PennState College of Engineering

D.A.T.A. Design Analysis Technology Advancement Laboratory

Implementing Gamification in Engineering Bridge Programs:

A case study exploring the use of Kahoot!

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Pokémon
GO


Candy
Crush
SAGA

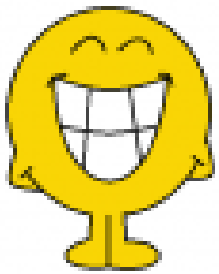
"The use of design elements characteristic for games in non-game contexts"

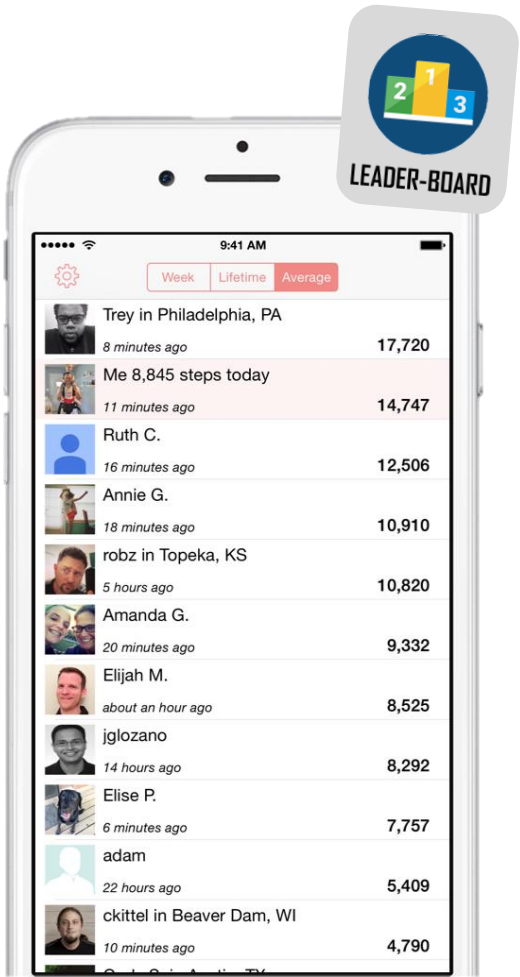
Deterding et al (2011, p. 10)

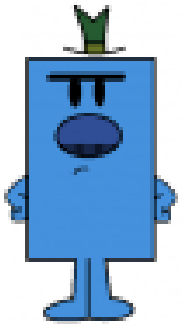
Kahoot! is a Gamified Student Responce System

Most of current applications are designed following a "*one-size-fits-all*" approach

Individuals perceive and respond to game elements in different ways

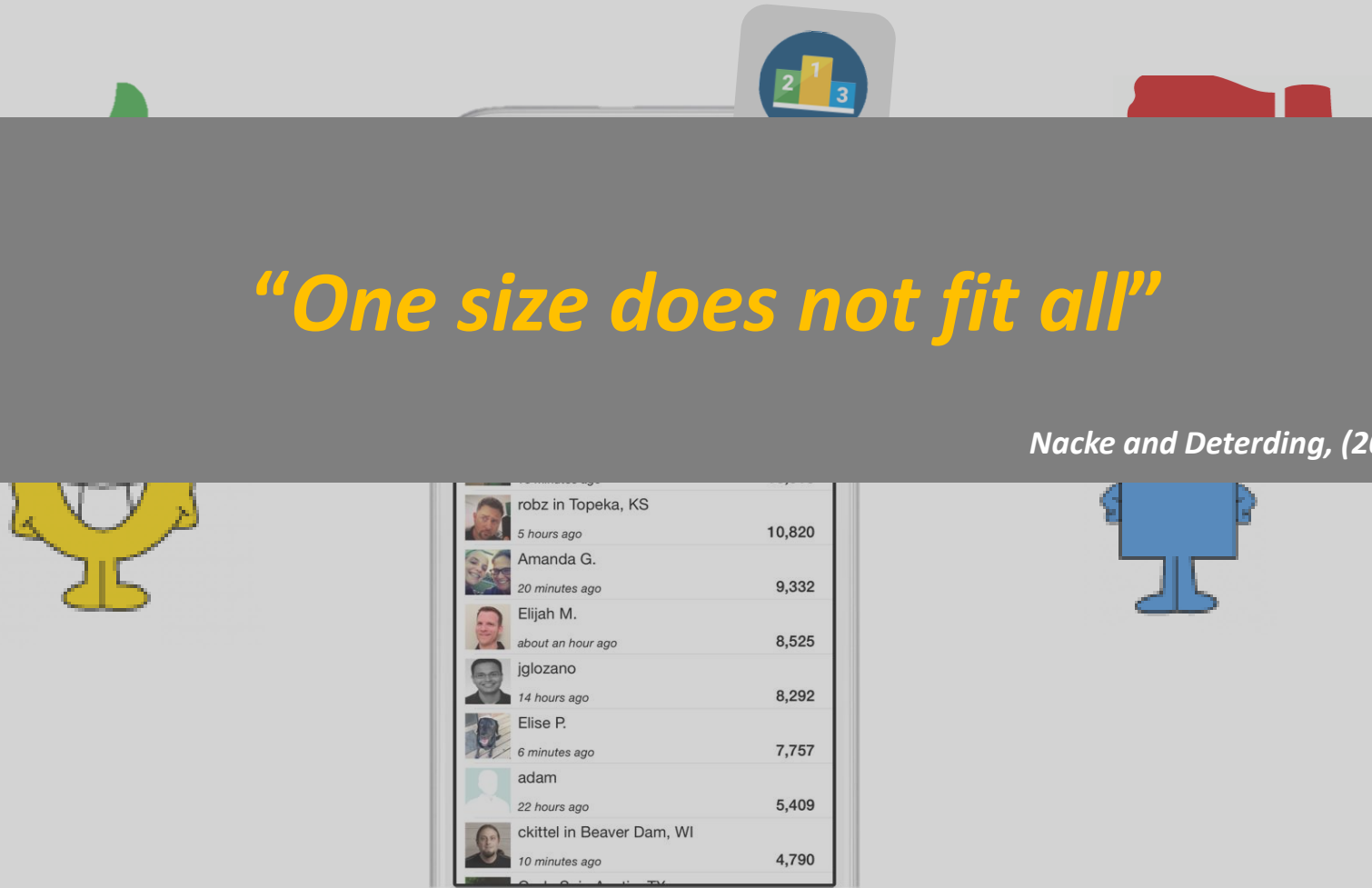






Hamari & Tuunanen (2014)

Individuals perceive and respond to game elements in different ways



"One size does not fit all"

Nacke and Deterding, (2017, p. 3)

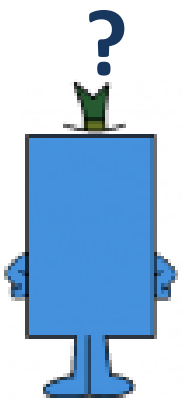
Player type models might help advance personalized Gamification

Hexad Player Type Model

Marczewski (2015)

Need to understand the relationship between students' player type and their perception of game elements

Study	*Independent Variables*	*Dependent variable*		*Educational Context*
	Player Type	Reported perception without exposure*	Reported perception with exposure ǂ	
Orji et al. (2014)	BrainHex	X		NO
Orji et al. (2017)	BrainHex	X		NO
Tondello et al. (2016)	Hexad	X		NO
Tondello et al. (2017)	Hexad	X		NO
Orji et al. (2018)	Hexad	X		NO
Lopez and Tucker (2019)	Hexad		X	NO
This work	Hexad		X	YES



RQ1. Does students' Hexad player type correlate to their perception of the game elements and the application used?

Jump Start Program

This was a four-week summer bridge program designed to support the academic success of current students who are in entrance-to-major classes for any engineering major.

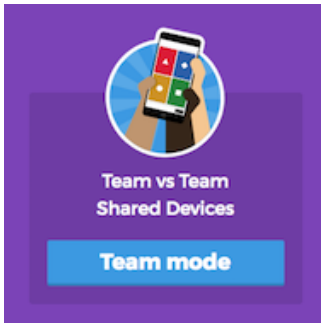
https://inclusion.engr.psu.edu/student-programs/multicultural-engineering-program/jump-start.aspx

Kahoot! was employed to gamified the *General Physics Mechanics* section

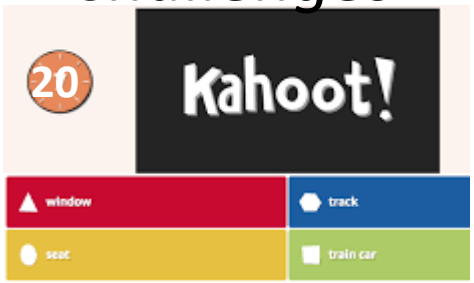
15 students → K! → *For group and individuals problem-solving activities*

Game Elements:

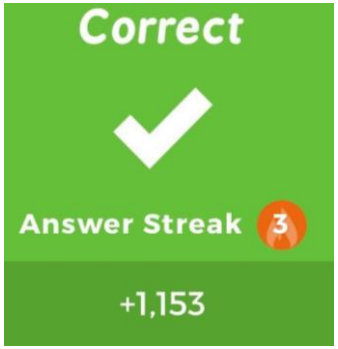
Teams



Challenges



Points



Leaderboard

Rewards

Students were asked about their perception of the application and game elements

Day 1:

Hexad Player Type Questionnaire

Day 2-16:

Class activities

*"What did you **like the (i) most/ (ii) least** about today's class?"*

Day 16:

Application perception

(7-point Likert scale)

S1: *"I would like to continue using Kahoot! in the future"*

S2: *"Kahoot! motivated me to work in teams to solve the different problems"*

S3: *"Kahoot! motivated me to learn physics."*

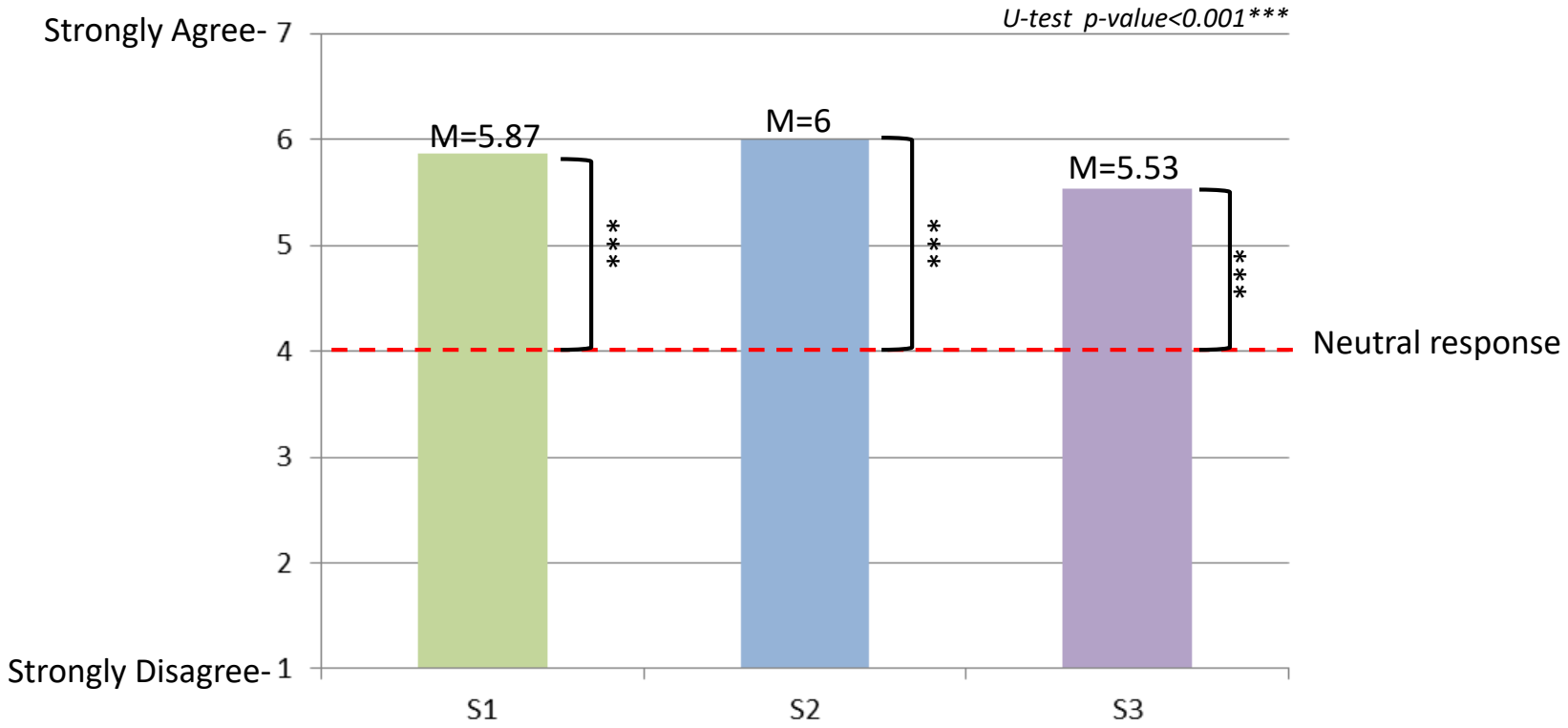
Game elements perception

(multiple choice)

The most and least:

(i) Motivating
(ii) Fun
(iii) Frustrating

Students had a positive view of the application Kahoot



S1: "*I would lik*

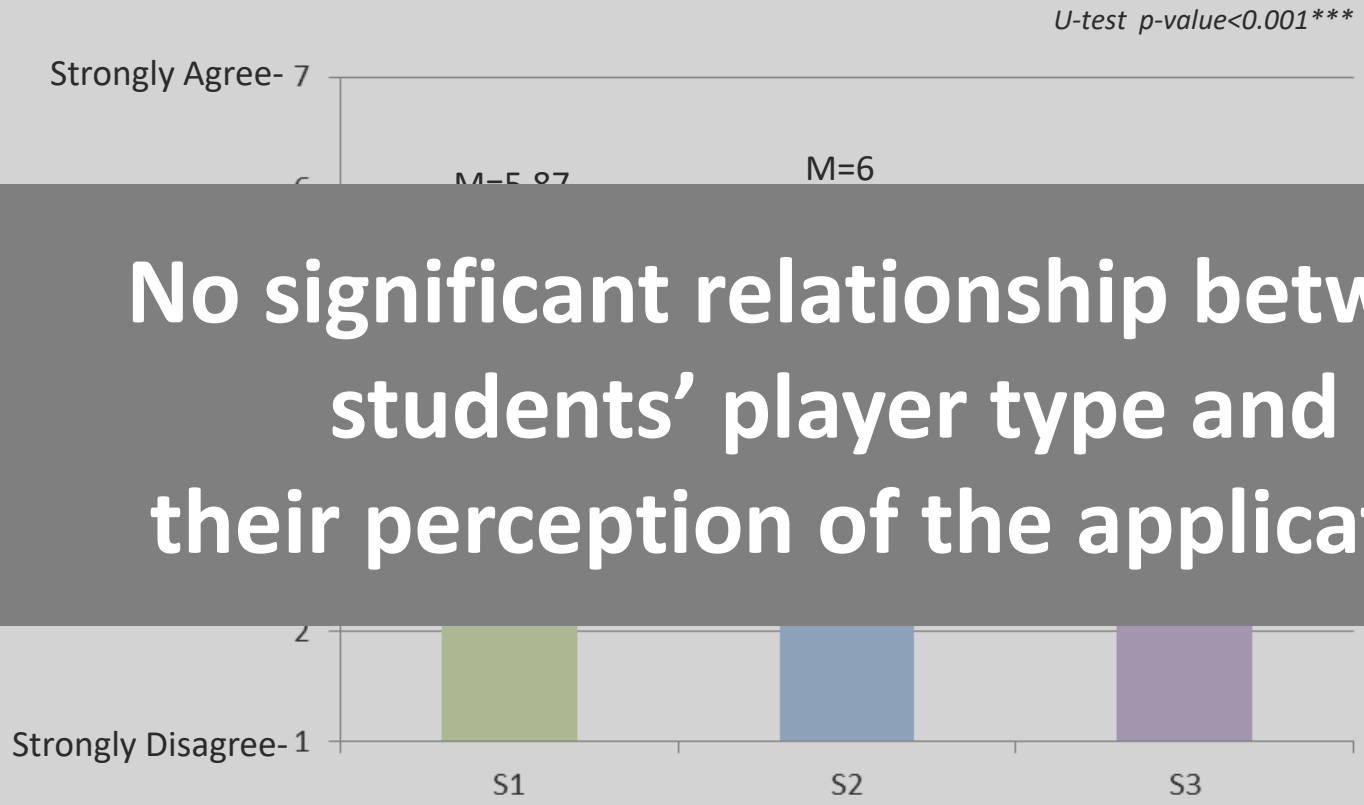
S2: "*Kahoot! r*

S3: "*Kahoot! n*

*Students would like to **continue using the application** in the future, and **felt motivated** by the application to **work in teams** and **learn physics***

nt problems"

Students had a positive view of the application Kahoot

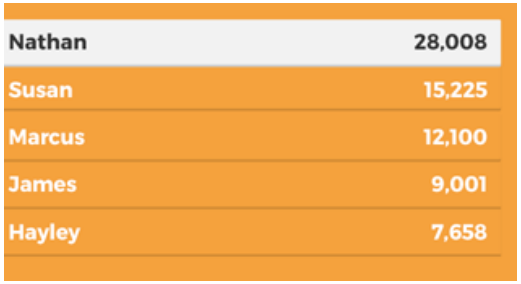


No significant relationship between students' player type and their perception of the application

*Students would like to **continue using the application** in the future, and **felt motivated** by the application to **work in teams** and **learn physics***

Students liked the *Leaderboard* element but not the *Challenges* of time pressure

Leaderboard



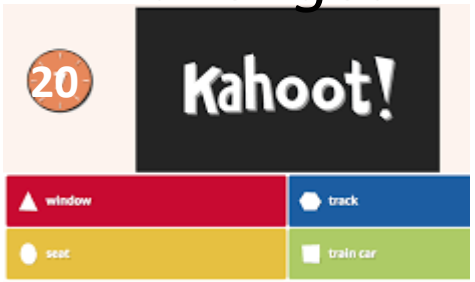
Most Motivating

7 out of 15

χ-sq.=10

p-value=0.04

Challenges



Least Fun

12 out of 15

χ-sq.=34.67

p-value<0.001

Most Frustrating

11 out of 15

χ-sq.=30.67

p-value<0.001

Students' perception of game elements was dependent on their Hexad Player type

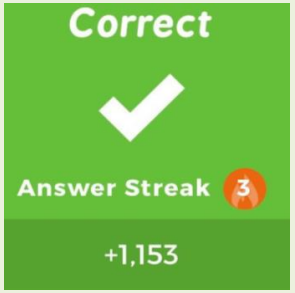
Most Fun

χ-sq.=25.25
p-value=0.014

Least Motivating

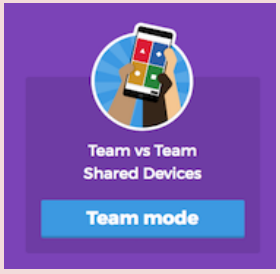
χ-sq.=20.36
p-value=0.016

Points

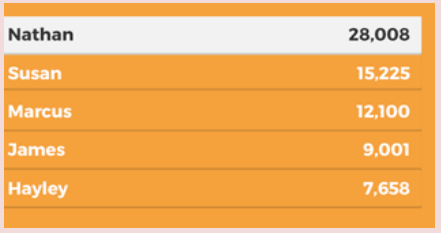


Rewards

Teams



Leaderboard



The open-ended questions show that students enjoyed using the application Kahoot!

*What did you **like the most** about today's class?*

Word *Kahoot!* **24.5%** of responses

*What did you **like the least** about today's class?*

Word *Kahoot!* **only twice**

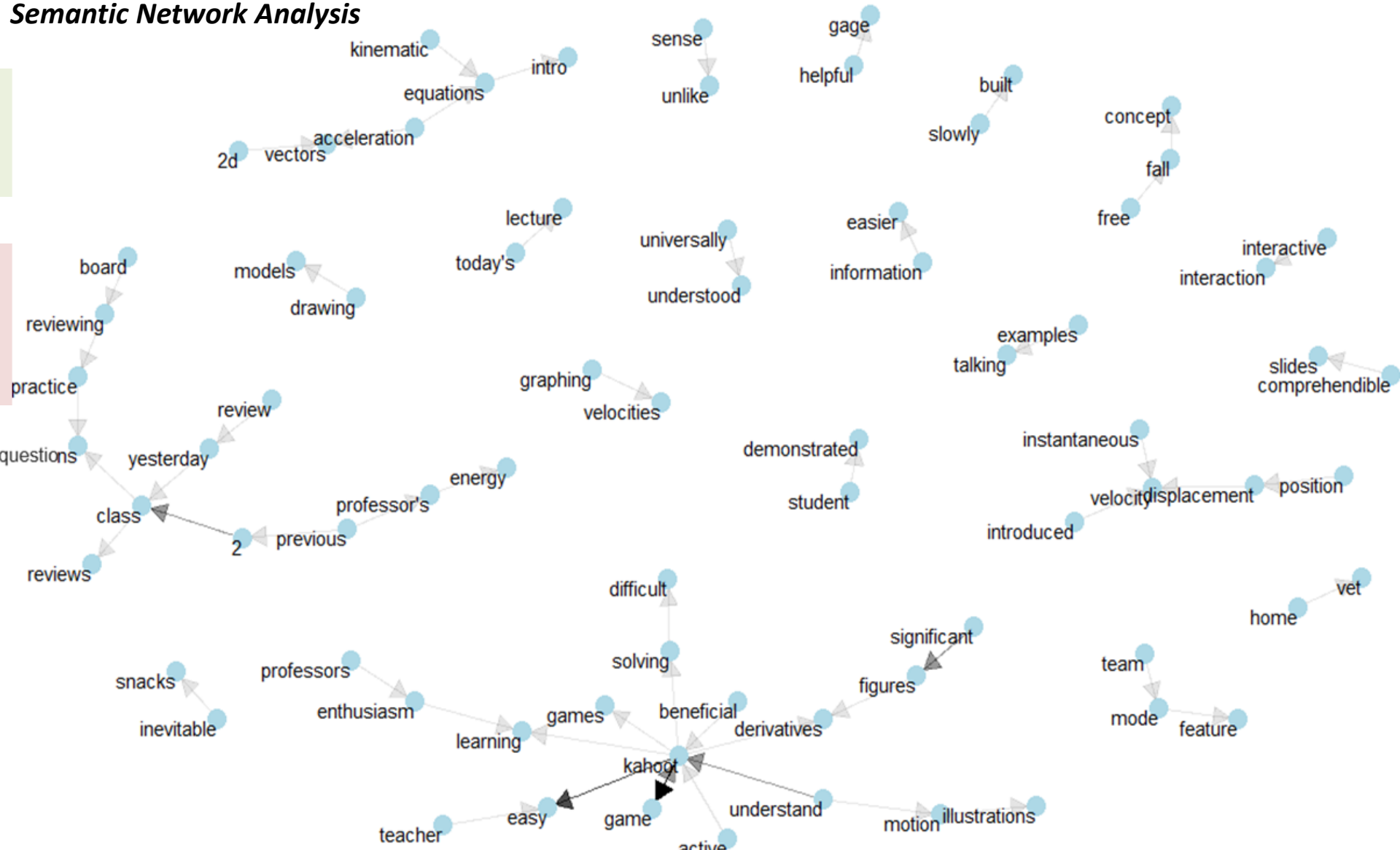
(emphasize that the application should be used more often)

Word Frequency Analysis:

"**Kahoot**" (freq. 31) "**Problems**" (freq. 31)

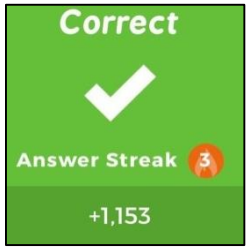
The open-ended questions show that students enjoyed using the application Kahoot!

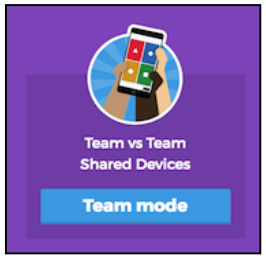
Semantic Network Analysis



Results reveal the benefits of gamifying learning activities

- Benefits of gamified applications, like *Kahoot*!, to engage students.
- Kahoot can also serve as a valuable Student Response System.





- Students' perception of the game elements is dependent on their player type
- Personalized gamification could potentially provide more benefits

Controlled experiment to measure the effects of gamification on students' learning performance

Perception ≠ Performance

***S1*: "*I would like to continue using Kahoot! in the future*"**

***S2*: "*Kahoot! motivated me to work in teams to solve the different problems*"**

***S3*: "*Kahoot! motivated me to learn physics.*"**

More than 15 students ?

This study provides insights into the relationship between students' player type and their perception of different game elements, which could potentially help researchers advance personalized educational gamification

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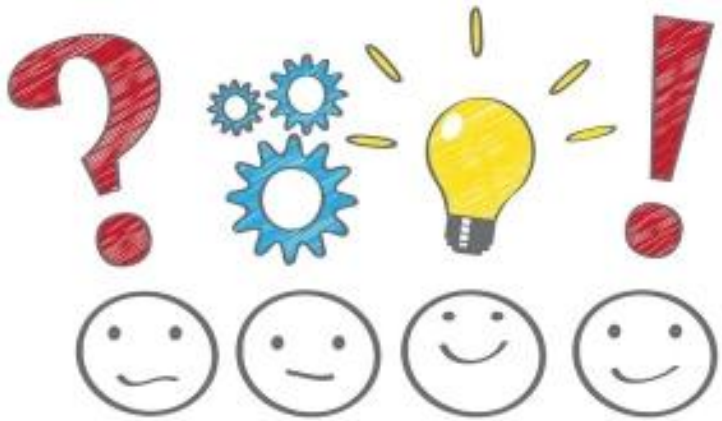
Thank you!



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