

# Motivating First-Year Computer Science Students Using Gamification



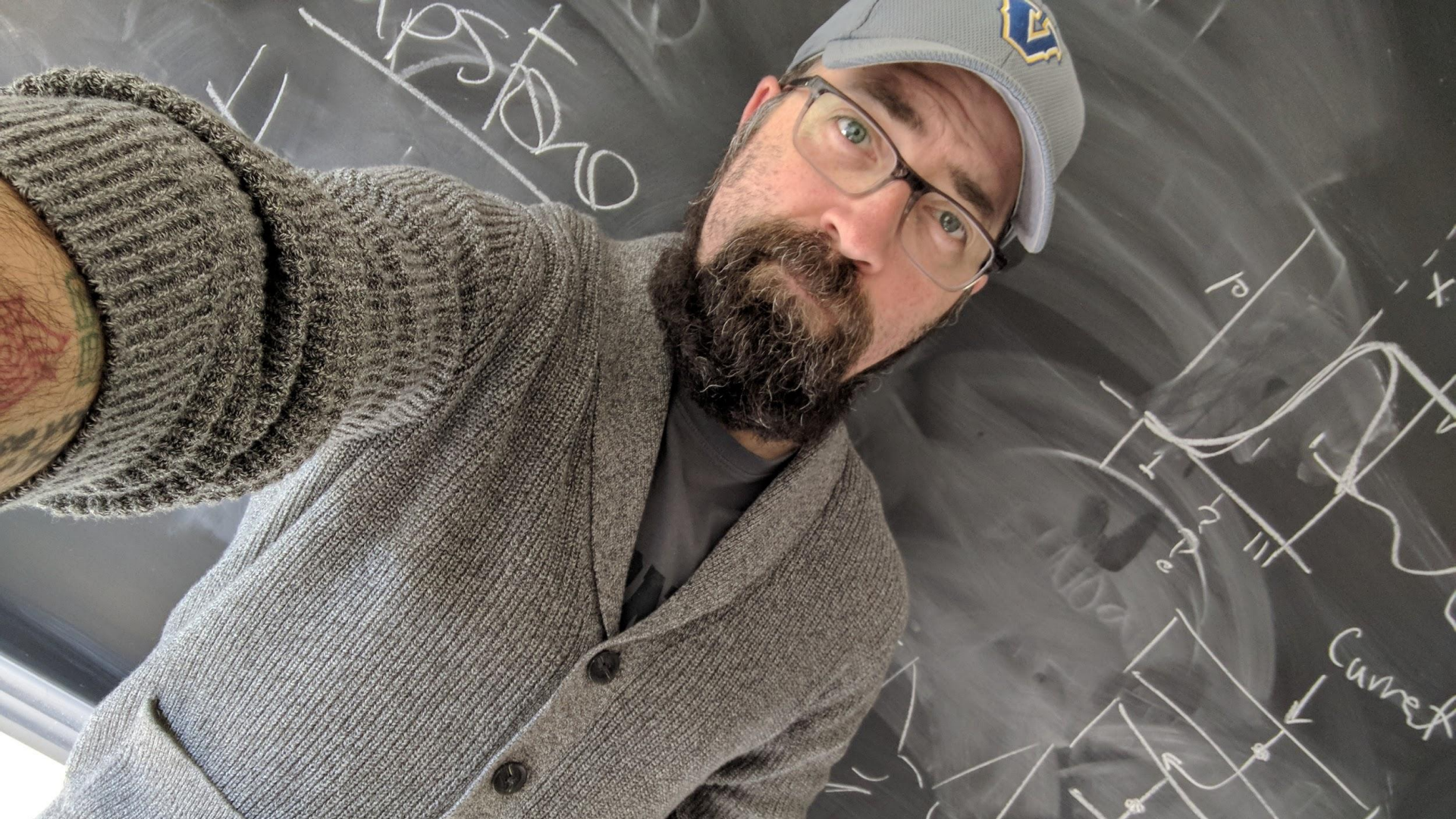
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**Laurentian**University  
Université **Laurentienne**

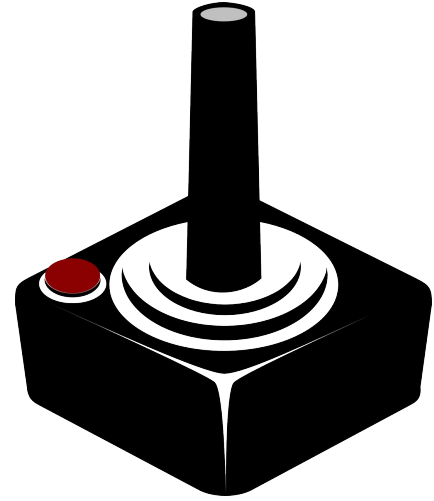
Presented to: Contact North  
Pockets of Innovation Showcase



1. In the previous slide, what colour of sweater was I wearing?

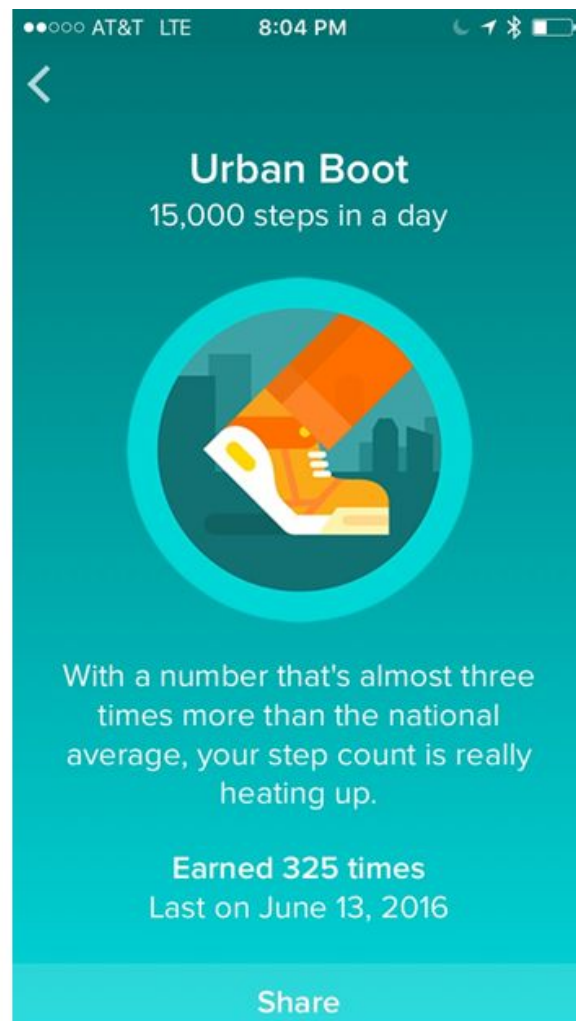
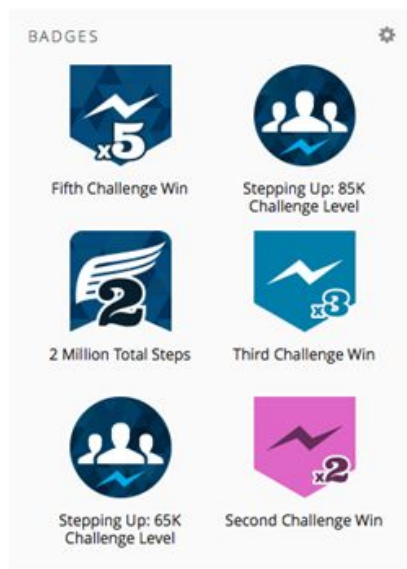
# What is Gamification?

“the application of game design principles in non-gaming contexts”

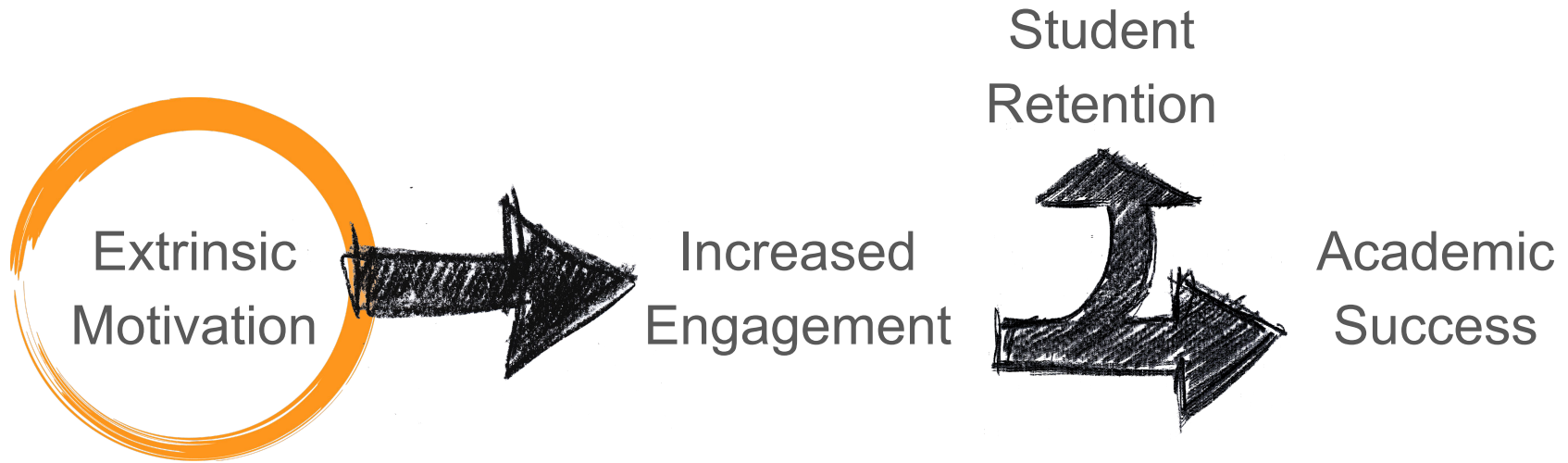


2. The joystick from the previous slide is from which classic video game console?



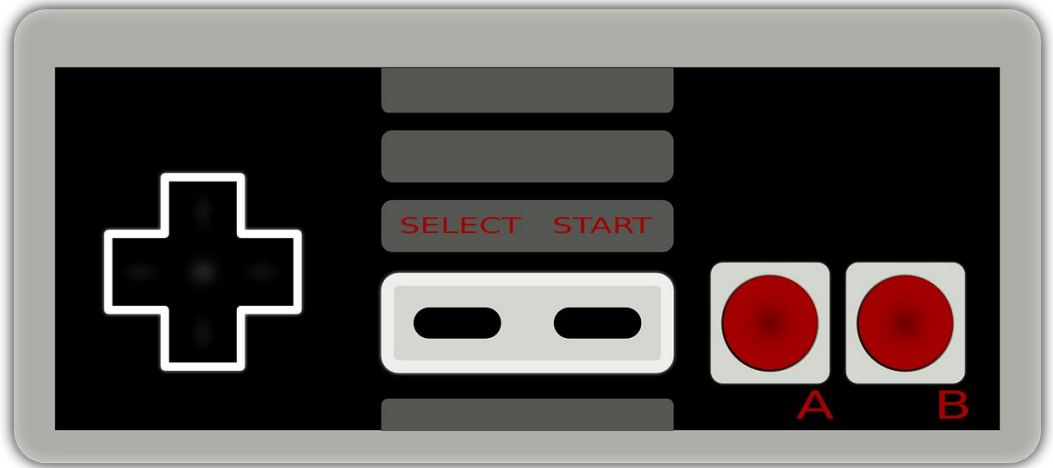


# Why Gamification?



# Types of Gamification I

- Badges / Achievements
- Points
- Leaderboard
- Competition
- Cooperation





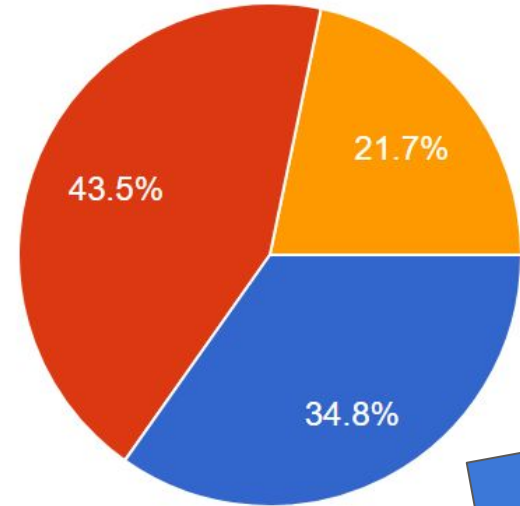
# Types of Gamification II

- Instant feedback
- “Levelling up”
- Quests
- Role playing



# COSC 1046/7 - Intro to computer science

- 8:00 a.m. start
- Large class
- Mostly non-degree students



# Gamification System

- Unearned badges “greyed out”
- Colour-coded categories
  - **Blue**: Assignments
  - **Green**: Tests
  - **Grey**: Miscellaneous
  - **Orange**: Social
  - **Purple**: Test reflections
  - **Red**: Labs
- Mystery badges: ??????

COSCI1046 ▼

BADGE LIST SCOREBOARD SETTINGS BADGES REQUESTS AWARD USERS COURSES LOGOUT

ALangille's  
BADGES

BADGES SCORE

1 10

Show: ☒ Earned Badges ☒ Unearned Badges

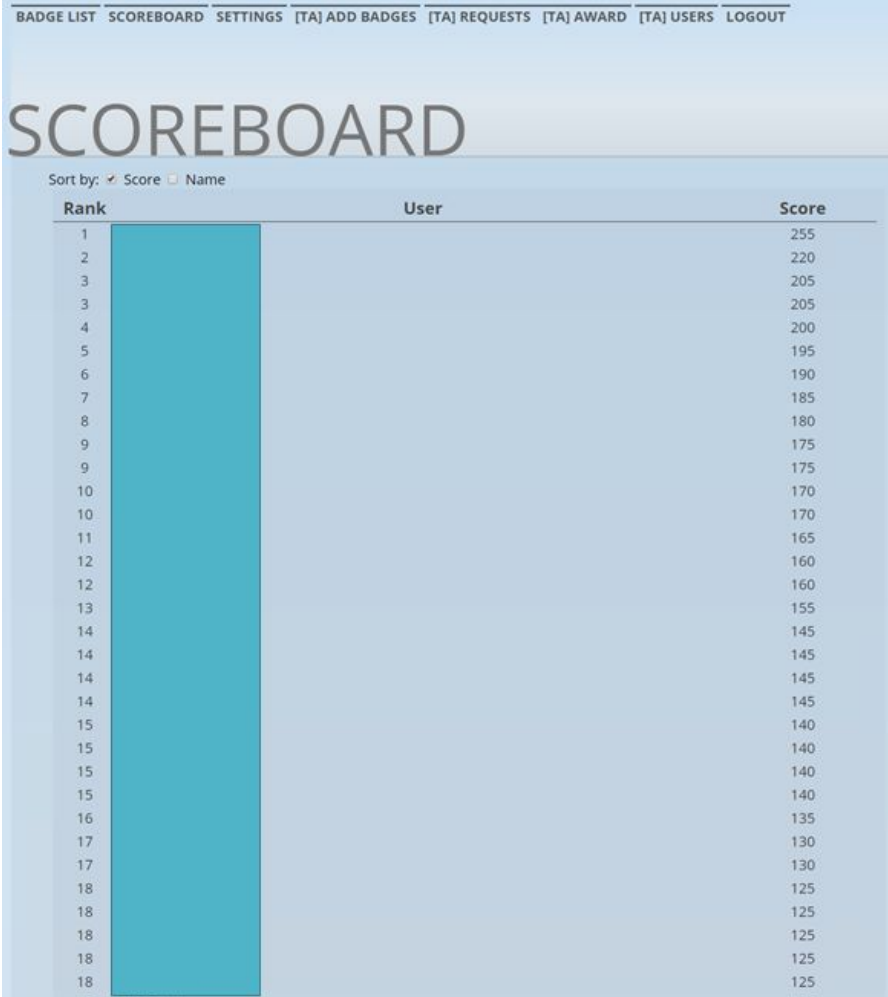
Sort by: ☒ Date Acquired ☐ Point Value

Work of art! Have your assignment chosen as display solution Earned 2017-09-20 11:04:13	10	Zip it and ship it. (Pro) Submit all 5 assignments	10	Assignment perfection 100% on an assignment	10
Assignment pro 85% or more on every assignment	10	Early bird Submit an assignment > 72 hours before it is due	10		
Zip it and ship it. Submit 1st assignment	5	Assignment jedi 95% or more on every assignment	5	????? ?????	5
I got this! One test above > 75%	20	Always improving Test 2 score > test 1 score	20	Test Perfection Score 95% or more on one test.	20
Quizzler 70% or more on all tests	10	Quiz Master 90% or more on all tests	5	Cursed Gold Submit Cursed Gold	20
Hello World! Welcome to COSCI	10	Cursed Gold (AI) Submit Cursed Gold	10	Popular kid Determine the most popular value in an array (AS Bonus)	10
Quiz Test Quiz champion	10	????? ?????	20	Social butterfly 25+ posts to the discussion forum	15
Help! I need somebody. Post a question to the forum	10	I know that one! Reply to a question on the discussion forum	10	Chatterbox 15+ posts to the discussion forum	10
I know that one (Pro) Be the first to reply to a question on the forum	5	I know what you meme Post a meme to the meme thread	5	Kahoots Champion Have the high score in Kahoots	25
Kahoots Top 25 Be in the top 25 players in Kahoots	15	Oracle Guess test grade exactly.	10	Exam Oracle Guess exam grade exactly.	10
Fortune Teller Guess test grade within 2 marks	5	Exam Fortune Teller Guess exam grade within 2 marks	5	Nuclear lab rat Attend all 6 labs	20
Survey Pro Badges Survey Responder	20	Lab 101 Attend your first lab	10	????? ?????	10
????? ?????	10	Survey says? Answer the lab time survey	5		

3. Roughly what percentage (or fraction)  
of my first-year students are  
non-program students?

# Gamification System

- Scoreboard/leaderboard with optional “nicknames” and opt-out.



The screenshot shows a web-based scoreboard interface. At the top, there is a navigation bar with links: BADGE LIST, SCOREBOARD, SETTINGS, [TA] ADD BADGES, [TA] REQUESTS, [TA] AWARD, [TA] USERS, and LOGOUT. Below the navigation bar, the word "SCOREBOARD" is displayed in large, bold, grey letters. Underneath, there is a "Sort by:" dropdown menu with "Score" selected and "Name" as an option. The main content area is a table with three columns: Rank, User, and Score. The table lists 25 rows of data. The first row has Rank 1, a blue bar representing the user, and a Score of 255. The second row has Rank 2, a blue bar, and a Score of 220. The third row has Rank 3, a blue bar, and a Score of 205. The fourth row has Rank 3, a blue bar, and a Score of 205. The fifth row has Rank 4, a blue bar, and a Score of 200. The sixth row has Rank 5, a blue bar, and a Score of 195. The seventh row has Rank 6, a blue bar, and a Score of 190. The eighth row has Rank 7, a blue bar, and a Score of 185. The ninth row has Rank 8, a blue bar, and a Score of 180. The tenth row has Rank 9, a blue bar, and a Score of 175. The eleventh row has Rank 9, a blue bar, and a Score of 175. The twelfth row has Rank 10, a blue bar, and a Score of 170. The thirteenth row has Rank 10, a blue bar, and a Score of 170. The fourteenth row has Rank 11, a blue bar, and a Score of 165. The fifteenth row has Rank 12, a blue bar, and a Score of 160. The sixteenth row has Rank 12, a blue bar, and a Score of 160. The seventeenth row has Rank 13, a blue bar, and a Score of 155. The eighteenth row has Rank 14, a blue bar, and a Score of 145. The nineteenth row has Rank 14, a blue bar, and a Score of 145. The twentieth row has Rank 14, a blue bar, and a Score of 145. The twenty-first row has Rank 14, a blue bar, and a Score of 145. The twenty-second row has Rank 15, a blue bar, and a Score of 140. The twenty-third row has Rank 15, a blue bar, and a Score of 140. The twenty-fourth row has Rank 15, a blue bar, and a Score of 140. The twenty-fifth row has Rank 15, a blue bar, and a Score of 140. The twenty-sixth row has Rank 16, a blue bar, and a Score of 135. The twenty-seventh row has Rank 17, a blue bar, and a Score of 130. The twenty-eighth row has Rank 17, a blue bar, and a Score of 130. The twenty-ninth row has Rank 18, a blue bar, and a Score of 125. The thirtieth row has Rank 18, a blue bar, and a Score of 125. The thirty-first row has Rank 18, a blue bar, and a Score of 125. The thirty-second row has Rank 18, a blue bar, and a Score of 125. The thirty-third row has Rank 18, a blue bar, and a Score of 125.

Rank	User	Score
1		255
2		220
3		205
3		205
4		200
5		195
6		190
7		185
8		180
9		175
9		175
10		170
10		170
11		165
12		160
12		160
13		155
14		145
14		145
14		145
14		145
15		140
15		140
15		140
15		140
16		135
17		130
17		130
18		125
18		125
18		125
18		125
18		125

## AWARD BADGES

Badge	Progress (0-10)
Zip it and ship it	10
Zip it and ship it (Pro)	10
Assignment perfection	10
Assignment pro	10
Assignment jedi	10
Early bird	10
Just order the wine	10
Work of art	10
Lab 101	10
Nuclear lab rat	10
Lend a hand	10
Survey 500?	10
I got this	10
Always improving	10
Quicker	10
Quiz Master	10
Help I need somebody	10
I know that one	10
I know what you mean	10
Charterbox	10
Social butterfly	10
Life of the party	10
Hello World	10
Kahoots Top 25	10
Kahoots Champion	10
Fortune Teller	10
Oracle	10
Test Perfection	10
Exam Oracle	10
Exam Fortune Teller	10
Test Badge	10

BADGE LIST

SCOREBOARD

SETTINGS

[TA] ADD BADGES

[TA] REQUESTS

[TA] AWARD

[TA] USERS

LOGOUT

# BADGE MANAGER

Add Badge

Name

Description

Value

Colour

Mystery

Submit

	ID	Name	Description	Value	Colour	Mystery
X Edit	23	Zip it and ship it.	Submit 1st assignment	5	blue	
X Edit	24	Zip it and ship it. (Pro)	Submit all 5 assignments	10	blue	
X Edit	25	Assignment perfection	100% on an assignment	10	blue	
X Edit	27	Assignment pro	85% or more on every assignment	10	blue	
X Edit	28	Assignment jedi	95% or more on every assignment	5	blue	
X Edit	29	Early bird	Submit an assignment > 72 hours before it is due	10	blue	
X Edit	31	Just under the wire	Submit an assignment with < 10 mins before it is due	5	blue	✓
X Edit	32	Work of art!	Have your assignment chosen as display solution	10	blue	
X Edit	33	Lab 101	Attend your first lab	10	red	
X Edit	35	Nuclear lab rat	Attend all 5 labs	20	red	
X Edit	36	Lend a hand	Help someone else in the lab	10	red	✓
X Edit	37	Survey says!?	Answer the lab time survey	5	red	
X Edit	38	I got this!	One test above > 75%	20	green	
X Edit	40	Always improving	Test 2 score > test 1 score	20	green	
X Edit	42	Quizzler	70% or more on all tests	10	green	
X Edit	43	Quiz Master	90% or more on all tests	5	green	
X Edit	44	Help! I need somebody.	Post a question to the forum	10	orange	
X Edit	45	I know that one!	Reply to a question on the discussion forum	10	orange	
X Edit	46	I know that one (Pro)	Be the first to reply to a question on the forum	5	orange	
X Edit	47	I know what you meme	Post a meme to the meme thread	5	orange	
X Edit	48	Chatterbox	15+ posts to the discussion forum	10	orange	
X Edit	49	Social butterfly	25+ posts to the discussion forum	15	orange	
X Edit	50	Life of the party	50+ posts to the discussion forum	20	orange	✓
X Edit	100	Hello World!	Welcome to COSCI	10	grey	
X Edit	102	Kahoots Top 25	Be in the top 25 players in Kahoots	15	purple	
X Edit	103	Kahoots Champion	Have the high score in Kahoots	25	purple	
X Edit	104	Fortune Teller	Guess test grade within 2 marks	5	purple	
X Edit	105	Oracle	Guess test grade exactly.	10	purple	
X Edit	111	Test Perfection	Score 95% or more on one test.	20	green	
X Edit	112	Exam Oracle	Guess exam grade exactly.	10	purple	
X Edit	113	Exam Fortune Teller	Guess exam grade within 2 marks	5	purple	

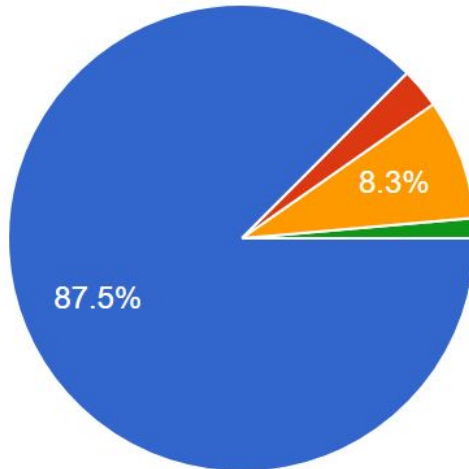


# COSC 1046 - Exit Survey

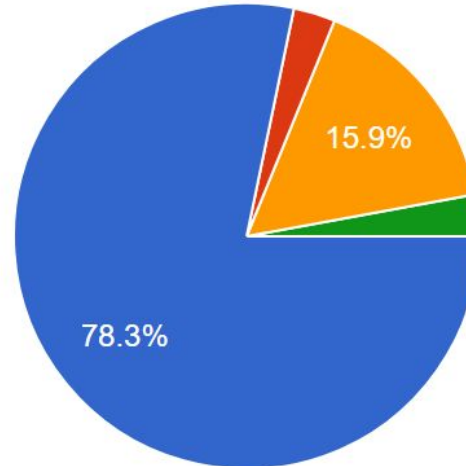
Did you enjoy the badges/achievements website?

- Yes
- No
- Somewhat
- Did not participate

1st time



2nd time

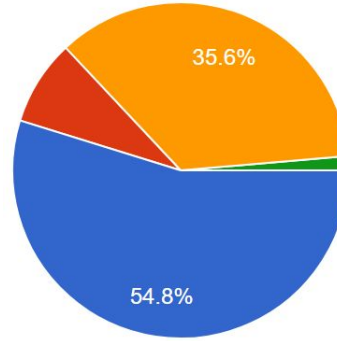


# COSC 1046 - Exit Survey

Did the badges/achievements motivate you to work harder on assignments (top, or labs bottom) than you would have without them?

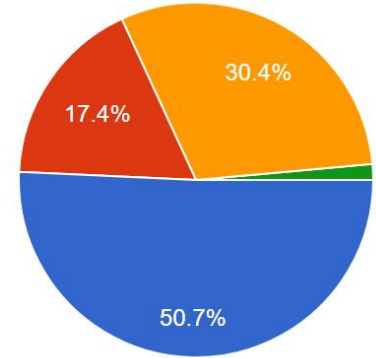
- Yes
- No
- Somewhat
- Did not participate

1st time

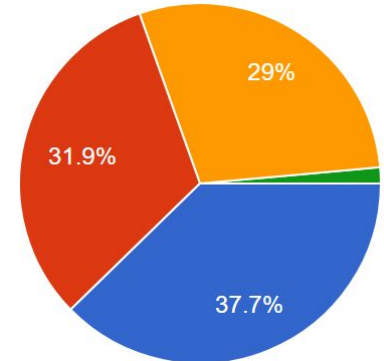
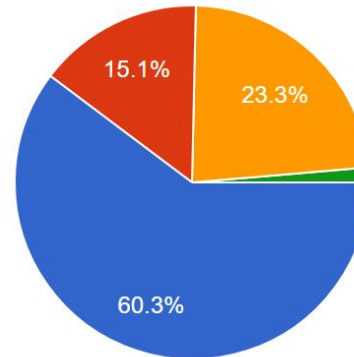


assignments

2nd time



labs

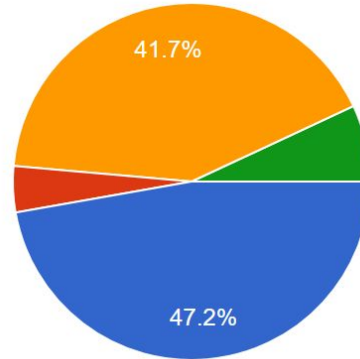


# COSC 1046 - Exit Survey

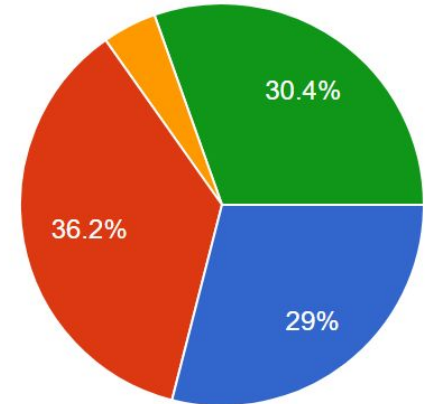
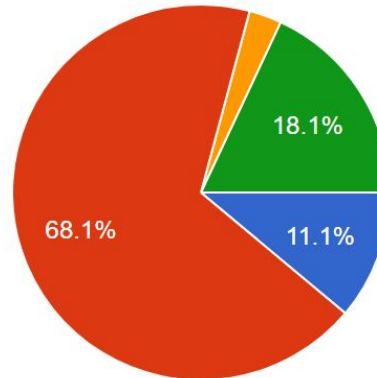
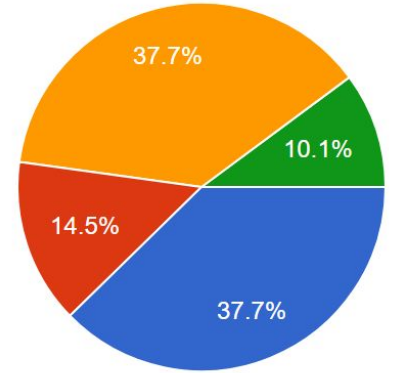
Which feature was your favourite?

- Leaderboard
- Mystery Badges
- Non-mystery Badges
- Badge Request

1st time



2nd time

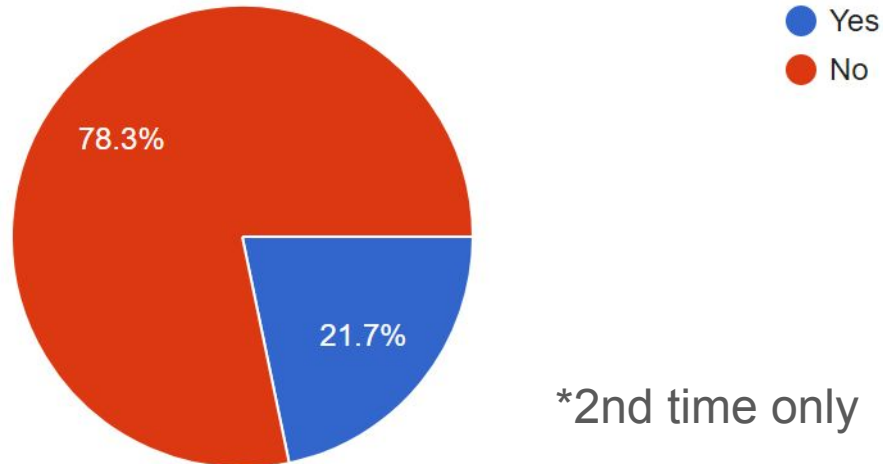


4. What colour were the assignment badges?

# COSC 1046 - Exit Survey

Did you tell another student in the course about the requirements to achieve a mystery badge once you had discovered the mystery?

69 responses



\*2nd time only

# Student feedback: #thumbsup



- 1st time
  - Yes to badges!! :)
  - Overall an A1 idea. I wish my Engineering classes provided some incentive like this.
  - I think it was a good idea. I might have enjoyed it more if I understood the course better and knew what I was doing. They would have been more fun to unlock and such. But i really think they are a good idea!!
- 2nd time
  - I enjoyed the badges system... It was good motivation to do better
  - Thanks for making this fun addition to class! Would like to see a Code Review badge to encourage collaboration.



5. What was the students' favourite feature of gamified COSC 1046 (computer science I)?

# Student feedback: #thumbsdown



- 1st time
  - There should be some sort of rubber banding or catch-up mechanism, since once you fall behind even a little bit, it is very difficult or impossible to win. Which make it demotivating which defeats the purpose of the whole thing.
  - They favor those that already do really well and that would work hard regardless.
  - The only downfall was requesting mystery badges.
- 2nd time
  - I still haven't gotten the badges that I requested...
  - I would appreciate if students would not comment pointless [censored] in the discussion forum because its really annoying searching through their [censored] comments to find useful information

# What “Worked”

- It's fun!
- Potential source of motivation and engagement.
- A solid foundation to build on.
- Interest from faculty and instructional designers is increasing.



# What “Needs Work”

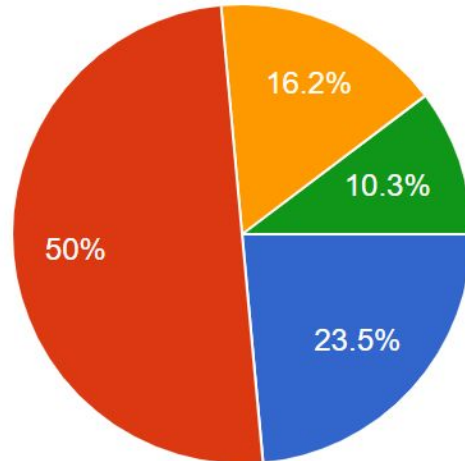
- Mystery badges aren’t (always) fun.
- Administration is too manual.
- Doesn’t work for everyone.
- Novelty is an issue.
- How to “measure” effectiveness?



# But What About - Pandemics

## Badges

68 responses



- I like the COSC 1046 badges, and they help motivate me to work harder on course material.
- The COSC 1046 badges are interesting, but they don't really motivate me to work harder.
- I don't find the COSC 1046 badges interesting or motivating.
- I didn't know there were badges in COSC 1046.

# Future Enhancements

COSC1046 ▾		
BADGE LIST SCOREBOARD SETTINGS [TA] ADD BADGES [TA] REQUESTS [TA] AWARD [TA] USERS LOGOUT		
Admin's BADGES		BADGES 6 SCORE 65
Show: <input checked="" type="checkbox"/> Earned Badges <input type="checkbox"/> Unearned Badges		Sort by: <input checked="" type="checkbox"/> Date Acquired <input type="checkbox"/> Point Value
Lend a hand Help someone else in the lab 10 Earned 2017-03-27 07:46:44	Nuclear lab rat Attend all 5 labs 20 Earned 2017-03-27 07:46:43	Zip it and ship it. (Pro) Submit all 5 assignments 10 Earned 2017-03-27 07:46:42
Assignment perfection 100% on an assignment 10 Earned 2017-03-27 07:46:40	Assignment Jedi 95% or more on every assignment 5 Earned 2017-03-27 07:46:39	Hello World! Welcome to COSCI 10 Earned 2017-01-08 23:03:02
Assignment pro 85% or more on every assignment 10	Early bird Submit an assignment > 72 hours before it is due 10	Work of art! Have your assignment chosen as display solution 10
Zip it and ship it. Submit 1st assignment 5	????? ????? 5	I got this! One test above > 75% 20
Always improving Test 2 score > test 1 score 20	Test Perfection Score 95% or more on one test. 20	Quizzler 70% or more on all tests 10
Quiz Master 90% or more on all tests 5	????? ????? 20	Social butterfly 25+ posts to the discussion forum 15
Help! I need somebody. Post a question to the forum 10	I know that one! Reply to a question on the discussion forum 10	Chatterbox 15+ posts to the discussion forum 10
I know that one (Pro) Be the first to reply to a question on the forum 5	I know what you meme. Post a meme to the meme thread 5	Kahoots Champion Have the high score in Kahoots 25

# Attendance

+


# Kahoot!

[https://en.wikipedia.org/wiki/File:Kahoot\\_Logo.svg](https://en.wikipedia.org/wiki/File:Kahoot_Logo.svg)



# Why Not in PSE?

← → ↻ 🔒 Secure | <https://www.classcraft.com> ☆

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## Gamify Your Classes

Transform your classroom into an epic adventure your students play throughout the year!

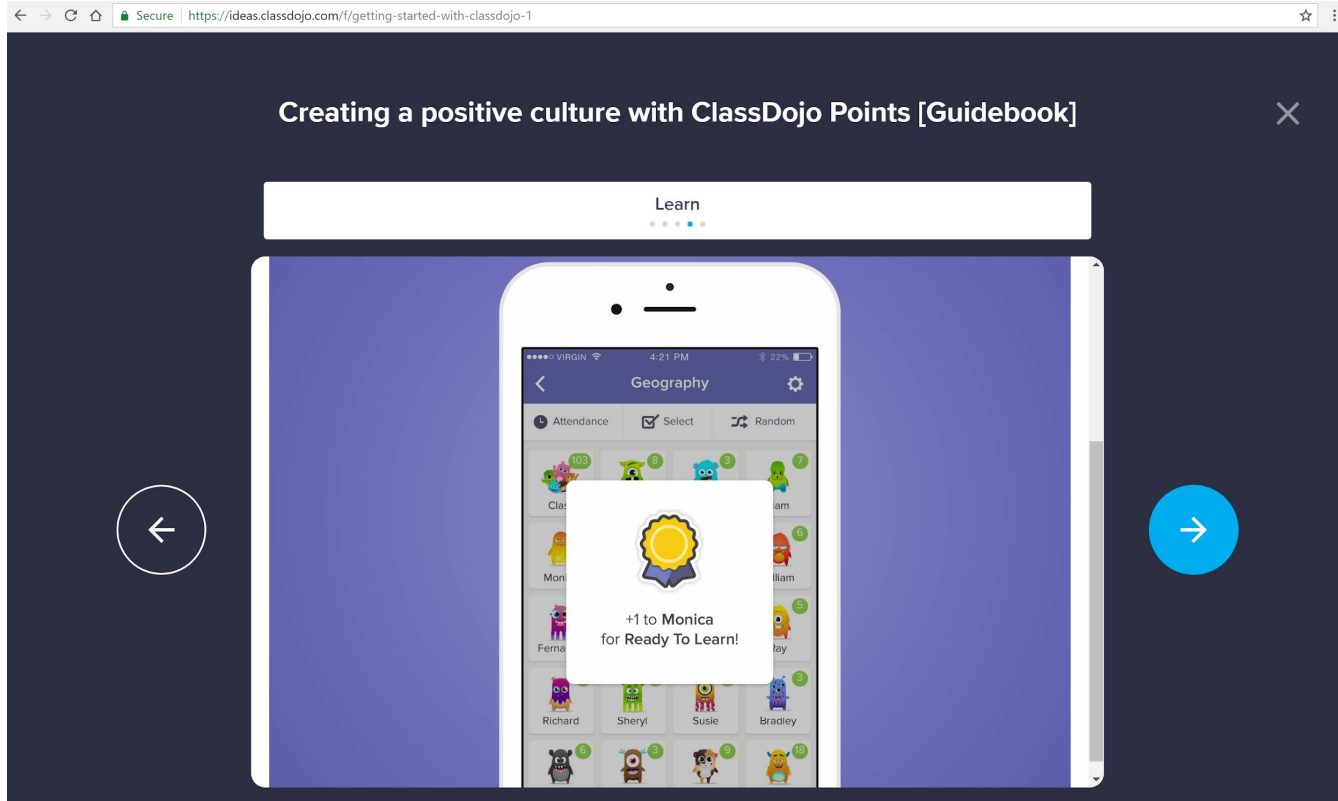
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*Free for teachers, with unlimited classes*



# Why Not in PSE?



Why Not in PSE?



6. Name two gamification techniques other than badges/achievements.

# Moving Beyond Badges

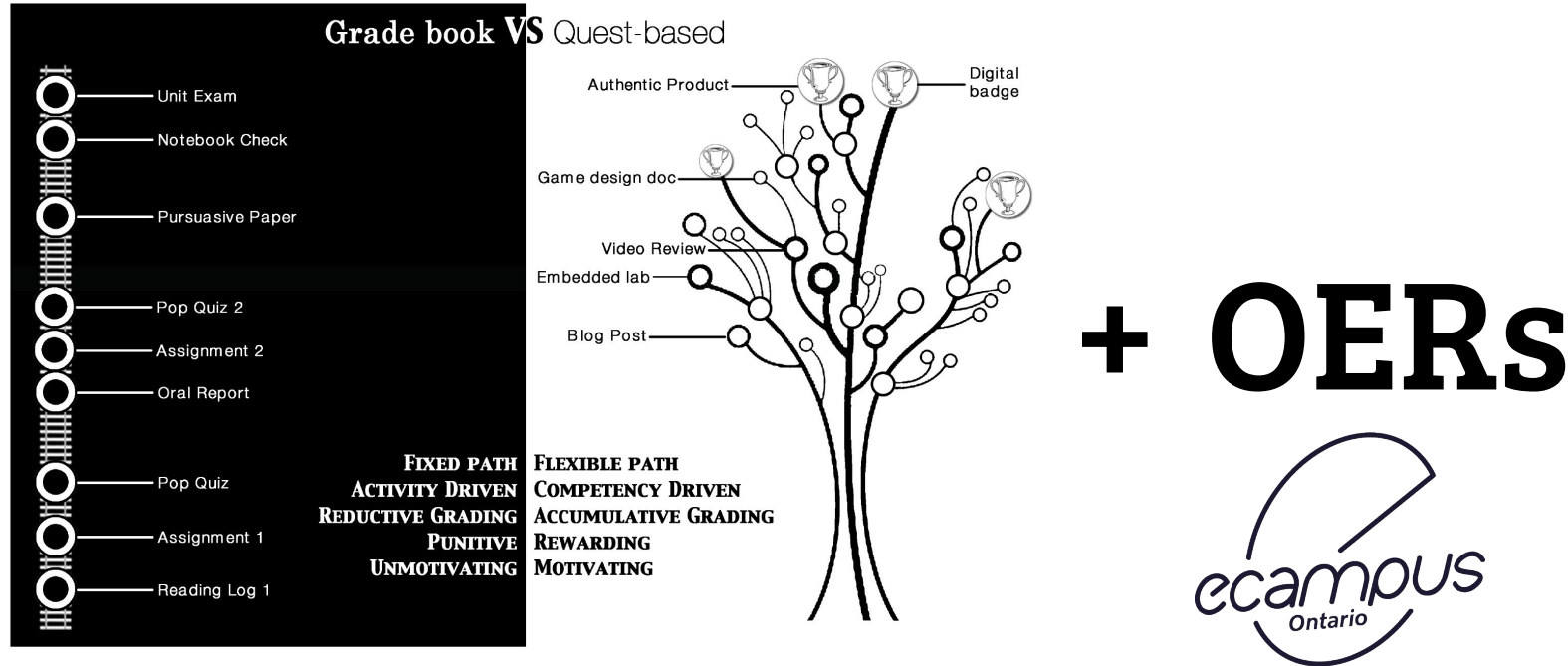


Figure 1. Traditional linear gradebook approach to learning vs. non-linear quest-based learning


Haskell C. Understanding quest-based learning. White paper. Boise State University. 2013.

# Closed Systems vs. Open Badging or Gamification vs. Credentialing

← → ↻ 🏠 Secure | <https://www.ecampusontario.ca/open-badges/> ☆

## Benefits of Open Badges


An Open Badge bridges the wide gap between employers and job seekers by allowing hiring managers to gain insight into graduates' unique talents and characteristics. It's a convenient way for individuals to differentiate themselves from colleagues and job candidates who have similar credentials and work experience. It is also a remarkable solution for Ontario learners who have previously not been able to capitalize on their soft skills and hidden talents.



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**OpenBadges**

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## About Open Badges

Open Badges communicate skills and achievements by providing visual symbols of accomplishments packed with verifiable data and evidence that can be shared across the web. Open Badges empower individuals to take their learning with them, wherever they go, building a rich picture of their lifelong learning journey. Thousands of organizations across the world already issue Open Badges, from non-profits to major employers to educational institutions at all levels.



# The end?



# Assignment Badges

 <b>Work of art!</b> Have your assignment chosen as display solution Earned 2017-09-20 11:04:13	 <b>Zip it and ship it. (Pro)</b> Submit all 5 assignments	 <b>Assignment perfection</b> 100% on an assignment
 <b>Assignment pro</b> 85% or more on every assignment	 <b>Early bird</b> Submit an assignment > 72 hours before it is due	
 <b>Zip it and ship it.</b> Submit 1st assignment	 <b>Assignment jedi</b> 95% or more on every assignment	 <b>?????</b> ?????








# Test Badges

 <b>I got this!</b> One test above > 75%	<b>20</b>	 <b>Always improving</b> Test 2 score > test 1 score	<b>20</b>	 <b>Test Perfection</b> Score 95% or more on one test.	<b>20</b>
 <b>Quizzler</b> 70% or more on all tests	<b>10</b>	 <b>Quiz Master</b> 90% or more on all tests	<b>5</b>	 <b>Cursed Gold</b> Submit Cursed Gold	<b>20</b>

# Misc Badges

 <b>Quizzler</b> 70% or more on all tests	<b>10</b>	 <b>Quiz Master</b> 90% or more on all tests	<b>5</b>	 <b>Cursed Gold</b> Submit Cursed Gold	<b>20</b>
 <b>Hello World!</b> Welcome to COSC!	<b>10</b>	 <b>Cursed Gold (AI)</b> Submit Cursed Gold	<b>10</b>	 <b>Popular kid</b> Determine the most popular value in an array (A5 Bonus)	<b>10</b>
 <b>Quiz Test</b> Quiz champion	<b>10</b>	 <b>?????</b> ?????	<b>20</b>	 <b>Social butterfly</b> 25+ posts to the discussion forum	<b>15</b>









# Social Badges

 <b>Quiz Test</b> Quiz champion	10	 <b>?????</b> ?????	20	 <b>Social butterfly</b> 25+ posts to the discussion forum	15
 <b>Help! I need somebody.</b> Post a question to the forum	10	 <b>I know that one!</b> Reply to a question on the discussion forum	10	 <b>Chatterbox</b> 15+ posts to the discussion forum	10
 <b>I know that one (Pro)</b> Be the first to reply to a question on the forum	5	 <b>I know what you meme</b> Post a meme to the meme thread	5	 <b>Kahoots Champion</b> Have the high score in Kahoots	25

# Kahoot/Reflection Badges

 <b>I know that one (Pro)</b> Be the first to reply to a question on the forum	<b>5</b>	 <b>I know what you meme</b> Post a meme to the meme thread	<b>5</b>	 <b>Kahoots Champion</b> Have the high score in Kahoots	<b>25</b>
 <b>Kahoots Top 25</b> Be in the top 25 players in Kahoots	<b>15</b>	 <b>Oracle</b> Guess test grade exactly.	<b>10</b>	 <b>Exam Oracle</b> Guess exam grade exactly.	<b>10</b>
 <b>Fortune Teller</b> Guess test grade within 2 marks	<b>5</b>	 <b>Exam Fortune Teller</b> Guess exam grade within 2 marks	<b>5</b>	 <b>Nuclear lab rat</b> Attend all 6 labs	<b>20</b>

# Lab Badges

 <b>Fortune Teller</b> Guess test grade within 2 marks 5	 <b>Exam Fortune Teller</b> Guess exam grade within 2 marks 5	 <b>Nuclear lab rat</b> Attend all 6 labs 20
 <b>Survey Pro</b> Badges Survey Responder 20	 <b>Lab 101</b> Attend your first lab 10	 <b>?????</b> ????? 10
 <b>?????</b> ????? 10	 <b>Survey says!?</b> Answer the lab time survey 5	

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