



WIN! WIN! WIN!

PRACTICAL INSIGHTS TO GAME-BASED LEARNING



Dr. Meike Sauerwein

Division of Environment and Sustainability, Hong Kong University of Science & Technology

OUTLINE

1. Games vs Gamification
2. Examples of games & game-based class structures
3. Benefits of games & student responses
4. What games can & cannot achieve
5. Practical tips on how to embed games into your class

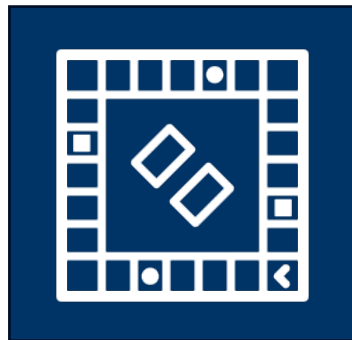
EDUCATIONAL GAME

DEFINITIONS



Game

A structured form of play for entertainment.



Educational Game

Games designed to be entertaining but with educational value.

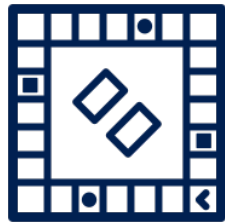
GAMES VS GAMIFICATION

DEFINITIONS



Gamification - integration of gaming elements into non-game activities (e.g. learning) to make them more appealing to the public/students

➤ Educational



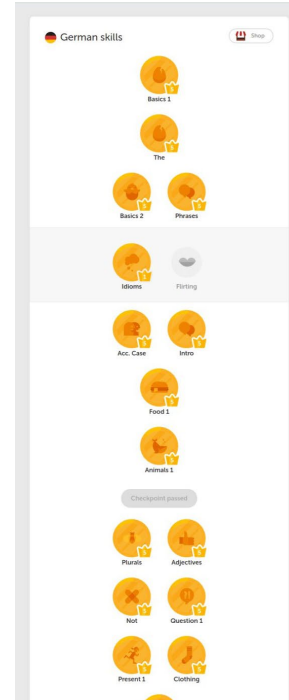
Serious Games - Games that are designed for entertainment but have a more “serious” theme & message behind the game play.

➤ Educational & Recreational

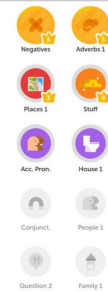
GAMIFICATION EXAMPLES



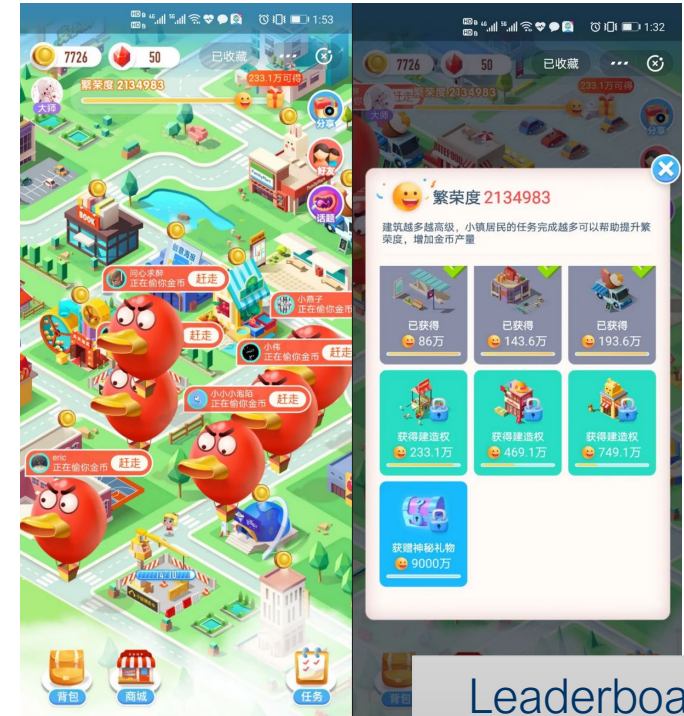
Point System
Grocery stamps map



Badges & Milestone
Duolingo



1 Test out of 6 skills



Leaderboard
Alipay Town

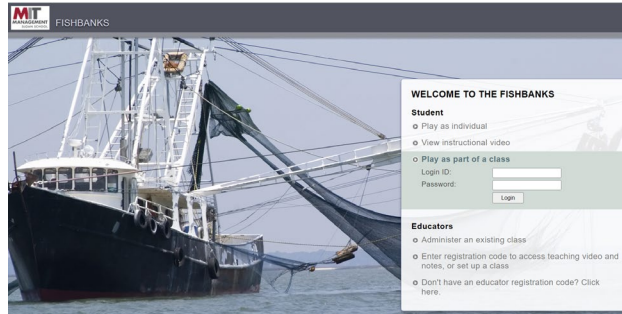
Typical elements: Journeys,
Characters, Rewards and Badges, ...

GAMES FOR SUSTAINABILITY EDUCATION

HAVE EMERGED OVER THE PAST DECADES



Catan: Oil Springs



MIT Fishbanks

Sustainability games have been developed in various formats

- Board games
- Gard Games
- Computer Simulations
- etc.



EcoChains: Arctic Crisis



LOOP – Life of Ordinary People



Milk.Co – The Life Cycle Challenge



EXAMPLES OF GAMES & GAME-BASED CLASS STRUCTURES

GAME EXAMPLES

EXAMPLE: THE FISHBANK GAME (TRAGEDY OF THE COMMONS)

YEAR 1 Make decisions for current year

Buy

SELLER	NUMBER OF SHIPS	RESERVE PRICE (\$/SHIP)
--------	-----------------	-------------------------

Sell

No. of Ships:

Reserve Price:

Make offer

3
CURRENT TOTAL FLEET

READ THESE REPORTS AFTER EVERY ROUND

HARBOR COAST DEEP

PAY ATTENTION TO THIS INFO

Ship Market Value (\$ / Ship)	300
Number of Ships (Ships)	3
Value of Ships (\$)	900
Bank Balance (\$)	600
Total Assets (\$)	1,500

	Harbor	Coast	Deep
Expected Catch per Ship (Fish / Year / Ship)	0	15	25
Price of Fish (\$ / Fish)	20	20	20
Expected Revenue per Ship (\$ / Year / Ship)	0	300	500
Operating Cost per Ship (\$ / Year / Ship)	50	150	250
Expected Profit per Ship (\$ / Year / Ship)	-50	150	250

Aim of the game: experience the consequences of overfishing the oceans

- Online-based game, groups compete with each other
 - Classroom – 5 students share 1 computer to run the simulation
- Easy navigation of progress of groups due to leader board in the game
- Communication with game instructor through game chat or announcements

GAME-BASED CLASS STRUCTURE

EXAMPLE: THE FISHBANK GAME (TRAGEDY OF THE COMMONS)

CLASS RUNDOWN

YOUR TEAM NAME [CHART] [Log out Atlantic 1]

YEAR 1 Make decisions for current year

BUY

SELLER	NUMBER OF SHIPS	RESERVE PRICE (\$/SHIP)
	<input type="text" value="0"/>	<input type="text"/>

SELL

No. of Ships:
Reserve Price:

Make offer

3 CURRENT TOTAL FLEET

READ THESE REPORTS AFTER EVERY ROUND

PAY ATTENTION TO THIS INFO

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Course "Introduction to Sustainability"

Introduction to related topics (10min or more)

Game Tutorial (slides) ~10min

Game setup / Login ~5min

Game Play (35min-1h)

Debriefing/ Post-Game Discussion (15-20min)

Total: ~2 hours

GAME EXAMPLES

EXAMPLE: MILK.CO – THE LIFE CYCLE CHALLENGE



Aim of the game: understand the life cycle of milk how to make milk production more sustainable

- Board/Card-Game game, each student represents a company and compete with other players to produce most sustainable milk
- Different rounds of gameplay that allows flexibility to cut the game shorter
- Rule-set moderately complicated – requires game facilitators for groups

GAME-BASED CLASS STRUCTURE

EXAMPLE: MILK.CO – THE LIFE CYCLE CHALLENGE

CLASS RUNDOWN



Seminar/ Class Module about Life Cycle Thinking

Introduction to the topic (10-15min)

Game Tutorial ~10min,
meanwhile game setup

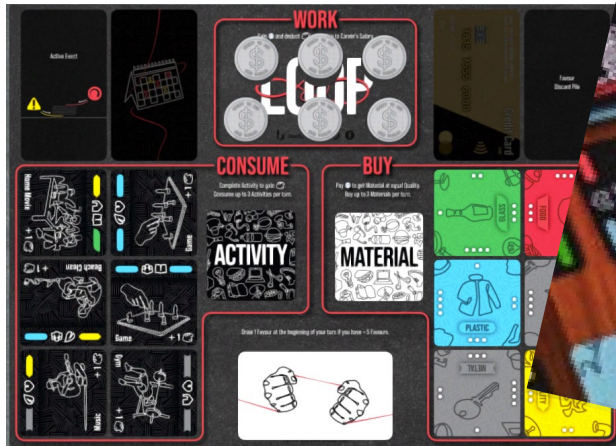
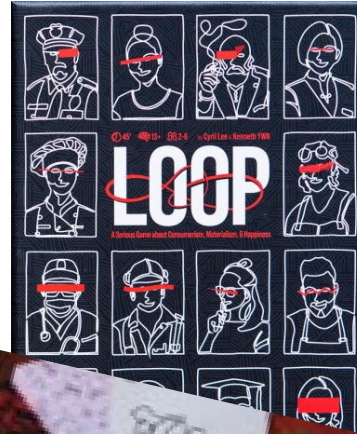
Game Play (20-60min)

Post-Game Discussion (20min)

Total: 1-2 hours

GAME EXAMPLES

EXAMPLE: L.O.O.P. – LIFE OF ORDINARY PEOPLE

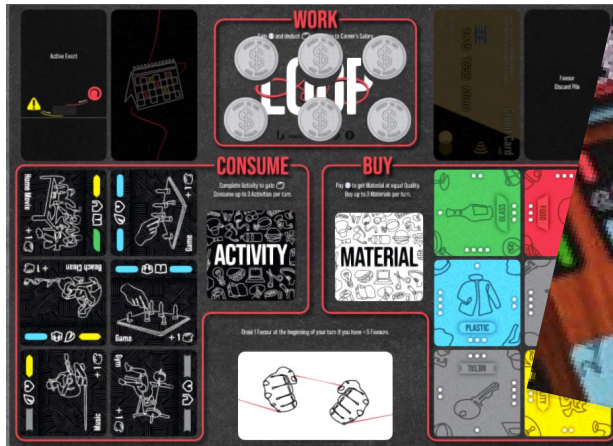


Aim of the game: explore the consequences of consumerism (e.g. resource depletion, work-life balance), the value of value-based consumption, sharing economy and whether consumption makes us happy.

- Board/Card-Game game, each students works, buys and completes activities to become the “happies person”
- Rule-set complicated – requires good instruction (video) & trained game facilitators
- Very interactive and fun (also commercially available)

GAME-BASED CLASS STRUCTURE

EXAMPLE: L.O.O.P. – LIFE OF ORDINARY PEOPLE



CLASS RUNDOWN

Course "Introduction to Sustainability",
course "The Smart Consumer"

Distribution of Game Rules

Introduction on the topic of sustainable consumption
(10-15min)

Game Tutorial Video ~5min,
meanwhile game setup

Walk through / Q&A ~5min

Game Play (~1h)

Game Questionnaire (Debriefing
Questions) (5-10min)

Debriefing/ Post-Game Discussion (~30min)

Total:
1.5-2 hours



BENEFITS OF GAMES & STUDENT RESPONSES

TURNING CLASS CONTENTS INTO A GAME

MILK.CO – THE LIFE CYCLE CHALLENGE – THE STARTING POINT

- 1.5 h workshop for students in School of engineering (pass/fail course)
- Students don't know each other and hence collaboration & engagement in activities rather poor

→ convert class content into a game

ACTIVITY:
Mapping Life Cycle Stages & Processes

The life cycle processes for Cow, soy and rice milk are listed around the map.

As a group, please work together and discuss the right sequence of the processes into the right order

groups 7 min

GROUP DISCUSSION:
Life Cycle Impacts & potential for improvements

What **options** does the coffee shop have to **significantly reduce its carbon emissions from milk**?

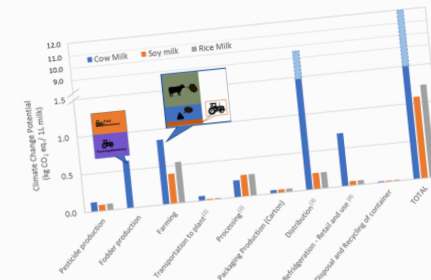
e.g. how to change milk life cycle emissions?
how to change their business model?



Work in groups



~5 min




TURNING CLASS CONTENTS INTO A GAME

COMPARISON OF LECTURE+ ACTIVITY WITH THE GAME-BASED CLASS

Lecture +
Activity

ACTIVITY:
Mapping Life Cycle Stages & Processes

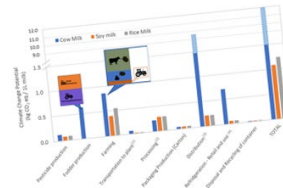
The life cycle processes for Cow, soy and rice milk are listed around the map. As a group, please work together and discuss the right sequence of the processes into the right order



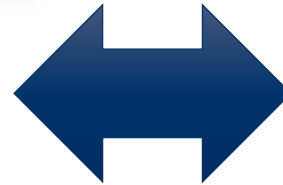
7 min

GROUP DISCUSSION:
Life Cycle Impacts & potential for improvements

What options does the coffee shop have to significantly reduce its carbon emissions from milk?
e.g. how to change milk life cycle emissions? how to change their business model?



Work in groups ~5 min



Game-based
class



Comparison of **delivery methods** – Students rating of the delivery method

Delivery Method	Number of students	Mean Score
Lecture + Activity	29	5.68*
Game-based Class	27	6.33*

STUDENTS' PERCEPTION OF GAME-BASED CLASSES

STUDENT FEEDBACK FOR “INTRODUCTION TO SUSTAINABILITY” (2 GAMES USED)

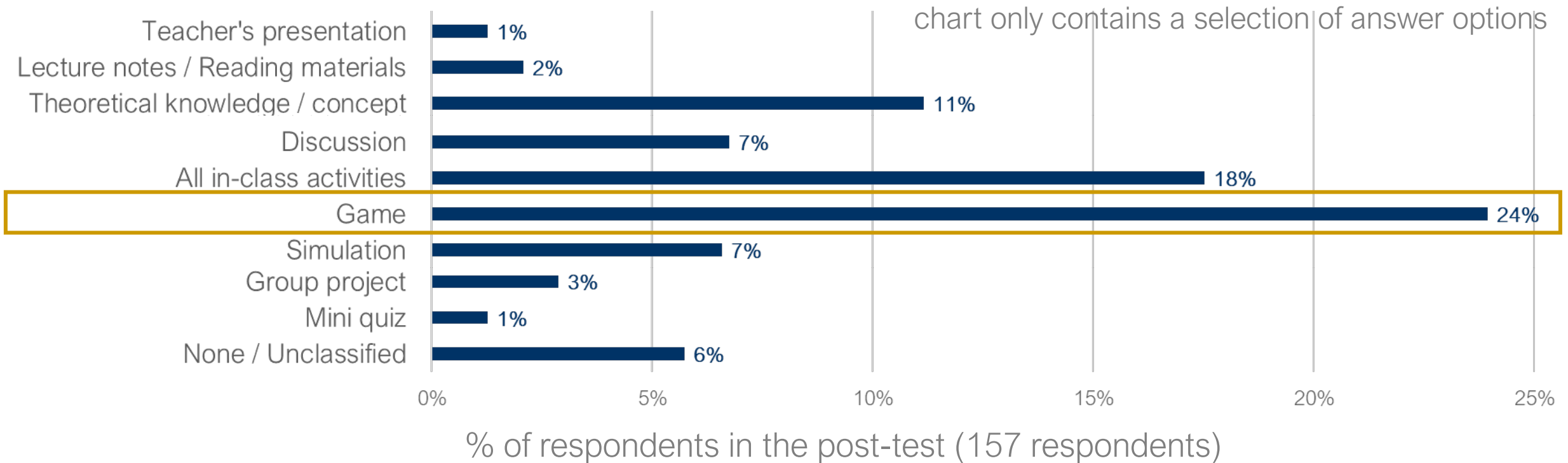
Q: What do you like about the class?

- “*The class is interactive - engaging and fun! The games and activities definitely help in understanding of concepts.*”
- “*There are interesting activities which bring students to be more committed*”
- “*Very related to daily life.*”
- “*Gaining more in-depth information about the things that are going on around us which we are usually unaware of. In-class activities to strengthen our knowledge about the topic & Interactive class setting*”

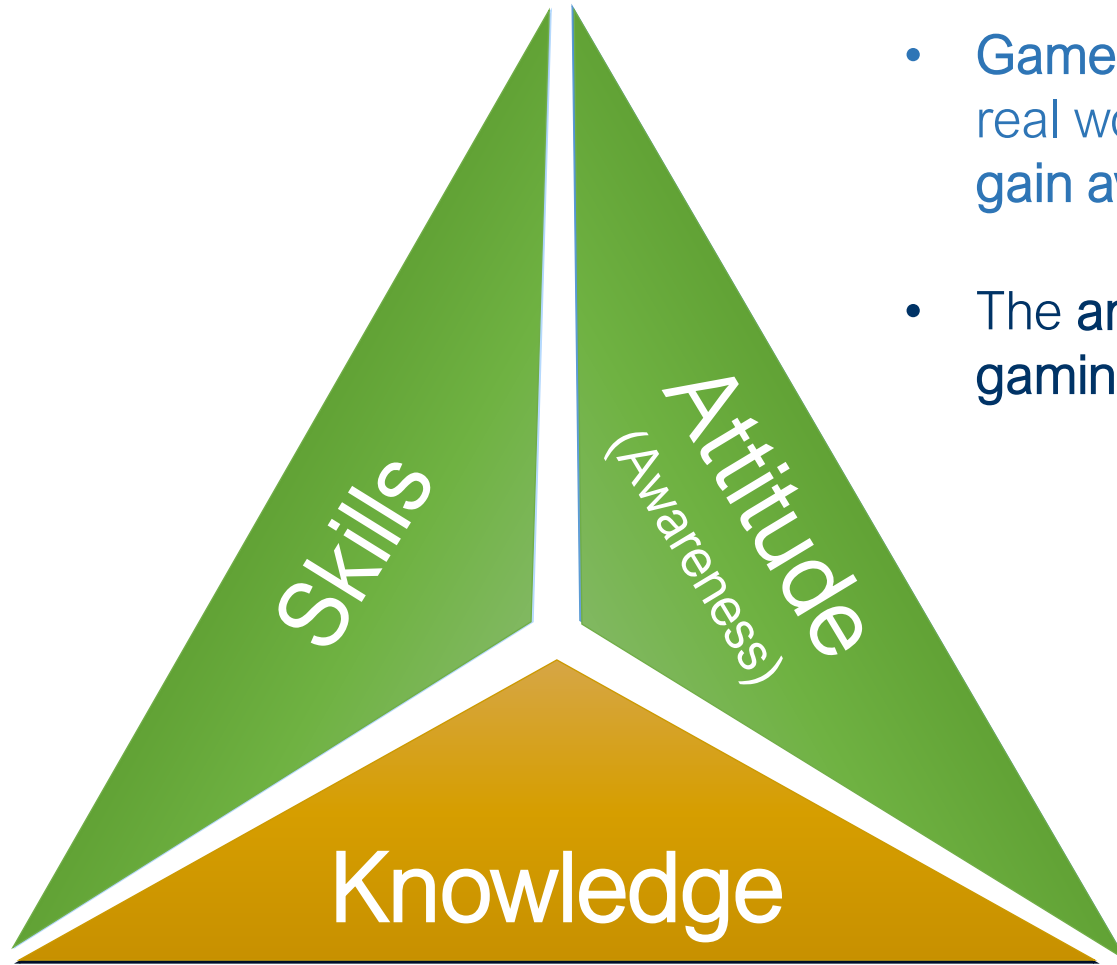
STUDENTS' PERCEPTION OF GAME-BASED CLASSES

STUDENT FEEDBACK FOR "INTRODUCTION TO SUSTAINABILITY" (2 GAMES USED)

Q: What element(s)/activity(ies) in SUST1000 you think is/are **EFFECTIVE** in improving your attitude towards sustainable development?



WHAT GAMES CAN AND CANNOT ACHIEVE



- Games are powerful tools to allow students to experience real world issues in a “small scale” & “save space” and gain awareness of the consequences
- The amount of knowledge that students can gain during gaming is limited

GAMES FOR SUSTAINABILITY EDUCATION

THE ROLE OF DEBRIEFING

Table 1 | A summary and comparison of formats of climate change games.

Game format	Key features	Pros and cons	Examples
Offline facilitated experience	Facilitated activities, often involving teams or role play	Flexible and adaptable, but facilitation requirement a potential barrier	<i>Climate Di</i>
Card-/board-game	Short gameplay session, usually involving a small number of players	Typically low in cost and technological requirements, but may be harder to scale	<i>Arctic Sag</i> <i>EcoChains</i> <i>Keep Cool!</i>
Computer game	Computer-based role plays, simulations or management games	Consistent and scalable experience, but requires computer hardware	<i>Anno 2070</i> <i>Climate Ct</i> <i>Fate of the</i>
Mobile game	Highly graphical with short, on-the-go play sessions	Able to provide portable, location-based games, but requires smartphone technology	<i>Climate M</i> <i>WB Clima</i>
Pervasive game	May include a combination of online and offline activities	New experiences with multiple entry points, but may be less intuitive to learn	<i>FutureCoa</i> <i>Greenify</i> ⁵⁴ <i>Love Letter</i>

The selected references are representative rather than an exhaustive list.

Wu and Lee (2015), Nature Climate Change

Goals and outcomes

Facilitated learning with debriefing;
qualitative assessment

Facilitated learning with debriefing;
qualitative assessment

In-game assessment

In-game assessment

Debriefing

- reflection, sharing, and discussion - after the game-play
- **essential** to allow players to step back and reflect on their learning and **enable effective learning**

Insufficient debriefing of the game may jeopardize achievement of intended learning outcomes

Tips:

- Prepare a few key messages the debriefing should convey (be flexible)
- Practice engaging debriefing techniques



PRACTICAL TIPS ON HOW TO EMBED GAMES INTO YOUR CLASS

TIPS FOR USING GAMES IN CLASS

BEFORE THE CLASS

1. **Test out the game with a (small) group** (unfamiliar with the rules)
2. **New to gaming? - Invite colleagues / collaborators to run it with you**
3. **Train your game facilitators** (past students who like the game make great facilitators)
4. Prepare **bullet-proof instructions** (e.g., short intro slides/video, individual tips on each table)
5. **Plan enough time** (short intro & sufficient time for debriefing, buffer time)

TIPS FOR USING GAMES IN CLASS

DURING THE CLASS

1. Make sure **facilitators know what to do when** (when to set up the game, by when need to end, etc.)
2. Have a “if we run out of time...” – strategy
3. Have a **strategy to keep students** who finish early **busy**
4. Focus **only a few key learnings/messages** and be flexible (games not always go as planned)

DEVELOPING GAMES / GAMIFYING CLASS CONTENT

DIFFICULTIES AND TIPS

- Does not “feel” like a game, not fun to play.
- **Lack intrinsic player motivation.** - “Gain more points” or “Unlock more badges” doesn’t last long.
 - **Tip: Tailor-make stories to align the game mechanics.**
 - **Tip: Adopt elements from past successful game models.**
- **Complex ideas cannot be gamified** properly.
 - **Tip: Generalize and simplify into key learnings prior to gamification. Reduce the numbers of key learnings into a few categories by grouping similar ILOs**
- **Including many different game elements**
 - **Tip: Fight the temptation of adding too many elements or patches**

THANK YOU FOR YOUR ATTENTION!

LOOKING FORWARD TO YOUR
FEEDBACK & QUESTIONS

Dr. Meike SAUERWEIN, HKUST

meike@ust.hk

www.linkedin.com/in/meikesauerwein

Acknowledgement:

Mr. Cyril Lee, Blackbody Lab (Game Developer),
CEI HKUST and Hong Kong UGC

Reach out if you like to know more or
use the games for your classes:

Milk.Co – The Life
Cycle Challenge



L.O.O.P Game
<https://www.theloop.page/>

