



Co-funded by the Erasmus+ Programme of the European Union

TRAINING THE EDUCATORS TO FACILITATE THE TEACHING AND ASSESSMENT OF ABSTRACT SYLLABUS BY THE USE OF SERIOUS **GAMES (TEGA)**



List of authors:

Sara Rye Yama Abdullahi Firdaus Enammi Carla Sousa Filipe Luz Vicky Maratou Rízos Chaliampálias **Achilles Kameas** Raimonda Agnė Medeišienė Indrė Ščiukauskė DariusKaraša







THIS PROJECT HAS BEEN FUNDED WITH SUPPORT FROM THE EUROPEAN COMMISSION. THE EUROPEANCOMMISSION'S SUPPORT FOR THE PRODUCTION OF THIS PUBLICATION DOES NOT CONSTITUTE ANENDORSEMENT OF THE CONTENTS, WHICH REFLECT THE VIEWS ONLY OF THE AUTHORS, AND THECOMMISSION CANNOT BE HELD RESPONSIBLE FOR ANY USE WHICH MAY BE MADE OF THE **INFORMATIONCONTAINED THEREINITY**

TABLE OF CONTENTS

1. INTRODUCTION 1

2. IDENTIFYING PLAYER PROFILE (10 MINUTES) 2

3. IDENTIFY THE LEARNER TYPOLOGY (10 MINUTES) 3

4. CHARACTERISTICS OF A GAME (20 MINUTES) 5

5. THEORETICAL FOUNDATION 9

6. THEORETICAL MODEL 11

A. THE CONNECTION BETWEEN THEORETICAL AND PRACTICAL ASPECTS OF THE MECHANICS (20 MINUTES) 15

B. SUGGESTIONS FOR GAME/LEARNING MECHANICS (20 MINUTES) 22

7. SELECTION OF THE CLEAN SLATE GAME (10 MINUTES) 23

8. Ensuring the game inclusivity and accessibility (10 Minutes) 24

9. Ensuring the flow element in the design (10 Minutes) 27

10. DRAFTING THE INSTRUCTION OF THE GAME (30 MINUTES) 28

11. Ensuring the game playability by playtesting through Beta-Play and reflection (Half a day) 29

12. Assessment Pack (30 minutes) 30

REFERENCES: 38

TABLE OF FIGURES

FIGURE 1: THE DIMENSIONS OF ACCESSIBILITY AND INCLUSIVE DESIGN. SOURCE:	
AUTHORS' ELABORATION	.24

Table 1 – Player Profile	2
TABLE 2 - LEARNER TYPOLOGY	З
TABLE 3 - CHARACTERISTICS OF A GAME	5
TABLE 4 - FEATURES OF THE GAME	9
TABLE 5 - GAME THEORETICAL CLASSIFICATIONS	11
TABLE 6 - CONNECTION BETWEEN THEORETICAL AND PRACTICAL ASPECTS OF THE	
MECHANISM	15
TABLE 7 - INCLUSIVITY MEASURES	25
TABLE 8 - FLOW ELEMENTS	27
TABLE 9 - INSTRUCTIONS OF THE GAME	28
TABLE 10 - PLAYTESTING & REFLECTION	29
TABLE 11 - GAME FEEDBACK QUESTIONNAIRE	30
TABLE 12 - POST-TEST QUESTIONNAIRE	31
TABLE 13 - TUTOR'S READINESS QUESTIONNAIRE	32
TABLE 14 - STUDENTS' POST-PLAYING EXPERIENCE QUESTIONNAIRE	33

1. INTRODUCTION

For a game to be called a game, various characteristics needs to be considered. Motivation design combines the rules, mechanics, and consequences in a game system to keep players engaged, through challenge to reward to punishment. We then will consider the criteria related to the learner/player typology, game characteristics, mechanics, principle of Playability (The easement of instruction) and Inclusivity/Accessibility. We then make sure to include some principle of Flow theory in order to design a step-based instruction for the game as well as clear assessment and learning outcomes. TEGA design package describes the procedures for designing the game. The design pack include instructions for the exploration and application of the game characteristics, mechanics, principle of Playability (The easement of instruction) and Inclusivity/Accessibility. Using the principle of Flow theory in order to design a step-based instruction) and Inclusivity/Accessibility. Using the principle of Flow theory in order to design a step-based instruction) and Inclusivity/Accessibility. Using the principle of Flow theory in order to design a step-based instruction. The plate/tick boxes for a game that meets the criteria set by each tutor and the requirements of the classroom. This will be followed by the assessment pack and altogether create a scenario-based analysis to map the actual learning against the intended learning outcomes. We go through the process as follows:

Each step above is briefly explained in the following sections:

2. IDENTIFYING PLAYER PROFILE (10 MINUTES)

Player Profiles, per Bartle's original 1996 typology for Multi-user Dungeons, which maps to aACTING-INTERACTING,PLAYERS-WORLDinterestgraph(adaptedfrom https://mud.co.uk/richard/hcds.htm):

Think about what your Player profiles are, or what learner profiles you would like to target in your design.

Table 1 – Player Profile

Player Profile	Description
Achievers	Seek achievement within the game, give themselves game-related goals, and achieve them through ACTING in the WORLD. They immerse themselves, shared with other people to add authenticity, and competition. The point of playing is to master the game, and make it do what you want it to do. Achievers are proud of their formal status in the game's built-in level hierarchy, and short time to reach it
Explorers	They try to find out about the virtual world. They are interested in the game surprise and INTERACTING with the WORLD. It's the sense of wonder they crave for; other players add depth to the game, but not essential. Scoring points all the time is a worthless occupation because it defies the open-endedness. They rack up sufficient points to reach the top, but They are proud of their knowledge of the game's finer points, especially if new players treat them as knowledgeable.
Socialisers	They use the game's communicative facilities, as a context in which to converse. They are interested in INTERACTING with other PLAYERS with talking or exotic behaviour. Finding out about people and getting to know them is far more worthy than just a setting. Socialisers are proud of their friendships, their contacts, and their influence.
Killers	They seek Imposition upon others through game tools to cause distress to other players. Where permitted, they acquire weapon and ACTING on other PLAYERS without their consent. They wish to demonstrate their superiority over fellow humans. Killers are proud of their reputation and of their oft-practiced fighting skills.

3. IDENTIFY THE LEARNER TYPOLOGY (10 MINUTES)

Learner Profiles (opposite pairs, each pair an axis in the multidimensional typology), roughly citing the seminal typology in Felder & Silverman, 1988 (Learning and Teaching Styles in Engineering Education):

Think about what your learner profiles are, or what learner profiles you would like to target in your design.

 Table 2 - Learner Typology

Learner Profile	Description
Sensing Learners vs. Intuitive Learners	Sensors like facts, data, and experimentation solving problems by standard methods and dislike "surprises"; Sensors are patient with detail but do not like complications; good at memorizing facts, are careful but may be slow. Intuitors prefer principles and theories and innovation and dislike repetition. Are bored by detail and welcome complications. good at grasping new concepts, are quick but may be careless, more comfortable with symbols, since words are symbols, translating them into what they represent comes naturally to intuitors and is a struggle for sensors
Visual Learners vs. Auditory Learners.	 Visual learners remember best what they see: pictures, diagrams, flow charts, timelines, films, demonstrations. If something is simply said to them, they will probably forget it. Auditory learners remember much of what they hear and more of what they hear and then say. They get a lot out of discussion, prefer verbal explanation to visual demonstration, and learn effectively by explaining things to others.
Inductive Learners vs. Deductive Learners.	Teaching tends to follow a deductive course of reasoning while learning tends to be inductive. Inductive learners need motivation for learning and how this stuff will be useful to you some day" approach: like sensors, they need to see the phenomena before they can understand and appreciate the underlying theory. An effective way to reach both groups is to follow the scientific method in classroom presentations: first induction,

Learner Profile	Description		
	then deduction. The instructor precedes presentations of theoretical material with a statement of observable phenomena that the theory will explain or of a physical problem the theory will be used to solve; infers the governing rules or principles that explain the observed phenomena; and deduces other implications and consequences of the inferred principles. Such problems play to the inductive learners strength and they also help deductive learners develop facility with their less preferred learning mode.		
Active Learners vs. Reflective Learners.	An "active learner" is someone who feels more comfortable with, active experimentation than reflective observation. They do not learn much in situations that require them to be passive (such as most lectures). They work well in groups and tend to be experimentalists. Reflective learners do not learn much in situations that provide no opportunity to think about the information being presented (such as most lectures), They work better by themselves or with at most one other person. They tend to be theoreticians.		
Sequential Learners vs. Global Learners.	Sequential learners follow linear reasoning processes when solving problems; They can work with material when they understand it partially or superficially. Sequential learners may be strong in convergent thinking and analysis. They learn best when material is presented in a steady progression of complexity and difficulty. Global learners make intuitive leaps and may be unable to explain how they came up with solutions.; global learners may be better at divergent thinking and synthesis. Global learners sometimes do better by jumping directly to more complex and difficult material.		

4. CHARACTERISTICS OF A GAME (20 MINUTES)

The measures for a good game extracted from the focus group are listed here. They can be used to make decisions about what characteristics of the game you would like to fit within your game.

Table 3 - Characteristics of a Game

Measures	Sub Measures		
	Memory tasks	Perfection Impossible	
Education Como	Controllers	Customisable	
	Know your target	Start Simple	
	Sneak in Learning		
	Restrictions	Acceptance	
	Impede Creativity	Group Size	
Design	Restrictions are Good	Fun	
	Easier to Learn	Real World	
	Creative	Visualise	
	Open Source	Editors	
Life of Game	Modelling	Intrinsically Rewarding	
	Explore		
Engagement	Entertaining	Gameplay Exciting	
	Don't Force Learning	Real Life	
	Teamwork	Communication []	
	Discussion	Different Personalities	
Engagement	Common Goal	Prevent Interruptions	
	Teamwork	Incentive for Engagement	
	Group Size	Games a Good Tool	
Assessment	Learn via Playing	External Assessor	
ASSESSMENT	Integrate Learning with Gameplay	Anonymous Voting	

Measures	Sub Measures		
	Focus on Learning Outcomes	Use of Framework	
	Use References	More Instruction	
	Assess Specific Skills	Methods of assessment:	
	Peer Assessment	Matching results with objectives	
	Observation and discussion	Change in Performance & Behaviours	
	Challenges in achievement of learning	j outcomes:	
	Time Pressure []	Teach Time Management	
Mechanics	Finish within time Limit	Every Person Talk	
Picchanics	Moderators Time Management	Facilitator	
	Time Limits		
Human Factor	Learn Different Opinions Social		
	Essence	GOALS/OBJECTIVE	
	Experimenting	Achievement of outcomes	
	Iterative process	Ability of learners to understand the outcomes	
	Integration of objectives with different game element	Alternative means for achievement	
	Fun Element	Focus motivation for achievement	
	Matching Requirements with goals	Promotion of Autonomy	
Characteristics	Iterative Emergent Process	Development of different Skills	
Ul a youu yame	Low risks	Link theory with practice	
	Promotes Co-Creation of game	Opportunity for differentiation	
	Ability of solve real world problems	Developing attitude and mindset of learners	
	Use of triadic perspective of learning	Encourage innovative thinking – Goal	
	Measurable learning outcomes	Improves learning – Goal	
	Creative activities Eliminates fear of failure – Goal		
	Easily accessible		

Measures	Sub Measures		
	Think Creatively	Perspective Taking	
Social Skills	Interactive	Communication	
	Teamwork		
What is a	Ability to complete task	Fail as a team	
failure?	Not engaging	Not listening to team	
Rules	Easy Instruction	Collective effort to solve problems	
Ruico	Difficulty level	Ability to bend the rules to win	
Interaction	Platform for Collective activity	Enjoying the process	
	Involves collaboration and teamwork		
	Skills and competencies of target audience	Creativity	
	Problem Solving	Risk Assessment	
Applications of	Communication	Critical thinking	
Games	Lifelong learning	Metacognitive awareness of learners	
	Assessing stake	Decision making	
	Negotiation	Teamwork	
	Adaptation & Recognising Patterns		
Skills of	Assessment of Processes and outcomes	Learning from Process	
Educators	Mapping learning outcome	Learning how to engage learners and intervene	
	Consult Students	Incentives for students	
	Game Around Interest	Mechanics to Ensure Listening	
	Ways they Learn	Each state opinion	
Inclusivity	Non-native Gamers	Small Group (4-6)	
	Inaccurate Preconceptions	Don't jump between ideas	
	Approaches of inclusivity in collective multiplayer games:	Moderator	

Measures	Sub Measures		
	Approaches in non-competitive game	Team Management	
	Limitations in inclusivity	Pair discussion	
	Don't Expect Rule of Thumb	Disability	
	Information Transmission	Agile Approach	
	Focus Group	Fun to Loose	
Disutanting	Adapt to Feedback	No Pressure	
raycesting	Want to Learn	Replay-ability	
	Customisability	Simple	
	Atomic Parameters	Co-operation	
	Custom Interface	Common Ground	
	Contextualising reusability	Intermittent discussion in between sessions,	
Sustainability of	Co-creation of games	Connecting overall gaming experiences	
Games	Involving old students in new courses	Replay-ability of the existing games that are naturally compounded of different stages	
	Reusability of games,		

5. **THEORETICAL FOUNDATION**

The clean slate of the game (if the educator doesn't intend to create a game from scratch) can be taken from BGG (https://boardgamegeek.com/browse/boardgamemechanic). To add a theoretical foundation, we need to ensure the existence of the following within our game:

Table 4 - Features of the game

Features of the	Description			
game				
Commitment to	Until captivating the player completely (Goffman 1980: 376). This creates the			
participate in	normative expectations of clearly defined world in which the player can perform their			
the game	individual actions within the above cybernetic circuit.			
Framework	Games are specifically motivating control systems within a defined framework consists of three different (combinable) factors or dimensions. Behavioural dimension, frame dimension, and a construction dimension (Jürgen Fritz, 2004).			
Magic Circle	Once the framework is set, the limits about structure, rules, communication, and behaviour within a "Magical Circle" can be set (Suter, 2018). Magic Circle: Inside the circle, inherently different rules apply but mutual interacting between outside the circle in the real world (including reward and punishment).			
	Raise a challenge by offering opportunities for action and allowing them to be evaluated.			
	To evaluate is to reward or punish, to give a positive or negative feedback.			
	Game design, which, in its execution, acceptance of the rules encloses the player in the "Magic Circle".			
	Supervision and control of the real world. On the other hand, the real world's rules			
	simply formulate the rules of access to a game, so they frame and regulate the			
Rule system	transfer of the subject from the real world to the magical circle of a game, but they			
	do not interfere with the rules of the game.			
	Role play: Live Action Roleplaying (LARP) is a genre that is freer in dealing with the permeability of the real world and the virtual world. In a live role game, the player is physically present in the game as a game character. The player is allowed to freely interpret and improvise his role. It is not only the behaviour of the game character that is regulated by the life-world experiences of the player, but individual rules as well.			

Features of the	Description				
game	Description				
	A simple set of instructions for our characters and/or objects, their behaviours and				
	their relationships. This world can be perceived as object oriented. We start with				
	creating objects, their scene (their playing field) and their movements.				
	Perfectly challenged, with dosed punishment and well rewarded, the player cruises				
	or floats through the game. This is the experience of flow (Csíkszent-mihályi 1990)				
	that captures the player and persuades him to identify with game-play and				
	sequencing (via his avatar). Games, however, do not only differ in short-term game				
	mechanics (micro mechanics), but also in long-term mechanics (macro mechanics).				
	The latter motivate for hours, if not for days and weeks. Often progression strategies				
Flow principle	or intrinsic narrative strategies are used as macro mechanics, such as, in form of				
	new (visual) worlds, additional new challenges, superordinate comparisons, and				
	(complex) stories. For example, the game Tearaway (2013) is visually and				
	narratively convincing with its unique unfolding paper world. If we now classify the				
	rules according to the well-known Mechanics-Dynamics-Aesthetics (MDA) theory				
	(cf. Hunicke et al. 2004), which attempts to formalize the consumption of games by				
	means of analytics, and in which mechanics are the basic components/ rules				
	(possible player actions, algorithms etc.) of a game.				
	Game mechanics create motivations (Figure 1) a minimal unit for engagement and				
	involvement. In most cases a game system consists of individual game mechanic				
	hierarchical (one mechanic dominates), competitive (several mechanics				
	simultaneously) or mixed (cf. Suter, in this volume) units. Macro mechanics: sorting,				
	exploring and storytelling. Often storytelling may be accompanied by a second macro				
	mechanic such as exploring that is key for setting up sets of supporting micro				
	mechanics. It has to be noted that narration is often used as a purposeful				
	game mechanic. However, many developers don't identify storytelling as only a				
Game	game mechanic, they see it as a method to structure games in plot sequences an				
mechanics:	a means to purvey meaning. Meaning however can be purveyed as well by				
	motivational game mechanics (Fabricatore, 2007). The pragmatic division into macro				
	and micro mechanics is based on the fact that the simplest game mechanic is a				
	cybernetic control loop of challenges, event and plot options, decisions, actions and				
	the resulting rewards and punishments (Zurich Game Manifesto-2013). Macro				
	mechanics establish the framework for the decisions and interactions of a game,				
	individual micro mechanics establish playful and purposeful paths and experiences				
	for the player. In most cases, these micro and macro mechanics are designed as				
	cybernetic circuits or control systems.				

6. **THEORETICAL MODEL**

Final theoretical model is a combination of the following model

Bauer: In a game-mechanic framework texts, sounds, graphics, pictures, animations, story bits, social media friends available to the game system through challenges from a simple competition of a body-controlled game, for instance long jump or steering an idle spaceship in space (gaining control), to solving any kind of puzzle.

Experiential learning /facilitators (Matsuo, 2015 complementing Kolbe's 1984): In addition for a game to support intrinsic experiential learning, knowledge acquisition and skill training is obtained through game mechanics [Macro and Micro]. (e.g., quests, cascading information, leader boards, goals, levels, badges, role-play, tokens, etc.). Although they can causally correlate (Table 1), game mechanics is subjective; whilst game experience is observed and produced objectively.

The LM-GM mapping framework (Arnab et al, 2015), LM-GM establish relationships between the mechanics present in educational philosophies (pedagogical theories and strategies) and those of games. We formulated this as the learning-game mechanic (LM-GM) model. As they mentioned themselves these game mechanics are non-exhaustive but considering a variety of educational theories (e.g., constructivism, behaviourism, personalism). Lim et al also connects the two through thinking skills as an expansion to blooms taxonomy. (Table 2)

Classifications based on Bloom's ORDERED Thinking Skills (Lim et al, 2013)

Table 5 - Game Theoretical Classifications

Models	Game Learning Mechanics	Learning Mechanics/Long- term-Macro/Short-term- Micro	Player Rules/Game mechanics
Bauer	Mechanics of motivation	Audio Visual System	Interface System
Matsuo/Kolbe	Experiential Learning	Active Experiment	
		Concrete Experiment	

Models	Game Learning Mechanics	Learning Mechanics/Long- term-Macro/Short-term- Micro	Player Rules/Game mechanics
		Reflective Observation	
		Abstract Conceptualisation	
		Fun/ Challenge/Reflection	
		Learning goal and development ne	etwork
		Plan	
		Demonstration	
		Challenge	
	Learning/Game Mechanical	Imitation	
Arnab et al		Modelling	
		Action/Task	
		Simulation	
		Question and Answer	
		Cooperation	Stimulate/Response
		Competition	Time Pressure
lim/Bloom	A 1.		Movement
Lim/Bloom thinking skills and Arnab Combined	Applying		Cooperation
			Capture/Eliminate
			Selecting/Collecting
	Analysis	Observation	Shadowing

Models	Game Learning Mechanics	Learning Mechanics/Long- term-Macro/Short-term- Micro	Player Rules/Game mechanics
		Feedback	Analyse
		Mini-Games	
		Realism	
		Experimentation	
		Identity	
		Communal discovery	Resource Management
		Assessment	Action Points
	Evaluating	Urgent optimism	Game Turns
		Reward/Penalty	Discuss
		Pareto Optimal	Reflect
			Hypothesis
			Motivation
			Incentive
			Collaboration
			Assessment
		Ownership	Tiles/Grids
	Creating	Responsibility	Infinite Game Play
		Accountability	Status
		Planning	Design/Editing

Models	Game Learning Mechanics	Learning Mechanics/Long- term-Macro/Short-term- Micro	Player Rules/Game mechanics
		Protégé-Effect	
		Strategy Planning	
		Design-Editing	
		Cascading information	Role Play
		Participation	Question/ Answer
	Understanding	Objectify	Tutorials
			Appointment
		Instructional	Cut-Scenes
		Guidance	Tokens
		Generalisation	Good Information
		Explore	
	Retention	Discover	
		Repetition	
		Pavlovian Reaction	
		Behavioural Momentum	
		Virality	

A. THE CONNECTION BETWEEN THEORETICAL AND PRACTICAL ASPECTS OF THE MECHANICS (20 MINUTES)

By this time, you should have made some preliminary decisions about the learning mechanics, the thinking skills and game mechanics. The table below gives you some inspiration on some *Rule designs*. So, by eliminating non-viable options from the left side of the table, you will be limiting your game rule designs at right. This is in no way prescriptive. It is only designed to help you choose between a myriad of available rules and designs.

Table 6 - Connection between theoretical and practical aspects of the mechanism

Learning Mechanics	Thinking Skills	Game Mechanics	Game Rule designs.					
Accountability		Design/Editing	"King" Piece	Chaining	Gravwell	Modular Board	Real Time	Three Strikes
Ownership		Infinite Game Play	Acting	Changing Board	Grid Coverage	Move Through Deck	Reflexes	Tile Placement
Planning	Creating	Ownership	Action /Role selection	Character	Grid Movement	Move-and- capture	Relative Movement	Time Bomb
Responsibility		Protégé Effect	Action Blocking	Chit-Pull System	Hand Limit	Movement Points	Renewable Deck	Time Track

Learning Mechanics	Thinking Skills	Game Mechanics	Game Rule designs.					
		Status	Action Drafting	Closed Economy Auction	Hand Management	Movement Template	Resource Budget	Timed Rounds
		Strategy planning	Action Points	Collect Em' All	Hand Ranks	Moving Multiple Units	Resource to Move	Track Movement
		Tiles/Grids	Action Queue	Combo Making	Hand Refinement	Multiple Goal	Rock-paper- scissors	Trading
Assessment		Action Point	Action Retrieval	Command Cards	Hex and Counter	Multiple Loss Condition	Role Playing	Traitor Game
Collaboration	Evaluating	assessment	Action Event	Commodity Speculation	Hexagon Grid	Multiple Lot Auction	Roles with Asymmetric Information	Trick-Taking
Hypothesis		collaborations	Actions Timer	Communication limits	Hidden Deployment	Multiple Maps	Roll/Spin and Move	Trivia

Learning Mechanics	Thinking Skills	Game Mechanics	Game Rule d	Game Rule designs.					
Incentive		communal discovery	Advantage Token	Competitive game	Hidden Movement	Multiple Player Pieces	Roll-and-move	Trump Suit	
Motivation		Resource Management	Alliances	Compound Goal	Hidden Roles	Multi-use Cards	Rondel	Tug-of-war	
Reflect/Discus s		Game turns	Area Control	Connections	Highest-Lowest Scoring	Narrative Choice/Paragraph	Route Building	Turn Order: Auction	
		Pareto Optimal	Area Enclosur	e Constrained Bidding	Hints	Negotiation	Scenario / Mission /Campaign	Turn Order: Claim Action	
		Rewards/penaltie s	Area Impulse	Contingency	Hit-or-miss	Network and Routed Building	Scenario-Driven	Turn Order: Pass Order	
		Urgent Optimism	Area Majority	Contracts	Hot Potatoes	Once-Per-Game Abilities	Score-and-Reset Game	Turn Order: Progressive	
Analyse	Analysing	Feedback	Area Movement	Co-operative Game	I cut, You Choose	One Man's Trash	Secret Unit Deployment	Turn Order: Random	

Learning Mechanics	Thinking Skills	Game Mechanics	Game Rule de	Game Rule designs.				
Experimentatio n		Meta-Game	Asymmetric Games	Crayon Rail System	Immovable Pieces	One Vs. Many	Selection Order Bid	Turn Order: Role Order
Feedback		Realism	Auction/ Bidding	Critical Hits and Failures	Impulse Movement	Order Counters	Semi-Cooperative Game	Turn Order: Stat-Based
Identify			Auction: Dutch Priority	Cube Pusher	Income	Ownership	Sequence Finding	Unit Protection
Observation			Auction: English	Cube Tower	Increase Value of Unchosen Resources	Paper-and-Pencil	Set Collecting	Unit Stats
Shadowing			Auction: Fixed Placement	Deadline	Individual Decks	Parcheesi	Shared Deck	Unit Upgrading
Action/Task		Capture/Eliminati on	Auction: Once around	Deck Building	Induction	Passed Action Token	Shrinking Board	Variable Phase Order
Competition	Appiying	Competition	Auction: Sealed Bid	Deduction	Interrupts	Path Movement	Simulation	Variable Player Turn Order

Learning Mechanics	Thinking Skills	Game Mechanics	Game Rule de	Game Rule designs.				
Cooperation		Cooperation	Auction: Turn Order Until Pass	Delayed Purchase	Investment	Pattern Building	Simultaneous Action selection	Variable Set-up
Demonstration		movement	Auction: Dexterity	Dice Rolling	Kill Steal	Pattern Movement	Singing	Variable Win Condition
Imitation		progression	Auction: Dutch	Die Icon Resolution	King of the Hill	Pattern Recognition	Singular Player Pieces	Variable Player Powers
Simulation		selecting/Collecti ng	Auctioning and Bidding	Different Dice Movement	Ladder Climb	Physical Movement	Slide/Push	Victory Points as a resource
		Simulate/Respon se	Automatic Resource Grow th	Differing Player Goals	Layering	Pick-Up and Deliver	Social Deduction	Voting
		Time Pressure	Back and Forth	Difficulty Settings	Legacy Game	Pieces as Map	Solitaire	Wild Card
Objectify	Understandi ng	appointment	Best Fit	Discard Pile	Letters from Whitechapel	Player Elimination	Stock Holding	Word Game

Learning Mechanics	Thinking Skills	Game Mechanics	Game Rule de	Game Rule designs.				
Participation		Cascading information	Betting and Bluffing	Drafting	Line Drawing	Player Judge	Spatial Alignment	Worder Placement, different worker types
Questions And Answers		questions and answers	Bias	Drawing	Line of Sight	Player Powers	Speed Matching	Worker Placement
Tutorial		Role Play	Bigger the Better	Elapsed Real Time Ending	Loans	Point Acquisition	Spin-off Game	Worker Placement
		Tutorial	Bingo	Enclosure	Lose a turn	Point to Point Movement	Square Grid	Worker Placement with Dice
Discover	Detertion	Cut scenes/Story	Block Game	End Game Bonuses	Maintenance Cost	Predictive Bid	Stacking and Balancing	Zone of Control
Explore	Retention	Tokens	Board Shortcuts	Engine Building	Mancala	Pre-Rolling and Locking	Stat Check Resolution	

Learning Mechanics	Thinking Skills	Game Mechanics	Game Rule de	Game Rule designs.				
Generalization		Virality	Board Space Abilities	Escape The Curse of The Temple	Map Addition	Prisoner Dilemma	Static Capture	
Guidance		Behavioural Momentum	Bribery	Events	Map Deformation	Programmed Movement	Story Telling	
Instructional		Pavlovian interactions	Campaign / Battle Card	Finale Ending	Map Reduction	Push Your Luck	Sudden Death Ending	
Repetition		Goods/Informatio n	Captain Sonar	Flicking	Market	Pyramid Arcade	Sympathy Benefits	
Modelling		Fun	Card Drafting	Folk on a Map	Matching	Race	Take That	
		Challenge	Card Play Conflict Resolution	Follow	Measurement Movement	Random Player Order	Targeted Clues	
		Mini-games	Catch the Leader	Force Commitment	Melding and Splaying	Randomized Board	Team-Based Game	

Learning Mechanics	Thinking Skills	Game Mechanics	Game Rule designs.					
		Quick-Feedback	Catch Up, Mechanic	Galaxy Trucker	Memory	Random- Production	Tech Trees/ Tech Tracks	
		Levels		Gloom haven	Mini-map Resolution	Ratio / Combat Results Table	Three Dimensional Movement	

B. SUGGESTIONS FOR GAME/LEARNING MECHANICS (20 MINUTES)

A series of suggestions for possible game mechanics based on the above categories, can be found in the excel sheet attached. This is an example of 283 mechanics, classified based on the type of the game, and typology of the learners.

7. SELECTION OF THE CLEAN SLATE GAME (10 MINUTES)

The clean slate of the game (if the educator doesn't intend to create a game from scratch) can be taken from BGG (https://boardgamegeek.com/browse/boardgamemechanic) as well as any other desired data based or example. We then will use this clean slate of the games and add/amend the criteria related to the learner/player typology, game characteristics, mechanics, principle of Playability (The easement of instruction) and Inclusivity/Accessibility. We then make sure to include some principle of Flow theory in order to design a step-based instruction for the game as well as clear assessment and learning outcomes. For a game to be called a game, various characteristics needs to be considered. Motivation design combines the rules, mechanics, and consequences in a game system to keep players engaged, through challenge to reward to punishment.

This process will be met if you follow the process in this toolkit carefully!

8. Ensuring the game inclusivity and accessibility (10 Minutes)

Inclusive design recognizes accessibility for people with and without disabilities, by including the voices and representations of players in the game.





The importance of games are pointed out as a medium to organise our lived experience, promote learners' involvement, comprehension, cooperation, and motivation for teaching practices (Gil-Domenéch & Berbegal-Mirabent, 2017). Analogue games particularly deal with current issues with traditional/instructional pedagogical methods (Sardone & Devlin-Scherer, 2016) through an experiential framework. One of these issues is implementing inclusivity within a diverse classroom composed of motor-divergent, Neuro-divergent, and culturally diverse pupils. Heron et al. (2018) provided a guideline for accessibility Support Needs and Relevant Design Aspects. Also, TEGA project (TEGA-Porject, 2022) identified 14 measures for inclusivity (Consulting the students, Play testing, Customisability, being fun, Simplicity, Co-Operation, Common goal and grounds Mechanics to ensure listening, Team management, Communication, Lifting Language barrier, Personality traits, Unique engagement and Assigned responsibility). These measures combined could to some extent ensure measures of inclusivity are being met in your design, please fill out the following form. You don't need to make sure all boxes are ticked, but more than half needs to be ticked.

Table 7 - Inclusivity Measures

Inclusivity measures	Considered through mediated tool	Why not considered
	Size of cards;	
	Token shape;	
	Regularity of piece manipulation;	
Motor Skills	Ease of communicating instructions;	
	Physical acting;	
	Paper money;	
	Number of tokens;	
	Size of game board elements.	
	Reading level;	
Visual Sensory	Lying/bluffing;	
	Communication of strategy.	
	Audibility;	
Sansan/Auditan/	Lying/bluffing;	
Sensory/Additory	Communication of strategy;	
	Need for audible communications.	
	Reading level required;	
Cognitivo	Game state complexity;	
cognicive	Memory requirements;	
	Game flow;	

Inclusivity measures	Considered through mediated tool	Why not considered		
	Number of token combinations;			
	Synergy of rules;			
	Scoring;			
	General knowledge/trivia;			
	Multitasking.			
Customisability				
Playtesting				
Fun				
Simplicity				
Co-Operation				
Common Goal				
Listening Mechanics				
Team Management				
Communication				
Lifting language barrier				
Personality traits				
Unique engagement				
Assigned responsibility				
Missing measure 1				
Missing measure 2				

9.

Ensuring the flow element in the design (10 Minutes)

Table 8 - Flow Elements

Elements	Tools considered	Why not considered
Magic Circle		
Reward		
Punishment		
Step-based		
Micro-Mechanics		
Macro-mechanics		
Challenge		
Visual		
Narrative		
Rules & regulation		
Assessment		
Learning outcome		
Cybernetic Circuit		
Live Role Game		
Behaviour		
Relationship		
Supervision		

10. DRAFTING THE INSTRUCTION OF THE GAME (30 MINUTES)

Table 9 - Instructions of the game

The instruction points	What is considered
Setting the learning outcome	
Setting the type of the game	
Number of players (Maximum, Minimum)	
Narrative	
Game final target	
Step- based challenge	
Opportunities for addressing the challenge	
Consequences (Reward and Punishment)	
Rules of magic circle (what to do/what not to do)	
Stop point (When does the game is considered finished).	
Supervision and control rules	
Reflection points within a cybernetic circuit	
Assessment of learning outcome	

11. ENSURING THE GAME PLAYABILITY BY PLAYTESTING THROUGH BETA-PLAY AND REFLECTION (HALF A DAY)

Table 10 - Playtesting & Reflection

Playtest 1	Number of players	Time	Feedback	Reflection points	Amendment to playtest
Playtest n					
Final game					

Game feedback questionnaire

Table 11 - Game feedback questionnaire

No.	Question	Reveals
1	What was your favourite moment(s) in the game?	Emotions, experience, knowledge acquired
2	If you could change, add, or remove anything from the experience, what would it be?	Emotions, experience
3	What would you change about the game? -	Improvement
4	Was there anything in the rules you didn't understand? (mechanics)	Improvement
5	Do you have any other feedback you'd like the designer and/or publisher to hear?	Improvement

Post-test questionnaire (using M. Sousa's suggestions)

Table 12 - Post-test questionnaire

			Likert scale of evaluation				
No.	Question	(None) 1	- 2	- 3	- 4	(Totally) 5	
1	How the game maintains the balance between fun and knowledge acquisition						
2	How much you were engaged into the game?						
3	How do you classify the level of challenge of the played game?						
4	How do you classify the level of anxiety after playing the game?						
5	How do you classify the level of surprise after playing the game? - no needed						
6	How do you classify the level of frustration after playing the game?						
7	Did the game achieved the objectives previously defined for this session?						
8	How likely you would play this game again?						

Tutor's readiness questionnaire

Table 13 - Tutor's readiness questionnaire

No.	Question	Answer
1	Is the game included in the BGG database (<u>https://boardgamegeek.com/</u>)?	(Y/N)
2	What is the theme of the game?	Short answer
3	What is the type of the game?	(select from list: strategy, adventure, role play, simulation)
4	What is the language of the game?	(short answer)
5	For those who do not speak the language in which this game is published, how language-dependent are the components (aside from the rules)?	(select from list: No necessary in-game text; Some necessary text - easily memorized or small crib sheet; Moderate in-game text - needs crib sheet or paste ups; Extensive use of text - massive conversion needed to be playable; Unplayable in another language)
6	ow long does it take to learn the rules?	(short answer)
7	How heavy (difficult/complex) is this game?	(select from list: light, medium light, medium, medium heavy, heavy)
8	How long does it take to play?	(short answer)
9	Minimum number of players?	(number)
10	Maximum number of players?	(number)
11	Age range of players?	(numbers)
12	List the game materials, e.g. dice, board, cards, etc.	(list/short answer)
13	List the learning objectives that you want to achieve through this game.	(list/short answer)
14	List the game mechanics.	(list/short answer)
15	Have you made adaptations to this game?	(Y/N) If Yes, name the adaptations you have made and why?
16	Have you play tested the game at least once?	(Y/N)

Students' post-playing experience questionnaire

Table 14 - Students' post-playing experience questionnaire

EVALUATION OF THE METHOD (GBL)			
 In your opinion, how much knowledge have you acquired by learning this method compared to other teaching methods? Compared to other teaching methods, how attractive are the activities conducted by this method? 	 Precious little (1) Little (2) On average (3) Much (4) A lot (5) Unattractive (1) Not attractive (2) Moderately attractive (3) Attractive (4) 		
EVALUATION OF THE PARTICULAR GAME	□ Very attractive (5)		
 Which discipline knowledge had to be used to play this game? [knowledge acquisition] 	 Economics Management Finance Marketing Mathematics Psychology Others 		
4. Did you encounter any problematic situations while playing this game? [problem solving]	□ Yes □ No		
 Have you noticed any mistakes made by you or your competitors while playing this game, from which lessons can be learned? [critical thinking, engagement, learning] 	□ Yes □ No		

6.	Did you experience emotional tension while playing this game? [emotional engagement]	□ Yes □ No
7.	Would you like to play this game again?	□ Yes □ No
8.	How this game could be improved in terms to i	increase the level of knowledge acquisition of the

course?

Thanks for the answers!

Extra Sheet for answers

Extra Sheet for answers

Extra Sheet for answers

References:

Suter, Beat (2018), Rules of Play as a Framework for the "Magic Circle". In: Beat Suter, Mela Kocher, René Bauer (Hg.): Games and Rules.Volume 33.

Fritz, Jürgen (2004): Das Spiel verstehen. Eine Einführung in Theorie und Bedeutung, Weinheim and München: Juventa.

Goffman, Erving (1980): Rahmen-Analyse. Ein Versuch über die Organisation von Alltagserfahrungen, Frankfurt am Main: Suhrkamp.

Matsuo, M. (2015). A Framework for Facilitating Experiential Learning. Human Resource Development Review, 14(4), 442-461. <u>https://doi.org/10.1177/1534484315598087</u>

Csikszentmihalyi, Mihaly (1990): Flow: The Psychology of Optimal Experience, New York: Harper and Row.

Fabricatore, Carlo (2007): "Gameplay and Game Mechanics Design: A Key to Quality in Videogames." In: Proceedings of the OECD-CERI Expert Meeting on Videogames and Education, Santiago, CL: OECD, pp. 1-18.

Bloom, B. S. (1956). Taxonomy of educational objectives: The classification of educational goals: Handbook I, cognitive domain (B. S. Bloom, Ed.). Longmans.

Arnab, S., & Clarke, S. (2016). Towards a trans-disciplinary methodology for a game-based intervention development process. British Journal of Educational Technology. <u>http://doi.org/10.1111/bjet.12377</u>

Kiili, K., Lainema, T., de Freitas, S., & Arnab, S. (2014). Flow framework for analyzing the quality of educational games. Entertainment Computing, 5(4), 367–377. <u>http://doi.org/10.1016/j.entcom.2014.08.002</u>

Arnab, S., Lim, T., Carvalho, M.B., Bellotti, F., de Freitas, S., Louchart, S., Suttie, N., Berta, R. and De Gloria, A. (2015) Mapping learning and game mechanics for serious games analysis. British Journal of Educational Technology, 46 (2). pp. 391-411

Proulx, J. N., Romero, M., & Arnab, S. (2016). Learning Mechanics and Game Mechanics Under the Perspective of Self-Determination Theory to Foster Motivation in Digital Game Based Learning. Simulation & Gaming, 1046878116674399.

Lim, T., Carvalho, M.B., Bellotti, F., Arnab, S., Freitas, S.D., Louchart, S., Suttie, N., Berta, R., & Gloria, A.D. (2013). The LM-GM framework for Serious Games Analysis.

Aguado-Delgado, J., Gutiérrez-Martínez, J. M., Hilera, J. R., de-Marcos, L., Otón, S. (2020). Accessibility in video games: a systematic review. Universal Access in the Information Society, 19, 169-193. https://doi.org/10.1007/s10209-018-0628-2

Barnes, C. (2019). Understanding the social model of disability - Past, present and future. In N. Watson & S. Vehmas (Eds.), Routledge Handbook of Disability Studies. Routledge.

Connor, D. J. (2019). Why is Special Education So Afraid of Disability Studies? - Analyzing Attacks of Disdain and Distortion from Leaders in the Field. Journal of Curriculum Theorizing, 34(1), 10-23.

Crenshaw, K. (1989). Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics. University of Chicago Legal Forum,1(8), 139-167.

Engel, G. L. (2003). The Clinical Application of the Biopsychosocial Model. In R. M. Frankel, T. E. Quill, Susan H. McDaniel

European Commission (2019). European Accessibility Act - Improving the Accessibility of Products and Services in the Single Market. European Commission - Employment, Social Affairs, & Inclusion.

Fryer, L. (2021). Introducing a Social Model of Media Accessibility [Conference presentation]. IAMCR 2021 Conference - Rethinking borders and boundaries: Beyond the global/local dichotomy in communication studies, Nairobi, Kenya.

Gilbert. R. M. (2019). Inclusive Design for a Digital World: Designing with Accessibility in Mind. Appress.

Greco, G. M. (2019). Towards a pedagogy of accessibility: The need for critical learning spaces in media accessibility education and training. Linguistica Antverpiensia, New Series – Themes in Translation Studies, 18, 23-46.

Goering, S. (2002). Beyond the Medical Model? Disability, Formal Justice, and the Exception for the "Profoundly Impaired". Kennedy Institute of Ethics Journal, 12(4), 373-388. https://doi.org/10.1353/ken.2002.0025

Hamilton, I. (2022). Accessibility Then and Now: History, Myths, Considerations, and Tools. In K. Isbister & C. Hodent (Eds.), Game Usability - Advice from the Experts for Advancing UX Strategy and Practice in Videogames (2nd Edition; pp. 239-259). CRC Press. <u>https://doi.org/10.1201/9781003109389-17</u>

Heron, M. J., Belford, P. H., Reid, H., & Crabb, M. (2018). Meeple Centred Design: A Heuristic Toolkit for Evaluating the Accessibility of Tabletop Games. The Computer Games Journal, 7, 97-114. https://doi.org/10.1007/s40869-018-0057-8

Huizinga, J. (1980). Homo Ludens: A Study of the Play-Element in Culture. Original Publication: 1944. Routledge & Kegan Paul Ltd.

Lethwaite, S. (2014). Web accessibility standards and disability: developing critical perspectives on accessibility. Disability and Rehabilitation, 36(16), 1375-1383. https://doi.org/10.3109/09638288.2014.938178

Pfahl, L. & Powell, J. (2011). Legitimating school segregation. The special education profession and the discourse of learning disability in Germany. Disability & Society, 26(4), 449-462. https://doi.org/10.1080/09687599.2011.567796

Silvers, A. (1998). Formal Justice. In A. Silvers, D. Wasserman, & M. Mahowal (Eds.), Disability, Difference, and Discrimination (pp. 13-145). Rowman & Littlefield.

Silvers, A. (2000). The Unprotected: Constructing Disability in the Context of Antidiscrimination Law. In L. P. Francis & A. Silvers (Eds.), Americans with Disabilities (pp. 126–45). Routledge.

Sousa, C., Neves, J. C., & Damásio (in press). Intellectual Disability Through Gaming: Operationalizing Accessibility, Participation, and Inclusion. Journal of Gaming and Virtual Worlds. http://dx.doi.org/10.33767/osf.io/9znad

Sousa, C., Neves, J. C., & Damásio (2022). The Pedagogical Value of Creating Accessible Games: A Case Study with Higher Education Students. Multimodal Technologies and Interaction, 6(2), 10. http://dx.doi.org/10.3390/mti6020010 United Nations (2006). Convention on the Rights of Persons with Disabilities and Optional Protocols. United Nations.

Waddington, L. & Priestley, M. (2020). A human rights approach to disability assessment. Journal of International and Comparative Social Welfare, 37(1), 1-15. <u>https://doi.org/10.1017/ics.2020.21</u>

World Health Organization (2002). Towards a Common Language for Functioning, Disability and Health - ICF. World Health Organization.