "real-life" situations. It is popular and effective in promoting engagement, collaboration and discussion (Thistlethwaite et al., 2012; Hakkarainen et al., 2007) as students exposed to CBL also seem better able to connect theory to clinical practice (Hansen, 2005). However, some topics, especially medical ethics and professionalism, are very sensitive and text-based CBL fails to provide the active/engaging learning experience needed to fully immerse and train students in that regards (Naik & Sangle, 2013).

Our game "Welcome Rookie" utilises novel gamification elements to maximize the outcomes of CBL to help students learn and apply medical ethics. We have used powerful storytelling features embedded into a physical card game to simulate real clinical settings. Players take the role of Dr Katie Peers, a junior doctor with the objective to safely complete a night on call while prioritising, diagnosing and treating the patients referred by following General Medical Council's (GMC) ethical and professionalism guidelines. The tailored story progresses by revealing different cards based on the decisions, actions and choices players make, which can drastically alter the story, resulting in success, failure, or even death.

The deck of cards proposes a cooperative scenario that can be played by 1 to 6 players. Within 30 minutes, players will have to unravel the story as a team and make some tough choices in real time to win. While the game is played using a physical deck, a support app has been developed to provide hints throughout the game using novel Augmented Reality (AR) capabilities. At the end of the game, the app also automatically scores players' performance based on the choices they have made and provide a detailed report reflecting their strengths, weaknesses and lessons learned.

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• Hansen, W., Ferguson, K., Sipe, C. & Sorosky, J. (2005) Attitudes of faculty and students toward case-based learning in the third-year obstetrics and gynecology clerkship. Am J Obstet Gynecol; 192(2), pp.644–647.

• Naik, A. & Sangle, D. (2013). Comparative study of Case Based Learning (CBL) with didactic lectures as a Teaching-learning (T-L) method for improvement of ethical skills of M.Sc. Pharmaceutical Medicine students. Research Journal of Pharmacy and Technology. 6(1), pp.912-915.

• Thistlethwaite, J., Davies, D., Ekeocha, S., Kidd, J., MacDougall, C., Matthews, P., Purkis, J. & Clay, Do. (2012) The effectiveness of case-based learning in health professional education. A BEME systematic review: BEME guide no. 23 Med. Teach., 34 (6), pp. e421-e444.

Learning Outcomes

1. Develop clinical reasoning skills of medical ethics for student doctors and enhance the accompanying decision-making process.

2. Promote problem solving, collaboration and team work.

3. Connect medical professionalism theories to clinical practice and real-life ethical dilemmas.

4. Introduce basic medical ethics terminology.

5. Understand the importance/value of adhering to medical ethics and professionalism in a clinical setting and the repercussions of failing to do so.

6. Learn how to prioritise basic ethical principles.

7. Reflect on different ethical decisions, laws and the expected conflicts.

Uniqueness

1. Integrate unique gamification mechanics with AR technologies in a novel CBL game that addresses a critical learning module (medical ethics).

2. Embed tacit knowledge of medical experts into engaging playable scenarios.

3. A huge impact is expected on medical education after transforming the transition between theory and practice, which in return will potentially improve medical decision-making process and ethical practices.

4. Unlike traditional CBL, this game gives the players the opportunity to roleplay and live through a doctor's eyes in an immersive educational experience.

5. Unlike most educational games, this game relies on a heavily engaging mechanics that engage different typologies of players.

6. Educational elements regarding medical ethics are not presented as a separate layer from the game, but deeply embedded in the game mechanics to immerse players in an engaging experience.

FABE Mathematics scrabble game

The FABE mathematics scrabble game is an educational board game developed with the aim to improve students mental arithmetic skills, computational skills and to arouse interest in Mathematics.

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Game Description

The FABE Mathematics scrabble game is an educational board game with set of rules that lead to attainment of instructional objectives.

The game materials are

Racks for holding tiles

Tiles made of Digits(0, 1, 2, 3, 4, 5, 6, 7, 8, 9), Basic Mathematics symbols (+,-,×,÷), Other mathematical symbols (>,<, =)

A game board with inscriptions (double digit score, double number score, triple digit score and triple number score)

A bag for tiles and racks

Paper and pencil for recording points

Rules of the game

The game tiles are placed vertically or horizontally not diagonally or both vertically and horizontally

Only true mathematical expression, equation and number can be formed.

A false play attracts zero points and the player loses turn. Examples

i) 2 + 2 = 4 is a correct equation while 3 + 2 = 4 is NOT a correct equation

ii)+2 is correct an acceptable expression in Mathematics but ×2 is a NOT a correct expression in Mathematics

Only the digits not symbols can be reused and each row (column) should not contain more than three symbols.

A player can exchange tiles from the bag and loses turn.

The game points are calculated depending on the inscription the tile is placed on. Example:

A tile with digit 3 on a triple digit score will be calculated as 3x3 =9 points.

(ii) If the digit 3 is on double digit score then the point is 3 x 2 = 6points

(iii) If any digit is placed on double number score, the accrued points will be doubled

(iv) If any digit is placed on a triple number score the accrued points will be tripled.

Procedures

A tile is picked from the bag by each player to determine who starts the game. The player with the least digit starts the game example if three players picks digits(4, 1, 5) the player with digit 1 starts followed by the player with digit 4 and the player with digit 5 plays last. If Mathematics symbols are picked then the rule of Division, Multiplication, Addition and Subtraction (DMAS) is applied.

Six more tiles are added to make up seven tiles expected by each player for the game.

The players start the game by placing tiles on the start(star symbol*)

Players can form

Numbers using one or more digits (17,235,6)

Mathematical expressions using numbers and symbols (8-3, 265 x 9)

Equation (7+18= 25, 68 – 9 = 59).

PREMIUM POINT. A 50 point BONUS for solving correct equation.

Strategy :Each player aims at obtaining a premium point by solving an equation correctly, current points are added to previous points to get the cumulative points and the game ends when any player plays his/her last tile.

Winner: The player with the highest cumulative point is the winner.

Learning Outcomes

Players don't determine tiles that are picked from the bag hence it is a game of chance teaching the concept of probability also it requires mental arithmetic skill to place the tiles on the board to achieve high points and in calculating points the players computational skill are improved. Summarily, interest in mathematics is arouse and sustained.

Uniqueness

The FABE mathematics scrabble game is different from the ones available because it increases the players mental and computational skill unlike the English scrabble game which increases players vocabulary.

LifeLab+

A health game that mixes Pokemon Go style "go outside" gameplay with diet challenges and multiplayer gameplay.

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Game Description

LifeLab + is a multi-pronged real-world game with augmented reality features and mini games. The game is only accessible to class groups who take part in the Engaging Adolescents in Changing Behaviour intervention. In LifeLab + players can play different health-related adventures.

In "Bobby Saves the World" players have to team up with friends to save their real neighbourhood from a demon that Bobby accidentally unleashes in his lab. Moving location to location, players investigate gas attacks where the demon has released lazy gas and they save people from the demon's minions.

In "Doug's Channel" players help a popular streamer investigate their missing friend by collecting evidence on the international conspiracy of Big Food to trick people into buying cheap sugar dense foods with little nutritional benefit. Players have to take photographs of real-world advertisements and supermarket layouts to help expose the culprits and rescue Doug's friend.

Gutsy sees players helping to raise an alien by giving it food that helps it maintain a healthy gut biome. Players suggest food through a matching tile game and Gutsy gives players real-world food experiments to try in return.

Finally, an at-home exercise challenge system allows players who don't want to exercise outside to customise their journey to fitness by going on one of three virtual-coach supported fitness programmes.

Multiplayer elements allow players to invite their classmates to join them in quests. The game is protected so that only participants in our intervention can gain access using unique usernames and passwords we give them.

LifeLab+ is one of a three part complex intervention. In addition to the game, class groups are given access to an 8-lesson educational pack that culminates in a visit to a specially build lab facility at Southampton General Hospital. Finally, their teachers are given "Healthy Conversation Skills" training on how to support young people's ownership of their health journeys.

We are incorporating data driven approaches to our game and are treating it as a "Software as a Service" product. In other words, the intention is to continually update, change, and add content to the game in response to how it is used by our players. Whilst this practice is common in the commercial games industry, it is relatively rare for a Serious Game to be developed in this way.

The game has been developed by a team of Serious Game experts, pyschologists specialising in behaviour change, with co-design representatives from our target age group.

Learning Outcomes

The game seeks to improve education and behaviour on eating and exercise. We aim to change attitudes as well as actual behaviour.

Uniqueness

Most interventions in this area fail because they are overly didactic. Instead of telling teenagers to eat better and do more exercise we have attempted to design exercise and eating activities that align with their existing values. These games emphasise social aspects, and experimenting with one's own body over being told what to do by adults.

Multingo (Çarpala)
multiplication table game

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Game Description

Multingo (Çarpala) can be played 36 students at the same time. It contains 36 player cards and 55 multiplication table questions stamps. First, a person who manages the game is selected. (This person usually becomes a teacher, and sometimes the winner can be rewarded with managing the game on the next round)

The round cards written by the result of the multiplication are distributed to the students.

The manager mixes the stamps and selects one of them and reads the multiplication question.

The manager waits a little while for the student to calculation according to the level of the student.

The student closes this calculation if the multiplication result is written on the round card given to him/her.

The manager chooses the second multiplication process and proceeds to this way. The student closes all the numbers on his card, says "Multingo (Çarpala) " and takes the card to the manager for checking.

If all the results are correct, this student is declared the winner.

There is an owl medal for the champion in the box. This medal is designed to increase motivation in the game.

Learning Outcomes

It was observed that the students playing "Multingo (Çarpala)" learned the multiplication table quickly and with fun.

Uniqueness

Multingo(Çarpala) can be played with maximum 36 students at the same time. It helps classroom manegement and provides learning with fun.

Brave New World

Settlers on an uninhabited island choose constitutional rules, and then experience the consequences as they try to maximise their character's happiness, amidst competing interests and revolution.

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Game Description

The players are settlers on an uninhabited island. In the original version, described here, they are Goblins on a planet far, far away. The objective is for each player's Goblin character to live the happiest life they can live, measured in terms of happiness tokens they collect as they pass through different stations. The first player to collect 20 tokens is the winner.

Each player is dealt a Character Card which sets out their particular characteristics, their likes/dislikes and how many happiness tokens they will gain (or lose) by landing on each station (e.g. a Goblin suffering from itchy fleas will be made happier by a visit to medical hut). The Character Card also describes the Goblin's gender, religious affiliation and race (green or purple).

Importantly, Goblin world, like our own, has ingrained and long-standing prejudices. Some groups – eg females, the minority purples, and the religious 'spoon-carrier' sect – tend to fare worse than others.

To start the game, the Leader is chosen by a roll of the dice. The Leader then choses a single 'High Law' from a list of options. The High Law will be the supreme legal rule on the island. Some of the options on the list of possible High Laws benefit the Leader directly, others protect one of the oppressed social groups, whilst others try to impose social conformity. It is only after the High Law is chosen, that the players are permitted to turn over their Character Cards and discover their character. Thus the Leader chooses the supreme High Law not knowing what his/her characteristics are.

During the course of game-play new ordinary laws (as distinct to the High Law) are made regularly (whenever a character lands on a red square a law-card is picked up and read out). But these ordinary laws are only valid if they are in harmony with the supreme High Law.

Where there is disagreement about the meaning/validity of an ordinary law, the players must resolve this with the Leader having a casting vote. This human dimension is important, as flexibility or harshness towards others is likely to be reciprocated when a player is hoping for a lenient interpretation!

Whenever a player is dissatisfied they may use their turn declare Revolution. The chances of success increase according to the number of players willing to support it, meaning the more dissatisfaction, the less stable the regime. If successful, the old Leader is overthrown, the instigator becomes the new Leader, and chooses a new supreme High Law. All ordinary laws are scrapped. But if the Revolution fails, all of its supporters are consigned to the punishment Swamp for three turns.

Not all audiences enjoy fantasy, so other versions of the game – with identical principles – have been developed: Pilgrim (set in colonial New England); Pirate; and The Island (which has a young adult horror back drop). The game also exists in Spanish and Welsh language versions.

Learning Outcomes

These are adjusted to some degree, depending on the players age-profile, context and version of the game. However, the following objectives are consistent:

1) Developing empathy; players are required to adopt the roles of those in society who may be very unlike themselves.

2) Developing an understanding of the need for legal systems to balance conflicting rights and interests.

3) Understanding that human rights exist for the benefit of an entire community, and that societies which oppress particular groups are dysfunctional and mired in conflict.

4) Understanding both the significance of the Rule of Law, and that it is ultimately dependent upon the acceptance and good will of a critical mass of citizens.

5) Developing an understanding of the differing roles within constitutional systems, and the scope for tension between them, e.g. those appointed to make laws and those who have to interpret them.

6) Developing an understanding of the complexity of legal interpretation, of how words and regulations can be read in more than one way, and that the agenda of the reader affects the interpretation which is likely to be favoured.

Uniqueness

No existing games around building a civilisation are aimed at experimenting with its political structures in a competitive way. It also allows for experimentation in this context at different levels, depending on the participants.

WinWin Insurance Plus

WinWin Insurance Plus integrates situated learning with authentic enterprise data and experiential education based on cognitive and flow theory to develop business management and strategic planning learning by steadily operating company to gain the profit and reputation.

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Game Description

WinWin Insurance Plus, an educational game, is developed by National Taiwan University of Science and Technology Mini Educational Game (NTUST-MEG) research group and Cathay Life Insurance. The content of this game is generated from real-word life insurance company including the stock and bond flow, the risk, financial background of clients, and covers knowledge of life insurance. WinWin Insurance Plus integrates situated learning with authentic enterprise data and experiential education to develop business management and strategic planning learning by steadily operating company to gain the profit and reputation. In the game story, players as the insurance company professional manager operates the company following the philosophy "corporate social responsibility and sustainable operation" not only to make profit and gain social reputation. The only way to win the title of "Best Insurance Company Professional Manager" is to operate steadily the company including selling the insurance, investing stocks and bond, recruiting, expanding company department, executing project within six rounds of game within global unpredictable occurrence. The story provides the learners a scenario and a task as a part of situated learning. In this study, there were four players in each group. WinWin Insurance Plus integrating situated learning and experiential learning with authentic insurance company data designed on cognitive theories and flow theories leads to learning transfer. WinWin Insurance Plus designed base on authentic enterprise data, worker placement and resource allocation with precise calculation assists learners to experience steadily operation with all aspect is the key to be the best professional manager. Each round learner can exam their strategy planning; the profit and social reputation as feedback and scaffolding to guide learners to reflect and plan the strategy for the next round. Learners transform the experience in the game to the business management and strategic planning knowledge.

Learning Outcomes

WinWin Insurance Plus integrating situated learning and empirical learning with cognitive design could be considered as an educational game that promotes learners' engagement,management and strategy planning learning.Learners knows how to operate the company following the philosophy "corporate social responsibility and sustainable operation."

Uniqueness

WinWin Insurance Plus integrates situated learning and empirical learning with cognitive and flow theories design.WinWin Insurance Plus designed base on authentic enterprise data, worker placement and resource allocation with precise calculation assists learners to experience steadily operation with all aspect. The content of this game is generated from real-word life insurance company including the stock and bond flow, the risk, financial background of clients, and covers knowledge of life insurance. Learners operate steadily the company including selling the insurance, investing stocks and bond, recruiting, expanding company department, executing project in the game within global unpredictable occurrence.

Hex on Turtle Islands

Hex on Turtle Islands is a game that focuses on developing players' identity, self-efficacy and interest in cybersecurity.

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Game Description

Objective: Hex on Turtle Islands is a digital game to engage players with cybersecurity concepts. Our purpose is to use gaming to convey multidisciplinary aspects of cybersecurity, promote cybersecurity self-efficacy, and increase participation of pre-teens in cybersecurity, especially those from underrepresented populations

Design: Hex on Turtle Islands is a two-dimensional game involving two main components:

1) Rich Narrative- Hex on Turtle Islands provides a rich narrative for players to immerse themselves in the role of student on a summer internship with a team of scientists aboard a research ship investigating the local marine flora and fauna around the Turtle Islands. During the gameplay, players help game characters by solving different kinds of problems.

2) Cybersecurity concept based puzzles - The player completes game-based tasks by learning and applying cybersecurity knowledge. The game is designed to balance technical concepts with social/contextual cybersecurity aspects.

Plot and gameplay: The Turtle Islands, which is home to the large corporation known as HEX, is the setting of the game. The crew on a research ship is composed of the player in the role of a summer intern, two friends designed to be roughly the same age as the player, a lead researcher, an assistant researcher, and a technical specialist. The story begins as the lead researcher is about to make an announcement; the player is tasked with retrieving one final piece of data for her from the ship's hold. As the player goes below deck, the boat is boarded by pirates, and the scientists are kidnapped. With no crew at the helm, the boat runs aground on one of the islands, leaving the player and their two friends with the initial goal: to find out what has happened to the rest of the crew. As the game progresses, players explore the Islands, uncovering a larger mystery surrounding the HEX Corporation en route to rescuing the other crew members and saving the Islands and the world in the process. Along the way, players will need to use skills, knowledge, and practices associated with cybersecurity to unravel the mysteries behind the HEX Corporation and rescue the crew.

Learning Outcomes

Develop cybersecurity skills by successfully completing cybersecurity tasks and applying learned knowledge

Develop interest in cybersecurity by playing a game within a relatable world and story that is an overall engaging and fun game experience

Develop cybersecurity self-efficacy through mastery and vicarious experiences

Uniqueness

Informal interventions have been shown to interest young learners in cybersecurity, and digital games (due to their affordances of identity formation and epistemic transfer) are an especially appealing medium to tackle this. However, in a recent review of cybersecurity games, we found that most games had thin narratives. In our game, we engage players with authentic cybersecurity concepts, but also tap into an array of interests to attract those who might not think of themselves as interested in cybersecurity.

Cybersecurity has a deeply rooted equity problem. However, little is known about designing cybersecurity game-based learning for inclusion. In Hex on Turtle Islands, players are provided with diverse representations in both characters, and in how they can depict their in-game avatar. Further, Hex on Turtle Islands focuses on the broader definitions of cybersecurity including topics such as trust and the social implications of cybersecurity. We created challenges focusing on underpinnings of cybersecurity such as problem solving.

Moiland!

Multiplayer data driven game about the world.

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Game Description

M✪iLAND! is a local multiplayer game with educational elements. Game sets 2-3 players against each other in struggle for world domination via conquering as much countries as possible. Players can compete in various game modes. Score of each player depends on selected game metrics. In the prototype demo players can switch between population and area of each country, but it can be basicaly any measurable data for each country.

Game started as jam project with students in 2019 (https://tedigames.itch.io/moiland) and it proved to be both realy catchy and educative, so we decided to develop it further. In near future we plan to aim for a mobile version, where each player can see only his own part of gameplay instead of split screen provided in prototype. For extra fun, there will be various power-ups that player can use to gain advatage in conquering countries.

Players can develop different strategies for each mode using provided map and their knowledge about selected metrics. They can learn it by playing as the game constantly shows values for countries they are currently „visiting". They can also "tryhard" and try to learn top countries for selected metric. This can be used for teaching specific geographic, demographic, or historical datasets. Game also greatly helps to understand the concept of round earth, if needed.

Learning Outcomes

Players can discover various facts about different countries, such as land mass, population, gdp, median income or basicaly any provided data. There is also possibility to use it as esport in class or during various geographic competitions.

Uniqueness

Game combines competitive nature with data about the world. It is possible to add various combinations in order to teach specific subjects including historical data (ie. colonisation, war aliances or other divisions of world map than current borders).

Prison Escape

Prison escape uses a game-based learning approach for bridging the theory-practice divide and improving online student engagement, motivation and experience in a knowledge management course.

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Game Description

Prison Escape, as an active, innovative, interactive and full of fun online-gamified team exercise, is specifically designed to motivate online students to behaviourally, cognitively and emotionally engage in an undergraduate online course namely 'Knowledge Management & Organisational Learning' through complex real-world experiences (e.g. knowledge sharing in virtual teams); and yet, emphasised theory-based knowledge (e.g. resource-based theory) within a Community of Inquiry Framework (Garrison, Anderson & Archer, 2000). Prison Escape helps to bridge the theory-practice divide and improving online student engagement, motivation and experience in a knowledge management course.

While the online exercise could have any two types of teams, which allow for the enactment of competitive and cooperative behaviours, in this educational online-gamified team exercise, online students are divided into prisoner and police teams. Each team may consist of four to six members and each game may involve up to 20 to 40 groups. In other words, each game may allow up to 240 online students actively participating at the same time.

The online team exercise starts in Week 3 of each course offering and lasts for three weeks (totalling ten rounds in the game). This allows time for teams to strategically organise, manage and share knowledge resources as well as apply skills and concepts they have learned in the course. Each team's mission is to catch or escape before the game ends (i.e. in round 10). Students must work with their own peers (either police or prisoner) in order to fulfil their mission. Once students have registered and signed in the game, they will be able to travel on a virtual map using virtual transportation such as cars, buses, taxis and trains to 'catch' or 'escape' on various virtual routes on the map. The virtual map helps online students visualise their own and their counterparts' locations, encouraging them to practise and develop, for example, their interpersonal and cognitive skills during the planning activities. The online team exercise helps to enhance students' experience by supporting their higher-order thinking, individual and collective learning, and social presence online. Before each round begins, students are encouraged to reflect on the skills they have practised and re-organise, reinforce and consolidate their learning in the course materials for further personal development.

An animated video is developed and embedded in the web-based game setting the scene for the exercise. Students are able to use a WhatsApp-like feature that supports student communication within the game to share knowledge and ideas with their teammates online. A prisoner group is

considered caught when both a police and a prisoner groups landed on the same travel stop on the virtual map. The game will alert all groups if a prisoner group is caught. The game will end once all prisoner groups are caught or all rounds are completed.

Assessment strategies have been carefully developed and integrated to enhance student learning. For instance, online students each prepare a report reflecting on their own learning journey after the exercise. The exercise and reflective report are purposefully and constructively aligned with course learning outcomes (Biggs & Tang, 2011). Prison Escape is mobile friendly, meaning that the game displays accurately between desktop/laptop computer and a mobile device such as a handheld phone (iPhone, Android, Blackberry) or tablets (iPad, Kindle, and Galaxy). Prison Escape is covered under a Creative Commons Attribution 4.0 International Licence and thus is available to the wider academic community.

Learning Outcomes

The game helps bridging the theory-practice divide and improving online student engagement, motivation and experience in a knowledge management course. Online students are able to learn theories such as 'knowledge worker roles' (Reinhardt et al., 2011) and, at the same time, practice those roles in a close to real-life situation. In short, online students are able to draw connections between coursework and real-life situations in an online environment. They are behaviourally, cognitively and emotionally engaged in an undergraduate online Knowledge Management & Organisational Learning course.

Uniqueness

The effectiveness of my innovative, game-based, online initiative is evidenced by students' behavioural, emotional and cognitive engagement in the course. In terms of behavioural engagement, there was a significant and visible improvement in student interaction, persistence and attention to detail, not only during the team exercise but also throughout the semester. Many students were inspired and motivated to think critically and creatively. They evaluated and challenged different views and offered constructive criticism through the forums, and thus were able to practise their communication, presentation and interpersonal skills. Also, the online nature of the team exercise imposes no capacity restrictions in terms of where and when to participate and so allows students from domestic and international, metropolitan and regional areas to engage and interact with, and thus to learn from and with, each other. The team exercise helps online students from equity and other demographic subgroups participate actively in the course and exemplifies the breadth and depth of learning that can be achieved by online students. The University's Learning Analytics showed that online students' behavioural engagement in terms of the number of forum views and posts increased nearly 22-fold in the pilot year in 2015 and remained steady with an average of 69,000+ interactions since the exercise was fully implemented in 2017.

Regarding emotional engagement, many students were enthusiastic about the innovative and interactive teaching approach as they could apply their knowledge through the online exercise and they valued the knowledge and skills they were developing. One student commented, 'I felt connected and enthusiastic from the start. I've found what I've been taught helpful at a grass roots level' [Unsolicited Teaching Evaluation, 2019].

In terms of cognitive engagement, many students put much effort into understanding the course content and continued studying it throughout the semester. The University's Learning Analytics showed that an average of 99.37% of students accessed the course resources including Prison Escape after the exercise was fully implemented, which strongly indicates that the team exercise helps foster student development by stimulating curiosity and independence in learning.

Both the online team exercise and the reflective report provide theoretical and practical learning opportunities for students to constructively apply their learning of the concepts and theories in the

course. One student commented: 'The [reflective] assignment is a practical example of Knowledge Theory. The team exercise is also a good team building and memorable activity that helps support my understanding of the topic. It is very interesting and applicable to any workplace' [Unsolicited Teaching Evaluation, 2018]. Thus, the exercise and reflective report emphasise learning that bridges the theory-practice divide and help online students apply their knowledge and skills in the workplace.

Further evidence that my communicated expectations and support of student learning have the perceived impact by the students themselves is found in their consistent positive feedback through my teaching evaluation scores. Since the game was fully implemented in 2017, the course's teaching evaluation scores have received an average of 4.11 out of 5 (with 5 as the highest), which exceeds the university's average of 3.93 for all USQ course offerings (550+ courses each year) in the same delivery mode (i.e. online) during the same period of time.

The High Distinction and Distinction combined percentage has increased every year since introducing Prison Escape (from 26.88% in 2016 to 30.00% in 2019). This indicates that my initiative has assisted online students to achieve greater success in the course. The evaluation response rate also reached its highest at 53.54% in 2018, while the response rate for all University courses averages 25% only each year.

Hubro Education Business & Marketing Simulations

Business and marketing simulations, where students compete with each other in a virtual business environment.

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Game Description

Our simulations, Hubro Business and Hubro Marketing, offer students the opportunity to run their own virtual business. This allows them to learn all the aspects of running a business, whilst the instructor (their teacher or lecturer) can work through it with them, set assessments on the platform, and monitor all the decisions they're making within the game. Our simulations offer an engaging and practical approach to students learning about business and marketing.

The base-case for the simulations, set in the future, is that the students will start and run a jetpack business, where jetpacks are the new mode of transport. The market operates similarly to our current car industry.

The Business simulation covers all operational and financial aspects of the business, and students complete the following tasks throughout each quarter (a round in the game): Market forecasts, Research & Development, Production, Market Analysis, Financing and Budgeting. They have access to reports and statements, including Sales and Market Reports. For instance, in the Financial Report, students can see the financial statements and all related numbers. The decisions students make in each round generate the numbers and information for these reports and statements. These help them make informed decisions throughout the game.

The Marketing simulation is based around the marketing mix, or 4P's. The tasks in this simulation are: Market Analysis, Product Management, Product Promotion, Staff Management, Price and

Distribution, Research and Development, Financing and Market Research. Players get the same reports and statements as in the Business simulation, based again on their decisions.

As students play through these simulations, they are making key business decisions, which determines the success of their business. Also, students are competing against each other, and the company with the most equity, wins. Throughout the simulation, they get feedback from virtual advisers, letting them know how their decisions are playing out.

The role of the teacher or lecturer whilst running these simulations, is to create discussions around the decisions the students are making, and encourage them to explain their reasonings. We have a feature in the game: 'Get Attention', which once the teacher presses in their interface, freezes the screens for all players. Our simulation games allow the teacher to assess students, as they can add their own assessment tasks into the game, in any round as they wish. In addition to this, the teacher interface has an 'Insights' tab, where graphical representation for each company's equity, income and sales is available. There are also financial and sales insights. This is important not only to monitor students and get an idea of their progress and understanding, but also helps to initiate discussions within the classroom.

Our simulation games are versatile, can be customised by the teacher to suit the class and level, and can be used both in and out of the classroom. During distance learning, our games provide not only a way for business students to remain engaged, but also to continue working with their peers, and as an assessment tool for teachers.

Learning Outcomes

1) To give students a developed understanding of core business practice and decision making processes. This includes understanding of the research, market and financial aspects.

2) Develop students' confidence with the 'numbers' - budgeting, statements, sales reports.

3) They have to fill out and answer questions on their budget in the game, and tailor their decisions around the finance statements they receive.

4) To improve the students' understanding of business terminology.

5) Within the Marketing simulation - for the students to understand how markets and market research works, and the importance of the marketing mix as a concept.

Uniqueness

Our simulation games are modern, easy to implement, and focus on the core concepts of business. A lot of other simulation games that are available cover a broad array of concepts, all in one simulation. Whereas in Hubro simulations, we have created two simulations that focus in depth on the main aspects of running a business. Our simulations are also highly customisable, allowing instructors to create a simulation that fits their class. Adding content is easy, and gives teachers the chance to assess students on what they are currently learning, whether that is a key figure analysis, SWOT analysis, or a set of questions written by that instructor. Our simulations also score highly on ease of use and design. With state of the art design, our simulations are the most intuitive in the market. The interfaces are easy to navigate, so a high level of technical competence is not required.

Our simulations are also adaptable to several different courses, and levels. Both high school and higher education institutions have been using our simulations with great success.

Codemancer

Play Aurora must learn magic to rescue her father, but Magic in Aurora's world works the same way Programming works in ours.

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Game Description

Codemancer brings the mystery of magic and the exhilaration of learning to code together in a fantasy universe that uses spell-casting as a way to teach and learn programming skills. Codemancer's fantasy universe is filled with rival sorcerers and their minions for players to encounter along their journey. Codemancer is a non-violent, entertaining, and educational game designed to be inclusive and accessible to learners at any stage. Features include a gender-neutral fantasy setting with a female protagonist, a narrative backbone, and a programming interface that's designed to be easy to understand by kids with varying degrees of skill and experience. Codemancer breaks down barriers that may have discouraged some kids from embracing technology and elevates their screentime to be more productive and entertaining. It isn't a typical coding or technology game.

WHAT IS CODEMANCER ALL ABOUT?

Codemancer tells a moving story about Aurora, a young, creatively talented girl who's trying to grow up, become independent, and do good in the world in the face of incredible obstacles when her father is suddenly kidnapped. Aurora has to embark on an adventure to save him as she grows into a gracious and independent young woman. She must learn magic spells to save her father, but the magic used in Aurora's world works the same as programming does in ours. Inspire children to explore their potential as they discover the magic of coding.

CODEMANCER SPECIFICALLY TEACHES:

• Sequential Algorithms

• Debugging

• Functions

• Scope

• Looping Constructs

• Concurrent Programming

...AND TEACHES IN GENERAL:

• Computational Thinking

• Planning

• Problem Solving

• Resilience

CODEMANCER FEATURES:

• A narrative inspired by popular works of young adult fantasy worlds such as Harry Potter, Percy Jackson, The Neverending Story, The Last Airbender, and many more!

• Gameplay that takes place in a hexagonal world, making it easy to estimate distances and angles by eye.

• 'Freeze time' ability, so players can debug the programs they've written and potentially code their way out of a jam to learn from their mistakes.

CODEMANCER IS STRUCTURED FOR ACCESSIBILITY AND INCLUSIVITY:

• A gender-neutral fantasy setting with a female protagonist

• Tap-based interface and no reflex-based gameplay means kids with dexterity issues can play

• Uses pips (like on a die) instead of numerals -- No Math Necessary

• No syntax errors -- if you can enter a spell, it will run. Syntax errors can be frustrating and cause learners to quit before they really begin.

• Codemancer uses an open dyslexic font, where letters are designed to look distinctly different from each other to make reading easier for kids with dyslexia.

• The game is fully voice-acted, so reading is completely optional.

• Codemancer's programming language is designed to be accessible, but also translates easily to a variety of popular real-world programming languages (such as Python).

• Codemancer has the potential to reach under-represented groups in coding and teach them an often-exclusionary, but nonetheless important, 20th-century skill.

Learning Outcomes

Players gain a familiarity with basic programming concepts like sequence, iteration, and functions, in the most accessible way possible.

Uniqueness

Codemancer is a programming game designed for the kind of kid who wouldn't want to play a programming game. It's nested in a fun story with a female protagonist. It has a custom-built programming interface without the messiness of most drag-and-drop graphical programming systems. Everything extraneous which could be a barrier for players is removed -- we use pips instead of numerals and no numbers over 5, the game is voice acted and reading is optional, etc.

The Experience of SMILE (EoS)

A board game for the Clay Works onboarding program: (Clay Works is a 3D art learning center).

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Game Description

The Experience of SMILE (EoS) game is a roll-and-move game that applies the action of Collection, and it is best for two to five players. The gameplay flows from one player to another and keeps track of the number of SMILE medals that each player possesses. The system actions in the game consist of rolling the die, making a move and deciding on a desired action according to the game specification in order to collect SMILE medals. The first player who collects two sets of SMILE medals wins the game.

The EoS game is the board game designed for the onboarding program of Clay Works, a 3D art learning center. It provides new knowledge to players who are newcomers. In particular, the knowledge of the Clay Works organizational core values, basic regulations, daily tasks, some common routine activities and some expected basic behaviors were intentionally designed into the EoS game as its learning contents. Players will learn the organizational core values from collecting the SMILE Medals as they represent Clay Works organizational core values: S for Synergy; M for Mastery; I for Innovation; L for Learning; and E for Enjoyment. Other learning contents will be revealed to all players through each turn of each player.

Learning Outcomes

1. Players are able to memorize all of the Clay Works organizational core values after playing the EoS game.

2. Players are able to recall some basic regulations, daily tasks, and common routine activities by playing the EoS game.

3. Players are able to highlight the expected basic behaviors by playing the EoS game.

Uniqueness

The game itself is unique as it is designed for Clay Works by gathering field work data and actual incidents happened in the organization. So, the theme of the game is about workflows in Clay Works. The game is fun and easy to play because the rule is simple. Importantly, it gives new employees' advantages to learn some basic workflows and social norms in the workplace. It also helps them relax from being newcomers and easily building relationships to other players (colleagues). Even though the EoS is designed as the learning game for the Clay Works onboarding program, anyone can play it for fun.

Otherworldly Maths (OWM)

OWM is a Role-Playing Game (RPG) that puts the user in charge of building a base on another planet and to obtain the necessary resources to do so, they must hone their math skills and solve a series of challenges.

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Game Description

OWM is a Research-based Game. OWM puts the player in control of the Commander, a character in charge of building a space base on another planet. In order to obtain the necessary resources, the

player must first build the production plants and then solve challenges inside each of them. Earning resources this way, the player can build new production plants and upgrade the existing ones, increasing the resource output. Each production plant requires the player to hone one or two mathematical competencies, and by repetition necessary to obtain the required number of resources, develop mathematical dexterity in those areas. Rather than an approach based on the uses of quizzes and other pitfalls of edutainment products, in OWM learning activities are integrated intrinsically on the playability. The player uses math skills to solve challenges that emerge organically from the game world, and he/she is rewarded with resources that allow them to advance in-game challenges, as well in more complex math knowledge. With a lot of real-time feed-back, in OWM Failure is an opportunity to play again, therefore to learn.

Additionally, the player will also have to protect his base against space pirates, and in order to fight this threat, they must build ships using the same resources they used to upgrade their base. This creates a game loop where the player must first rebuild his base, then obtain resources to build ships and continue to upgrade the base and fight pirates to get better ships, more resources and a faster production line. By creating multiple layers of rewards and needs, we ensure the player focuses on actual fun gameplay, while still having to use math in order to unlock more of the game and improve his base, which helps keep a higher player interest throughout the gameplay experience.

OWM is being developed under project GBL4deaf – Game-Based Learning for Deaf (LISBOA-01-0145-FEDER-032022) funded by FCT and LISBOA2020.

Learning Outcomes

Our central goal is understanding how the videogame promotes mathematics' learning in DHH students attending 5th to 9th grade (n = 30) by measuring mathematics achievement (arithmetic and geometry mathematics contents) before (pretest) and after (posttest) playing the videogame.

It is expected higher mean scores in mathematics achievement after playing the videogame comparing with the results before playing the videogame. Moreover, it is expected that the differences between pre and posttest mean scores are statistically significant.

Uniqueness

OWM is an inclusive videogame designed for Deaf and Hard-of-hearing children, it uses implicit learning, which means that instead of: using game time to explain mathematical subjects to the player and requiring the player to solve formal mathematical problems or answering a quiz; the game present organic in-game situations which require mathematical skills to solve the in-game situations. However, the player must reflect and come to the conclusion how to best approach and resolve them himself/herself. This means that while effectively practising mathematical dexterity while playing, in no moment the player is taken off of the gameplay to receive a lesson, or faced with a multiple-choice quiz that would shatter immersion. Instead, the experience of playing and learning are not two separated moments, and fun isn't a 'reward' after a 'learning' moment, but rather than two things are meant to happen at the same time, and resources are the player reward for using their own strategies to solve mathematical challenges.

Marion's Journey

A history game for children about how Jews fled the Nazi menace

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Game Description

Marion is an elderly lady who came to the UK as a young Polish refugee, having fled with her Jewish family across Eurasia to Siberia and back.

The game shows the story of her adventures as her family have to struggle to survive, from the Nazi invasion of Poland to the concentration camps in Siberia where the Russians held them as unwanted aliens, then their flight via Tashkent and Bukhara, suffering starvation and disease, until she is sent, alone, by her mother to the UK to live in Glasgow as a refugee.

The game is playable by young children, and has been made accessible to all primary schools in the Glasgow region, by the City Council.

Art assets in the game use a map of Europe that had been made by a young friend of Marion's. This gives the game authenticity, and the artwork is of a child-friendly style in other ways too. Marion herself, as a young girl, is played as the heroine of the story, and is shown as athletic in the minigames, where she has to steer a raft down a river, and later run across town evading adults like policemen, to find her mother. These events from her real life are illustrated as minigames, so that the game will appeal to all children.

They easily control the game, with arrow keys or the mouse. Gameplay is also friendly to children, as it is not possible for the character to die. Rather, any bad consequences of alternative decisions are described, and the worst that can happen is that the character restarts the level. It is not possible to 'lose' the game.

The story's narrator is Marion herself, but now as an old lady of course, who described her experiences in an interview recorded as part of a digital heritage project, called 'Gathering the Voices'. This charity was set up to capture the testimonies of Jewish holocaust survivors, and Marion's story was selected to be dramatised into a game to educate young children about the holocaust in a way that would appeal to them, show them the harsh reality of the 2nd World War, and yet not in a way that would upset them emotionally.

Graduates from Glasgow Caledonian University were selected to make the game in the Summer after graduation, as their first professional work, under supervision from the university lecturers who taught them game design. Finance was provided by the charity (above) and from Glasgow City Council's education project 'Sense about Sectarianism', which sees the game as a way to help counteract some of the religious hatred that still troubles Glasgow today.

As a case study in preserving our heritage and bringing it to life for younger generations, this game has been presented at the 1st international conference on Digital Heritage in Granada, Spain (https://ieeexplore.ieee.org/document/7419604/); and an invited talk at the EVA/Minerva Jerusalem International Conference on Digitization of Culture.

Learning Outcomes

School children learn the dark history of World War 2, suitably for their age group.

They learn about the upheaval for civilians in Europe, particularly in Poland, and the chaos caused by superpower alliances and betrayals. They learn how hard it was to survive persecution across continents, when ordinary people were half starved, put in concentration camps, and suffer the deaths of their loved ones from multiple diseases.

They learn how the persecution continues on return home after the war, from former neighbours who fear their returning claims to their former homes.

They also learn what it's like to be a refugee, and what it means to be offered a chance of a new life in a civilised country at last; in this case the young girl who arrived as a refugee in Glasgow, where she was finally able to live her life and still lives today.

The game also helps young children, especially recent immigrants who may be refugees themselves, with the English language listening and reading skills, because Marion herself speaks so clearly, and all her speech is shown in speech bubbles on screen as well.

Uniqueness

This game is unique because it is able to convey grim history to young children in a way that they can understand without being faced with the worst terrors. Instead the story is told through the perspective of a real young girl (of 8-12 years old over the course of the war) in a heroic role, so they can easily identify with her.

The game has a special authenticity, because of the inclusion of her friend's artwork showing the map of her journey across Eurasia, and because of the narration.

The story is narrated by the girl herself grown up, now as an elderly lady, who still speaks with a Polish accent. The inclusion of her photographs at the end of the game bring home the reality of the story, and the realisation that elderly people like their own grandparents have had adventurous lives of their own, and are a source of humanity.

Despite all the hardship, it is in the end a positive story.

Logistic Simulator (LOST)

LOST is an innovative game to support teaching and learning logistics concepts.

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Game Description

The traditional teaching of logistics has faced a strong criticism due to fact that most logistics tools and techniques require a specialized knowledge, thus some students could find them difficult to understand. Additionally, when facing reality, students appear to be incapable to understand how the different functional areas of an enterprise interact. This means that traditional teaching has privileged knowledge fragmentation rather than promoting an integral vision of how a decision in one functional area affects others. Furthermore, many universities have organized their curriculums in a standalone content approach offering a limited number of experiences connecting various contents relevant for logistics. Faced with these challenges, LOST (Logistics Simulator) was created to support learning and teaching of logistic concepts, it has not been designed in accordance to a particular course, but to cover several challenges/problems associated to decision making in the

wide spectrum of logistics management through the operation of a small supply chain. The game consists in simulating a hypothetic enterprise dedicated to the production of balls used for different sport games. The game is placed within an online platform called "GOAL Project". This online platform aims to promote the learning of logistic concepts by providing support tools.

When entering the game, each player will receive a randomly generated demand database, so each player will have a different game, but similar in terms of difficulty. The game could be played individually or in teams and its divided in five different scenarios, each scenario will increase in its level of difficulty and in the number of decisions to be made.

The first scenario consists in a small enterprise with two facilities: a factory, where the balls are produced; and a store, dedicated to sell the balls. The player should take decisions about the number of balls to be produced each week, raw materials quantity and quality to be used in the factory and raw material purchases from different suppliers. The decision about the number of balls to be produced should consider machine time and current stock of raw materials. At the end of the week, the balls produced by the factory can be shipped to the store; the player needs to decide the amounts to be shipped considering transportation vehicle capacities and cost. For each round, unsatisfied demand is considered in the game as a lost sale.

The available production capacity is very tight, thus the players will experience difficulties to fulfill all the demands faced during the game. On the other hand, product demands will exhibit a combination of behaviors, from seasonal to trend and random.

In order to aid players to improve their decision making the game includes a number of key performance indicators. Additionally provides a punctuation system, which allow the players to know their performance level as compared to other players. The professors involved in the game, have the possibility to visualize the partial or full results of the players, check their key performance indicators and the decision taken by each player on each round.

Learning Outcomes

So far, we have obtained more than 250,000 visits to the platform and more than 180,000 visits to the game. Approximately 5,500 people have registered on the platform, and the game has been used in more than 20 countries (mainly in Latin America) and by more than 40 universities.

The game has been used in different types of studies measuring variables such as the speed of knowledge acquisition, intrinsic motivation, extrinsic motivation, self-directed learning, enjoyment, reflection on learning and academic achievement.

So far, articles have been presented in eight different academic congresses and we have written an article for an arbitrated journal based on the findings obtained within the platform.

On the other hand, the opinion of the users of the platform has also been measured, and the results are extremely satisfactory.

Uniqueness

The number of games dedicated to teaching logistics is really poor. In literature and online we have found very few games dedicated to teaching this area. Among the great advantages that we have found when using this platform, is that the concepts can be developed intuitively, so that any user can operate the game without having the need to have previous knowledge in this area. We have experimented with engineering students, business students, and high school students, small entrepreneurs and specialists who have experience in this area. Regardless of the public, the simulator has been well received in all these audiences, the opinion about the game is really good and the users understand how the game works.

On the other hand, the game is free, the number of topics that can be taught using the game is really high, the materials that appear on the page are free, the score obtained in the game is immediate, the ranking achieved can be observed in the game.

Reef Stakes®

Reef Stakes® is Malaysia's first marine themed role-playing card game designed to simulate real-life stakeholder relationships, introduce iconic marine species and highlight threats to marine ecosystems.

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Game Description

Reef Stakes® is designed by young professionals in the conservation workspace. The game aims to simulate real-life stakeholder relationships, introduce some of Malaysia's most iconic marine species, and highlight threats to marine ecosystems.

The game goes along two tracks: nature and development. At the start, each player chooses one of six roles (conservationist, developer, natural resource manager, tourism operator, politician and fisherman) at random. Each role is assigned three specific missions (nature/development related) to achieve which corresponds to the role's priorities in real life. For example, all three of the conservationist's missions are related to nature (Protected Area/, while the tourism operator's are both nature (Protected Area) and development (Coastal City) related.

To begin, seven cards are distributed to each player which may consist of track (Nature/Development) or scenario cards. The building up of the game revolves around a "rock" card where players build in either the nature or development track. To win, the player will have to play all three specific mission cards (level 5) on the board. However, since some priorities (missions) overlap, players have to communicate, work together, or even sabotage to place their best cards on the table. Sabotage comes in the form of scenario cards that thwart the advancement of a track.

Learning Outcomes

Reef Stakes® has three main learning outcomes:

1) Simulate real-life stakeholder relationships

-The six roles chosen (conservationist, developer, natural resource manager, tourism operator, politician and fisherman) represent stakeholders that are directly involved in the future of a coral reef ecosystem. Through the game, participants get to experience the life of a stakeholder and their priorities; thus allowing players to emphathize within their roles. They are allowed to discuss, debate and even sabotage each other.

2) Introduce Malaysia's iconic marine species

-Several iconic and endangered marine species are introduced in Reef Stakes®. These include the dugong (Dugong dugon) and leatherback turtle (Demochelys coriacea). The two species' appearance in the game affects the game in the same way the species will be affected in real life.

http://reefstakes.com/home/marine-issues/endangered-species/

3) Highlight threats to marine environment

-Reef Stakes® also brings to light key threats to the marine environment. These threats are portrayed as scenario cards which affect gameplay proportionate to the effect in real life. Players are able to witness how damaging (negative scenario) or how constructive (positive scenario) it can be.

http://reefstakes.com/home/marine-issues/

Uniqueness

In the past, awareness programs and outreach have been reliant on face to face interaction with time as a limitation. Conservation topics can be difficult, technical and somewhat serious and depressing. The effectiveness of outreach is also highly dependent on the person conducting the outreach.

Reef Stakes® is a custom-made game to address this problem and facilitate delivery of intended messages. The game highlights issues in a fun and approachable manner. Because each player assumes a role in the game and player to player interaction is encouraged, players will gain the ability to empathize with the issues and challenges facing the marine environment, instead of relying on one-way communication. The game is also compact and portable, allowing sessions to be replicated anywhere at any time.

As compared to other educational games, we have a strong offline and online presence. Since inception in 2017, Reef Stakes® has reached out to more than 3,000 people from all walks of life. The game has been used by more than 10 local NGOs, 2 regional NGOs, 3 local universities and 2 local dive centers in their outreach work in more than 10 countries including Germany, Cambodia and Taiwan. The game was used in various ways to stimulate discussion including classroom sessions and even through a tournament format.

Reef Stakes® also maintains a strong online presence through website and social media with more than 1,100 likes on Facebook and 500 followers on Instagram. The game plans to expand by translating into other languages and incorporate other ecosystems like mangroves and seagrasses.

Driller Thriller

Oil Exploration Drilling Game

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Game Description

Driller Thriller is a board game of strategy for 2 to 4 players and from 10 years old to Adult where players learn about the real world of Oil Exploration and Drilling and the Risks. Can you drill a successful Oil Well or will it be a Water Well? More advanced players may choose between a number of Wild-Cat rules to create a more tactical and strategic game for the player that needs a bigger challenge.

Learning Outcomes

It is educational as it is based on actual terms and processes used in the oil exploration and drilling business.

Uniqueness

I used to be an oil and gas exploration geologist, it is based on my real-world experience of the oil exploration industry. So, players will learn about the business as they play and take that knowledge away with them. It may even inspire them to become involved in the oil exploration industry as a career path they never considered beforehand. Of that, I would be proud because it was exciting as well as challenging as a job can be!

Little Fish Lagoon

A formative assessment of collaboration and communication skills that puts players in charge of a North Atlantic fishery

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Game Description

Players compete against each other within a common pool of resources they have to collectively manage. Cooperation and communication is necessary to win the game. Each team directs their boats to fish one or more species of fish in the harbour in order to generate revenue and upgrade their fleet. The challenge arises when players strain species of fish and populations begin to dip making the whole ecosystem increasingly unstable. Players must work out policies with other players, and coordinate their actions while working to keep their business profitable. While they are communicating with each other, patterns in players' communications are visualized dynamically.

Learning Outcomes

Game design and dynamic player feedback is informed by the PISA 2015 collaborative problem-solving framework. There are two competencies described in that framework that define a matrix of evidence statements. The two competencies are Collaboration and Problem-solving. Collaboration skill is defined with 3 dimensions; (1) establishing and maintaining shared understanding; (2) taking appropriate action to solve the problem; and (3) establishing and maintaining team organisation. Problem-solving skill is defined with 4 dimensions; (1) exploring and understanding; (2) representing and formulating; (3) planning and executing; and (4) monitoring and reflecting. In addition to these deeper learning competencies, the game is aligned with biology standards in ecology dealing with population dynamics and economics standards in microeconomics dealing with markets and competition.

Uniqueness

The game and its visualization tool provide dynamic feedback for learners and reference points for teaching and learning communication skills necessary for effective collaboration. The game's communication and visualization tools are available in a separate, stand-alone application that can be employed with any collaborative classroom activity. As far as we know, there isn't a game on the market that has been designed to provide dynamic feedback about patterns in students' communications for use by classroom teachers. The teachers' application allows them to track text exchanges between players in up to ten or more groups, as well as view and display groups' communication visualizations for discussions with small groups or the whole class.

NEMESIS Game

Changemaker of tomorrow through game-based social innovation education

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Game Description

The storyline of the NEMESIS Game brings the player into the game world of NEMESIS City, his mission, in the sense of a superhero, is to increase the well-being and happiness of the inhabitants of this city with his social innovation power. This will be achieved by implementing social innovations, which are rewarded with happiness points. As more tasks are solved, the happiness level of the city increases. This is intended to demonstrate the value of social innovation in society and thus illustrate the importance of the learning activity.

The Co-Creation Lab - as a superhero cave - gives the player the opportunity to work on emerging problems in collaboration with teachers, social innovators and parents (as non-player characters (NPC)), who offers different role models with different attitudes and ideas.

The general goal is to make the city as happy as possible, regardless of competition structures and high scores. The player chooses freely between the missions, and there are no negative consequences if not all missions are completed. Rather, the focus is on positive reinforcement through additional points when reaching certain goals.

The game city is composed of different habitats (forest, school, lake, village, neighbourhood) in order to offer the students identification possibilities. The different missions or assignments are clearly presented in a city map, where the player can choose freely between them.

Information or hints needed to solve the tasks are given to the game, e.g. by communicating with NPCs or exploring game objects. Social innovations are implemented by manipulating game objects in order to reproduce and apply them in the game world. By communicating with NPCs, problems can be identified and handled in the game, or information or objects can be obtained that are needed for the process of the game.

This procedure can be illustrated using the example of the social innovation "Public Bookcase": In the Co-Creation Lab, the player receives a request for help from an NPC via the city map, which illustrates the importance of reading, but also the possible reduced accessibility of books. Thus, the problem is addressed by the NPC and is identified by the player. Options of the player, or required sub-steps to solve the social issue in the game are communicating with NPCs (e.g. with a social innovator in the Co-Creation Lab to develop the idea of the public bookcase through dialogue, With a school principal to get permission for setting up the bookcase); Examining and find items (Find

suitable places in the schoolyard, Find a bookcase, Collecting books) and using or combining items (Providing the book case with exchange books in the school yard). After solving the task, the player will receive a feedback, further information to the social innovation and the happiness points for the City.

Learning Outcomes

The NEMESIS Game focuses on the following topics: Defining Social Innovation, processing examples of Social Innovation and elaborating the effects of Social Innovation on society. These issues are intended to achieve the goals of the active engagement with the topics of social innovation, promotion of students' self-efficacy expectations and promotion of a positive emotional experience during the learning process.

Uniqueness

The unique aspect of the game is its theme, the combination of social innovation education and game-based learning with the aim to sensitize today's youth to the social issues of the future, strengthen their scope of action and create the future changemakers. The player is given the opportunity to implement various social innovations in a protected environment. The effects and consequences of these social innovations are thus made experienceable and tangible. Most importantly, for young people the main purpose is to be aware of what they could achieve with their efforts not only at the micro level but also for the present and future common good. On the one hand, this should support young peoples' expectations of their self-efficacy and sensitize them in the sense of empathy for the concerns of the social future. The main focus is on active involvement with the topic and emotional experience during the learning process.

L Cube

Sharing the importance of Lifelong Learning

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Game Description

L Cube is a board game that aims to teach the importance of Lifelong Learning. Designed to provide a window into the world of work, students are introduced to education and career pathways, economic literacy concepts, income tax and retirement funds. The game encapsulates relevant, up-to-date current affairs and even takes players through the impact of different economic cycles.

Bringing the community together to learn about the world of financial literacy and different career pathways in the business and finance industry through a workshop in Singapore MOE Schools since 2017, our workshop provides participants with a simulation of real-life situations. This enables them to learn to make education, career and financial decisions in a fun and fail-safe learning environment. It also preps participants for the transition from school to further education or workplace and be aware of the roles and responsibilities of adulthood. With the acquired knowledge from the workshop, participants will be able to make informed financial decisions, education and career choices, as well as planning towards a better future, improving their quality of life.

The experiential learning also takes them through the impact of the different economic cycles. The game equips students with the necessary knowledge to make informed decisions for the successful transition from school to further education or workplace. This well designed game encapsulates relevant and up-to-date current affairs and hence, it enables players to navigate their career pathways and lifelong learning opportunities throughout this game of life.

Learning Outcomes

Players will be able to better understand the concept of Lifelong Learning, acknowledge the importance of budgeting, learn to manage their education and career pathways, experience the impacts of the economic cycle and make wise decisions during the cycle.

Uniqueness

L Cube Boardgame is played together with an app. Most of the gameplay/story happens in the app. With it, we are able to update the gameplay/story to be relevant to the current affair or trend.

The Breakfast Room Project Management Game

A Lego-based construction project management game for Year 6 children

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Game Description

Part of the Association for Project Management (APM) strategy in its 'Chartered' era is to have 'project management (PM) as a life skill for all'. If PM is truly a life skill, then it is important to start learning it at an early age, but can it be taught to children and if so, how? Is it possible to integrate STEM, construction industry practice and sustainability themes? The solution to these questions is the 'Breakfast Room Project Management Game'. The aim was to teach basic PM theory, construction PM and associated team skills in a fun and accessible way for children. In this game, Using LEGO and PM tools and techniques, Year 6 children collaborate and deliver a freestanding 'Breakfast Room' building for their school under realistic constraints of time, cost and client scope. Children take the roles of project management team, supplier team and construction and logistics team. The game is supported by the use of realistic project management tools and documentation, realistic costs and realistic constraints and a sped-up clock to drive the schedule and create a sense of urgency. The construction uses LEGO to simulate prefabricated components, allowing for a rapid assembly once the planning has been completed. Children learn construction PM techniques and terminology as well as developing lifeskills such as leadership, teamwork, communication, creativity, decision making and following/giving instructions. It is also fun - its Lego, so the means of assembly needs no introduction. The game arose from an academic/industrial partnership to deliver 'social value' for schools in the area of a prestigious construction project. The academic created the educational infrastructure and integrated the project management knowledge. The construction project manager acted as subject matter expert. The success of the game and feedback proved that children's natural, intrinsic appreciation of PM can be built upon, theory and techniques can be accepted if they are quickly demonstrated through practice and LEGO PM games are a valid means of teaching and practicing life-skills, sustainability and construction industry practices. The game is now in demand by other construction companies with similar mandates for 'social value'.

Learning Outcomes

Discuss realistic construction project choices – structure, site, functionality, aesthetics, cost, budget, fitness for purpose (quality)

Identify the consequence of decisions in the difference between what the client wanted and what the team delivered

Practice life-skills such as knowing how to/when to ask for help, interacting with unknown adults, following instructions, improvising, negotiation, information handling, teamwork, leadership

Complete a piece of teamwork under realistic constraints of cost and time

Uniqueness

There is nothing else like this game available, that combines construction industry practice and project management theory into a learning experience suitable for Year 6 children.

Institute Senra

Protect the Institute Senra against the cyber attack and learn about computer security and the dangers of the clothing industry for the environment.

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Game Description

Our game connects two subject areas - chemistry and computer science.

Player's objective is to explore the building and acquire knowledge in the areas of internet security, fake news, phishing, gathering information, and chemical pollution. Player finds himself in the role of cyber-cat Taylo in the hallway of the Senra Institute. Player can save the Institute and humanity from disaster by protecting a computer that controls the chemical processes on the 2nd floor. With the acquired knowledge he solves different tasks. Properly solved tasks bring points to the player, and more points collected means greater protection of the Institute against attack.

You can download the game from here: http://hrast.pef.uni-lj.si/ecgbl2020/

Learning Outcomes

Students are aware of the dangers of using the internet. They know how to protect themselves while using information and communications technology. They are aware of the possible impact that wrongly understood information could have. Students develop critical thinking for example searching, processing, and evaluating data from multiple sources. Students learn about the wide use of chemicals in textile production and their impact on the environment. They are aware of social responsibility for sustainable development.

Uniqueness

Our game is unique because it combines important topics regarding the preservation of nature, critical thinking, and cyber-security.

CYBERSPACE_INVADERS

Educational escape room game designed to teach the principles of cybersecurity

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Game Description

This digital Escape Room In-A-Box was created as a gamified learning experience for organisations to teach the fundamental principles of cyber security. Though this tool was primarily intended for new employees with a base level knowledge of cyber security, it can also be used as a refresher for current members of any organisation. Cyberspace_Invaders was created using the design thinking process and tools such as Squarespace, to develop a digital escape room with three distinct learning outcomes. As players move through the game, they take on the role of an agent hired by Company X and are presented with a series of puzzles and challenges that will both educate and engage future cyber security experts.

Learning Outcomes

LO1 - Be aware of emails phishing attempts.

LO2 - Exercise caution with what is distributed on social media.

LO3 - Make users aware of cloud account vulnerabilities.

Uniqueness

Educational escape rooms based around cyber security currently available on the market are limited, not engaging and minimalistic. Our aim was to create an innovative educational game which not only gets users excited and engaged about cyber security but also reinforces its required learning outcomes.

KSU Treasure Hunter

KSU Treasure Hunter is an Augmented Reality campus guide learning game.

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Game Description

The "KSU Campus Treasure Hunt" application (app) is an instructor-developed educational Augmented Reality (AR) learning game smartphone app designed to expedite the contextual learning of campus facilities. It helps users learn practical information about Kyushu Sangyo University (KSU) campus facilities through play of a bilingual AR treasure hunt. It introduces prospective students, in English or Japanese, to the KSU campus, and provides an informational reference guide to important campus services for all students. As such, it functions as both a promotional and informational tool for the university.

The design of the learning game involves the mapping of instructional goals onto the first three levels of Bloom's taxonomy - remember, understand, and apply - in a 3-level structure that requires app users to engage progressively higher-level thinking skills. The learning game aims to be engaging

and allow for the provision of gradual, scaffolded feedback where low-stakes failure encourages continued practice in a fun learning process involving an element of fantasy in the teaching process. Through the use of student-produced artwork, the app user is immersed into a world of pirates and treasure. They are prompted by a pirate non-playing character (NPC) to embark on a treasure hunt around the KSU campus, and are provided with a treasure map to facilitate their journey. In order to find the treasure of jewels (knowledge of facility services) and coins (points earned through selecting correct in-game responses) the user visits campus facilities to discover AR markers giving access to the learning game.

Upon completion of the learning game performance summaries display the collected jewels, score, and a star-rating based on the score. Upon completion of all three levels at a facility a final performance summary displays a cumulative score for that facility, and a star-rating based on this score. The cumulative score is displayed as the current score in the High Scores scene. The in-game content is made available in a Campus Information screen accessible from the Main Menu. In the performance summaries users are prompted to search for the treasure at another facility. However, users can also navigate to a Main Menu and select from Continue, that returns them to the Main Map, New Game, High Scores, Campus Information, and Credits.

Learning Outcomes

Learning outcomes include knowledge of the names of key campus facilities and services, understanding of what each service entails, and application of knowledge of the services in order to solve problems commonly encountered by students.

Uniqueness

The "KSU Campus Treasure Hunter" app is innovative in its combination of a campus knowledge system and a learning game. This is intended to transform the student experience of campus information services by engaging users in a fun learning process that involves an element of fantasy in the teaching process.

Chem-o-crypt

Learn to encode/decode text or balance chemical equations at once

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Game Description

It is a platformer game designed to teach chemical equation balancing or encryption/decryption using Caesar cipher. During each level, player has to run around the platform to collect correct number of chemical elements required to balance the equation. In the cryptography version, instead of chemical elements, player is tasked with collecting the letters of the cipher/plain text corresponding to the desired encryption/decryption. Game mechanic involves patrolling enemies, flying bats, jumping, moving around, moving platforms and some hazards such as water and thorns. Player needs to collect items while avoiding enemies and hazards.

Learning Outcomes

Player will learn to balance the chemical equations or encoding/decoding process using Caesar cipher.

Love A Maggot

An action game where children try to treat infected wounds using medicinal maggots and antibiotics.

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Game Description

'Love A Maggot' was co-designed by a multidisciplinary team to communicate the effectiveness of medicinal maggots to primary school children. Medicinal maggots have an extremely high clinical success rate for disinfecting chronic wounds and are available on NHS prescription in the UK. They also offer us an alternative to antibiotics at a time when antibiotic resistance is one of the biggest threats to global health, food security and development. Despite these clear benefits, maggot therapy is not widely embraced by patients, there is therefore an urgent need to change negative attitudes towards medicinal maggots.

In the game players are tasked with treating a patient's wound by eliminating bacteria. There are four different coloured bacteria which appear on the patients wound which is the main play area. If two or more bacteria of the same colour touch they start to increase in size. At a threshold size the bacteria divides into one more of the same colour and a large biofilm. Biofilm is untreatable using antibiotics. When the total number of bacteria and biofilm is above a value the patient dies and the player loses the game. To treat a patient the player can fire one of four different coloured antibiotics at the bacteria. If the colour of an antibiotic matches the colour of a bacteria it decreases its size once in contact, when the bacteria gets small enough it disappears. Antibiotics do not affect biofilm, to treat those the player must unlock the maggot power. Initially the patient will not let the player use maggots, so the player must spend time talking to the patient to convince them to allow maggot treatment. The maggot can treat both biofilm and bacteria. Interactions between all the game objects is largely physics driven, this gives the game a more organic feel and makes each playthrough slightly different.

The game is available on-line (https://loveamaggot.com/maggotgame/).

Learning Outcomes

Infections can be treated using antibiotics, but they become less effective the more you use them. Maggots are extremely effective at treating infected wounds, more effective than using antibiotics long term. Patients are often unsure about allowing the use of maggots during treatment, which means we have to spend time talking to them about it.

Uniqueness

From a topic point of view, it is the only game we know of which is related to medicinal maggots.

What is interesting about this project from the game design point of view is that we had to un-balance the game to meet the learning outcomes. The maggot unit is much more powerful than the antibiotics, and once a player learns this she can easily win every time. Although this means that players are unlikely to engage with the game past an initial hours playthrough, we found during testing with primary school children that the learning objectives were achieved in most cases during this play time. Accepting this imbalance as a game designer was really challenging, but ultimately achieved the aims of the project.

Cryptocastle

In the course of the game, the player has to solve various encrypted and decrypted messages to escape from the castle.

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Game Description

Game: http://hrast.pef.uni-lj.si/ecgbl2020/games/cryptocastle.zip

The game is aimed at schoolchildren aged 11 to 15 years who, by playing the game, acquire knowledge of encryption and decryption. In the course of the game, they will encounter various forms of message decryption. The students do not need any previous knowledge of cryptography. For each task there are hints that help the players to solve it. The difficulty of the tasks increases.

The main player in the game is a boy who has accidentally been trapped inside Cryptocastle and must escape from it. He has to solve all tasks correctly to get to the next room, and is aided by the ghost who gives him the clues. The game starts with the introductory animation. Then it continues to the first level, where the player appears in the basement of the castle. Here he meets a good character, the ghost. After the player has solved two tasks correctly, the game moves on to the second level, which takes place in the living room and is similar to the first level, only with different tasks. When the player has solved the tasks correctly, the game continues to the third level, which is also the last one. It is different from the previous ones and takes place in the library. Here the player meets a bad character, the prisoner, who is trapped in the castle and has bad intentions. The player solves only one decryption task, and in the next task he chooses how to encrypt the message and then encrypts it. If the player chooses a good method for encrypting the message (Caesar's) and then encrypts it correctly, the player wins the game. The winning animation follows. If the player chooses a weaker encryption method (mirroring) and then encrypts it correctly, the player has only a limited time to leave the castle (he must be faster than the prisoner). If he fails, a losing animation follows and the player remains trapped in the castle. If he is faster than the prisoner, he wins the game (the winning animation follows). If the player decides not to encrypt the message, he loses the game and the losing animation follows. The winning animation shows how the player manages to get out of the castle and has a conversation with the ghost. The losing animation shows how the prisoner gets out of the castle, the exit closes and the player remains trapped in the castle.

Learning Outcomes

Student knows how to decrypt and encrypt messages using various methods. Student understands the importance of cryptography. Student knows different methods for decrypting and encrypting messages.

Uniqueness

The game is interesting and rewarding. It is also challenging for the player and difficult enough to keep the player engaged. It has a dynamic and unique storyline.