Using Gamification in Education: What are some important principles?

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about me

(1) Bachelor degree Computer Technology

NANYANG TECHNOLOGICAL UNIVERSITY
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(2) Postgraduate diploma in education

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(3) Master degree Instructional Design & Technology

NANYANG TECHNOLOGICAL UNIVERSITY
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(4) PhD Instructional Systems Technology, Indiana University

United States of America

about me

(1) 1993-1997
Systems Engineer

SONY

(2) 1998-2001
Teacher

BUKIT VIEW PRIMARY SCHOOL

(3) 2003-2006
Graduate Assistant

(4) 2006-2013
Assistant Professor

NANYANG TECHNOLOGICAL UNIVERSITY

(5) 2014 – present
Associate Professor, Director of CITE, Associate Dean

Core research interests

- Technology enhanced learning & engagement (TELE)

- Online communication

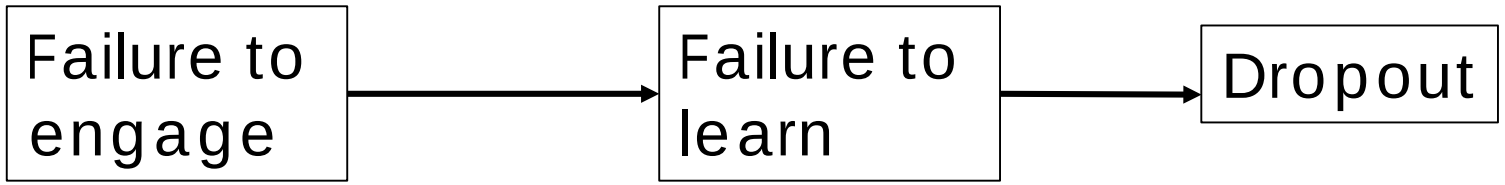
Student disengagement!

1.3 million students leave high school every year without a certificate

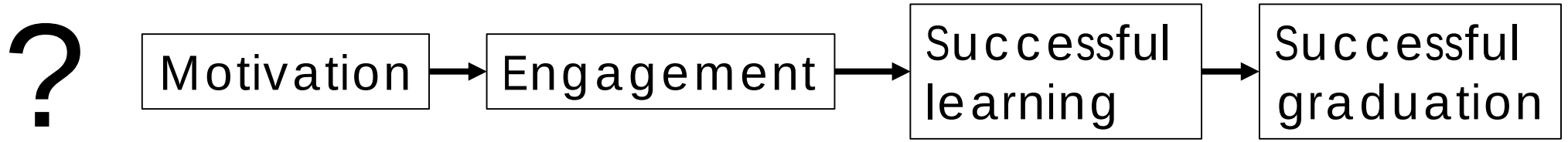
https://www.edweek.org/ew/articles/2014/05/01/kappan_washor.html

Student Disengagement: It's Deeper than You Think

By Elliot Washor and Charles Mojkowski, *Phi Delta Kappan*



So how can we address this problem?



Behavioral engagement

Emotional engagement

Cognitive engagement

Ways to motivate students

- Rewards (e.g., grades)
- Punishment (e.g., warning note)
- What about the use of **gamification**?

2 billion	Times *Angry Birds* have been downloaded
3 billion	Hours/week people spend playing online games
5.93 million	Years people have spent, by March 2010, playing *World of Warcraft*
10,000	Hours an average young person living in a country with a strong gamer culture will have spent playing games by the age of 21
97%	Percentage of 12 -17 year olds in the US who play video games
30	Average age of a game player in the US
47%	Percentage of gamers who are women

Sources:

Jane McGonigal TED talk "Gaming can make a better world'
Google.com
Pew Foundation
Entertainment Software Association

What’s the difference between Play & games?

GAME

- **Goals**
- **Rules**
- **Rewards**
- **Challenges**

What’s the difference between **games** & **gamification**?

“

The use of game elements and game design techniques in **non-game** contexts.

”

Kevin Werbach, University of Pennsylvania

“

global **gamification market** was valued at USD 2.17 billion in 2017, and is expected to reach USD **19.39 billion** by **2023**

”

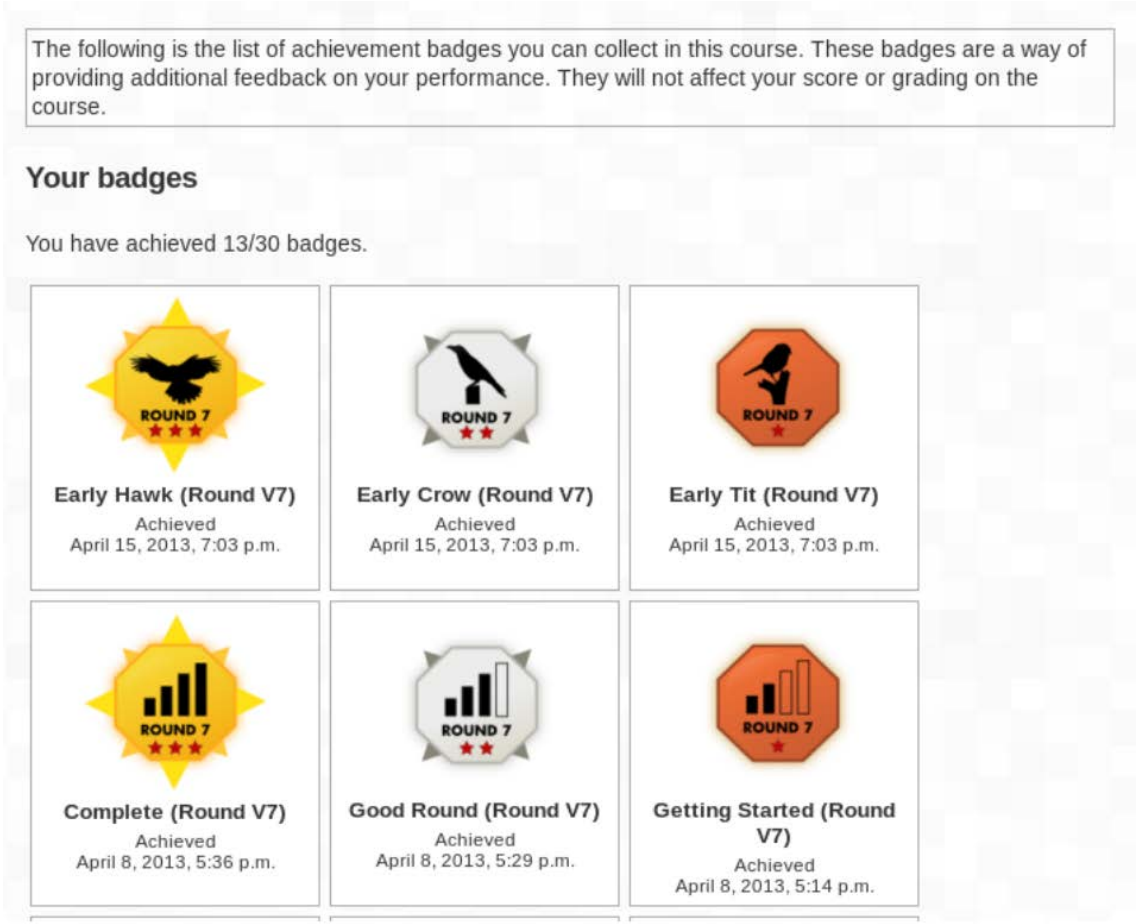
https://www.mordorintelligence.com/industry-reports/gamification-market

GAMIFICATION EXAMPLES

Online course “Software as a Service”, University of California, Berkeley

GAMIFICATION EXAMPLES

Data Structures & Algorithms course, Aalto University, Finland



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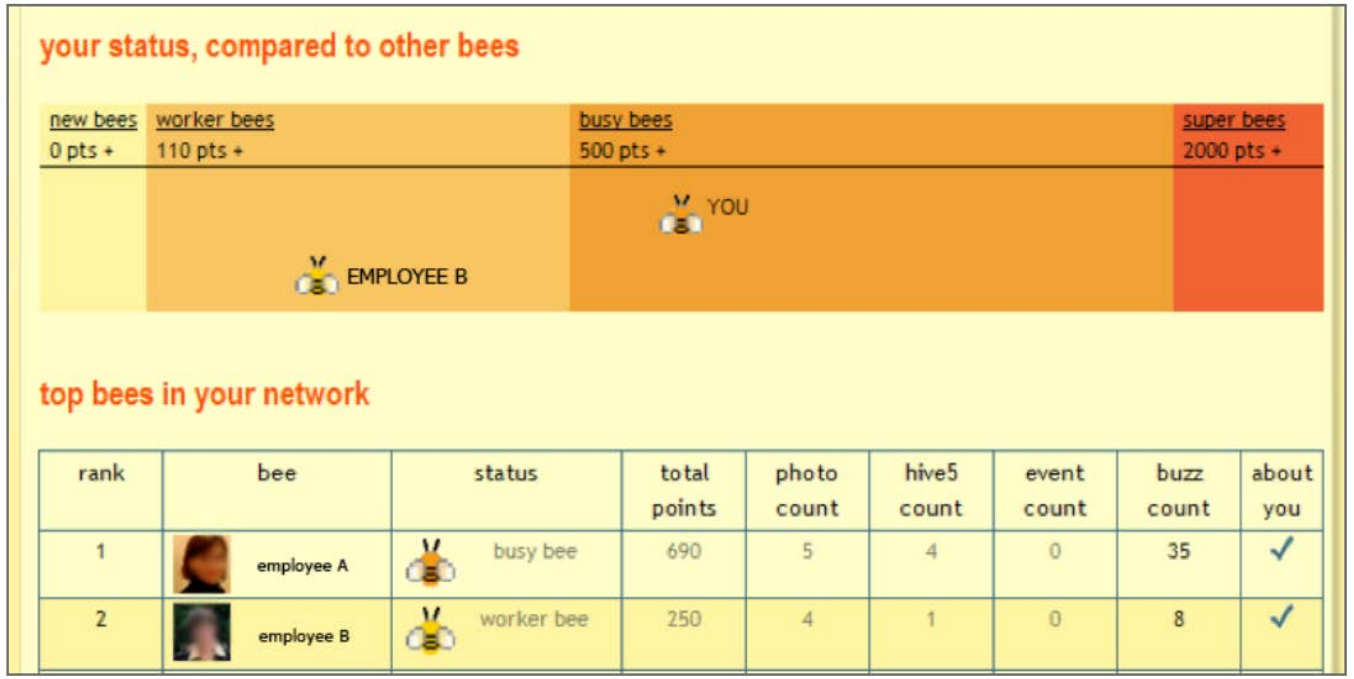
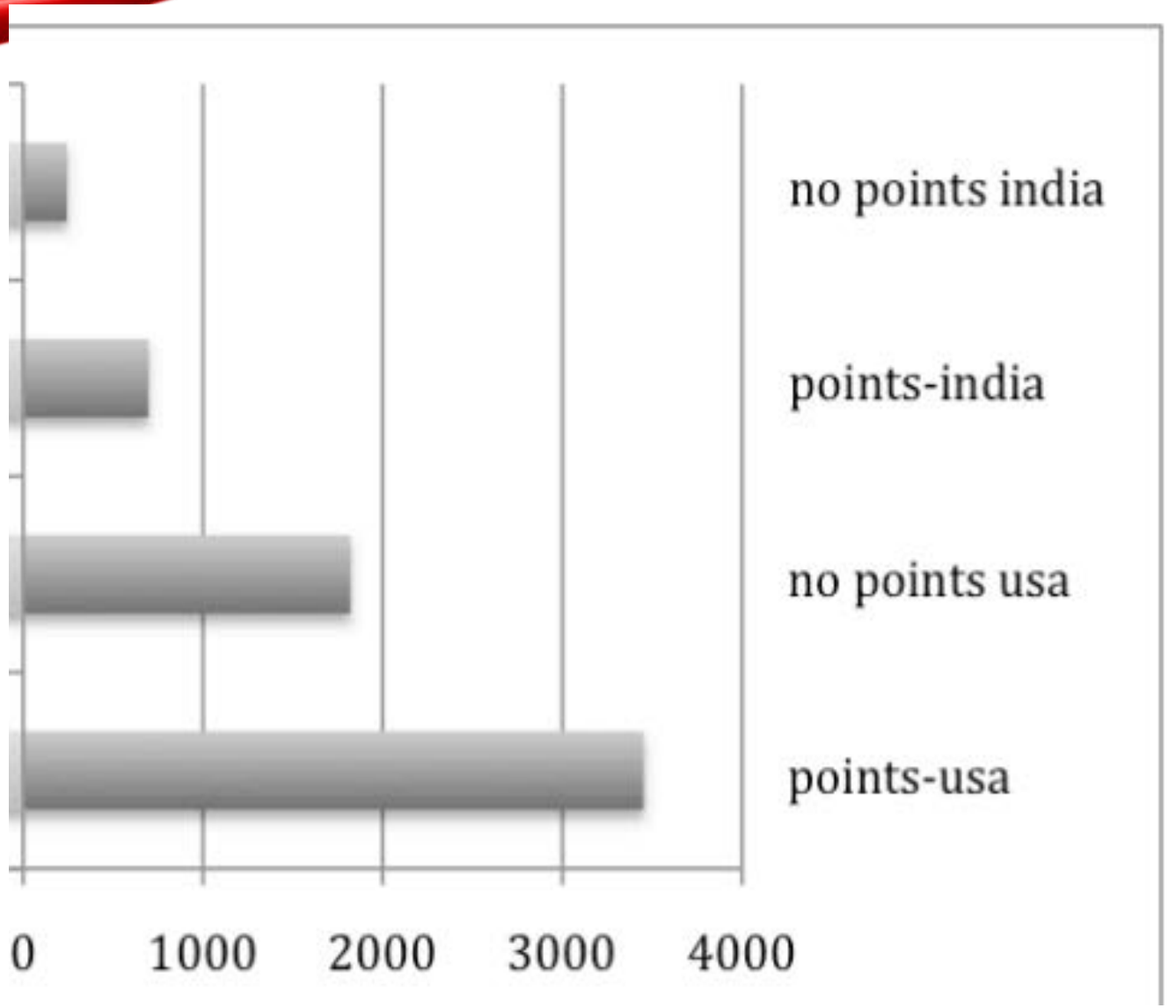
- Awards badges for “collaborative engagement”
- Students comment on other people’s project and give an online “thumbs-up” for the most helpful comments from others.
- At the end of the term, one student will win a badge for the most useful collaboration of all.
- Students can display the online badge in online resumes or on Facebook

But does gamification actually work?

mixed findings were reported in studies

- A large IT company head quarted in the USA with ~400,000 employees around the world
- Each user got 5 points for contributing each photo or list
- Each user got 15 points for contributing a comment on a profile page, photo.

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Language Learning & Technology
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ARTICLE

Improving argumentative writing: Effects of a blended learning approach and gamification

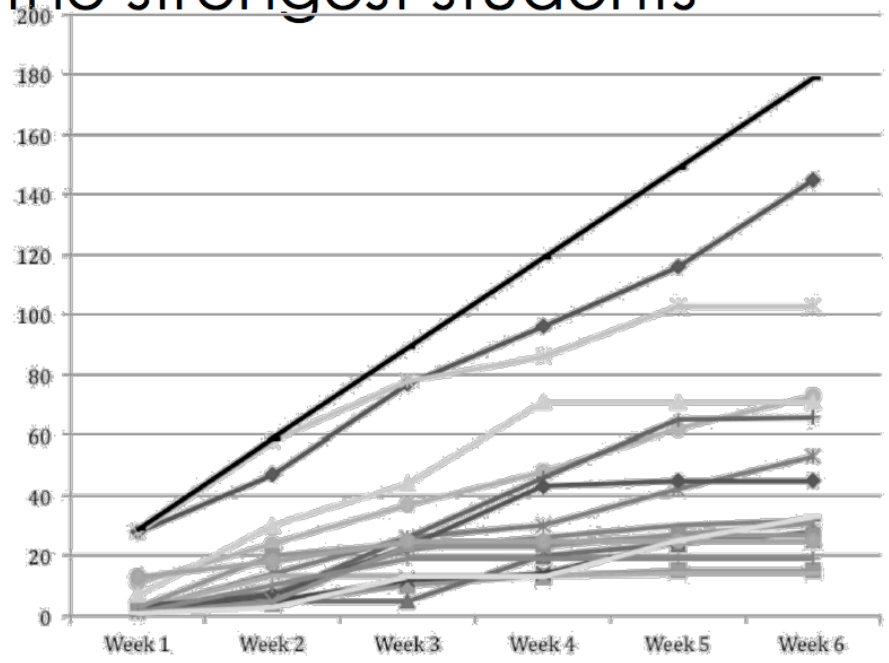
Yau Wai Lam, *The University of Hong Kong*

Khe Foon Hew, *The University of Hong Kong*

Kin Fung Chiu, *The University of Hong Kong*

According to Jack Nicholson

During weeks 4-6, most students stopped working the points, except the strongest students



My solution: Meaningful gamification

- Careful consideration of **intrinsic motivation**, **not merely** **extrinsic** motivation
- Careful alignment between **learning objectives** and **game elements**

GAFCC model

- My PhD student (Lucy) and I proposed a theory-driven model based on 5 motivational theories:

  - Flow theory
  - Goal-setting theory
  - Social comparison theory
  - Self-determination theory
  - Behavior reinforcement theory

GAFCC model

Computers & Education

Volume 125, October 2018, Pages 254-272

Implementing a theory-driven gamification model in higher education flipped courses: Effects on out-of-class activity completion and quality of artifacts

Biyun Huang, Khe Foon Hew

GAMIFICATION DESIGN MODEL

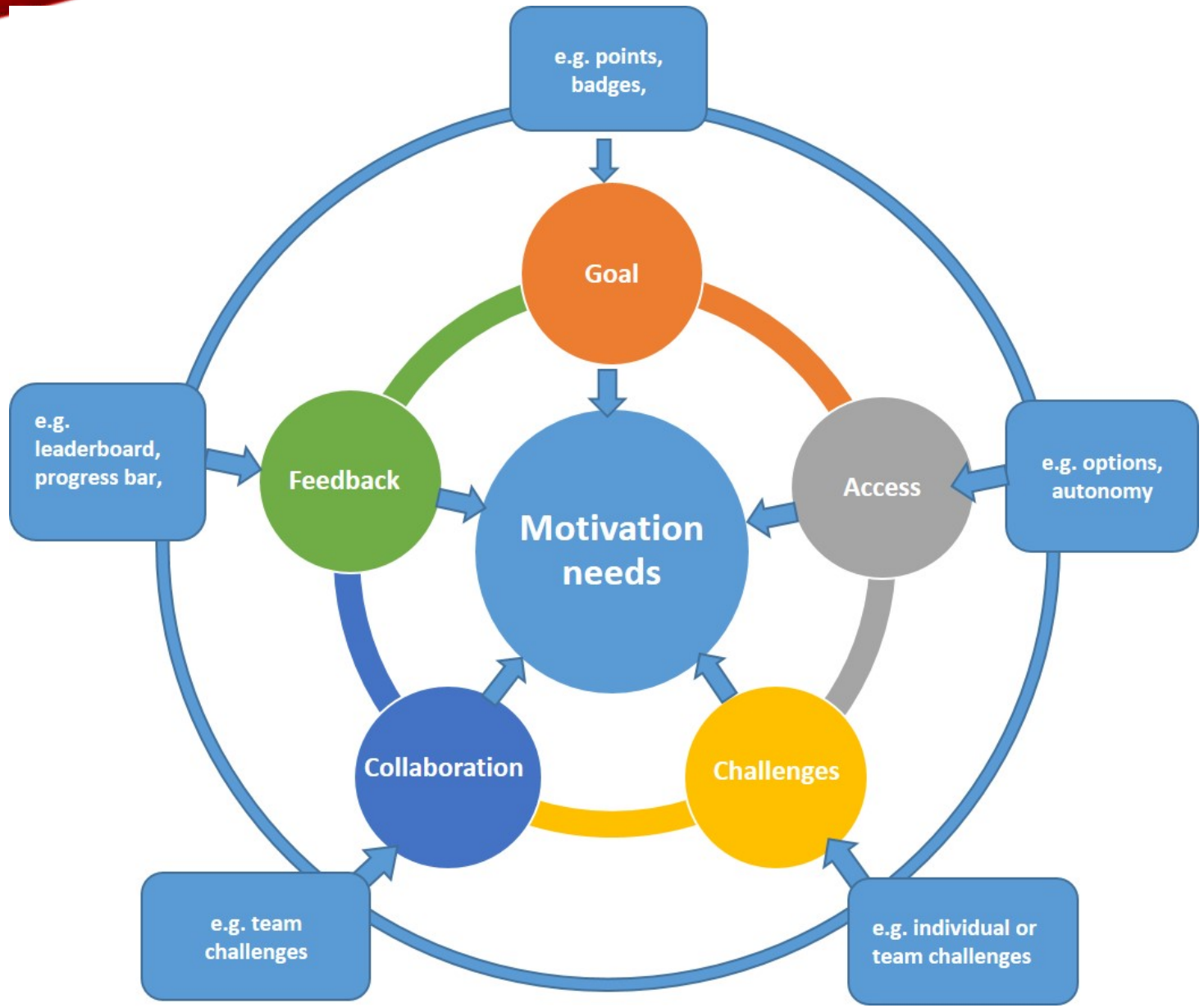
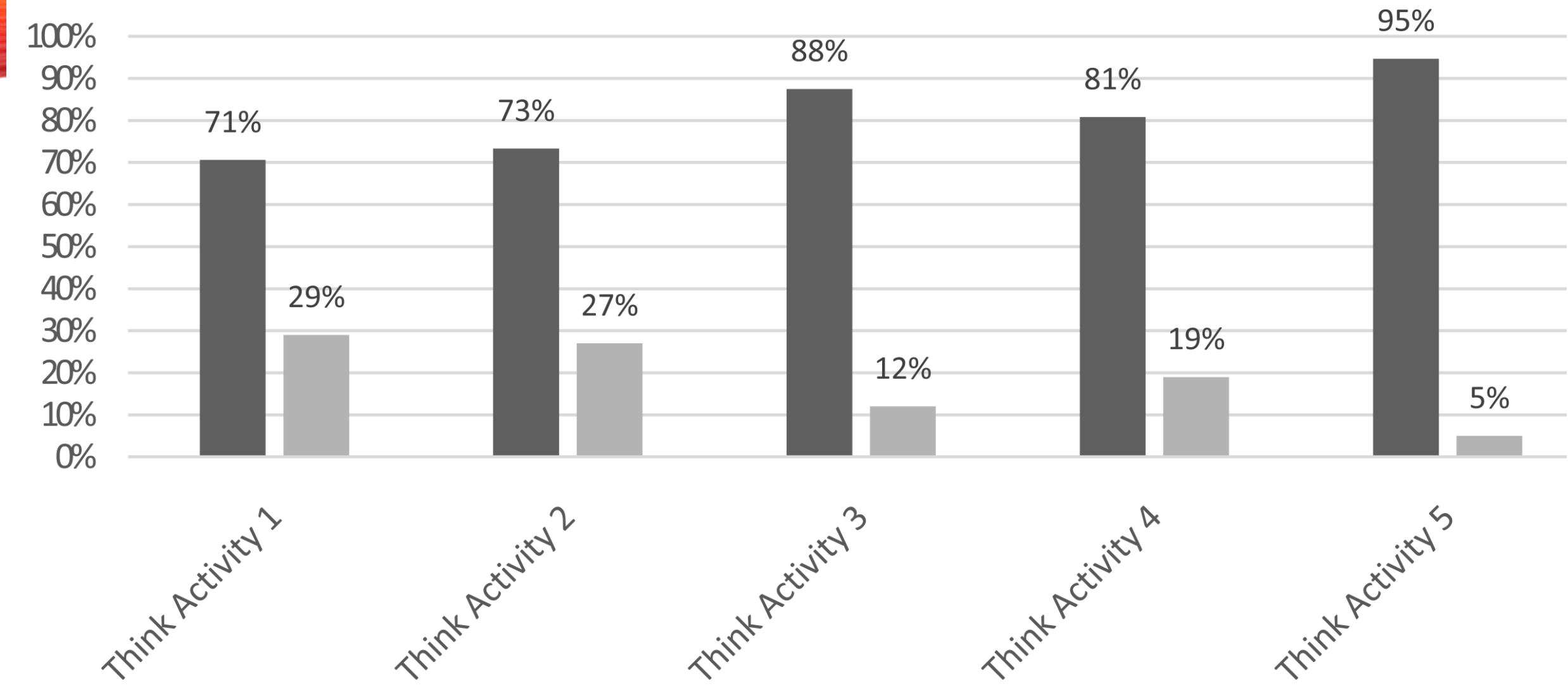


Table 3
Instructional objectives, learning activities, and gamification strategies.

Instructional Objectives	Learning Activities	Gamification Strategies
Basic Level: ● Identify the properties of information, and distinguish information and knowledge. ● Compare trends and issues pertaining to the information society. ● Analyze and enumerate the characteristics, user needs, and differences of information organizations. Higher Level: ● Analyze and evaluate information management practices in organizations and society ● Apply information models and create information organization evaluation reports.	Pre-class: ● Think activities. ● Pre-class reading materials or videos. In-class: ● Learning concepts and theories of information management. ● Learning cases of information management. ● Class discussion and hands-on practices. Post-class: ● Quizzes. ● Forum discussions.	Pre-class: ● Reward students with early bird badges if they complete a pre-class Think Activity before a specified deadline. Enabled motivating elements: Goal, feedback. Post-class: ● Reward students with super-efficient badges if they complete the quizzes within a specified deadline. ● Reward students with communicator badges if they initiate or reply 3 postings. ● Reward students with truth-seeker badges if they raise or reply 2 questions on the discussion forum. Enabled motivating elements: Goal, access, feedback, challenge, and collaboration.

So far, results of GAFCC model very encouraging!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Think Activity 1
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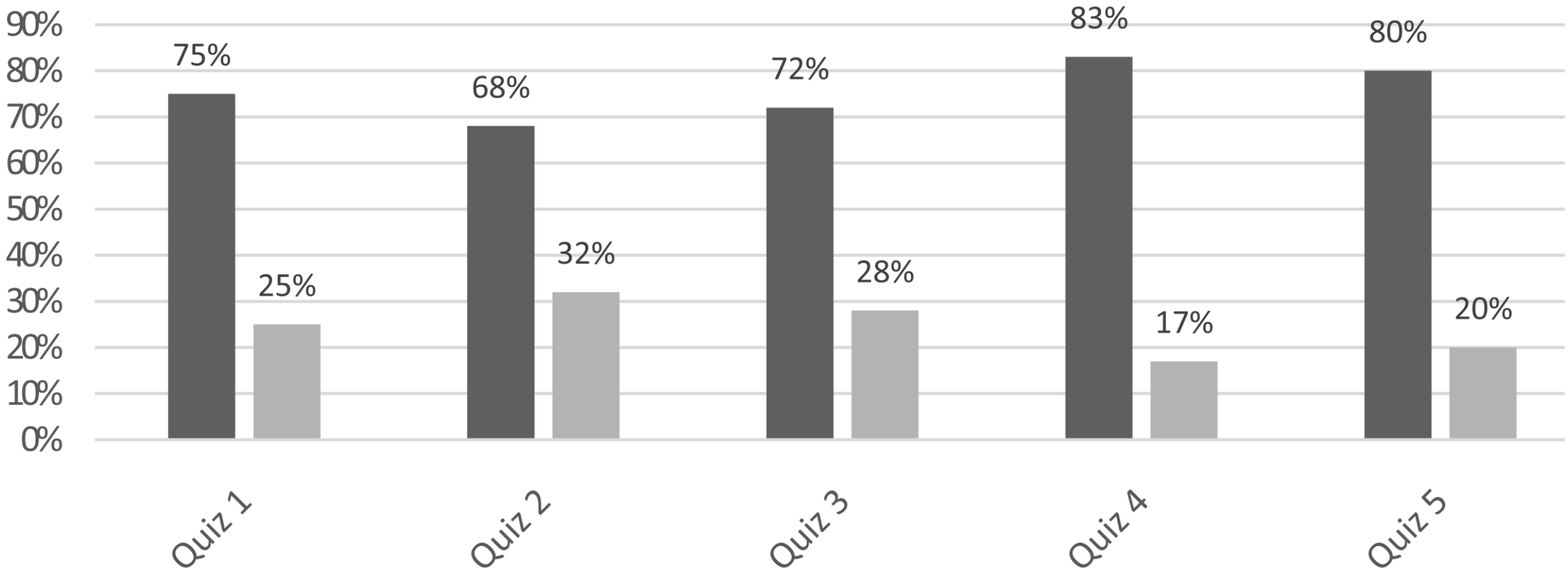
Think Activity 3
Think Activity 4
Think Activity 5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Quiz 1
Quiz 2
Quiz 3
Quiz 4
Quiz 5

Table 7
Scores of post-class quizzes.

	Class	N	Median	Minimum	Maximum	Significance
Quiz 1	Treatment	25	9.60	0.00	10.00	U = 109.00, P = 0.023
	Control	15	0.00	0.00	10.00	
Quiz 2	Treatment	25	10.00	0.00	10.00	U = 109.00, P = 0.035
	Control	15	0.00	0.00	10.00	
Quiz 3	Treatment	25	10.00	0.00	10.00	$U = 116.50$, $P = 0.007$
	Control	15	0.00	0.00	10.00	
Quiz 4	Treatment	25	9.00	0.00	10.00	$U = 98.50$, $P = 0.006$
	Control	15	0.00	0.00	10.00	
Quiz 5	Treatment	25	10.00	0.00	10.00	$U = 94.00$, $P = 0.003$
	Control	15	0.00	0.00	10.00	

In another study

INTERACTIVE LEARNING ENVIRONMENTS
https://doi.org/10.1080/10494820.2018.1495653

Routledge
Taylor & Francis Group

Investigating the effects of gamification-enhanced flipped learning on undergraduate students' behavioral and cognitive engagement

Biyun Huang, Khe Foon Hew and Chung Kwan Lo

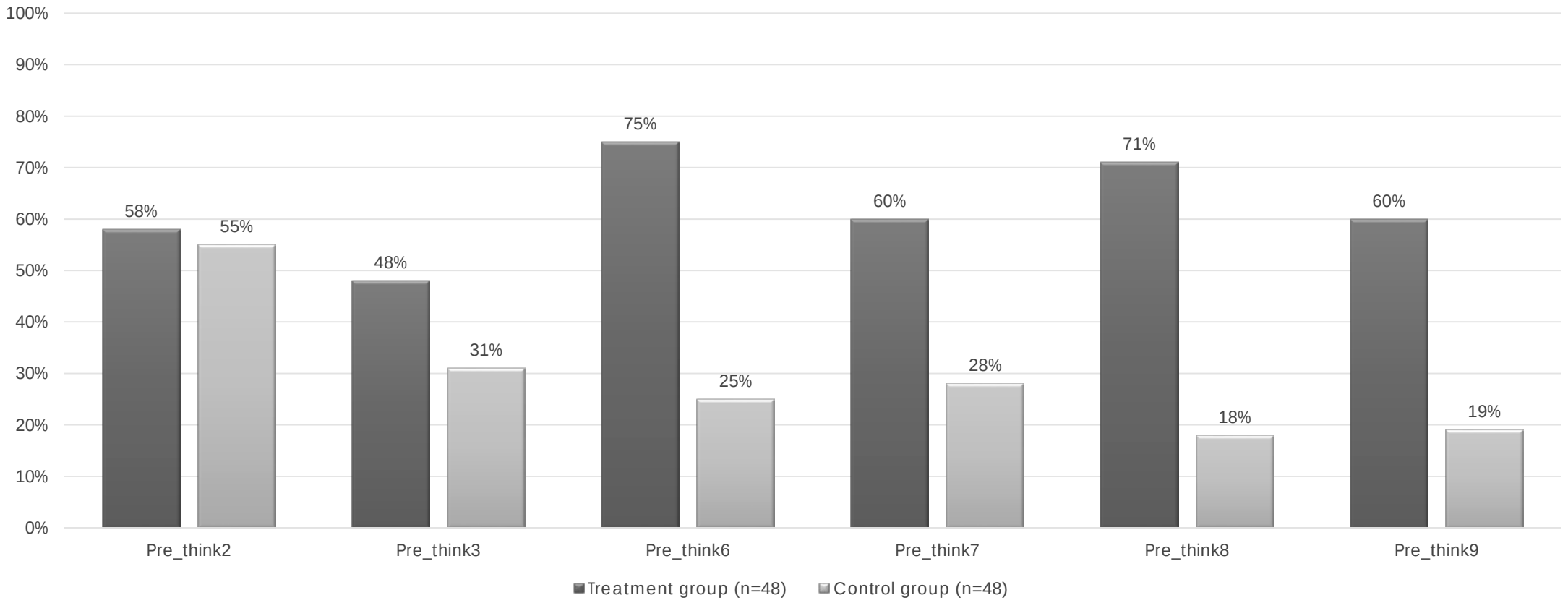
Table 3. Intended outcomes, rules, motivating elements, and game elements.

Intended outcomes (behavioral and cognitive)	Rules	Motivating elements	Game elements
• Early participation in pre-course thinking activities	Participation at least 1 day before each course starts (i.e. before Mon. 00:01am) earns an early bird badge	Short-term goal; feedback	Early bird badge
• Participate in weekly post-class quiz	Completing a quiz within 48 hours earns a supper efficient badge	Short-term goal; feedback; challenge	Super-efficient badge
• Quality of postings in thinking activities	Good quality postings may earn hidden badges, such as movie coupons, coffee coupons, tour package coupons	Feedback	Movie badge; Coffee badge; Tour package badge
• Quality of teamwork	The team with highest votes earns a champion trophy. The team (randomly selected and evaluated by instructor) with high quality earns a team bonus.	Challenge, collaboration	Champion trophy badge
• Consistent efforts and quality of work	Actively and consistently participating in all of the activities, and producing high quality work is leveled up (i.e. upgraded). The number of assigned badges for the whole class is shown on a leaderboard	Long-term goal; access; feedback; challenge	Level up; Certificate for information professionals (5 levels); Progress tracker; leaderboard

Table 5. Types of badges used in the gamification-enhanced flipped learning group.

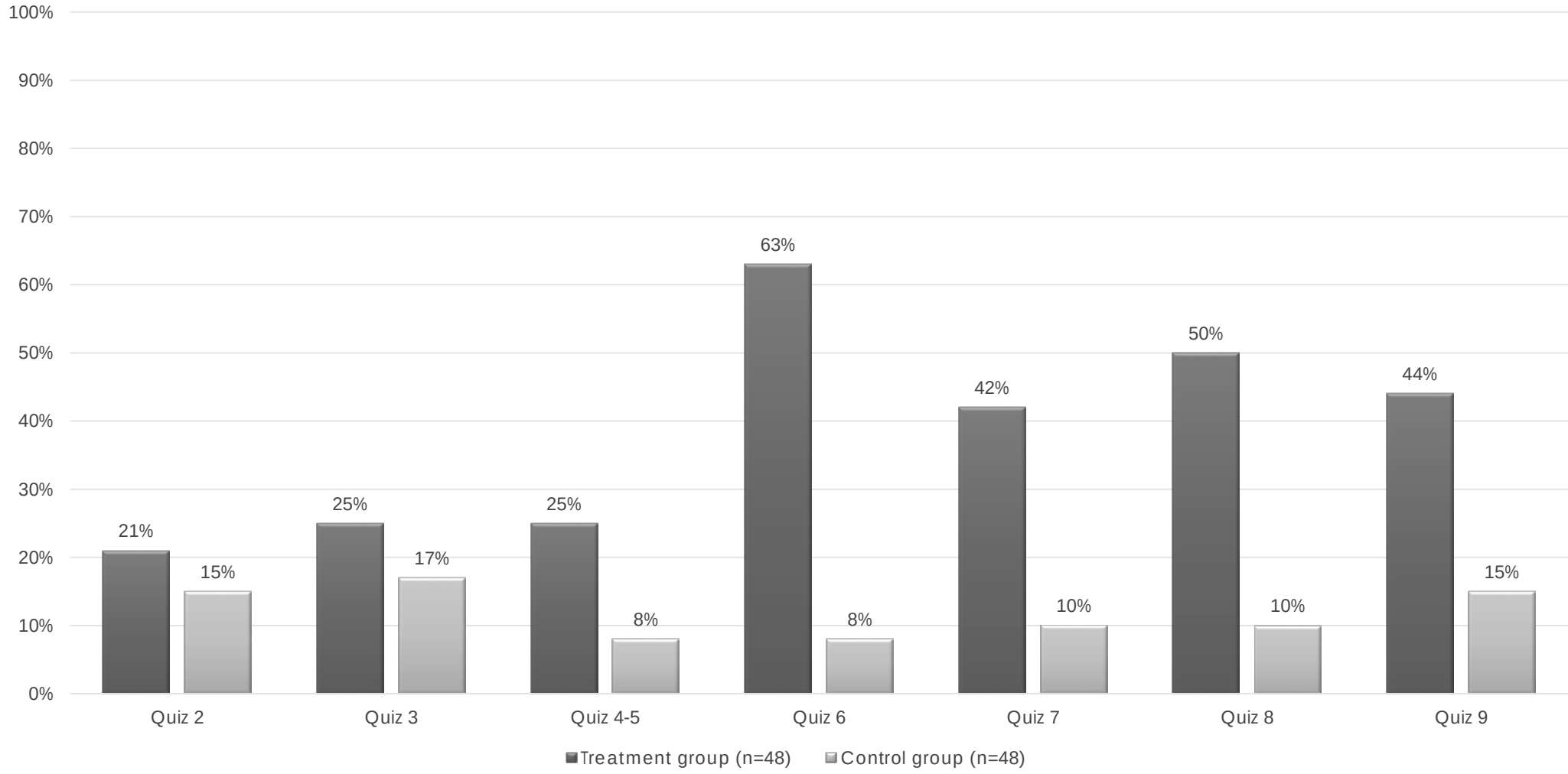
Participation-based badges	Descriptions	Quality-based badges	Descriptions
Early bird 	Reward early participation in pre-course thinking activities	Coffee badge 	Reward quality postings in pre-course thinking, tutorial forum, or the Let's Ask forum.
Super-efficient 	Reward timely participation in post-class quizzes (within 48 hours)	Movie badge 	Reward quality postings in pre-course thinking, tutorial forum, or the Let's Ask forum.
Certified information professionals (Level 1–3) 	Reward consistent efforts in completing the flipped activities before deadline each week.	Tour package badge 	Reward quality postings in pre-course thinking, tutorial forum, or the Let's Ask forum.

Pre-class activity



Note: No pre-class activity was assigned for week 4 &5

post-class activity



SUMMARY

If you forget everything I said, just remember 3 things:

- Gamification can be an **effectiv**e method to engage students.
- But using gamification has to informed by relevant **theoretical perspectives (e.g., GAFCC design model)**
- Need careful alignment between **learning objectives** and **game elements**

THANK YOU!