



**Presented at the FIG Working Week 2017,  
May 29 - June 2, 2017 in Helsinki, Finland**

# Saving Earth, Populating Mars: Learning affordances of a game- based 3D Virtual Environment

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# Setting the scene

- **Subject title:** Land Administration Systems
- **Subject code:** GEOM30013
- **Level:** 3 (Undergraduate)
- **Prerequisite:** N/A
- **Size:** 80 students
- **BSc and BDes:** Spatial Systems, Civil Systems, Environmental Eng. Systems, Property , Urban Design and Planning

# Intended Learning Outcomes

1. Explain social, economic and environmental importance of land in societies
2. Describe land administration process and its subsystems
3. Classify technical and non-technical options for designing and managing land information infrastructures
4. Analyse local and overseas approaches to land administration in both developed and developing country contexts for sustainable development
5. Design land administration systems for specific country contexts

# Assessments

- Assignment 1 (5%) associated with intended learning outcomes 1 and 2:
  - 700 Word report on **land policies of individual territories** due in weeks 4
- Assignment 2 (5%) associated with intended learning outcomes 1 and 2:
  - 400 Word report on **peer review of assignment 1** due in weeks 6
- Major Project, (20%) Associated with intended learning outcomes 1-6
  - 2000 Word report on **designing a land administration systems**, due at the end of teaching break
- Assignment 3, (10%) Associated with intended learning outcomes 1-6
  - 500 Word report on **peer review of the major reports** due at the end of Week 11
- Assignment 4 (10%) associated with intended learning outcomes 1-6:
  - 10 minute presentation on **the major projects** due in weeks 12

# Motivation

- Student feedback
  - Some concepts are abstract
  - Looks like a research subject
- Better Student Experience
  - Fun subject

# Methodology

- Prototype
- Student acceptance testing (qualitative, quantitative)
- Improve

# Saving Earth , Populating Mars



# Evaluation

- In a survey, students were
  - required to respond to positive and negative statements related to their interaction with the game (quantitative)
  - required to provide compare the game to their existing learning through written comments and feedback (qualitative)
  - required to provide age, gender, experience



# Quantitative

STATEMENT	NO RESP.	1 STRONGLY DISAGREE	2	3	4	5 STRONGLY AGREE	TOTAL RESP.
I was engaged in the learning experience in Saving Earth Populating Mars	1	2	12	26	30	7	<b>77</b>
Saving Earth Populating Mars is a helpful program for my learning	3	1	8	34	27	5	<b>75</b>
I enjoyed the 3D virtual environment as an information delivery system	1	0	9	20	35	13	<b>77</b>
In the future, I would prefer to learn with 3D Virtual Reality software than with textbooks	1	4	9	17	24	23	<b>77</b>
In the future, I would prefer to learn with textbooks than with Saving Earth Populating Mars	2	9	22	25	14	6	<b>76</b>
Learning would be easier with Saving Earth Populating Mars	0	0	11	36	23	8	<b>78</b>
I was willing to explore the program	1	0	7	11	33	26	<b>77</b>
I liked using Saving Earth Populating Mars as an additional learning tool	1	2	5	23	21	26	<b>77</b>
The visual representation of data in Saving Earth Populating Mars is better for my understanding	1	1	13	28	25	10	<b>77</b>
The 3D spatial distribution of the game play keeps me entertained between information bursts	1	3	10	22	26	16	<b>77</b>
Saving Earth Populating Mars is a waste of time	2	13	36	20	5	2	<b>76</b>

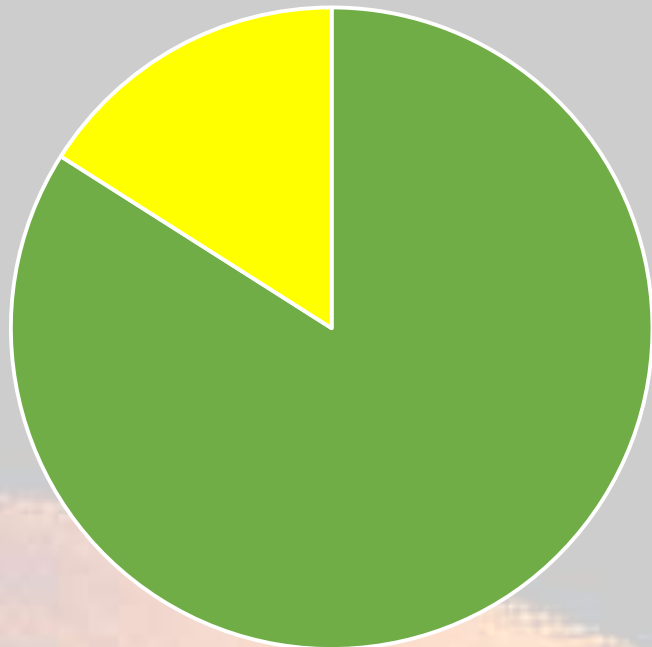
# Qualitative

1. How was Saving Earth Populating Mars different/better than Course or LMS online tools?
2. What is the one thing you would change about Saving Earth Populating Mars?
3. What is one thing you liked about using Saving Earth Populating Mars?
4. What would need to be included to make the 3D Virtual Environments more engaging for your learning?
5. Which part of the 3D Virtual Reality in particular do you think will improve your learning?

# Quantitative Analysis

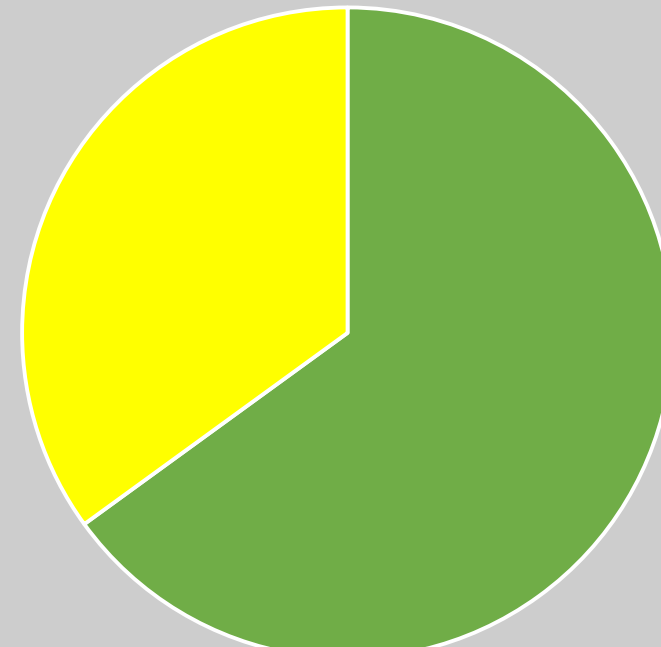
# Statements

The game offered a different way of learning



■ Agreed ■ Other

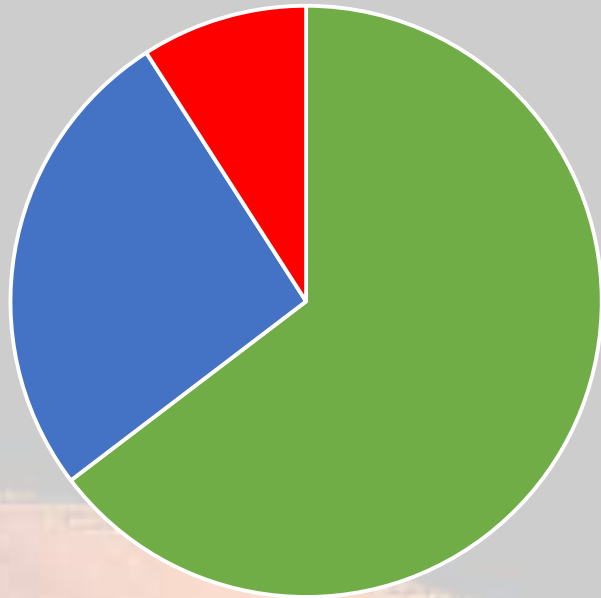
Students would prefer to learn with 3D Virtual Environments and not textbooks



■ Agreed ■ Other

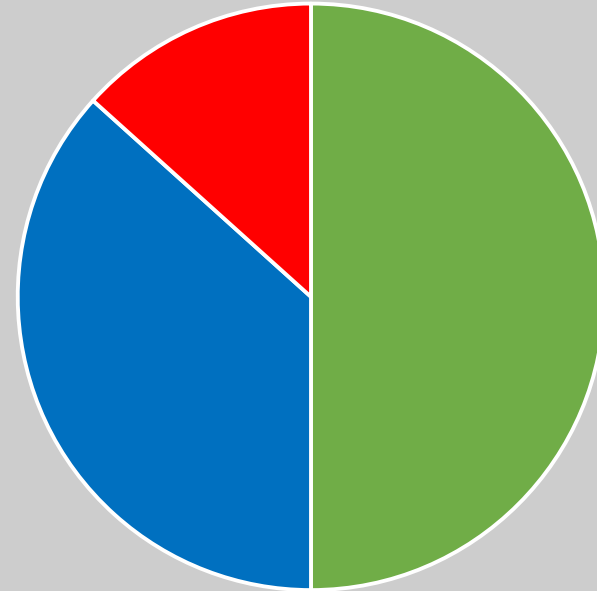
# Statements

The game is  
a waste of time



■ Disagree ■ Unsure ■ Agree

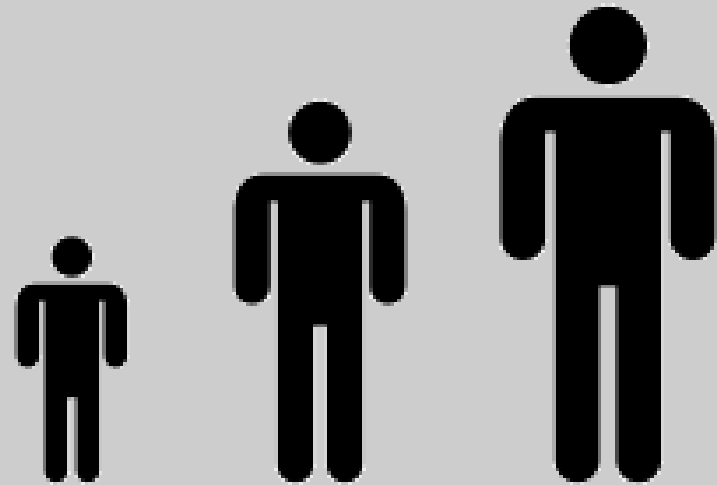
The learning would be better with 3D  
Virtual software



■ Agree ■ Unsure ■ Disagree

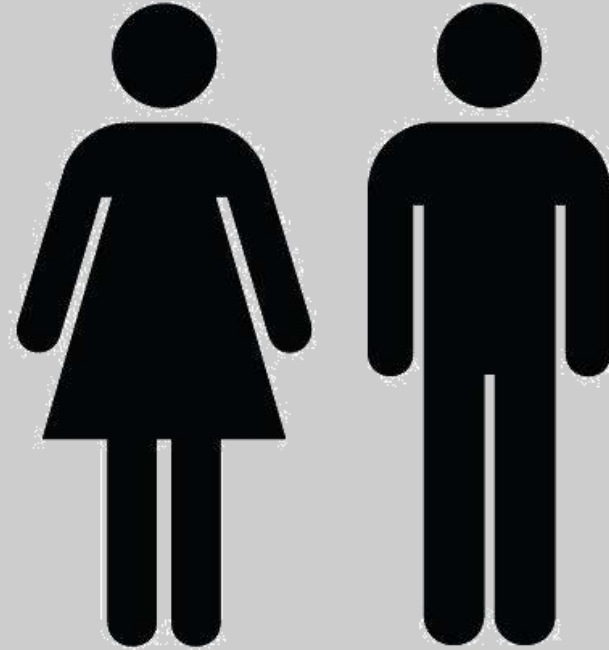
# Age

- The age range of 18-20 includes statements where differences were observed.
  - *I enjoyed the 3D virtual environment as an information delivery system has a 75% agree rate compared to 62% for the core analysis, and*
- The 23-24 age range, with these users having a more negative experience with the game.



# Gender

- There were 58 male respondents and 19 female respondents.
- In the majority of statements, females tended to have lower agree values compared with core analysis agree values.



# Experience

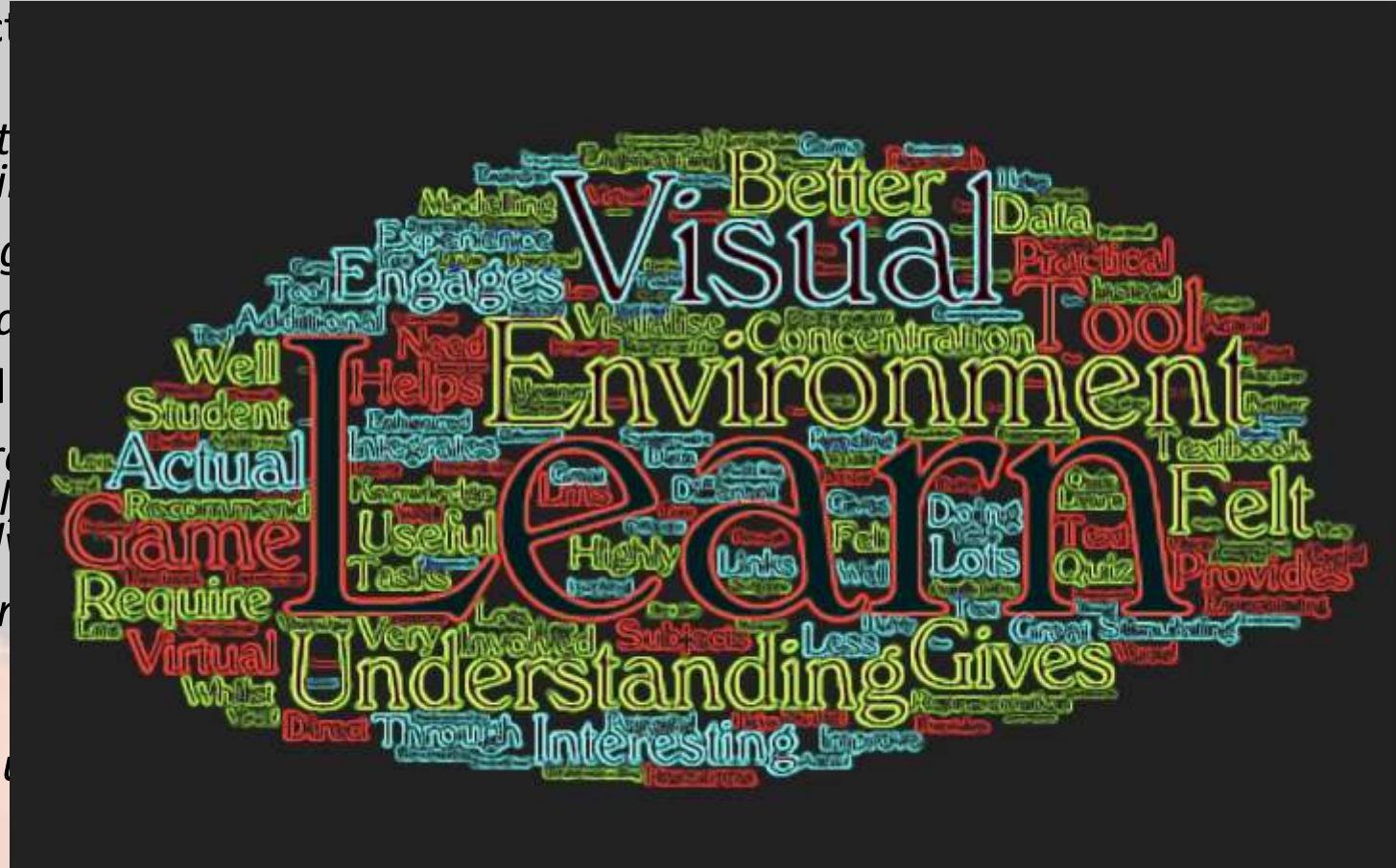
VALUE	DESCRIPTION	STUDY POPULATION
None	The person has no experience with gaming	5
Low	The person may have no experience with computer platform gaming, however, has experience with mobile gaming applications	37
Medium	The person may have some experience with computer platform gaming and has experience with mobile gaming applications	16
High	The person has significant gaming experience in both computer-based systems and mobile applications	19



# Qualitative Analysis

# How was Saving Earth Populating Mars different/better than Course or LMS online tools?

- “felt more practical environment”,
- “integrates text interesting environment”
- “more engaging”
- “useful as an additional tool”
- “helps to visualise”
- “would highly recommend subjects as well as modelling involved”
- “visual representation of understanding, improve”
- “entertaining but not too much though”



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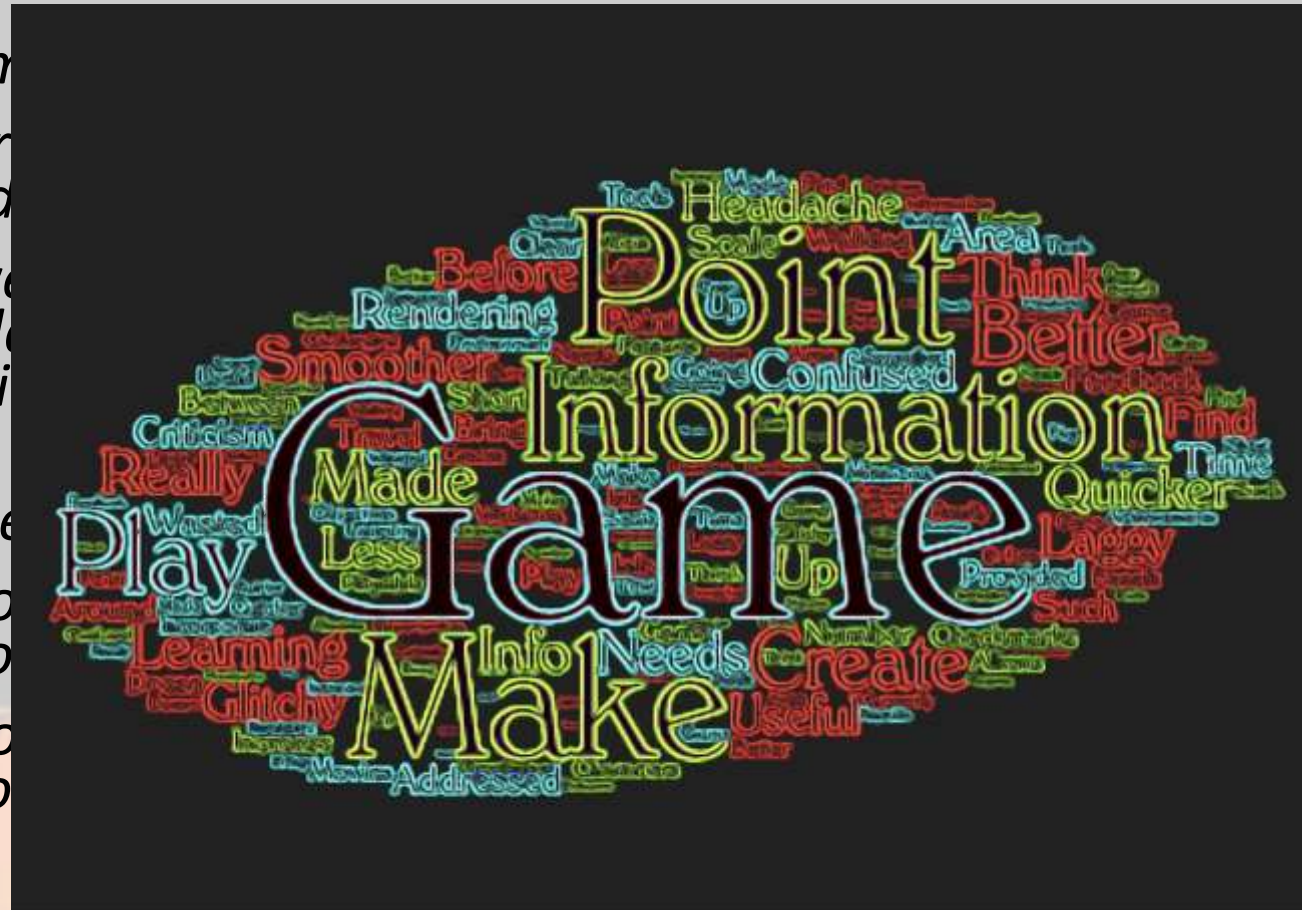
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# What is the one thing you would change about Saving Earth Populating Mars?

- “smoother game”
- “better quicker really confused”
- “very glitchy, v needs to be ad more useful cri provided”
- less area betwe
- “time wasted o find informatio
- “reduce scale o information po

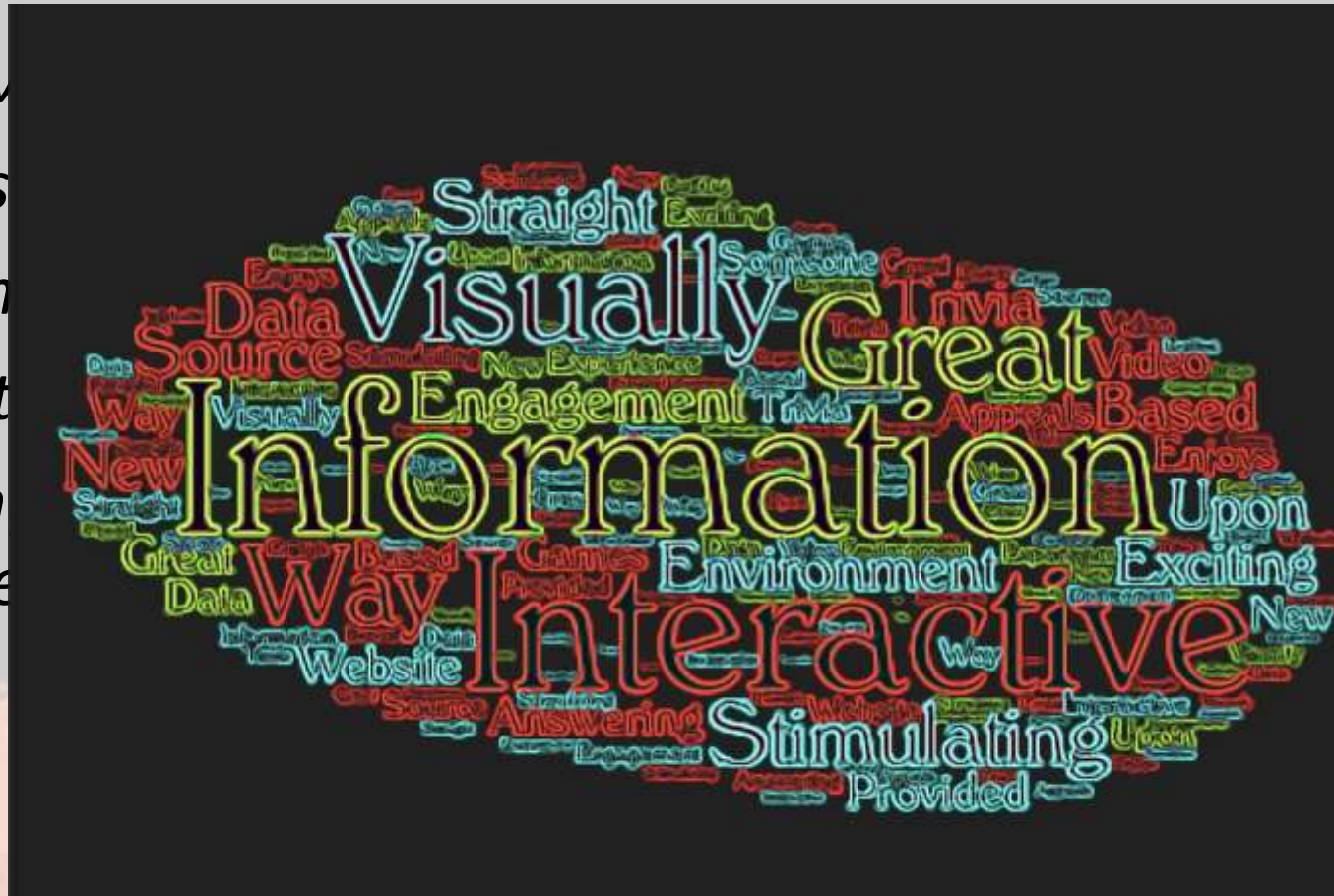


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# What is one thing you liked about using Saving Earth Populating Mars?

- “Interactive”
- “It was visually appealing”
- “engaging”
- “it went straight to the point”
- “Answering questions in a new learning experience”

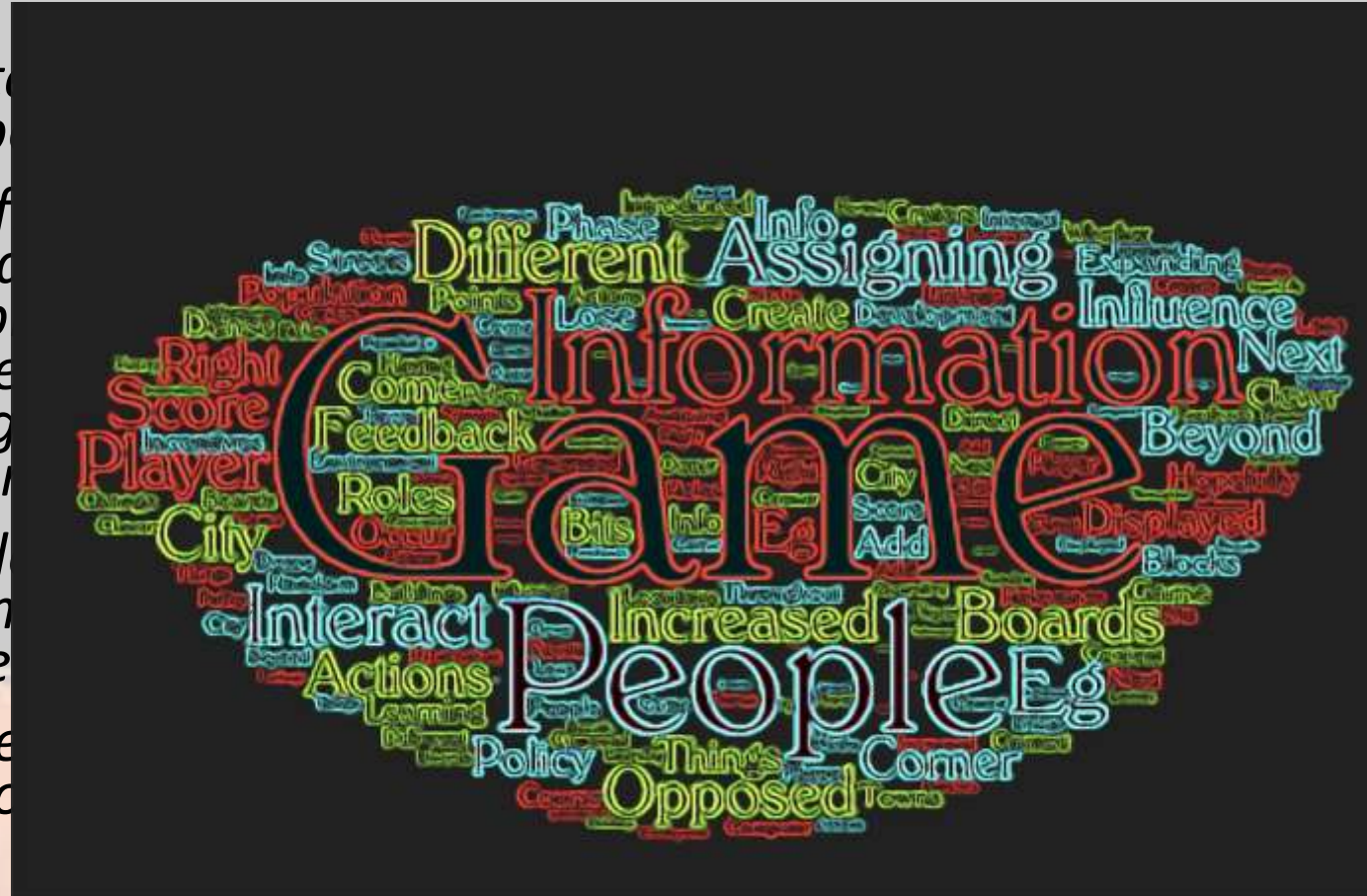


“Information”  
“nt”

“new learning  
video games”

# What would need to be included to make the 3D Virtual Environments more engaging for your learning?

- “People to interact with information bits”
- “Increased information on the game and the score displayed, expanding the population right, create different”
- “Different roles, hopefully complete phase of development”
- “Not just have info points made game”



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Which part of the 3D Virtual Reality in particular do you think will improve your learning?

- “The question of how to use different game mechanisms in VR to help students learn how they play”
- “Using learning objectives”
- “The trivia question which policy”
- “The ability to play out”
- “Starting a Learning Mechanism”
- “Access to content”
- “The links given”



different game  
mechanism in  
how they play

# Experienced users

- Q1. HOW DO YOU FIND THE VISUAL REPRESENTATION OF THE MATERIAL IN THE GAME?
  - Lacking. Don't use Earth buildings, you're on Mars. Domes, not bricks and mortar.
- Q2. WHAT ELEMENTS ARE MISSING THAT WOULD MAKE THE GAME A BETTER LEARNING EXPERIENCE?
  - *A multiplayer experience (mainly with your group) would be fantastic. I am imagining a multiplayer world where my group can work together to build our environment, while also visiting other groups areas (without editing them). Creates a competitive group v group for who can create the best environment".*

# Experienced users

- Q3. HOW DOES THE GAME PLAY RUN? IS IT SMOOTH? WHAT ELEMENTS COULD BE IMPROVED TO HELP MAKE THE PLAYER MORE COMFORTABLE?
  - *Not smooth --> camera angles need more varieties. It is pixelated and movement using the keyboard and mouse are too sensitive. Try to follow like games such as Counter Strike.*
- Q4. IS THERE ENOUGH VARIATION TO KEEP YOUR INTEREST? IF NOT, WHAT CAN BE DONE TO CREATE INTEREST? SCENARIOS, CHARACTERS, INFORMATION POINTS, ETC.
  - *Actually simulate a colony on Mars, develop a LAS and see how it develops.*



# Conclusions

- Learning



- Engagement

